Herziening Richtlijn Nierstenen

INITIATIEF
Nederlandse Vereniging voor Urologie (NVU)

IN SAMENWERKING MET
Nederlandse Vereniging voor Radiologie (NVvR)
Nederlandse Vereniging van Spoedeisende Hulp Artsen (NVSHA)

MET ONDERSTEUNING VAN
Kennisinstituut van de Federatie Medisch Specialisten

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Colofon

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Inhoudsopgave

Samenstelling van de werkgroep

Werkgroep

- Dr. F. (Frank) d'Ancona (voorzitter) , Uroloog, NVU
- Dr. S. (Stijn) Roemeling, Uroloog, NVU
- Dr. B.M. (Linda) Dirven-Konijn, Radioloog, NVvR
- Dr. D. (Diederick) Duijvesz, Uroloog, NVU
- Dr. B.M.A. (Barbara) Schout, Uroloog, NVU
- Drs. R. (Rozanne) Tijssen, AIOS Spoedeisende geneeskunde, NVSHA

Meelezers

- Drs. G.M. (Guido) Kamphuis, Uroloog, NVU
- Drs. B. (Bart) van der Heij, Uroloog, NVU
- Dr. S. (Saskia) Weltings, Uroloog, NVU
- Dr. E.G.W.M. (Eef) Lentjes, Klinisch chemicus, NVKC
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Samenvatting

Onderstaande is een samenvatting van de belangrijkste aanbevelingen uit de multidisciplinaire evidence-based klinische richtlijn van Herziening Richtlijn Nierstenen. Deze richtlijn beperkt zich tot radiologisch beleid, conservatieve behandeling, nieuwe interventietechnieken en invasieve behandeling bij nierstenen. Daarmee is deze richtlijn zeker geen vervanging van de bestaande EAU richtlijn maar moet gezien worden als complementair en het beantwoord vragen en knelpunten die vanuit de nationale beroepsgroep zijn geformuleerd en die vanuit de vorige nationale richtlijn een update behoeven. Deze richtlijn heeft als doelstelling de optimale diagnostiek en daaropvolgend ook beleid te bewerkstelligen bij patiënten die zich presenteren met nierstenen. In deze samenvatting ontbreken het wetenschappelijk bewijs en de overwegingen die tot de aanbevelingen geleid hebben. Lezers van deze samenvatting worden voor deze informatie verwezen naar de volledige richtlijn. Deze samenvatting van aanbevelingen staat niet op zichzelf. Bij medische besluitvorming dient rekening te worden gehouden met de omstandigheden en voorkeuren van de patiënt. Behandeling en procedures met betrekking tot de individuele patiënt berusten op wederzijdse communicatie tussen patiënt, arts en andere zorgverleners.

De samenvatting volgt na de commentaarfase.

Startpagina – Herziening Richtlijn Nierstenen

Waar gaat deze richtlijn over:

Deze richtlijn beschrijft wat volgens de huidige maatstaven de beste zorg is voor patiënten met nierstenen.

De vorige NVU nierstenen richtlijn kent hiermee een update/ aanvulling en tevens is er een poging gedaan nieuwe knelpunten vanuit het nationale veld te formuleren en van aanbevelingen te voorzien. De Internationale EAU richtlijn is uiteraard complementair en kan dan ook prima naast deze richtlijn gebruikt worden. We formuleerden met behulp van de Nederlandse urologen en andere betrokken disciplines de volgende knelpunten voor deze richtlijn:

- De toegevoegde waarde van dual energy CT bij de diagnostiek van nierstenen
- De rol van buscopan bij de behandeling van niersteenkolieken
- De rol van alphablokkers bij de behandeling van nierstenen
- De behandeling van obstructieve urolithiasis, de rol van de doubleJ versus de nefrostomie katheter
- De behandeling van obstructieve urolithiasis bij zwangeren en de rol van drainage
- Nieuwe ureterorenoscopische interventietechnieken bij de behandeling van nierstenen

Voor wie is deze richtlijn bedoeld:

Deze richtlijn is bestemd voor alle zorgverleners in de tweede en derde lijn die betrokken zijn bij de zorg voor de volwassen patiënten met urolithiasis.

Voor patiënten:

Urolithiasis is een verzamelterm voor het hebben van stenen in de urinewegen. Deze richtlijn spitst zich toe op nierstenen bij volwassenen, in de nieren of urineleiders. Deze stenen kunnen zeer forse koliekpijnen geven en de afvloed van de urine obstrueren. Het is dus van belang goede diagnostiek te doen om te bepalen waar de steen/ stenen zich bevinden en of er sprake is van dreigende schade aan de nieren. Radiologisch onderzoek is in dit verband van belang en de richtlijn bespreekt de mogelijke rol van een speciale techniek om ook direct de samenstelling van de steen te kunnen bepalen. Tevens is het van belang adequate pijnstilling te realiseren en de rol van buscopan wordt tegen het licht gehouden in vergelijking tot andere pijnstilling. Bij dreigende schade of infectie van de nieren is het draineren (=ontlasten van de druk) van de nieren van groot belang en de manier waarop staat al jaren ter discussie. Draineren kan met behulp van een doubleJ of nefrostomie katheter, twee interventies die erg verschillen van techniek, maar ook voor patiënten kan dit een groot verschil uitmaken in de genezing en het comfort. In deze richtlijn proberen we duidelijkheid te geven over welke techniek de voorkeur heeft en wordt ook ingegaan op een eventuele interventie bij zwangeren met obstructieve nierstenen. Ten slotte zal de steen behandeld moeten worden en er worden zowel medicamenteuze als chirurgische behandelopties beschreven. Deze richtlijn bespreekt de effectiviteit van de alphablokkers bij de behandeling van nierstenen alsook de rol van nieuwe endoscopische technieken met laser om de stenen via de urineleider te verkleinen/ vergruizen.

Totstandkoming van de richtlijn:

Het initiatief voor deze richtlijn is afkomstig van de NVU (Nederlandse Vereniging voor Urologie) en borduurt voort op de oude richtlijn Nierstenen uit 2014 waarbij toen al is

aangegeven dat er modulair een herziening nodig is afhankelijk van de ontwikkelingen in het veld.
De richtlijn is ontwikkeld naar aanleiding van een knelpunt analyse uit het urologisch veld en samen met een afgevaardigde van de Nederlandse Vereniging voor Radiologie (NVvR) en Spoedeisende Hulpartsen (NVSHA) en uiteraard van de NVU tot stand gekomen.

Verantwoording

Leeswijzer

Onderstaande conceptrichtlijntekst wordt na het doorlopen van de commentaar- en autorisatiefase opgenomen in de Richtlijnendatabase (www.richtlijnendatabase.nl). Verwijzingen naar 'tabbladen' zijn in de huidige versie van de richtlijntekst terug te vinden in de 'bijlagen' aan het einde van de hoofdtekst. In verband met de modulaire opbouw van richtlijnen in de database wordt verwezen naar modules (in plaats van hoofdstukken) en aanverwante producten (bijlagen).

Autorisatie en geldigheid

Autorisatiedatum:	Volgt, 2023
Geautoriseerd door:	Volgt, 2023
Belangrijkste wijzigingen	
Herbevestiging:	Volgt
Regiehouder(s):	Nederlandse Vereniging voor Urologie

Algemene gegevens

De ontwikkeling/herziening van deze richtlijnmodule werd ondersteund door het Kennisinstituut van de Federatie Medisch Specialisten (www.demedischspecialist.nl/kennisinstituut) en werd gefinancierd uit de Kwaliteitsgelden Medisch Specialisten. De financier heeft geen enkele invloed gehad op de inhoud van de richtlijnmodule.

Samenstelling werkgroep

Voor het ontwikkelen van de richtlijnmodule is in 2021 een multidisciplinaire werkgroep ingesteld, bestaande uit vertegenwoordigers van alle relevante specialismen (zie hiervoor de Samenstelling van de werkgroep) die betrokken zijn bij de zorg voor patiënten met nierstenen.

Belangenverklaringen

De Code ter voorkoming van oneigenlijke beïnvloeding door belangenverstrengeling is gevolgd. Alle werkgroepleden hebben schriftelijk verklaard of zij in de laatste drie jaar directe financiële belangen (betrekking bij een commercieel bedrijf, persoonlijke financiële belangen, onderzoeksfinanciering) of indirecte belangen (persoonlijke relaties, reputatiemanagement) hebben gehad. Gedurende de ontwikkeling of herziening van een module worden wijzigingen in belangen aan de voorzitter doorgegeven. De belangenverklaring wordt opnieuw bevestigd tijdens de commentaarfase.
Een overzicht van de belangen van werkgroepleden en het oordeel over het omgaan met eventuele belangen vindt u in onderstaande tabel. De ondertekende belangenverklaringen zijn op te vragen bij het secretariaat van het Kennisinstituut van de Federatie Medisch Specialisten.

Werkgroeplid	Functie	Nevenfuncties	Gemelde belangen	Ondernomen actie

F. (Frank) d'Ancona (voorzitter)	Uroloog Radboudumc	Consultant Boston Scientific waarvoor soms tegen betaling presentaties/proctoring	Geen	Geen
S. (Stijn) Roemeling	Uroloog, UMCG	Geen	Electro Medical Systems (EMS; Nyons, Zwitserland): financiële ondersteuning van voordrachten, masterclasses en workshops op het gebied van percutane steenchirurgie	Werkgroeplid wordt niet betrokken bij uitwerking en besluitvorming betreffende uitgangsvraag naar nieuwe interventietechnieken.
B.M. (Linda) Dirven-Konijn,	Radioloog, UZ Leuven	Geen	Geen	Geen
D. (Diederick) Duijvesz	Uroloog in het Canisius Wilhelmina Ziekenhuis (CWZ) te Nijmegen-Plaatsvervangend opleider Urologie-	Lid beroepsbelangencommissie (BBC) van de Nederlandse Vereniging voor Urologie (NVU), vacatiegelden - Lid stichting werkgroep endo-urologie (SWEN) van de Nederlandse Vereniging voor Urologie (NVU), vacatiegelden	Geen	Geen
B.M.A. (Barbara) Schout	Uroloog	- Lid stichting werkgroep endo-urologie (SWEN) van de Nederlandse Vereniging voor Urologie (NVU) waarbinnen voorzitter SENN (Steen	mede onderzoeker/auteur bij buscopanstudie (betaald door eigen ziekenhuis) en projectleider STONE studie (leading the change)	Werkgroeplid wordt niet betrokken bij de uitwerking betreffende de vraag over buscopan en over

		Expertise Netwerk Nederland) - DURO: dutch urology research organization - CUVO: commissie urologisch vaardigheidsonderwijs - DMC: data monitoring commissie Vacatiegelden NVU		drainagetechnieken.
R. (Rozanne) Tijssen	AIOS Spoedeisende geneeskunde, st. Antonius Ziekenhuis Utrecht/Nieuwegein	Lid Richtlijncommissie Nederlandse Vereniging van Spoedeisende Hulp artsen (NVSHA)	Geen	Geen
Klankbord				
E.G.W.M. (Eef) Lentjes	Klinisch Chemicus UMCU, afdeling Centraal Diagnostisch Laboratorium	Geen	Geen	Geen
S. (Saskia) Weltings	Uroloog Zaans MC	Commissie SWEN, onbetaald Commissie Werkgroep endourologie / SENN, onbetaald	Geen	Geen
B. (Bart) van der Heij	Uroloog, Zuyderland Medisch Centrum	Geen	Geen	Geen

G.M. (Guido) Kamphuis	Uroloog, Amsterdam UMC	advisory board lid Coloplast Porgès, Boston Scientific en Olympus; betaald onderwijs verzorgend voor Urologie Opleiding Instituut van de Nederlandse Vereniging Urologie; betaald	Projectleider van StONE studie (leading the change); studie naar verschil tussen dubbel J ureter catheter en nefrostomie katheter in patienten met obstruerende ureter stenen. (https://zorgevaluatienederland.nl/evaluations/stone)	Geen, gezien het deelname aan de klankbordgroep betreft
U.P. (Ulf) Arndt	Medisch manager bij Huisartsenposten de Limes BV 2 dagen per week, Waarnemend huisarts bij Huisartswaarnemer Arndt variabek; tot 01-01-2023	Geen	Geen	Geen

Inbreng patiëntenperspectief

Er werd aandacht besteed aan het patiëntenperspectief door uitnodigen van Patientfederatie Nederland en Nierpatiëntenvereniging Nederland voor schriftelijke knelpunteninventarisatie. De verkregen input is meegenomen bij het opstellen van de uitgangsvragen, de keuze voor de uitkomstmaten en bij het opstellen van de overwegingen. De conceptrichtlijn is tevens voor commentaar voorgelegd aan Patientfederatie Nederland en Nierpatiëntenvereniging Nederland en de eventueel aangeleverde commentaren zijn bekeken en verwerkt.

Wkkgz & Kwalitatieve raming van mogelijke substantiële financiële gevolgen

Bij de richtlijn is conform de Wet kwaliteit, klachten en geschillen zorg (Wkkgz) een kwalitatieve raming uitgevoerd of de aanbevelingen mogelijk leiden tot substantiële financiële gevolgen. Bij het uitvoeren van deze beoordeling zijn richtlijnmodules op verschillende domeinen getoetst (zie het stroomschema op de Richtlijnendatabase).

Uit de kwalitatieve raming blijkt dat er waarschijnlijk geen substantiële financiële gevolgen zijn, zie onderstaande tabel.

Module	Uitkomst raming	Toelichting
Module Radiologisch beleid –toegevoegde waarde van de dual energy CT-scan	geen financiële gevolgen	Uit de toetsing volgt dat de aanbeveling(en) breed toepasbaar zijn (>40.000 patiënten) maar dat de aanbevolde zorg al breed wordt toegepast.
Module Conservatieve behandeling: de rol van buscopan IV bij koliekaanvallen	geen financiële gevolgen	Uit de toetsing volgt dat de aanbeveling(en) breed toepasbaar zijn (>40.000 patiënten) maar dat de aanbevolde zorg al breed wordt toegepast.
Module Conservatieve behandeling: de rol van alfablokkers	geen financiële gevolgen	Uit de toetsing volgt dat de aanbeveling(en) breed toepasbaar zijn (>40.000 patiënten) maar dat de aanbevolde zorg al breed wordt toegepast.
Module Drainage met dubbel J katheter versus nefrostomie katheter	geen financiële gevolgen	Uit de toetsing volgt dat de aanbeveling(en) breed toepasbaar zijn (>40.000 patiënten) maar dat de aanbevolde zorg al breed wordt toegepast.
Module Behandeling van nierstenen bij zwangerschap	geen financiële gevolgen	De huidige situatie is niet veranderd.
Module Nieuwe interventietechnieken bij behandeling van nierstenen	geen financiële gevolgen	De huidige situatie is niet veranderd.

De kwalitatieve raming volgt na de commentaarfase.

Werkwijze

AGREE

Deze richtlijnmodule is opgesteld conform de eisen vermeld in het rapport Medisch Specialistische Richtlijnen 2.0 van de adviescommissie Richtlijnen van de Raad Kwaliteit. Dit rapport is gebaseerd op het AGREE II instrument (Appraisal of Guidelines for Research & Evaluation II; Brouwers, 2010).

Knelpuntenanalyse en uitgangsvragen

Tijdens de voorbereidende fase inventariseerde de werkgroep de knelpunten in de zorg voor patiënten met nierstenen. Tevens zijn er knelpunten aangedragen door de Nederlandse Vereniging voor Urologie (NVU), Nederlandse Internisten Vereniging (Nederlandse federatie voor Nefrologie), Nederlands Huisartsen Genootschap (NHG), Nederlandse Vereniging van Klinisch Chemici (NVKC), Nederlandse Vereniging voor Radiologie (NVvR), Verpleegkundigen & Verzorgenden Nederland, Nederlandse Vereniging voor Spoedeisende Hulp Artsen (NVSHA), Patientfederatie Nederland, Nierpatiëntenvereniging Nederland, Inspectie voor de Gezondheidszorg en Jeugd, Nederlandse Zorgautoriteit, Zorginstituut Nederland,

Nederlandse Federatie van Universitair Medische Centra, Nederlandse Vereniging van Ziekenhuizen, Samenwerkende Topklinische opleidingsZiekenhuizen, Zelfstandige Klinieken Nederland, Lareb, Vereniging Innovatieve Geneesmiddelen, Zorgverzekeraars Nederland (vallen Achmea, CZ, Menzis en VGZ onder) via een schriftelijke knelpunteninventarisatie. Op basis van de uitkomsten van de knelpuntenanalyse zijn door de werkgroep concept-uitgangsvragen opgesteld en definitief vastgesteld.

Uitkomstmaten

Na het opstellen van de zoekvraag behorende bij de uitgangsvraag inventariseerde de werkgroep welke uitkomstmaten voor de patiënt relevant zijn, waarbij zowel naar gewenste als ongewenste effecten werd gekeken. Hierbij werd een maximum van acht uitkomstmaten gehanteerd. De werkgroep waardeerde deze uitkomstmaten volgens hun relatieve belang bij de besluitvorming rondom aanbevelingen, als cruciaal (kritiek voor de besluitvorming), belangrijk (maar niet cruciaal) en onbelangrijk. Tevens definieerde de werkgroep tenminste voor de cruciale uitkomstmaten welke verschillen zij klinisch (patiënt) relevant vonden.

Methode literatuursamenvatting

Een uitgebreide beschrijving van de strategie voor zoeken en selecteren van literatuur is te vinden onder 'Zoeken en selecteren' onder Onderbouwing. De beoordeling van de kracht van het wetenschappelijke bewijs wordt hieronder toegelicht.

Beoordelen van de kracht van het wetenschappelijke bewijs

De kracht van het wetenschappelijke bewijs werd bepaald volgens de GRADE-methode. De basisprincipes van de GRADE-methodiek zijn: het benoemen en prioriteren van de klinisch (patiënt) relevante uitkomstmaten, een systematische review per uitkomstmaat, en een beoordeling van de bewijskracht per uitkomstmaat op basis van de acht GRADE-domeinen (domeinen voor downgraden: risk of bias, inconsistentie, indirectheid, imprecisie, en publicatiebias; domeinen voor upgraden: dosis-effect relatie, groot effect, en residuele plausibele confounding).

GRADE onderscheidt vier gradaties voor de kwaliteit van het wetenschappelijk bewijs: hoog, redelijk, laag en zeer laag. Deze gradaties verwijzen naar de mate van zekerheid die er bestaat over de literatuurconclusie, in het bijzonder de mate van zekerheid dat de literatuurconclusie de aanbeveling adequaat ondersteunt (Schünemann, 2013; Hultcrantz, 2017).

GRADE	Definitie
Hoog	• Er is hoge zekerheid dat het ware effect van behandeling dichtbij het geschatte effect van behandeling ligt; • Het is zeer onwaarschijnlijk dat de literatuurconclusie klinisch relevant verandert wanneer er resultaten van nieuw grootschalig onderzoek aan de literatuuranalyse worden toegevoegd.
Redelijk	• Er is redelijke zekerheid dat het ware effect van behandeling dichtbij het geschatte effect van behandeling ligt; • Het is mogelijk dat de conclusie klinisch relevant verandert wanneer er resultaten van nieuw grootschalig onderzoek aan de literatuuranalyse worden toegevoegd.
Laag	• Er is lage zekerheid dat het ware effect van behandeling dichtbij het geschatte effect van behandeling ligt; • Er is een reële kans dat de conclusie klinisch relevant verandert wanneer er resultaten van nieuw grootschalig onderzoek aan de literatuuranalyse worden toegevoegd.

Zeer laag	• Er is zeer lage zekerheid dat het ware effect van behandeling dichtbij het geschatte effect van behandeling ligt; • De literatuurconclusie is zeer onzeker.

Bij het beoordelen (graderen) van de kracht van het wetenschappelijk bewijs in richtlijnen volgens de GRADE-methodiek spelen grenzen voor klinische besluitvorming een belangrijke rol (Hultcrantz, 2017). Dit zijn de grenzen die bij overschrijding aanleiding zouden geven tot een aanpassing van de aanbeveling. Om de grenzen voor klinische besluitvorming te bepalen moeten alle relevante uitkomstmaten en overwegingen worden meegewogen. De grenzen voor klinische besluitvorming zijn daarmee niet één op één vergelijkbaar met het minimaal klinisch relevant verschil (Minimal Clinically Important Difference, MCID). Met name in situaties waarin een interventie geen belangrijke nadelen heeft en de kosten relatief laag zijn, kan de grens voor klinische besluitvorming met betrekking tot de effectiviteit van de interventie bij een lagere waarde (dichter bij het nuleffect) liggen dan de MCID (Hultcrantz, 2017).

Overwegingen (van bewijs naar aanbeveling)

Om te komen tot een aanbeveling zijn naast (de kwaliteit van) het wetenschappelijke bewijs ook andere aspecten belangrijk en worden meegewogen, zoals aanvullende argumenten uit bijvoorbeeld de biomechanica of fysiologie, waarden en voorkeuren van patiënten, kosten (middelenbeslag), aanvaardbaarheid, haalbaarheid en implementatie. Deze aspecten zijn systematisch vermeld en beoordeeld (gewogen) onder het kopje 'Overwegingen' en kunnen (mede) gebaseerd zijn op expert opinion. Hierbij is gebruik gemaakt van een gestructureerd format gebaseerd op het evidence-to-decision framework van de internationale GRADE Working Group (Alonso-Coello, 2016a; Alonso-Coello 2016b). Dit evidence-to-decision framework is een integraal onderdeel van de GRADE methodiek.

Formuleren van aanbevelingen

De aanbevelingen geven antwoord op de uitgangsvraag en zijn gebaseerd op het beschikbare wetenschappelijke bewijs en de belangrijkste overwegingen, en een weging van de gunstige en ongunstige effecten van de relevante interventies. De kracht van het wetenschappelijk bewijs en het gewicht dat door de werkgroep wordt toegekend aan de overwegingen, bepalen samen de sterkte van de aanbeveling. Conform de GRADE-methodiek sluit een lage bewijskracht van conclusies in de systematische literatuuranalyse een sterke aanbeveling niet a priori uit, en zijn bij een hoge bewijskracht ook zwakke aanbevelingen mogelijk (Agoritsas, 2017; Neumann, 2016). De sterkte van de aanbeveling wordt altijd bepaald door weging van alle relevante argumenten tezamen. De werkgroep heeft bij elke aanbeveling opgenomen hoe zij tot de richting en sterkte van de aanbeveling zijn gekomen.

In de GRADE-methodiek wordt onderscheid gemaakt tussen sterke en zwakke (of conditionele) aanbevelingen. De sterkte van een aanbeveling verwijst naar de mate van zekerheid dat de voordelen van de interventie opwegen tegen de nadelen (of vice versa), gezien over het hele spectrum van patiënten waarvoor de aanbeveling is bedoeld. De sterkte van een aanbeveling heeft duidelijke implicaties voor patiënten, behandelaars en beleidsmakers (zie onderstaande tabel). Een aanbeveling is geen dictaat, zelfs een sterke aanbeveling gebaseerd op bewijs van hoge kwaliteit (GRADE gradering HOOG) zal niet altijd van toepassing zijn, onder alle mogelijke omstandigheden en voor elke individuele patiënt.

Implicaties van sterke en zwakke aanbevelingen voor verschillende richtlijngebruikers		
	Sterke aanbeveling	*Zwakke (conditionele) aanbeveling*

Voor patiënten	De meeste patiënten zouden de aanbevolen interventie of aanpak kiezen en slechts een klein aantal niet.	Een aanzienlijk deel van de patiënten zouden de aanbevolen interventie of aanpak kiezen, maar veel patiënten ook niet.
Voor behandelaars	De meeste patiënten zouden de aanbevolen interventie of aanpak moeten ontvangen.	Er zijn meerdere geschikte interventies of aanpakken. De patiënt moet worden ondersteund bij de keuze voor de interventie of aanpak die het beste aansluit bij zijn of haar waarden en voorkeuren.
Voor beleidsmakers	De aanbevolen interventie of aanpak kan worden gezien als standaardbeleid.	Beleidsbepaling vereist uitvoerige discussie met betrokkenheid van veel stakeholders. Er is een grotere kans op lokale beleidsverschillen.

Organisatie van zorg

In de knelpuntenanalyse en bij de ontwikkeling van de richtlijnmodule is expliciet aandacht geweest voor de organisatie van zorg: alle aspecten die randvoorwaardelijk zijn voor het verlenen van zorg (zoals coördinatie, communicatie, (financiële) middelen, mankracht en infrastructuur). Randvoorwaarden die relevant zijn voor het beantwoorden van deze specifieke uitgangsvraag zijn genoemd bij de overwegingen. Meer algemene, overkoepelende, of bijkomende aspecten van de organisatie van zorg worden behandeld in de module Organisatie van zorg.

Commentaar- en autorisatiefase

De conceptrichtlijnmodule werd aan de betrokken (wetenschappelijke) verenigingen en (patiënt) organisaties voorgelegd ter commentaar. De commentaren werden verzameld en besproken met de werkgroep. Naar aanleiding van de commentaren werd de conceptrichtlijnmodule aangepast en definitief vastgesteld door de werkgroep. De definitieve richtlijnmodule werd aan de deelnemende (wetenschappelijke) verenigingen en (patiënt) organisaties voorgelegd voor autorisatie en door hen geautoriseerd dan wel geaccordeerd.

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Module 1 Radiologisch beleid –toegevoegde waarde van de dual energy CT-scan

Uitgangsvraag

Wat is de diagnostische accuratesse van dual energy CT om urinezuurstenen aan te tonen of uit te sluiten?

Welke plaats kan dual energy CT het beste krijgen in het diagnostisch traject van patiënten met urinezuurstenen?

Inleiding

Dual-energy of dual-source CT (DECT) maakt het mogelijk om verschillende niersteencomposities van elkaar te onderscheiden door het verschil in verzwakking coëfficiënt te interpreteren. Voor het opstellen van een behandelplan is alleen het onderscheid tussen urinezuursteen en niet-urinezuursteen van belang. Omdat urinezuurstenen middels chemolitholyse kunnen worden behandeld zodanig dat een meer invasieve behandeling mogelijk voorkomen kan worden. De huidige situatie is dat met regelmaat pas na een behandeling middels steenanalyse de diagnose urinezuurstenen wordt gesteld. Ook de plaats van DECT in het behandeltraject naast of als vervanging van single-energy CT (SECT, bij voorkeur een low-dose scanprotocol) is aan praktijkvariatie onderhevig.

Search and select

A systematic review of the literature was performed to answer the following question: Is dual energy CT superior to 'regular' mono-energy CT in the diagnosis of uric acid stones in adult patients with stone disease?

P: **patients**	adults with renal stone diseases
I: **index test**	dual energy CT (including composition software)
C: **comparator test**	'regular' single-energy CT (including composition software)
R: **reference standard**	stone analysis (after surgery or urination)
O: **outcome measure**	radiation exposure, diagnostic accuracy, prevention of surgery, time to healing, (cost?)

Relevant outcome measures

The guideline development group considered diagnostic accuracy as a critical outcome measure for decision making; and radiation exposure, prevention of surgery, time to healing and cost as important outcome measures for decision making.

A priori, the working group did not define the outcome measures listed above but used the definitions used in the studies.

Search and select (Methods)

The databases Medline (via OVID) and Embase (via Embase.com) were searched with relevant search terms until March 21st, 2022. The detailed search strategy is depicted under the tab Methods. The systematic literature search resulted in 199 hits. Studies were selected based on the following criteria: studies reporting original data, systematic reviews, RCTs and observational studies reporting on the dual energy CT superior in comparison to 'regular' mono-energy CT in the diagnosis of uric acid stones in adult patients with stone disease. 40 studies were initially selected based on title and abstract screening. After reading the full texts, 36 studies were excluded (see the table with reasons for exclusion under the tab Methods), and four studies were included.

Results

Four studies (Bonatti 2017, Jepperson 2014, Jepperson 2015 and Wisenbaugh 2014) were included in the analysis of the literature. Important study characteristics and results are summarized in the evidence tables. The assessment of the risk of bias is summarized in the risk of bias tables.

Summary of literature

Description of studies

Bonatti 2017 performed a retrospective in vivo study to compare the accuracy of single-energy CT (SECT) and dual-energy CT (DECT) in renal stone characterization. They included 30 patients, 18 males and 12 females, with a mean age of 56 years (range 34–86) with symptomatic urolithiasis who underwent CT on a second-generation dual-source scanner with a protocol that included low dose 120 kV scan followed by 100/Sn140 kV dual-energy scan. Inclusion criteria were: presence of renal stones at CT and stones extraction or expulsion within 1 month from the CT examination with subsequent stone analysis by means of infrared spectroscopy. 13/30 patients spontaneously expelled the stones and 17/30 underwent stone extraction by means of percutaneous nephrolithotripsy or ureteroscopy. The obtained stones were analysed by means of infrared spectroscopy and classified, according to their prevalent composition, into three categories: uric acid, cysteine, and calcific (calcium oxalates and phosphates). Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) for both SECT and DECT in predicting renal stones composition were calculated. Infrared spectroscopy analysis was as reference test.

Jepperson 2014 performed a study to compare speed and accuracy for determining urinary calculi composition between dual-energy computed tomography (DECT) and Hounsfield Unit (HU) measurements of calculi by a set of reviewers at varying levels of training and practice. Reviewers recorded HU values, stone colour, and predicted stone composition as they were timed. Accuracy of image interpretation, determination of calculi composition, and interpretation time were compared. Sixteen imaging exams were randomly selected for interpretation from a database of 60 patients in which DECT material-specific images, diagnostic HU images, and recovered stone material were available. Of the randomly selected calculi, 15 were non uric-acid (UA) and 1 was UA (6%), reflective of the population prevalence of 5–8% UA calculi.

Jepperson 2015 performed an in vivo retrospective cohort study in 65 patients to compare radiation exposure of DECT, standard single-energy CT (SECT), and low-dose renal stone protocol single-energy CT (LDSECT) for the evaluation of nephrolithiasis over a 6-month period. In patients with a cross-sectional diameter (measured at the level of the kidneys) of 35 cm and below, the tube voltages and reference effective tube current–time products were set to 80 kVp/419 mAs and 140 kVp/162 mAs with quality reference CTDIvol = 16 mGy. In patients with a cross-sectional diameter greater than 35 cm, the tube voltages and reference effective mAs were set to 100 kVp/210 mAs and 140 kVp/162 mAs with quality reference CTDIvol = 17 mGy.

Wisenbaugh 2014 performed an in vitro study to compare the accuracy between conventional computed tomography (CT) and dual-energy CT (DECT) in predicting stone composition in a blinded, prospective fashion. A total of 32 renal stones with known composition were scanned in vitro, first using standard CT techniques at 120 kilovolt peak (kV[p]) and then using fast-switched kilovolt DECT at 80 and 140 kilovolt peak (kV[p]). For the DECT scan, a spectral curve was created demonstrating the change of Hounsfield units (HU) across the kiloelectron volt

spectrum. The composition of each stone was estimated by comparing each sample curve with curves of known materials. To attempt stone determination using single-energy CT, the HU of each stone was compared with ranges reported in previous studies. Once the clinician had classified each stone type, the results were compared with the stone's true phenotype as determined by infrared spectroscopy. The accuracy of each method was compared.

None of the studies above mentioned explicitly the stone analysis as a reference test in their text and we assume the reported stone material as a reference test.

Results

Due to the diagnostic nature of the search question, pooling of data could not be performed.

Diagnostic accuracy

Bonatti 2017 reported that 50 stones were detected in 30 patients. At laboratory, 29/50 (58 %) stones were classified as prevalently composed by calcium oxalates or phosphates, 17/50 (34 %) by uric acid, and 4/50 (8 %) by cysteine. SECT correctly assessed stone composition in 26/50 (52 %) of the cases, DECT in 90 %. Sensitivity, specificity, positive predictive value, and negative predictive value in differentiating uric acid vs. non-uric acid stones were 0.94, 0.72, 0.64, and 0.96 for SECT and 1.00, 0.94, 1.00, and 0.96 for DECT, respectively.

Jepperson 2014 reported that DECT accuracy: Image interpretation 100% (day 1) and 94% (day 2); predicted stone composition 100% (day 1) and 73% (day 2). HU accuracy: Image interpretation 97% (day 1) and 91% (day 2); predicted stone composition was 45% accurate on both days. Overall accuracy of determination of stone composition and interpretation time for DECT were essentially double that of the HU images (87% vs. 45%, respectively).

Jepperson 2015 reported that of the 65 patients included in the study, stone material was available for 16; DECT analysis correctly predicted stone composition in 15/16 patients (93%).

Wisenbaugh 2014 reported that single-energy measurements accurately identified 14 of 27 stones of all composition (52%), whereas the DECT spectral curves correctly identified 20 (74%). When analysed by stone type, single-energy vs DECT correctly identified 12 vs 12 of the 12 uric acid stones, 2 vs 3 of the 6 struvite stones, 0 vs 3 of the 5 cystine stones, and 0 vs 2 of the 4 calcium oxalate stones, respectively. When simply attempting to differentiate uric acid vs non-uric acid stones, single-energy CT could accurately differentiate only 6 of 15 stones as non-uric acid (40%) compared with 14 of 15 stones (93%) for DECT.

Radiation exposure

Jepperson 2015 reported that DECT performed at 80/140 kVp and 100/140 kVp did not produce a significant difference in radiation exposure compared with LDSECT ($p = 0.09$ and 0.18, respectively). DECT performed at 80/140 kVp and 100/ 140 kVp produced an average 40% and 31%, respectively, reduction in radiation exposure compared with SECT ($p < 0.001$).

Prevention of surgery

No studies have been found that provide evidence for this outcome.

Time to healing

No studies have been found that provide evidence for this outcome.

Cost

No studies have been found that provide evidence for this outcome.

Level of evidence of the literature

The level of evidence regarding the outcome measure **diagnostic accuracy** starts at 'high' and was downgraded by two levels to low GRADE because of study limitations (risk of bias) and number of included patients (imprecision).

The level of evidence regarding the outcome measure **radiation exposure** starts at 'high' and was downgraded by two levels to low GRADE because of study limitations (risk of bias) and number of included patients (imprecision).

Conclusions

Low GRADE	There is low certainty about the high diagnostic accuracy of dual energy CT compared to 'regular' single-energy CT and stone analysis (after surgery or urination) for diagnosing uric acid stones in adult patients with stone disease. *Source: Bonatti 2017, Jepperson 2014, Jepperson 2015 and Wisenbaugh 2014*

Low GRADE	Dual energy CT may result in little to no difference in radiation exposure when compared with 'regular' single-energy CT in adult patients with stone disease. *Source: Jepperson 2015*

No GRADE	There is no evidence for the comparison of dual energy CT to 'regular' single-energy CT regarding prevention of surgery in adult patients with stone disease.

No GRADE	There is no evidence for the comparison of dual energy CT to 'regular' single-energy CT regarding time to healing in adult patients with stone disease.

No GRADE	There is no evidence for the comparison of dual energy CT to 'regular' single-energy CT regarding cost in adult patients with stone disease.

Overwegingen – van bewijs naar aanbeveling

Voor- en nadelen van de interventie en de kwaliteit van het bewijs

Er zijn vier observationele studies gevonden die rapporteren over de uitkomstmaten: diagnostische accuratesse en stralenbelasting. Er zijn geen studies gevonden die rapporteren over de uitkomstmaten: voorkomen van operatief ingrijpen, tijd tot genezing, en kosten. Wegens lage kwaliteit van de studies is er weinig zekerheid over de diagnostische nauwkeurigheid van dual-energy CT vergeleken met 'gewone' single-energy CT en steenanalyse (na chirurgie of urineren) voor het diagnosticeren van urinezuurstenen bij volwassen patiënten met steenziekte. Er is ook onzekerheid of dual-energy CT in een lagere stralenbelasting resulteert in vergelijking met 'gewone' single-energy CT bij volwassen patiënten met steenziekte, omdat er meerdere beïnvloedende factoren zijn voor de uiteindelijk ontvangen dosis (zoals habitus van de patiënt). Met betrekking tot stralenbelasting moet altijd gestreefd worden naar de laagste stralenbelasting die redelijkerwijs haalbaar is (ALARA-principe) binnen lokale afspraken in samenwerking met de medisch fysicus.

Er zijn geen bijwerkingen/complicaties die kunnen optreden door het gebruik van DECT versus SECT omdat het gaat om onderzoeken zónder toediening van intraveneus contrastmiddel. Vooral bij patiënten met urine-pH≤5,5 en lithiasis is de kans op het aantonen van een urinezuursteen middels DECT hoog. Bij deze groep patiënten kan een interventie ter

behandeling van de niersteen mogelijk worden voorkomen door het alkaliseren van de urine (i.e. chemolitholyse).

Aanbevelingen

Rationale van de aanbeveling: weging van argumenten voor en tegen de diagnostische procedure

Ondanks beperkte bewijskracht lijkt de DECT beter in het onderscheiden van urinezuurstenen en niet-urinezuurstenen ten opzichte van de SECT. Vooraf aan het instellen van een respectievelijk medicamenteuze of invasieve behandeling kan de uitslag van de DECT daarmee dus meer richtinggevend zijn dan SECT. De werkgroep adviseert de beschikbaarheid en uitvoering van een DECT of SECT lokaal tussen de betrokken afdelingen af te stemmen.

Wanneer de steencompositie van symptomatisch niersteenlijden reeds is vastgesteld, heeft de DECT geen meerwaarde boven SECT. Afhankelijk van lokale scanprotocollen leidt DECT niet altijd tot een hogere stralingsbelasting voor de patiënt, desondanks wordt de kans op een hogere stralingsbelasting door DECT niet als rechtvaardig beschouwd als er geen extra informatiewinst is te verwachten.

Overweeg een DECT in geval van vermoeden van urinezuursteenlijden.

Kennislacunes

Er zijn geen resultaten gevonden op het verschil tussen SECT en DECT in het voorkomen van chirurgisch ingrijpen, de herstelperiode of over-all kosten.

Literatuur

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Module 2 Conservatieve behandeling: de rol van buscopan IV bij koliekaanvallen

Uitgangsvraag

Wat is de plaats van butylscopolamine iv bij koliekaanvallen door niersteenlijden bij volwassenen?

Inleiding

Obstructieve urolithiasis kan zeer pijnlijk verlopen. Het kan zich presenteren als klassieke koliekaanvallen met bewegingsdrang maar ook als een meer constante uitstralende pijn; beide zijn zeer ingrijpend voor de patiënt. Dit maakt, buiten het oplossen van de oorzaak van de obstructie, pijnstilling van essentieel belang in de behandeling van deze patiëntengroep, zeker aangezien een grote groep patiënten de steen vanzelf uit plast zonder interventie. Van oudsher wordt buscopan iv, een spasmolytisch medicament, gebruikt in deze patiëntengroep, naast paracetamol, NSAID's en morfinepreparaten ter pijnreductie. De rationale achter het gebruik van een spasmolyticum voor pijn in deze patiëntengroep is dat de peristaltische en spastische beweging van de geobstrueerde ureter de meeste pijn genereerd. Een spasmolyticum zoals buscopan inhibeert acetylcholine wat aangrijpt op de muscarine receptoren in de wand van de ureter en zorgt zo voor relaxatie van de gladde spiercel. Er is meermaals onderzoek gedaan naar de effectiviteit van buscopan iv op het gebied van pijnreductie t.o.v. analgetische preparaten voor deze specifieke patiëntengroep. Recent zijn er meerdere studies uitgekomen die vraagtekens zetten bij de effectiviteit van buscopan iv op dit gebied. Het doel van deze vraag is om op basis van de nu beschikbare literatuur een goed advies te kunnen geven over het gebruik van buscopan iv in deze patiëntengroep. De werkgroep heeft bewust gekozen orale en rectale preparaten buiten beschouwing te laten vanwege de overtuiging dat als het middel via intraveneuze toegang geen meerwaarde blijkt te hebben, dat er dan ook geen plaats is voor orale/rectale preparaten in de behandeling van pijn bij urolithiasis. Bovendien is de ervaring dat met deze toedieningswijze eigenlijk niet meer gewerkt wordt.

Search and select

A systematic review of the literature was performed to answer the following question:
What are the (un)favorable effects of intravenous buscopan compared to normal analgesia (combination of paracetamol, NSAID, morphinomimetics) in admitted adults with colic pain associated with renal stone disease?

P: Adults with colic pain due to renal stone disease
I: Intravenous buscopan as an addition to 'normal pain relief'
C: Normal pain relief (combination of paracetamol, NSAID, morphinomimetics)
O: Pain reduction (NRS, VAS), side effects, need for (surgical) intervention, hospital admission

<u>Relevant outcome measures</u>

The guideline development group considered pain reduction as a critical outcome measure for decision making; and side effects, need for (surgical) intervention and hospital admission as important outcome measures for decision making.

A priori, the working group did not define the outcome measures listed above but used the definitions as stated in the studies.

The GRADE-standard limit of 25% difference for dichotomous outcomes (RR < 0.8 or > 1.25) and 0.5 SD for continuous outcomes was taken as minimal clinically (patient) important difference.

Search and select (Methods)

The databases Medline (via OVID) and Embase (via Embase.com) were searched with relevant search terms until February, 28th 2022. The detailed search strategy is depicted under the tab Methods. The systematic literature search resulted in 69 hits. Studies were selected based on the following criteria:

- The study population had to meet the criteria as defined in the PICO
- The intervention had to be as defined in the PICO
- Research type: systematic review or randomized controlled trial
- Articles written in English or Dutch

Thirteen studies were initially selected based on title and abstract screening. After reading the full text, ten studies were excluded (see the table with reasons for exclusion under the tab Methods), and three studies were included.

Results

Three randomized controlled trials (Holdgate 2005; Song 2011; Weltings 2021) were included in the analysis of the literature. Important study characteristics and results are summarized in the evidence tables. The assessment of the risk of bias is summarized in the risk of bias tables.

Summary of literature

Description of studies

Holdgate (2005) performed a randomized controlled trial to assess whether the addition of hyoscine butylbromide reduces the amount of opioid analgesia required and decreases the need for ongoing opioid analgesia in patients with acute renal colic. Adult patients between age 18 and 75 years whose presenting clinical symptoms consistent with renal colic as adjudged by a senior doctor and who required parenteral opioid analgesia were included. Exclusion criteria were receiving parenteral opioid analgesia or buscopan within 4 hours before presentation, pregnancy, glaucoma, urinary retention, and allergy to morphine or buscopan. Patients were randomized to 20 mg intravenous buscopan diluted to 10 ml or placebo (10 ml saline intravenously). In addition, 1 L normal saline for 2 hours, incremental doses of intravenous morphine in 2.5 mg aliquots at 5-minute intervals, 100 mg rectal indomethacin (unless in whom NSAIDs were contraindicated) were administered to all patients. In total, 91 patients were randomized to buscopan and 101 patients to placebo. Groups were comparable at baseline. Measured outcomes were the proportion of patients who required further morphine and adverse event rates.

Song (2011) conducted a prospective, double-blind, randomized controlled trial to determine the effect of adding butylscopolammonium bromide (BB) to morphine and ketorolac for the treatment of acute renal colic in the emergency department. Patients with a clinical presentation of 'typical renal colic' rather than 'confirmed urinary stone by CT scan' were eligible. Patients presenting to the emergency department who were at least 18 years of age whose flank pain was consistent with an abrupt onset of severe paroxysmal unilateral location were included. Exclusion criteria were a patient pain rating <5 on a 10 cm visual analogue scale (VAS), confirmed or suspected pregnancy, breastfeeding, contraindication to NSAIDs, opioids or BBs, history of peptic ulcer or renal disease, use of analgesics within 6 hours of presentation, current use of anticoagulants, history of bleeding tendency, suspicious surgical condition, hemodynamic instability defined as pulse >110/min and systolic blood pressure

<100 mmHg, and previous participation in the study. In total, 43 patients were randomized to placebo (50 mL of normal saline) and 46 patients to 20 mg intravenous BB diluted with 50 mL of normal saline. In addition, patients received 1 L of normal saline at 240 mL/h, 30 mg ketorolac intravenously and 5 mg morphine intravenously over 5 min at time zero. Groups were comparable at baseline. Measured outcomes were pain reduction, need for rescue morphine and occurrence of adverse effects. The level of pain was measured on a 10 cm VAS at baseline, 20 minutes, and 40 minutes after receiving the medication.

Weltings (2021) performed a placebo-controlled, multicenter, double-blind randomized clinical trial to assess whether placebo is non-inferior to continuous infusion of butylscopolamine in patients with renal colic. Adults presenting with a renal colic admitted to the urological ward for analgesics when pain was not under control with oral NSAIDs and a confirmation of a renal calculus by ultrasound or CT-scan were included. Exclusion criteria were pregnancy or lactation, contra-indication or known allergy to any of the drugs used (NSAIDs, morphine, paracetamol), a temperature >38.5 °C in the 24 hours before inclusion or receiving antibiotics for urinary tract infection, or indication for immediate drainage of the upper urinary tract. Patients were randomized to either 100 mg/24 h butylscopolamine via intravenous continuous infusion or placebo (consisting of saline). In addition, patients received 1000 mg oral paracetamol four times daily, 50 mg oral diclofenac three times daily, and oral tamsulosin 0.4 mg once daily. Piritramide 15 mg subcutaneously was used as escape analgesic as needed up to a maximum of five times and an intravenous anti-emetic was prescribed as needed. In total, 62 patients received butylscopolamine and 62 patients received placebo. Groups were comparable at baseline. Measured outcomes were reduction in pain, side effects and surgical interventions necessary for ongoing pain. The level of pain was measured with the Numerical Rating Scale (NRS) at the start of the study and at 1, 4, 8, and 24 hours.

Results

Pain reduction

Song (2021) reported mean pain scores with the Visual Analogue Scale (VAS) at baseline, 20 minutes, and 40 minutes after treatment with placebo or butylscopolammonium. At baseline, the mean pain score was 8.4 (SD 1.4) for placebo and 8.4 (SD 1.4) for butylscopolammonium (p=0.823). After 20 minutes, the mean pain score was 3.1 (SD 2.4) for placebo and 2.6 (SD 2.4) for butylscopolammonium (p=0.343). The mean difference in VAS score was -0.6 cm (95% CI -1.6 to 0.5, p=0.287). After 40 minutes, a significant difference in mean pain score between placebo (2.5, SD 2.6) and butylscopolammonium (1.3, SD 1.9) was found (p=0.023). The mean difference was -1.2 cm (95% CI -2.2 to -0.2, p=0.024), but was not clinically relevant.

Weltings (2021) measured the reduction in pain with the Numerical Rating Scale (NRS). A similar decrease in pain over time was found for patients receiving butylscopolamine or placebo (no absolute numbers were presented).

Side effects

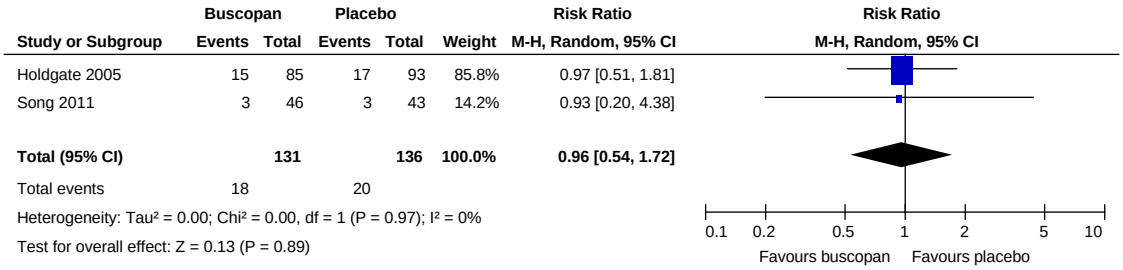
Holdgate (2005) reported adverse event rates for nausea, vomiting, urinary retention, allergic reactions, and other important events mentioned by the patients. For patients receiving buscopan, 15 of the 85 (18%) reported adverse events and 17 of the 93 (18%) patients who received placebo mentioned adverse events (RR 0.97, 95% CI 0.51 to 1.81) (Figure 1).

Song (2011) reported that 3 of the 46 patients (6.5%) treated with butylscopolammonium and 3 of the 43 patients (6.9%) treated with placebo experienced side effects (RR 0.93, 95% CI 0.20 to 4.38) (Figure 1). For placebo, the adverse events nausea, vomiting, and dizziness were

reported, while for treatment with butylscopalammonium, two patients experienced dizziness and one patient mentioned another adverse event.

Weltings (2021) reported that, in total, 24 of the 124 patients (19.4%) experienced side effects. No statistical differences in adverse events were found between treatment with butylscopolamine or placebo.

Figure 1. Occurrence of side effects, comparison buscopan versus placebo



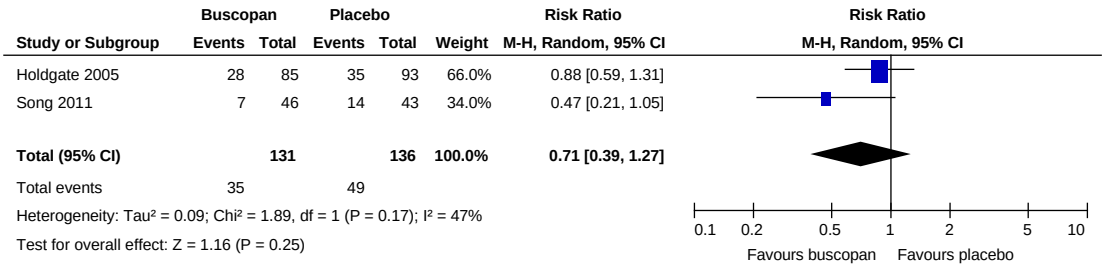
Need for (surgical) intervention

Holdgate (2005) reported that 28 of the 85 patients (33%) receiving buscopan and 35 of the 93 patients (38%) receiving placebo required further treatment with morphine (RR 0.88, 95% CI 0.59 to 1.31, p=0.5) (Figure 2).

Song (2011) reported how many patients needed rescue morphine to control sustained pain. For patients receiving butylscopolammonium, 7 of the 46 patients (15.2%) needed rescue morphine as compared to 14 of the 43 patients (32.6%) who received placebo (RR 0.47, 95% CI 0.21 to 1.05) (Figure 2). However, this difference was not significant (p=0.059).

Weltings (2021) reported that no surgical interventions were needed for ongoing pain during the study period.

Figure 2. Need for (surgical) intervention (treatment with morphine), comparison buscopan versus placebo



<u>Level of evidence of the literature</u>

According to GRADE, randomized controlled trials (RCTs) start at a high level of evidence.

The level of evidence regarding the outcome measure **pain reduction** was downgraded to a very low GRADE. One level because of risk of bias (doubts about blinding), one level for inconsistency (heterogeneity in the direction of the effect between studies) and one level for imprecision (not enough statistical power because of the low number of included patients).

The level of evidence regarding the outcome measure **side effects** was downgraded to a very low GRADE. One level because of risk of bias (doubts about blinding) and two level for imprecision (the 95% confidence interval crossed the lines of no (clinically relevant) effect).

The level of evidence regarding the outcome measure **need for (surgical) intervention** was downgraded to a very low GRADE. One level because of risk of bias (doubts about blinding) and two level for imprecision (the 95% confidence interval crossed the lines of no (clinically relevant) effect).

Conclusions

Very low GRADE	The evidence is very uncertain about the effect of intravenous buscopan as addition to normal pain relief on **pain reduction** when compared with only normal pain relief for admitted adults with colic pain in renal stone disease. *Source: Song, 2011; Weltings, 2021*

Very Low GRADE	The evidence is very uncertain about the effect of intravenous buscopan as addition to normal pain relief on **side effects** when compared with only normal pain relief for admitted adults with colic pain in renal stone disease. *Source: Holdgate, 2005; Song, 2011; Weltings, 2021*

Very Low GRADE	The evidence is very uncertain about the effect of intravenous buscopan as addition to normal pain relief on **need for (surgical) intervention** when compared with only normal pain relief for admitted adults with colic pain in renal stone disease. *Source: Holdgate, 2005; Song, 2011; Weltings, 2021*

Overwegingen – van bewijs naar aanbeveling

Voor- en nadelen van de interventie en de kwaliteit van het bewijs

De werkgroep heeft een literatuurstudie verricht naar de (on)gunstige effecten van intraveneuze buscopan in combinatie met standaard pijnstilling (combinatie van paracetamol, NSAID, morfinomimetica) in vergelijking met alleen standaard pijnstilling bij volwassenen met pijn bij niersteenlijden. Op basis van de resultaten van de literatuuranalyse lijken er geen verschillen te zijn in de cruciale uitkomstmaat (pijnvermindering) of de belangrijke uitkomstmaten (bijwerkingen en noodzaak voor (chirurgische) interventie) tussen behandeling met intraveneuze buscopan in combinatie met standaard pijnstilling en standaard pijnstilling alleen. De bewijskracht werd beoordeeld als zeer laag vanwege risico op bias en imprecisie. Er is dus vanuit de gevonden literatuur geen wetenschappelijke ondersteuning om buscopan iv als aanvullende pijnstilling aan patiënten met koliekpijnen op basis van urolithiasis te geven met als doel een betere pijnstilling te bewerkstelligen of een (chirurgische) interventie te voorkomen. Het toedienen van buscopan iv geeft geen toename van bijwerkingen boven de bekende bijwerkingen van de bestaande pijnstilling. In de overwegingen moet wel worden meegenomen dat de gevonden literatuur van zeer lage bewijskracht is en ook als zodoende moet worden beoordeeld. Er wordt namelijk wel in één van de studies (Song, 2011) een significant verschil gevonden maar dit wordt door de auteurs als klinisch niet relevant beoordeeld vanwege het geringe absolute verschil. Er blijft dus enige theoretische onzekerheid dat, indien een nieuwe studie met betere bewijslast verschijnt, er een aanpassing van de aanbeveling zou kunnen komen.

Aanbeveling

Rationale van de aanbeveling: weging van argumenten voor en tegen de interventies

1. Het toedienen van buscopan iv als aanvullende pijnstilling bij patiënten met pijn op basis van urolithiasis is in Nederland al langer een gewoonte die niet wetenschappelijk

onderbouwd is. Na wederom al het wetenschappelijke bewijs te hebben beoordeeld en gewogen, zien wij geen meerwaarde van het gebruik van buscopan aangezien de behandeling met buscopan iv als aanvullende pijnstilling bij niersteenkolieken niet leidt tot een significante verbetering van pijnreductie, het aantal benodigde interventies of bijwerkingen.

2. De kans op bijwerkingen van buscopan is gelijk aan die van een placebo volgens de gevonden evidence, dus gebruik lijkt ook niet nadelig te zijn. Echter door medicatie helemaal niet toe te dienen is er natuurlijk geen kans op bijwerkingen.

3. Het geven van buscopan iv brengt extra zorgkosten met zich mee. Niet alleen de kosten van het medicament buscopan zelf, maar de werkgroep is ook van mening dat gebruik van buscopan iv de ligduur verlengt door een extra iv medicament wat afgebouwd moet worden vóór ontslag omdat er geen acceptabel oraal alternatief voor thuis is. Dit verhoogt ook de zorgkosten significant. Tevens zou het routinematig toevoegen van buscopan aan de pijnstilling ervoor kunnen zorgen dat patiënten laagdrempeliger worden opgenomen door de intraveneuze toegangsweg van het middel, wat ook weer meer zorgkosten met zich meebrengt.

4. Er zijn slechts een drietal studies gevonden die bruikbaar zijn voor het beantwoorden van de uitgangsvraag en de bewijskracht is zeer laag voornamelijk vanwege de kans op blinding bias. De werkgroep is wel van mening dat de overtuiging van de behandelaar in de klinische therapie zeker een rol speelt in de uitkomst.

Geef geen buscopan bij de behandeling van obstructieve urolithiasis. Doseer en titreer bij patiënten met pijn op basis van urolithiasis pijnstilling middels paracetamol, NSAID's en morfinemimetica[1] zonder toevoeging van buscopan iv.

Kennislacunes

Geen kennislacune naar aanleiding van deze module geformuleerd.

Literatuur

Holdgate A, Oh CM. Is there a role for antimuscarinics in renal colic? A randomized controlled trial. J Urol. 2005 Aug;174(2):572-5; discussion 575. doi: 10.1097/01.ju.0000165337.37317.4c. PMID: 16006900.

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Weltings S, Buddingh KT, van Diepen DC, Pelger RCM, Putter H, Rad M, Schout BMA, Roshani H. The BUSCOPAN study: a randomized-controlled non-inferiority trial of a continuous butylscopolamine infusion versus placebo in patients with a renal colic not responding to oral non-steroidal anti-inflammatory drugs. World J Urol. 2021 Jul;39(7):2747-2752. doi: 10.1007/s00345-020-03460-0. Epub 2020 Sep 19. PMID: 32949255; PMCID: PMC8332573.

[1] https://www.farmacotherapeutischkompas.nl/bladeren/indicatieteksten/pijn

Module 3 Conservatieve behandeling: de rol van alfablokkers

Uitgangsvraag

Wat is de plaats van alfablokkers bij patiënten met symptomatisch ureterolihiasis?

Inleiding

Ureterolihiasis kunnen gepaard gaan met veel pijnklachten. Kleine stenen (<5mm) kunnen in principe veelal spontaan passeren met behulp van pijnstilling. Grotere stenen passeren minder makkelijk en moeten frequent met behulp van een operatie (vergruizen, ureterorenoscopie of percutane benadering) verwijderd worden. Aan een dergelijke ingreep zitten altijd risico's verbonden die potentieel schadelijk kunnen zijn voor de patiënt. Alfablokkers behoren tot een groep van medicatie die zorgen voor relaxatie van gladde spiercellen in de lagere urinewegen. Het toepassen van dit medicijn zou kunnen zorgen voor een gemakkelijkere passage van (grotere) ureterstenen. Zorgt het gebruik van alfablokkers voor een grotere kans op spontane passage van ureterstenen (binnen een snellere tijd), minder pijnklachten en daardoor minder noodzaak tot interventie/operatie?

Search and select

A systematic review of the literature was performed to answer the following question:
What are the (un)favorable effects of oral alpha-blockers (uroselective) compared to no alpha blockers (pain relief alone (combination of paracetamol, NSAID, morphinomimetics)) in patients with symptomatic ureteral stone disease?

P: Patients with symptomatic ureteral stone disease
I: Alpha-blockers (uroselective) oral (+ normal analgesics (combination of paracetamol, NSAID, morphinomimetics))
C: No alpha blocker (+ normal pain relief (combination of paracetamol, NSAID, morphinomimetics))
O: Percentage of stone passage, time to stone passage, pain (reduction) (NRS, VAS), side effects, need for (surgical) intervention

<u>Relevant outcome measures</u>

The guideline development group considered percentage of stone passage and time to stone passage as critical outcome measures for decision making; and pain (reduction), side effects and need for (surgical) intervention as important outcome measures for decision making.

A priori, the working group did not define the outcome measures listed above but used the definitions as stated in the studies.

The GRADE-standard limit of 25% difference for dichotomous outcomes (RR < 0.8 or > 1.25) and 0.5 SD for continuous outcomes was taken as minimal clinically (patient) important difference.

<u>Search and select (Methods)</u>

The databases Medline (via OVID) and Embase (via Embase.com) were searched with relevant search terms from 2018 until February, 28th 2022. The detailed search strategy is depicted under the tab Methods. The systematic literature search resulted in 97 hits. Studies were selected based on the following criteria:

- The study population had to meet the criteria as defined in the PICO
- The intervention had to be as defined in the PICO

- Research type: systematic review or randomized-controlled trial
- Articles written in English or Dutch

Seventeen studies were initially selected based on title and abstract screening. After reading the full text, 16 studies were excluded (see the table with reasons for exclusion under the tab Methods), and one study was included.

Results

The systematic review of Campschroer 2018 was included in the analysis of the literature. Important study characteristics and results are summarized in the evidence table. The assessment of the risk of bias is summarized in the risk of bias table.

Summary of literature

Description of studies

Campschroer (2018) performed a systematic review to assess the effects of alpha-blockers compared with standard therapy for ureteral stones 1 cm or smaller confirmed by imaging in adult patients presenting with symptoms of ureteral stone disease. The databases CENTRAL, MEDLINE Ovid, Embase and PubMed were searched on 18 November 2017. In addition, ClinicalTrials.gov and the WHO Portal/ICTRP were searched to identify all published, unpublished, and ongoing trials. All randomized controlled trials (RCTs) and quasi-RCTs were included regardless of their publication status or language of publication. Studies in which alpha-blockers were used as an adjuvant to surgery or lithotripsy were excluded. Inclusion criteria for participants were an age of 18 years or older, symptoms of ureteral stones including flank or abdominal pain, possibly radiating to the groin or external genitalia, diagnosis confirmed upon imaging or a single stone measuring 10 mm or smaller. Evidence of urinary tract infection or hydronephrosis with complicated factors (e.g., sepsis, uncontrollable pain, deterioration of renal function), kidney or ureteral abnormalities (e.g., single kidney, ureteral malformation), pregnant or lactating women, bilateral stones or taking an alpha-blocker or a calcium channel blocker or having allergies to these medications were exclusion criteria. Medical expulsive therapy with alpha-blockers to treat patients with ureteral stones versus standard therapy (e.g., non-steroidal anti-inflammatory drugs (NSAID's), corticosteroids, antispasmodics), or placebo were included as interventions. In total, 67 studies (with 10,509 participants) were included in the meta-analyses. A subgroup analysis for distal ureter stones was performed.

Results

1. *Percentage of stone passage*

Campschroer (2018) reported that treatment with alpha-blockers improved the stone clearance for distal ureter stones as compared to standard therapy (RR = 1.46, 95% CI 1.36 to 1.57) (Figure 1). This difference was considered as clinically relevant.

2. *Time to stone passage*

Campschroer (2018) reported a benefit in time to stone passage for distal stones treated with alpha-blockers as compared to standard therapy (MD = -3.43, 95% CI -4.26 to -2.60) (Figure 2). This difference was not considered as clinically relevant.

3. *Pain (reduction)*

Not reported.

4. *Side effects*

Not reported.

5. Need for (surgical) intervention

Not reported.

Figure 1. Forest plot of stone clearance (adapted from Campschroer 2018)

Study or Subgroup	Alpha-blocker Events	Total	Standard therapy Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
3.1.1 Distal ureter						
Abdel-Meguid 2010	61	75	42	75	2.2%	1.45 [1.16, 1.82]
Agrawal 2009	52	68	12	34	1.2%	2.17 [1.35, 3.48]
Ahmad 2015	42	49	26	48	1.9%	1.58 [1.19, 2.10]
Ahmed 2010	48	59	14	28	1.5%	1.63 [1.10, 2.40]
Al Ansari 2010	41	50	28	46	2.0%	1.35 [1.03, 1.76]
Albert 2016	66	80	15	40	1.4%	2.20 [1.46, 3.32]
Aldemir 2011	25	31	11	29	1.1%	2.13 [1.29, 3.49]
Alizadeh 2014	41	50	30	46	2.1%	1.26 [0.98, 1.61]
Arrabal-Martin 2010	30	35	19	35	1.7%	1.58 [1.13, 2.20]
Autorino 2005	45	50	27	46	2.0%	1.53 [1.18, 1.99]
Ayubov 2007	28	30	19	31	1.9%	1.52 [1.13, 2.05]
Bajwa 2013	23	30	11	30	1.1%	2.09 [1.26, 3.48]
Balci 2014	19	25	9	25	1.0%	2.11 [1.20, 3.72]
Bayraktar 2017	49	60	33	64	2.0%	1.58 [1.21, 2.07]
Cervenakov 2002	41	51	32	51	2.1%	1.28 [1.00, 1.65]
Cha 2012	82	107	16	34	1.6%	1.63 [1.12, 2.36]
Doluoglu 2015	17	21	18	23	1.8%	1.03 [0.77, 1.39]
Dong 2009	6	10	7	10	0.8%	0.86 [0.45, 1.64]
El-Gamal 2012	33	48	12	46	1.1%	2.64 [1.56, 4.44]
El Said 2015	15	28	7	26	0.7%	1.99 [0.97, 4.09]
Erkan 2011	24	37	9	34	0.9%	2.45 [1.33, 4.50]
Erturhan 2007	22	30	12	30	1.2%	1.83 [1.12, 2.99]
Ferre 2009	27	38	24	39	1.8%	1.15 [0.84, 1.59]
Furyk 2016	140	198	127	195	2.6%	1.09 [0.95, 1.24]
Griwan 2010	27	30	21	30	2.0%	1.29 [0.99, 1.67]
Han 2006a	29	35	17	32	1.6%	1.56 [1.09, 2.23]
Hermanns 2009	39	45	40	45	2.5%	0.97 [0.84, 1.14]
Hong 2008	53	66	27	42	2.0%	1.25 [0.97, 1.61]
Ibrahim 2013	46	52	12	23	1.4%	1.70 [1.13, 2.54]
Islam 2010	27	32	13	28	1.4%	1.82 [1.19, 2.78]
Itoh 2011	40	55	31	56	1.9%	1.31 [0.99, 1.75]
Itoh 2013	40	55	31	56	1.9%	1.31 [0.99, 1.75]
Kim 2007b	19	21	12	20	1.5%	1.51 [1.03, 2.21]
Kupeli 2004	8	15	3	15	0.3%	2.67 [0.87, 8.15]
Liatsikos 2007	33	42	16	31	1.5%	1.52 [1.05, 2.22]
Lojanapiwat 2008	27	50	1	25	0.1%	13.50 [1.95, 93.69]
Maitra 2012	37	50	15	50	1.3%	2.47 [1.57, 3.88]
Mshemish 2012	52	66	16	34	1.5%	1.67 [1.15, 2.44]
Mukhtarov 2007	24	27	18	25	1.9%	1.23 [0.93, 1.63]
Ochoa-Gomez 2011	22	32	23	33	1.7%	0.99 [0.71, 1.36]
Pedro 2008	25	34	27	35	2.0%	0.95 [0.73, 1.25]
Pickard 2015	216	249	202	246	2.8%	1.06 [0.98, 1.14]
Porpiglia 2006	18	30	8	24	0.8%	1.80 [0.95, 3.40]
Porpiglia 2009	37	46	22	45	1.7%	1.65 [1.18, 2.29]
Rahim 2012	37	45	22	45	1.7%	1.68 [1.21, 2.34]
Sayed 2008	26	30	22	30	2.0%	1.18 [0.91, 1.53]
Sen 2017	33	47	5	19	0.6%	2.67 [1.23, 5.79]
Sun 2009	27	30	8	30	0.9%	3.38 [1.84, 6.18]
Sur 2015	36	52	27	59	1.7%	1.51 [1.09, 2.11]
Taghavi 2005	18	20	11	24	1.3%	1.96 [1.24, 3.11]
Vincendeau 2010	47	61	43	61	2.2%	1.09 [0.88, 1.35]
Wang 2008a	51	64	17	31	1.7%	1.45 [1.03, 2.05]
Ye 2017	1419	1642	1300	1654	2.8%	1.10 [1.07, 1.13]
Yilmaz 2005	67	86	15	28	1.6%	1.45 [1.01, 2.09]
Yuksel 2015	32	35	25	35	2.1%	1.28 [1.01, 1.62]
Zehri 2010	23	33	12	32	1.1%	1.86 [1.13, 3.07]
Zhou 2011	68	88	13	43	1.2%	2.56 [1.60, 4.08]
Subtotal (95% CI)		**4525**		**4051**	**90.5%**	**1.46 [1.36, 1.57]**
Total events	3680		2635			

Heterogeneity: Tau² = 0.04; Chi² = 247.13, df = 56 (P < 0.00001); I² = 77%

Test for overall effect: Z = 10.23 (P < 0.00001)

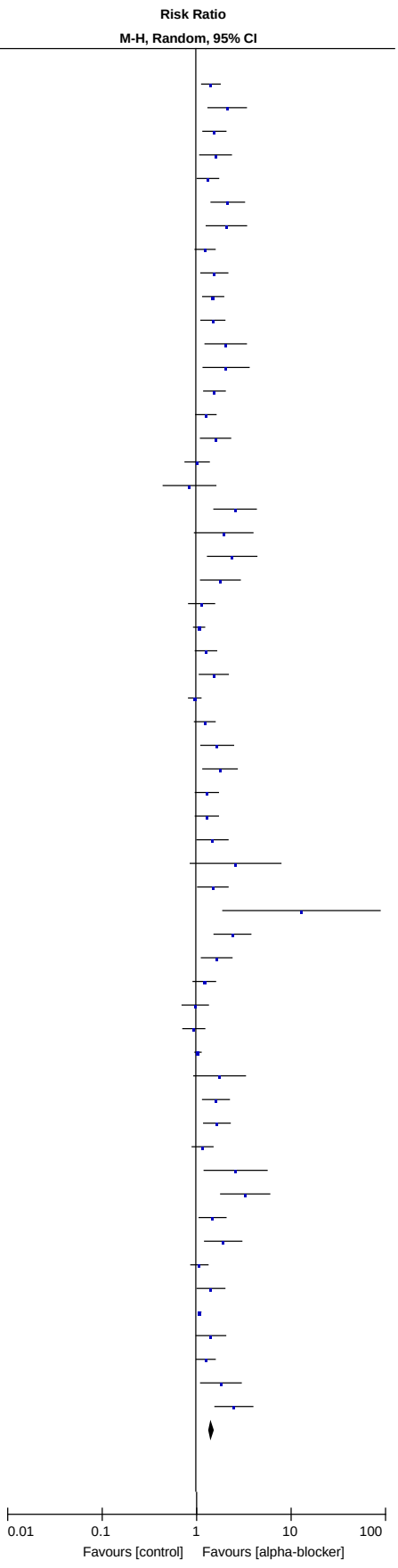
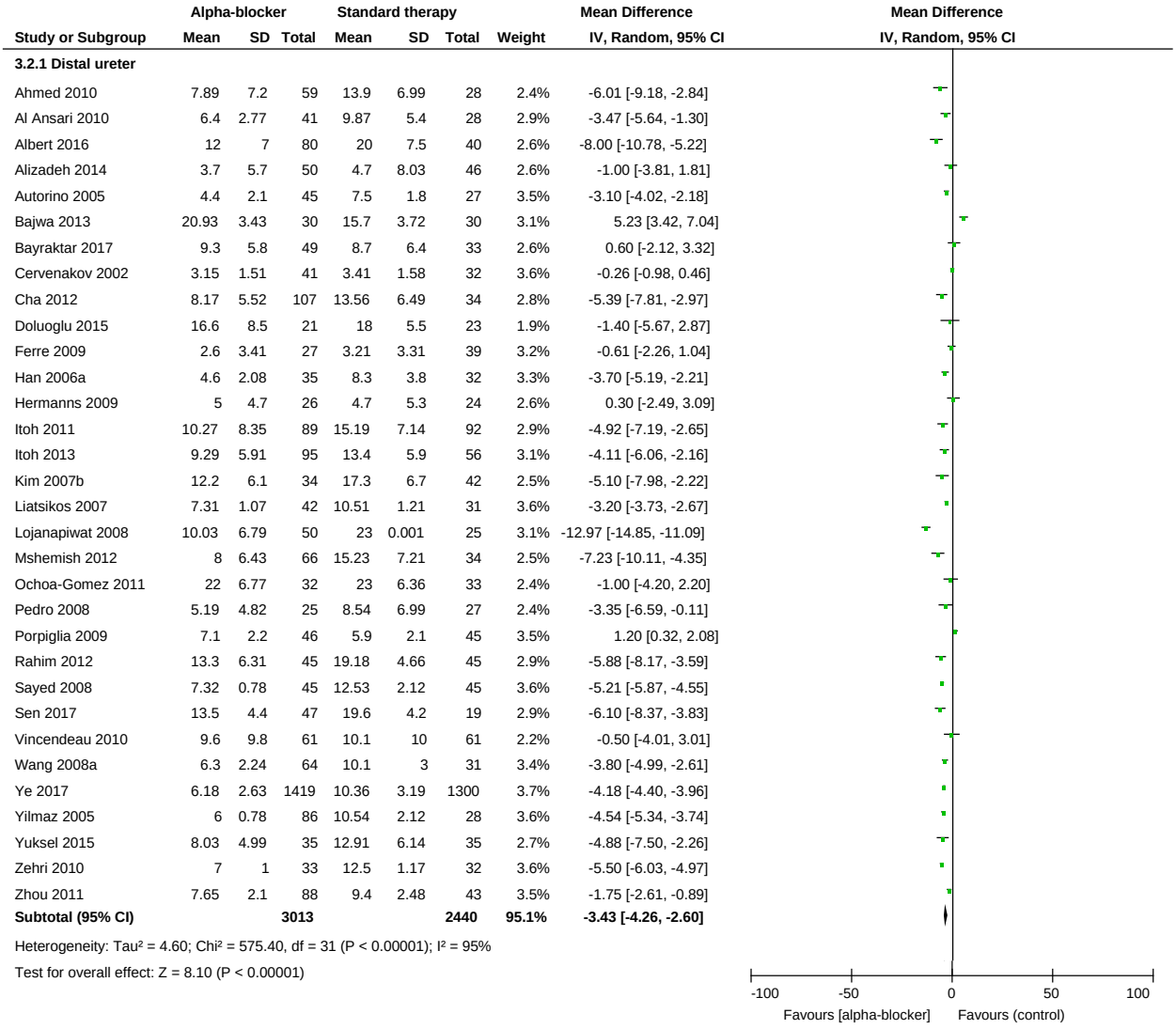


Figure 2. Forest plot of stone expulsion time (adapted from Campschroer 2018)



Study or Subgroup	Alpha-blocker Mean	SD	Total	Standard therapy Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
3.2.1 Distal ureter								
Ahmed 2010	7.89	7.2	59	13.9	6.99	28	2.4%	-6.01 [-9.18, -2.84]
Al Ansari 2010	6.4	2.77	41	9.87	5.4	28	2.9%	-3.47 [-5.64, -1.30]
Albert 2016	12	7	80	20	7.5	40	2.6%	-8.00 [-10.78, -5.22]
Alizadeh 2014	3.7	5.7	50	4.7	8.03	46	2.6%	-1.00 [-3.81, 1.81]
Autorino 2005	4.4	2.1	45	7.5	1.8	27	3.5%	-3.10 [-4.02, -2.18]
Bajwa 2013	20.93	3.43	30	15.7	3.72	30	3.1%	5.23 [3.42, 7.04]
Bayraktar 2017	9.3	5.8	49	8.7	6.4	33	2.6%	0.60 [-2.12, 3.32]
Cervenakov 2002	3.15	1.51	41	3.41	1.58	32	3.6%	-0.26 [-0.98, 0.46]
Cha 2012	8.17	5.52	107	13.56	6.49	34	2.8%	-5.39 [-7.81, -2.97]
Doluoglu 2015	16.6	8.5	21	18	5.5	23	1.9%	-1.40 [-5.67, 2.87]
Ferre 2009	2.6	3.41	27	3.21	3.31	39	3.2%	-0.61 [-2.26, 1.04]
Han 2006a	4.6	2.08	35	8.3	3.8	32	3.3%	-3.70 [-5.19, -2.21]
Hermanns 2009	5	4.7	26	4.7	5.3	24	2.6%	0.30 [-2.49, 3.09]
Itoh 2011	10.27	8.35	89	15.19	7.14	92	2.9%	-4.92 [-7.19, -2.65]
Itoh 2013	9.29	5.91	95	13.4	5.9	56	3.1%	-4.11 [-6.06, -2.16]
Kim 2007b	12.2	6.1	34	17.3	6.7	42	2.5%	-5.10 [-7.98, -2.22]
Liatsikos 2007	7.31	1.07	42	10.51	1.21	31	3.6%	-3.20 [-3.73, -2.67]
Lojanapiwat 2008	10.03	6.79	50	23	0.001	25	3.1%	-12.97 [-14.85, -11.09]
Mshemish 2012	8	6.43	66	15.23	7.21	34	2.5%	-7.23 [-10.11, -4.35]
Ochoa-Gomez 2011	22	6.77	32	23	6.36	33	2.4%	-1.00 [-4.20, 2.20]
Pedro 2008	5.19	4.82	25	8.54	6.99	27	2.4%	-3.35 [-6.59, -0.11]
Porpiglia 2009	7.1	2.2	46	5.9	2.1	45	3.5%	1.20 [0.32, 2.08]
Rahim 2012	13.3	6.31	45	19.18	4.66	45	2.9%	-5.88 [-8.17, -3.59]
Sayed 2008	7.32	0.78	45	12.53	2.12	45	3.6%	-5.21 [-5.87, -4.55]
Sen 2017	13.5	4.4	47	19.6	4.2	19	2.9%	-6.10 [-8.37, -3.83]
Vincendeau 2010	9.6	9.8	61	10.1	10	61	2.2%	-0.50 [-4.01, 3.01]
Wang 2008a	6.3	2.24	64	10.1	3	31	3.4%	-3.80 [-4.99, -2.61]
Ye 2017	6.18	2.63	1419	10.36	3.19	1300	3.7%	-4.18 [-4.40, -3.96]
Yilmaz 2005	6	0.78	86	10.54	2.12	28	3.6%	-4.54 [-5.34, -3.74]
Yuksel 2015	8.03	4.99	35	12.91	6.14	35	2.7%	-4.88 [-7.50, -2.26]
Zehri 2010	7	1	33	12.5	1.17	32	3.6%	-5.50 [-6.03, -4.97]
Zhou 2011	7.65	2.1	88	9.4	2.48	43	3.5%	-1.75 [-2.61, -0.89]
Subtotal (95% CI)			**3013**			**2440**	**95.1%**	**-3.43 [-4.26, -2.60]**

Heterogeneity: Tau² = 4.60; Chi² = 575.40, df = 31 (P < 0.00001); I² = 95%

Test for overall effect: Z = 8.10 (P < 0.00001)

Level of evidence of the literature

According to GRADE, systematic reviews and randomized controlled trials (RCTs) start at a high level of evidence.

The level of evidence regarding the outcome measure **percentage of stone passage** was downgraded to a low GRADE. One level because of risk of bias, one level for inconsistency/ publication bias.

The level of evidence regarding the outcome measure **time to stone passage** was downgraded to a low GRADE. One level because of risk of bias and one level for inconsistency.

The level of evidence regarding the outcome measure **pain (reduction)** could not be assessed with GRADE as this outcome measure was not studied in the included study.

The level of evidence regarding the outcome measure **side effects** could not be assessed with GRADE as this outcome measure was not studied in the included study.

The level of evidence regarding the outcome measure **need for (surgical) intervention** could not be assessed with GRADE as this outcome measure was not studied in the included study.

Conclusions

Low GRADE	The evidence suggests alpha-blockers increase **percentage of stone passage** when compared with standard therapy in patients with symptomatic ureteral stone disease. *Source: Campschroer, 2018*

Low GRADE	The evidence suggests that alpha-blockers result in little to no difference in **time to stone passage** when compared with standard therapy in patients with symptomatic ureteral stone disease. *Source: Campschroer, 2018*

No GRADE	No evidence was found regarding the effect of alpha-blockers on **pain (reduction)** when compared with normal analgesics in patients with symptomatic ureteral stone disease.

No GRADE	No evidence was found regarding the effect of alpha-blockers on **side effects** when compared with normal analgesics in patients with symptomatic ureteral stone disease.

No GRADE	No evidence was found regarding the effect of alpha-blockers on **need for (surgical) intervention** when compared with normal analgesics in patients with symptomatic ureteral stone disease.

Overwegingen – van bewijs naar aanbeveling

Voor- en nadelen van de interventie en de kwaliteit van het bewijs

De werkgroep heeft een literatuurstudie verricht naar de (on)gunstige effecten van alfablokkers (uroselectief) oraal in vergelijking met alleen pijnverlichting (combinatie van paracetamol, NSAID, morfinomimetica) bij patiënten met symptomatisch ureterolihiasis. Op basis van de beschikbare literatuur is het onzeker wat het effect van alfablokkers is op de cruciale uitkomstmaten percentage steenlozing en lijken er geen verschillen te zijn in tijd tot steenlozing in vergelijking met alleen pijnverlichting. De bewijskracht werd beoordeeld als zeer laag vanwege risico op bias, inconsistentie en publicatiebias. Er werd geen literatuur gevonden over het effect van alfablokkers op de belangrijke uitkomstmaten pijn(reductie), bijwerkingen en noodzaak voor (chirurgische) interventie. Bijwerkingen en of complicaties zijn wel beschreven en bekend bij het gebruik van alfablokkers. Er werden geen significante verschillen gezien tussen het gebruik van pijnstilling en/of alfablokkers.

Aanbeveling

Rationale van de aanbeveling: weging van argumenten voor en tegen de interventies

Toepassen van alfablokkers in de behandeling van distale stenen kan zorgen voor hogere kans op spontane en snellere passage. Ondanks dat de bewijskracht laag is, is het een middel met relatief weinig hinderlijke bijwerkingen waardoor het toepassen te overwegen is. Toepassen van alfablokkers in de behandeling van distale ureterstenen zorgt niet voor minder kans op een ingreep om de steen chirurgisch te verwijderen.

Overweeg het gebruik van alphablokkers bij de behandeling van distale ureterolihiasis om een hoger percentage steenlozing en snellere passage daarvan te bewerkstelligen.

Geef geen alfablokkers voor een hoger percentage en snellere passage van proximale ureterstenen.

Geef geen alfablokkers ter pijnstilling of om chirurgische behandeling te voorkomen.

Kennislacunes

Geen kennislacune naar aanleiding van deze module geformuleerd.

Literatuur

Campschroer T, Zhu X, Vernooij RW, Lock MT. Alpha-blockers as medical expulsive therapy for ureteral stones. Cochrane Database Syst Rev. 2018 Apr 5;4(4):CD008509. doi: 10.1002/14651858.CD008509.pub3. PMID: 29620795; PMCID: PMC6494465.

Module 4a Drainage met dubbel J katheter versus nefrostomie katheter in de behandeling van obstructieve ureterolithiasis

Uitgangsvraag Welk type drainage is het beste bij obstructieve ureterolithiasis?

Inleiding

Het draineren van de hoge urinewegen is noodzakelijk zodra er sprake is van een obstructie door ureterolithiasis die daardoor een infectie veroorzaakt, nierfunctie achteruitgang of forse pijnklachten geeft. Indien deze obstructie niet wordt behandeld is er een grote kans op morbiditeit en zelfs mortaliteit. Het behandelen van een urinewegobstructie kan middels een retrograde of antegrade route, achtereenvolgens de dubbel J katheter en de nefrostomie katheter. Beide drainage methoden hebben zo hun eigen voor- en nadelen. Deze zijn ten aanzien van de techniek, kosten, consequenties voor de patiënten en hun kwaliteit van leven verschillend maar er is ook onduidelijkheid welke techniek de voorkeur heeft bij bijvoorbeeld alleen pijn of nierfunctieachteruitgang ten gevolge van obstructie of bij een gelijktijdig aanwezige infectie. In de keuze van de 2 technieken spelen ook beschikbaarheid van personeel, ervaring en behandelruimte een rol. Er is dan ook een grote praktijkvariatie.

Met deze specifieke vraag doen we een aanbeveling ten aanzien van de drainage voorkeur bij obstructieve ureterolithiasis, al dan niet gecompliceerd door infectie.

Search and select

A systematic review of the literature was performed to answer the following question:
What are the (un)favorable effects of double J catheter compared to nephrostomy catheter in patients with obstructive ureterolithiasis with and without infection.

P: patients	patients with obstructive ureterolithiasis with and without infection
I: intervention	double J catheter
C: control	nephrostomy catheter
O: outcome measure	recovery of infection, recovery of kidney function, pain, length of hospital stay, complications, spontaneous stone passage, success rate, side effects, ICU admission and costs

<u>Relevant outcome measures</u>

The guideline development group considered recovery of infection, recovery of kidney function and pain as a critical outcome measure for decision making; and length of hospital stay, complications, spontaneous stone passage, success rate, side effects and costs as important outcome measures for decision making.

For this question a clinically relevant difference was not determined at forehand.

<u>Search and select (Methods)</u>

The databases Medline (via OVID) and Embase (via Embase.com) were searched with relevant search terms until March 9th, 2022. The detailed search strategy is depicted under the tab Methods. The systematic literature search resulted in 809 hits. Studies that met the following

criteria were eligible for selection: studies reporting original data, systematic reviews, randomized controlled trials (RCTs) and observational studies reporting on the effects of double J catheter compared to nephrostomy catheter in patients with obstructive ureterolithiasis. Fifteen studies were initially selected based on title and abstract screening. After reading the full text, twelve studies were excluded (see the table with reasons for exclusion under the tab Methods), and three studies were included.

Results

One systematic review and meta-analysis (Hinojosa-Gonzalez, 2021) was selected and supplemented with two RCT's (Ahmad, 2013 & Xu, 2021) for the analysis of literature. Important study characteristics and results are summarized in the evidence tables. The assessment of the risk of bias is summarized in the risk of bias tables.

Summary of literature

Description of studies

Hinojosa-Gonzalez (2021) performed a systematic review and meta-analysis with the objective to analyze available evidence on various clinical and quality of life (QoL) parameters to determine the advantages and disadvantages associated with percutaneous nephrostomy (PCN) and ureteric stenting (URS) for decompression in acute stone-related obstruction. Searches were performed in online databases PubMed, Web of Science, Scopus and Google Scholar until August 2020. Inclusion criteria of the systematic review were: comparison of demographic outcomes, clinical outcomes, QoL, and resource allocations of adult subjects with acute obstructive urolithiasis associated with infection or kidney injury treated through either URS or PCN. Excluded studies did not provide statistical comparison, the included patients were not adults or were pregnant. Length of follow-up was not reported.
Ten articles were included (n=772 patients of whom 420 treated with URS and 352 with PCN). The included study designs were five randomized controlled trials, of which two were prospective trials and three retrospective trials.

Ahmad (2013) conducted a randomized controlled trial to compare complication rate of PCN and double J ureteral stenting in the management of obstructive uropathy. A total of 300 patients were included of whom 100 were treated with double J stent and 200 with PCN. The majority of patients were male (72.7%). Age at baseline was 43 ± 9.65 years and 40 ± 10.35 years in the double J stent and PCN group respectively (p=<0.001). It should be noted that not all patients had an obstruction due to stone disease (25% in double J stent and 35% in PCN group) but due to for instance carcinomas. Outcome measures were complications and procedural success rate. Outcomes were assessed immediately after the procedure and after fifteen days to a maximum of three months (in patients experiencing complications).

The randomized controlled trial by Xu (2021) aimed to compare the efficacy of PCN versus URS for acute upper urinary tract obstruction with urosepsis in terms of recovery of infection, kidney function and length of hospital stay. Of the 65 patients included in the study, 35 were treated through PCN and 30 were treated through URS. Mean age was 65 years (IQR 51.5 to 71 years), the majority of patients were female (63%) and mean BMI was 23.83 kg/m^2 (IQR

21.73 to 26.12). Follow-up period was defined as the time for patients' body temperature to return to normal and biochemical indicators were assessed 3 days after treatment.

Results

1. Recovery of kidney function

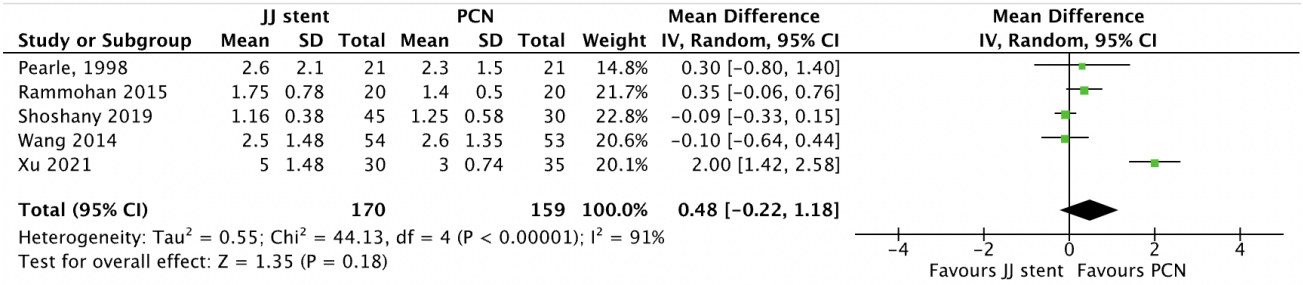
One randomized controlled trial (Xu, 2021) reported on recovery of kidney function expressed as postoperative serum creatinine. The outcome was assessed three days after treatment and did not differ between the double J stent (n=30, median serum creatinine 82.1 (µmol/L); IQR (64.1 to 113.6)) and the PCN group (n= 35, median serum creatinine 78.4 (µmol/L); IQR (65.4 to 104.6)) (*p*= 0.916). The 95% CI was not reported.

2. Recovery of infection

Four studies included in the systematic review (Hinojosa-Gonzalez, 2021) and one study published thereafter (Xu, 2021) reported the outcome recovery of infection. Both studies reported on time to normal temperature (shown in Figure 1). Additionally, Hinojosa-Gonzalez (2021) reported on time to normal white blood cell count and Xu (2021) reported on postoperative white blood cell count and postoperative CRP.

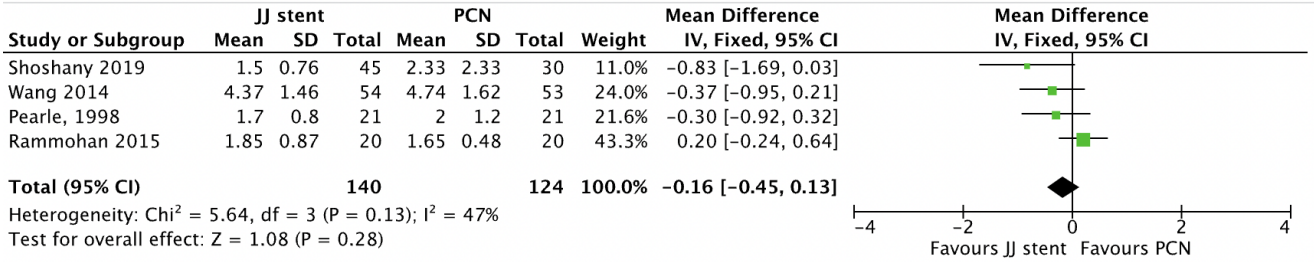
Time to normal temperature was determined for 170 patients treated through double J stent and 159 patients treated through PCN. No significant difference was found in normalization times, the mean difference was 0.48 (95% CI -0.22 to 1.18) (*p*=0.18) in favor of PCN (Figure 1).

Figure 1 Time to normal temperature, comparison double J stent versus PCN



Time to normal white blood cell count (WBC) was reported in four studies included in Hinojosa-Gonzalez (2021), 140 patients were treated through double J stent and 124 were treated through PCN. The mean difference was -0.16 (95% CI -0.45 to 0.13) (*p*=0.28) in favor of double J stent (Figure 2).

Figure 2 Time to normal WBC, comparison double J stent versus PCN



Postoperative white blood cell count as reported by Xu (2021) (measured three days after treatment) did not differ between the double J stent (n=30, median WBC count 7,12 (10^9/L); IQR (5.05 to 9.39) and the PCN group (n= 35, median WBC count 7,67 (10^9/L); IQR (6.13 to 17.24)) (*p*= 0.422). The 95% CI was not reported.

Finally, *postoperative CRP* (Xu 2021) was significantly lower in patients treated through PCN (median CRP 23.2 (mg/L); IQR (12.4 to 38)) than those treated through double J stent (median CRP 32.2 (mg/L); IQR (21.1 to 73.9)) (*p*=0.029). The 95% CI was not reported. Preoperative CRP was (median (IQR)) 117.7 (28.4 to 160.4) in the PCN compared to 115.3 (50.4 to 175.9) in de double J stent group (*p*=0.54).

The systematic review (Hinojosa-Gonzalez, 2021) also reported on two studies that only focused on cases with related sepsis, in which *time to normal temperature* and *time to normal white blood cell count* were assessed and pooled into one outcome "urosepsis parameters". In total 148 patients were treated through double J stent and 146 were treated through PCN. The outcome did not differ significantly between groups with a mean difference of 0.10 (95% CI -0.14 to 0.34) (*p*= 0.81) in favour of PCN (Figure 3).

Figure 3* Time to normal temperature and WBC in patients with sepsis, comparison double J stent versus PCN

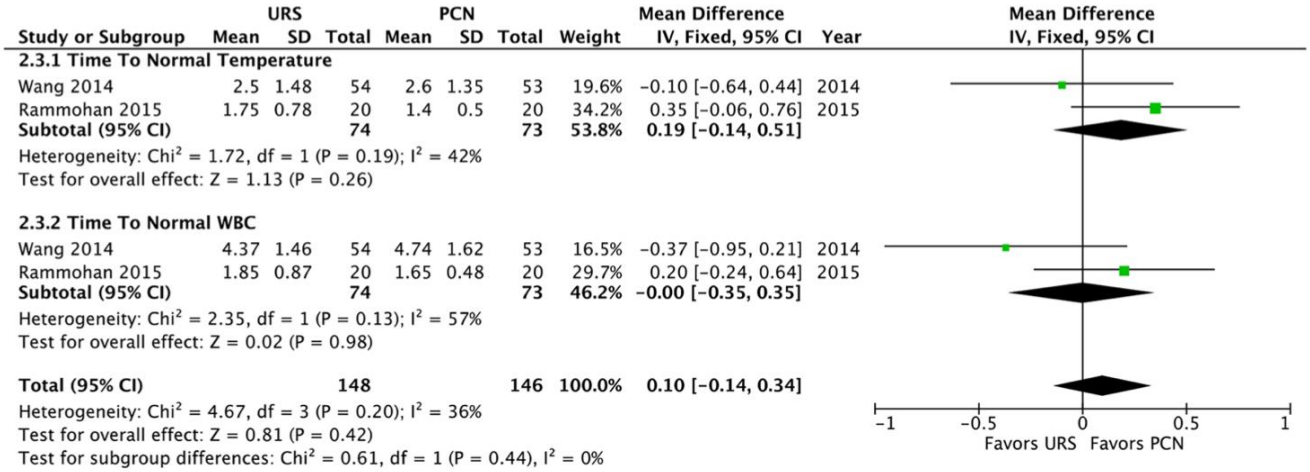
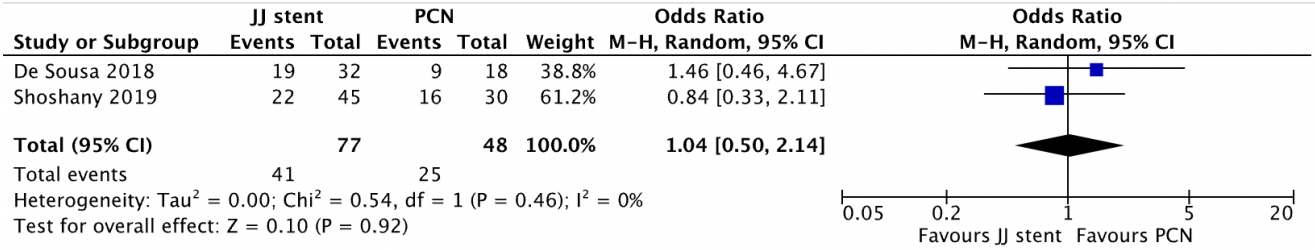


**Figure from Hinojosa-Gonzalez, 2021*
(URS = double J stent)

3. Pain

The outcome measure pain (assessed after the procedure) was reported in two studies included in the systematic review (Hinojosa-Gonzalez 2021). In total 77 patients were treated through double J stent and 48 patients were treated through PCN. There were no differences between treatments, mean difference was 1.04 (95% CI -0.50 to 2.14) (*p*=0.92) (Figure 4).

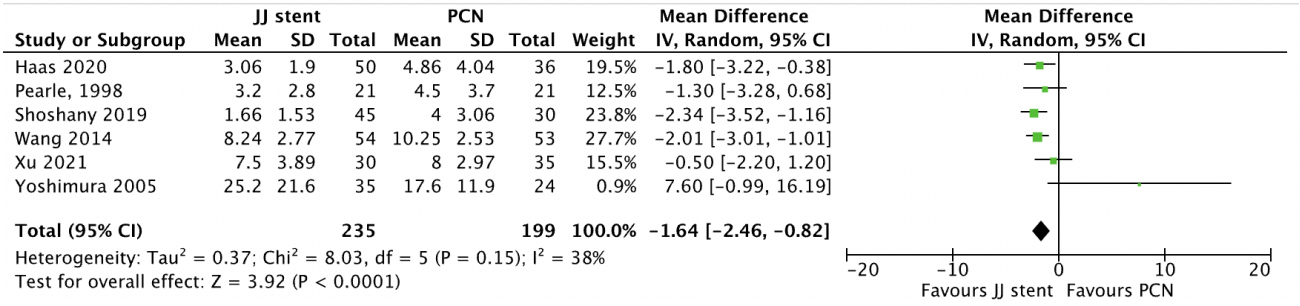
Figure 4 Pain, comparison double J stent versus PCN



4. Length of hospital stay

Five studies included in the systematic review (Hinojosa-Gonzalez, 2021) and the study by Xu (2021) reported on the outcome length of hospital stay (shown in Figure 5). In total, 235 patients were treated through double J stent and 199 patients were treated through PCN. Significant differences in hospital stay were found in favor of the double J stent. Mean difference was -1.64 (95% CI -2.46 to -0.82) (*p*=<0.0001) (Figure 5).

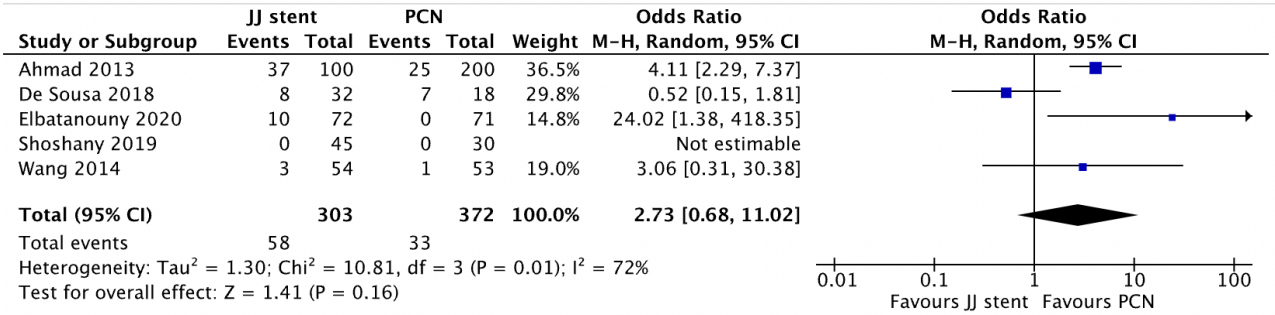
Figure 5 Length of hospital stay, comparison double J stent versus PCN



5. Complications

The outcome complications was reported in four studies included in Hinojosa-Gonzalez (2021) and in the study by Ahmad (2013). In total, 303 patients were treated through double J stent and 372 patients were treated through PCN. The pooled analysis showed a complication rate of 19% in the double J stent group compared to 8.8% in the PCN group (OR=2.73 (95% CI 0.68 to 11.02)) (*p*=0.16) in favor of PCN (shown in Figure 6). Reported complications were fever/septicemia, hematuria, PCN dislodgement, painful trigone irritation, ureteral perforation, stent migration and stent encrustation (Ahmad, 2013). It should be noted that none of the studies reported on treatment specific complications resulting in bleeding. These complications were combined under the term “bleeding/hematuria”. Moreover, it is unclear to which Clavien-Dindo classification the reported complications belong.

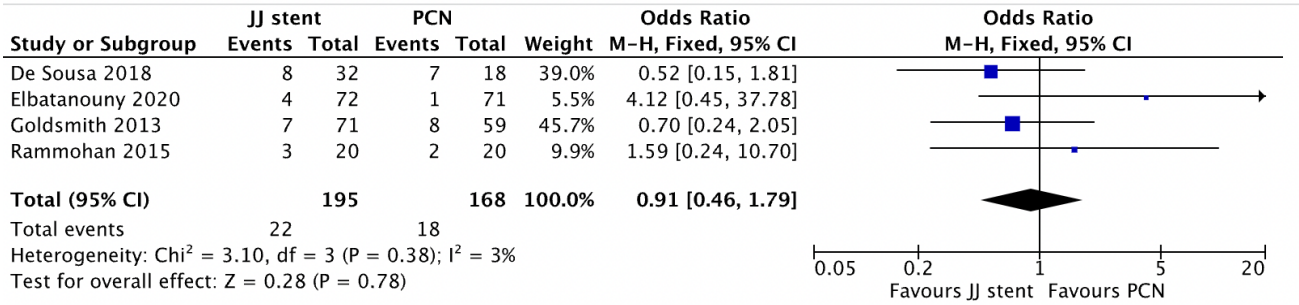
Figure 6 Complications, comparison double J stent versus PCN



6. Spontaneous stone passage

The systematic review by Honojosa-Gonzalez (2021) reported on spontaneous stone passage, based on four studies. Out of 195 patients in the double J stent group, 22 experienced spontaneous stone passage compared to 18 out of 168 patients in the PCN group (OR=0.91 (95% CI 0.48 to 1.79)) (*p*=0.78) in favor of PCN (Figure 7).

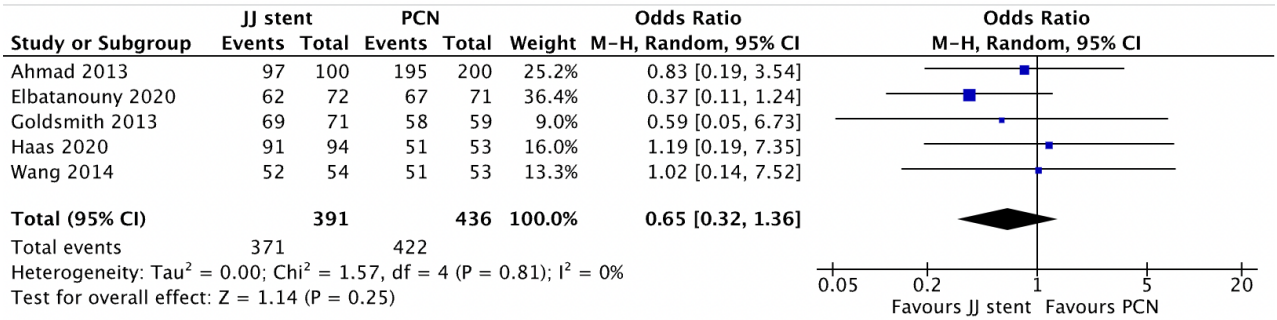
Figure 7 Spontaneous stone passage, comparison double J stent versus PCN



7. Success rate

The systematic review by Hinojosa-Gonzalez (2021) (based on 4 included studies) and the study by Ahmad (2013) reported on success rate. In total, 391 patients were treated through double J stent and 436 patients were treated through PCN. The pooled analysis showed a success rate of 95% in the double J stent group compared to 97% in the PCN group (OR=0.65 (95% CI 0.32 to 1.36) (*p*=0.25) in favor of double J stent (shown in Figure 8).

Figure 8 Success rate, comparison double J stent versus PCN



8. Side effects

No studies reported on the outcome measure side effects.

9. ICU admission
No studies reported on the outcome measure ICU admission.

10. Costs
No studies reported on the outcome measure costs.

Level of evidence of the literature
Systematic reviews of randomized controlled trials and randomized controlled trials started at GRADE high.

The level of evidence regarding the outcome measure **recovery of kidney function** was downgraded to very low GRADE because of study limitations (risk of bias; doubts about randomization, no blinding, one level) and number of included patients (imprecision, two levels).

The level of evidence regarding the outcome measure **recovery of infection** was downgraded to very low GRADE because of study limitations (risk of bias; doubts about randomization, no blinding, correction for confounders unclear, one level); applicability (bias due to indirectness due to varying measures of recovery of infection, one level); number of included patients (imprecision, two levels).

The level of evidence regarding the outcome measure **pain** was downgraded to very low GRADE because of study limitations (risk of bias; correction for confounders unclear, one level); number of included patients (imprecision, two levels).

The level of evidence regarding the outcome measure **length of hospital stay** was downgraded to low GRADE because of study limitations (risk of bias; doubts about randomization, no blinding, correction for confounders unclear, one level); number of included patients (imprecision).

The level of evidence regarding the outcome measure **complications** was downgraded to very low GRADE because of study limitations (risk of bias; doubts about randomization, no blinding, correction for confounders unclear, one level); conflicting results (inconsistency, one level); applicability (bias due to indirectness due to varying measures of complications, one level).

The level of evidence regarding the outcome measure **spontaneous stone passage** was downgraded to very low GRADE because of study limitations (risk of bias; correction for confounders unclear, one level); imprecision (very wide confidence interval, 2 levels).

The level of evidence regarding the outcome measure **success rate** was downgraded to very low GRADE because of study limitations (risk of bias; doubts about randomization, no blinding, correction for confounders unclear, one level); conflicting results (inconsistency, one level); imprecision (very wide confidence interval, two levels)

The level of evidence regarding the outcome measures **side effects, ICU admission and costs** could not be assessed as the included studies did not report on these outcome measures.

Conclusions

Very low GRADE	It is uncertain what the effects of drainage with double J catheter compared to percutaneous nephrostomy are on recovery of kidney function in treatment of patients with obstructive ureterolithiasis. *Sources: Xu, 2021*

5

very low GRADE	It is uncertain what effects of drainage with double J catheter compared to percutaneous nephrostomy are on recovery of infection in treatment of patients with obstructive ureterolithiasis. *Sources: Hinojosa-Gonzalez, 2021; Xu, 2021*

Very low GRADE	It is uncertain what effects of drainage with double J catheter compared to percutaneous nephrostomy are on pain in treatment of patients with obstructive ureterolithiasis. *Sources: Hinojosa-Gonzalez, 2021*

low GRADE	Length of hospital stay might be shorter after treatment through double J catheter compared to percutaneous nephrostomy in treatment of patients with obstructive ureterolithiasis. *Sources: Hinojosa-Gonzalez, 2021; Xu, 2021*

Very low GRADE	It is uncertain what effects of drainage with double J catheter compared to percutaneous nephrostomy are on complications in treatment of patients with obstructive ureterolithiasis. *Sources: Hinojosa-Gonzalez, 2021; Ahmad, 2013*

Very low GRADE	It is uncertain what effects of drainage with double J catheter compared to percutaneous nephrostomy are on spontaneous stone passage in treatment of patients with obstructive ureterolithiasis. *Sources: Hinojosa-Gonzalez, 2021*

10

Very low GRADE	It is uncertain what effects of drainage with double J catheter compared to percutaneous nephrostomy are on success rate in treatment of patients with obstructive ureterolithiasis. *Sources: Hinojosa-Gonzalez, 2021; Ahmad, 2013*

No GRADE	The effects of drainage with double J catheter compared to percutaneous nephrostomy in treatment of patients with obstructive ureterolithiasis on side effects are unknown. None of the studies reported on side effects.

No **GRADE**	The effects of drainage with double J catheter compared to percutaneous nephrostomy in treatment of patients with obstructive ureterolithiasis on ICU admission are unknown. None of the studies reported on ICU admission.

No **GRADE**	The effects of drainage with double J catheter compared to percutaneous nephrostomy in treatment of patients with obstructive ureterolithiasis on costs are unknown. None of the studies reported on costs.

Overwegingen – van bewijs naar aanbeveling

Voor- en nadelen van de interventie en de kwaliteit van het bewijs

Er zijn een systematische review en twee gerandomiseerde studies van lage kwaliteit gevonden die rapporteren over de uitkomstmaten herstel van nierfunctie, herstel van infectie, pijn, opname duur, complicaties, spontane steen passage en kans van slagen. Er zijn geen studies gevonden die rapporteren over de uitkomstmaten bijwerkingen, IC opname en kosten. Voor opnameduur lijkt het erop dat behandeling met een dubbel J katheter gunstiger is dan behandeling met nefrostomie katheter, voor de overige uitkomstmaten is de bewijskracht te laag om uitspraken over de richting van het effect te doen.

Het is echter onduidelijk in welke settings de dubbel J katheter en nefrostomie katheter plaatsingen werden verricht: in poliklinische setting of klinische setting en of de keuze van drainagemethode beïnvloed werd door de aanwezigheid van een infectie?

Lokale afspraken, logistiek, ervaring en beschikbaarheid bepalen regelmatig de opname duur.

De uitkomstmaat bijwerkingen werd wel gerapporteerd in een observationele studie (Joshi, 2021). In deze studie werd een vergelijking gemaakt tussen behandeling met een dubbel J katheter (n=21) ten opzichte van een nefrostomie katheter (n=13). Follow-up tijd was 12 ± 5 dagen in de PCN en 28.2 ± 14 dagen in de dubbel J katheter groep, waarna een vragenlijst werd afgenomen om bijwerkingen in kaart te brengen. Bijwerkingen werden beschreven als *pijn* en *urinary symptoms.* Met betrekking tot pijn rapporteerden 54% van de patiënten in de PCN-groep ten opzichte van 42% in de dubbel J katheter groep pijn in de lendenstreek (*p*=0.770) en 31% van de patiënten in de PCN groep ten opzichte van 68% in de Dubbel J katheter groep pijn in de blaas (*p*=0.083). Patiënten behandeld met de dubbel J katheter ervaarden meer hematurie (*p*=0.022) en mictieklachten *(*dysurie (*p*=<0,0001), urgentie (*p*=0,0020) en frequency (*p*=0,0202)) dan patiënten behandeld met PCN. Tot slot ervaarden patiënten in de dubbel J katheter groep meer dagelijks ongemak dan patiënten in de PCN-groep (*p*=0.023). Samengenomen suggereerden de auteurs dat behandeling met PCN minder bijwerkingen/klachten geeft dan een dubbel J katheter. De bewijskracht voor deze studie is zeer laag. Tevens zijn de uitkomstmaten sterk gerelateerd aan de dubbel J katheter plaatsing en zijn andere zaken zoals de verzorging en wisselingen van een nefrostomie katheter niet onderzocht.

Voor een beperkt aantal patiënten/subgroepen wordt er een duidelijke voorkeur voor type interventie geadviseerd, namelijk: het gebruik van antistolling (voorkeur dubbel J katheter), of het niet retrograad kunnen bereiken van de nier bij een niet passeerbare ureter (voorkeur NSK) of bij sommige typen urine deviaties (voorkeur NSK).

Aanbevelingen

Aanbeveling-1

Rationale van de aanbeveling: weging van argumenten voor en tegen de interventies

De uitkomstmaten: herstel van de nierfunctie, herstel van infectie, pijn, complicaties, spontane steenpassage en succes rate tonen geen significant verschil tussen de interventie (dubbel J) en de nefrostomie katheter plaatsing. Ten aanzien van bijwerkingen, IC opnames en kostenaspect zijn geen studies voorhanden om hier een uitspraak over te doen. De bewijskracht voor alle genoemde effecten van interventie (dubbel J katheter versus nefrostomie katheter) is zeer laag met uitzondering van de ziekenhuisduur als uitkomstmaat. Die is laag. De reden hiervan zijn bias risico, mogelijke randomisatie fouten, ongeblindeerd onderzoek, onduidelijke confouder correctie en onduidelijke inclusie dus mindere precisie. Lokale afspraken met betrekking tot poliklinisch of klinische interventies voor deze twee technieken kunnen hier belangrijk aan bijdragen.

Vanwege de bovengenoemde beperkingen is er een kennislacune aanwezig ten aanzien van deze uitgangsvraag, met name ten aanzien van de patiënt gerelateerde uitkomsten zoals irritatieve mictieklachten, hematurie, urineweginfecties en verzorging van dubbel J katheters en nefrostomie katheters.

Op basis van de uitkomstmaten kan er vanuit de literatuursearch geen eenduidig besluit worden genomen over de interventie bij voorkeur bij een patiënt met obstructieve nefropathie. Wel zien we dat de ziekenhuisopname duur significant korter is bij de dubbel J katheter plaatsing, waarschijnlijk te verklaren door plaatsing in poliklinische setting.

Bespreek met patiënten met obstructieve ureterolithiasis de voor- en nadelen van het plaatsen van een nefrostomie katheter en het plaatsen van een dubbel J katheter.

Bespreek met patiënt dat zowel een nefrostomie katheter als een dubbel J katheter ter drainage van obstructieve ureterolithiasis even goed zijn ter behandeling van

- Infectie
- Pijn
- Nierfunctie
- Complicaties
- Spontane steenlozing
- Succes rate

Aanbeveling-2

Rationale van de aanbeveling: weging van argumenten voor en tegen de interventie

De werkgroep voelt de behoefte om een expert opinion mee te geven in het geval wordt overwogen een drainage te verrichten bij een afvloedbelemmering van de nier in combinatie met een ernstige sepsis. De opinie bestaat daaruit dat een drainage via het plaatsen van een nefrostomie katheter een (lichte) voorkeur heeft (bij het voorhanden zijn van beide technieken), ten aanzien van de snelheid waarmee decompressie bereikt kan worden alsmede de controleerbaarheid van de drainage, welke niet makkelijk kan worden bereikt na plaatsing van een dubbel J katheter.

Geef de voorkeur aan drainage met een nefrostomie katheter bij patiënten met dreigende septische shock.

Kennislacunes

Het is onduidelijk welk van de drainage technieken het beste is als het gaat om kosten, IC opnames en vooral bijwerkingen bij patiënten. In een op dit moment lopende nationale multicenter RCT (STONE studie) zullen deze vragen beantwoord kunnen worden.

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Xu, Z. H., Yang, Y. H., Zhou, S., & Lv, J. L. (2021). Percutaneous nephrostomy versus retrograde ureteral stent for acute upper urinary tract obstruction with urosepsis. *Journal of Infection and Chemotherapy*, *27*(2), 323-328.

Module 4b Behandeling van nierstenen bij zwangerschap

Uitgangsvraag Welke behandeling is het beste bij obstructieve ureterolithiasis verdacht voor steenlijden bij zwangeren?

Inleiding

Er bestaat in den lande behoefte aan sturing gezien de grote heterogeniteit omtrent de behandeling van de zwangere patiënt met symptomatische hydronefrose verdacht voor uretersteenlijden. Daarbij is er discussie over het draineren versus interveniëren. Bovendien is er geen consensus, indien er wordt gekozen voor drainage, of een dubbel J katheter of een nefrostomie katheter betere uitkomsten geeft. Alhoewel het overbruggen van de zwangerschap middels drainage meest toegepast wordt, is de primaire steenbehandeling middels retrograde ureteroscopie wel in opkomst. Hiervan is niet bekend of dit inferieur, non-inferieur of superieur is in vergelijking met drainage middels dubbel J katheter of nefrostomie in de behandeling van een zwangere patiënt. Het doel van deze klinische vraag is dan ook hier antwoord op te geven.

Search and select

A systematic review of the literature was performed to answer the following question: What are the (un)favorable effects of drainage compared to retrograde ureteroscopy with stone treatment in pregnant patients with obstructive ureterolithiasis due to suspected kidney stones?

P: patients	pregnant patients with symptomatic obstructive ureterolithiasis
I: intervention	drainage
C: control	retrograde ureteroscopy with stone treatment
O: outcome	mortality and morbidity of mother and child, recovery of kidney function, pain, complications, admission to ICU, re-intervention

Relevant outcome measures

The guideline development group considered mortality and morbidity of mother and child as critical outcome measures for decision making; and recovery of kidney function, pain reduction, admission to ICU and re-intervention as important outcome measures for decision making.

A priori, the working group did not define the outcome measures listed above but used the definitions used in the studies.

For this question a clinically relevant difference was not determined at forehand. Therefore, the GRADE default - a difference of 25% in the relative risk for dichotomous outcomes (Schünemann, 2013) and 0.5 standard deviation for continuous outcomes - was taken as a minimal clinically important difference.

Search and select (Methods)

The databases Medline (via OVID) and Embase (via Embase.com) were searched with relevant search terms until March 9th, 2022. The detailed search strategy is depicted under the tab Methods. The systematic literature search resulted in 122 hits. Studies that met the following

criteria were eligible for selection: studies reporting original data, systematic reviews, randomized controlled trials (RCTs) and observational studies reporting on the effects of retrograde ureteroscopy with stone treatment compared to drainage in pregnant patients with obstructive uropathy due to kidney stones. Seven studies were initially selected based on title and abstract screening. After reading the full text, five studies were excluded (see the table with reasons for exclusion under the tab Methods), and two studies were included.

Results

Two retrospective database studies were included in the analysis of the literature (Song, 2013; Drescher, 2019). It should be noted that Song (2013) compared three treatments (ureteroscopy, percutaneous nephrostomy and ureteral stent) for obstructive uropathy in pregnant patients and reported results without post-hoc testing. Drescher (2019) also reported on these three treatments. The study reported on the risk of urinary tract infection and preterm labor in patients undergoing treatment for obstructive uropathy. Due to the lack of literature to answer the clinical question only the results of these studies are reported in this summary. Important study characteristics and results are summarized in the evidence tables. The assessment of the risk of bias is summarized in the risk of bias tables.

Summary of literature

Description of studies

The retrospective Chinese study of Song (2013) included in total 54 pregnant women with urolithiasis with persistent pain, fever, positive urine culture, suspected uncontrolled infection, and evidence of ongoing obstruction. Patients were treated with ureteroscopy (n=21), percutaneous nephrostomy (PCN) (n=16) or ureteral stent (URS) (n=17). The treatments were compared to examine procedural and obstetric outcomes. Patients were on average 27.1 years old and average gestational age was 26.5 weeks. The length of follow-up was not reported.

Drescher (2019) performed a retrospective study using data from Healthcare Cost and Utilization Project State Inpatient Database (HCUP SID) data for California and Florida. Of all pregnant women admitted to the hospital between 2008 and 2011 (n=2746872), n=3904 were admitted for kidney stones and n=1392 underwent intervention. Patients were treated with URS and/or ureteroscopy (n=1080) or PCN (n=312). The risk of urinary tract infection and preterm labor were assessed.

Results

Due to the heterogeneity of the studies, it was not possible to pool the data. The outcomes of the studies are described separately.

1. Mortality and morbidity

Both selected studies (Song, 2013; Drescher, 2019) report on the outcomes mortality and morbidity. There were no cases of death and various measures of morbidity were reported. Song (2013) reported gestational age and mode of delivery (cesarian vs vaginal) (Table 1). Women were on average 26.5 weeks pregnant at the time of the procedure. A higher percentage of women underwent a cesarean compared to a vaginal birth in all treatment groups.

Table 1. Outcomes of morbidity as reported by Song (2013)

Outcomes	Ureteroscopy group (n=21)	PCN group (n=16)	URS group* (n=17)	*p*-value
Gestational age at delivery (wk)	39.1	39.3	39.1	0.902
Mode of delivery (N (%)) Cesarean Vaginal	 17 (81.0) 4 (19.0)	 13 (81.2) 3 (18.8)	 13 (76.5) 4 (23.5)	 n.r

*One woman in the ureteral stent group had preterm labor (gestational age not reported)

Drescher (2019) reported urinary tract infection (UTI) and preterm labor and conducted a risk assessment of UTI and preterm labor. Intervention with URS and/or ureteroscopy (aOR 9.3, 95% CI 7.2 to 11.9), and PCN (aOR 21.2, 95% CI 15.9 to 28.4) each independently increased the risk of UTI at delivery (all $p < 0.001$). Intervention with URS and/or ureteroscopy (aOR 1.5, 95% CI 1.2 to 1.8), and PCN (aOR 2.3, 95% CI 1.7 to 3.1) each independently increased the risk of preterm delivery (all $p < 0.001$). In this model, UTI on admission was conferred the highest risk for preterm delivery (aOR 3.2, 95% CI 3.1 to 3.3, $p < 0.001$).

2. (Recovery of) kidney function

Not reported

3. Pain

Pain was reported as outcome complications by Song (2013), please refer to outcome measure number 4 described below.

4. Complications

One study reported on the outcome complications (Song, 2013). These were assessed intraoperatively (categorized as major complications, e.g., ureter perforation, severe hemorrage) and data on perioperative complications. Of the 1392 patients 17 experienced one or more complications such as bladder irritation (n=7 in ureteroscopy and URS group), mild haematuria (n=3 in ureteroscopy and PCN group), local skin infection (n=2 in PCN group), pain (n=7 in ureteroscopy and PCN group), tube obstruction (n=4 in PCN group) and encrusted stent (n=4 in URS group). Complication rate was highest in the URS group (52.9%) followed by the PCN group (31.2%) and lowest in the ureteroscopy group (14.3%). In the Table shown in this paper a p-value of 0.039 was reported regarding the difference in complication rate between procedures. However, in the text the authors describe the difference in complication rate between treatments to be non-significant ($p > 0.05$).

5. Admission to ICU

Not reported

6. Re-intervention

Not reported

Level of evidence of the literature

Observational studies for a therapeutic research question start at grade low.

The level of evidence regarding the outcome measure "**mortality and morbidity**" was downgraded to very low GRADE because of study limitations (risk of bias; no correction for confounders and insufficient statistical analysis) and number of included patients (imprecision).

The level of evidence regarding the outcome measure "**complications**" was downgraded to very low GRADE because of study limitations (risk of bias; no correction for confounders and insufficient statistical analysis) and number of included patients (imprecision).

The level of evidence regarding the outcome measures **"(recovery of) kidney function, pain, admission to ICU and re-intervention"** could not be assessed as the included studies did not report on these outcome measures.

Conclusions

very low GRADE	It is uncertain what the effects of treatment with drainage compared to retrograde ureteroscopy is on mortality and morbidity in pregnant patients with obstructive ureteropathy. *Sources: (Song, 2013; Drescher 2019)*

No GRADE	The effects of treatment with drainage compared to retrograde ureteroscopy of obstructive ureteropathy in pregnant patients on recovery of kidney function are unknown. None of the studies reported on (recovery of) kidney function.

No GRADE	The effects of treatment with drainage compared to retrograde ureteroscopy of obstructive ureteropathy in pregnant patients on pain are unknown. None of the studies reported on pain.

very low GRADE	It is uncertain what the effects of treatment with drainage compared to retrograde ureteroscopy is on complications in pregnant patients with obstructive ureteropathy. *Sources: (Song, 2013)*

No GRADE	The effects of treatment with drainage compared to retrograde ureteroscopy of obstructive ureteropathy in pregnant patients on ICU admission are unknow. None of the studies reported on ICU admission.

No GRADE	The effects of treatment with drainage compared to retrograde ureteroscopy of obstructive ureteropathy in pregnant patients on re-intervention are unknown. None of the studies reported on re-intervention.

Overwegingen – van bewijs naar aanbeveling

<u>Voor- en nadelen van de interventie en de kwaliteit van het bewijs</u>

Er zijn twee observationele studies van lage kwaliteit gevonden die rapporteren over de uitkomstmaten "mortaliteit en morbiditeit" en "complicaties". Er zijn geen studies gevonden die rapporteren over de uitkomstmaten "herstel nierfunctie", "pijn", "IC opname" en "re-interventie". Wegens het lage aantal en de lage kwaliteit van de studies is er geen duidelijke uitspraak te doen of retrograde ureteroscopie met steenbehandeling of drainage middels dubbel J katheter of nefrostomie katheter betere uitkomsten geeft bij zwangere patiënten.

De werkgroep heeft ook geen veelbelovende richting uit de bewijslast kunnen destilleren die wij het noemen waard vinden. De redenen voor deze lage bewijslast zijn ongetwijfeld talrijk, maar specifiek te noemen is de relatieve kleine populatie van patiënten, het onvermogen tot een geblindeerd en gerandomiseerd onderzoek en de heterogeniteit van de groep patiënten en hun klinische omstandigheden die ook doorlopen op de gebieden gynaecologie en pediatrie.

Aanbeveling

Rationale van de aanbeveling: weging van argumenten voor en tegen de interventies

De importantie van de klinische vraag deed deze werkgroep doen besluiten om deze vraag in een latere fase alsnog toe te voegen aan de eerder gedefinieerde lijst van onderzoeksvragen in dit stuk. De motivatie hiervoor was dat deze vraag relatief vaak tot een vraagstuk en intercollegiale discussie lijdt in de praktijk. Er bestond in de werkgroep de behoefte hier nogmaals een literatuursearch naar te doen met de hoop dat er in de afgelopen jaren nieuwe studies over het onderwerp gepubliceerd zijn. Nu blijkt helaas dat er persisterend onvoldoende wetenschappelijk bewijs is om een evidence based antwoord op de vraag te kunnen geven. Toch voelt de werkgroep de behoefte om enkele handvatten mee te geven, gebaseerd op expert opinion, in volledige overeenstemming met alle leden van deze werkgroep.

EXPERTS OPINION:

Diagnostiek:

- Bevestig middels beeldvorming de diagnose uretersteen alvorens een steenbehandeling te verrichten.
- Met name in het eerste trimester van de zwangerschap is terughoudendheid geboden ten aanzien van ioniserende straling.
- Een (ultra) low dose CT abdomen blanco kan geïndiceerd zijn indien de diagnose uretersteen echografisch of middels MRI niet bevestigd kan worden.

Behandeling:

- Behandel ongecompliceerd steenlijden bij de zwangere in principe conservatief.
- Interventie is geïndiceerd bij complicaties zoals niet te palliëren pijnklachten, koorts, ernstige hydronefrose, blow-out of inductie van premature contracties.
- Pas bij hydronefrose met koorts drainage middels nefrostomie of double J katheter van de nier toe.
- Ten aanzien van het type drainage van de nier is de expert opinion van de richtlijncommissie dat geen van de drainagemethodes de voorkeur heeft boven de ander.
- Wissel een nefrostomiekatheter of double J katheter binnen een kortere tijdspanne dan bij een niet-zwangere patiënt in verband met de verhoogde kans op encrustratie, bijvoorbeeld binnen 6 weken na plaatsing.
- Overweeg een steenbehandeling te verrichten teneinde langdurige drainage te voorkomen.

- Retrograde ureteroscopie met steenbehandeling is de modaliteit van voorkeur voor steenbehandeling bij de zwangere.
- Het verrichten van een antegrade steenbehandeling is bij de zwangere in uitzonderlijke gevallen geïndiceerd en dient in een centrum verricht te worden dat ervaring heeft met deze behandeling.
- Verricht geen Extracorporele Shock Wave Lithotrypsie (ESWL) bij een zwangere patiënte.

Kennislacunes

Wat zijn de (on)gunstige effecten van drainage in vergelijking met retrograde ureteroscopie met steenbehandeling bij zwangere patiënten met obstructieve ureterolithiase als gevolg van verdenking op nierstenen?

Literatuur

Drescher, M., Blackwell, R. H., Patel, P. M., Kuo, P. C., Turk, T. M., & Baldea, K. G. (2019). Antepartum nephrolithiasis and the risk of preterm delivery. *Urolithiasis*, *47*(5), 441-448.

Song, Y., Fei, X., & Song, Y. (2013). Diagnosis and operative intervention for problematic ureteral calculi during pregnancy. *International Journal of Gynecology & Obstetrics*, *121*(2), 115-118.

Module 5 Nieuwe interventietechnieken bij behandeling van nierstenen

Clinical question

Wat is de beste lasertechniek voor het behandelen van patiënten met urolithiasis tijdens retrograde URS?

Inleiding

Als stenen in de urinewegen klachten geven en niet spontaan (kunnen) passeren, kunnen ze operatief verwijderd worden. De steen zal tijdens deze operatie gefragmenteerd worden met behulp van een lasertechniek. De voor steenbehandelingen al langer bestaande en meest gebruikte lasertechniek is Ho:YAG, echter sinds een paar jaar is ook de Thulium Laser Fiber (TFL) techniek op de markt. Vooralsnog is het niet duidelijk of deze techniek voor zelfde of andere resultaten zorgt tijdens een operatie voor stenen in de urinewegen. Lasertechnieken zijn onderhevig aan veel technische ontwikkelingen. Nieuwe producten dienen eerst gelijkwaardige of betere effectiviteit te bewijzen (en even veilig of zelfs veiliger zijn) alvorens ze geïmplementeerd kunnen worden in richtlijnen en de dagelijkse praktijk. Ten aanzien van TFL is nog niet volledig duidelijk hoe de effectiviteit en veiligheid is ten opzichte van Holmium:YAG.

Search and select

A systematic review of the literature was performed to answer the following question: What is the superior laser technique for retrograde surgery in patients with urolithiasis?

P: patients	patients with urolithiasis & indication for retrograde surgery
I: intervention	super pulse thulium fiber laser
C: control	holmium: YAG laser
O: outcome measure	stone free rate (CT), reinterventions, complications, patient comfort, procedural time, hospital stay, costs

<u>Relevant outcome measures</u>

The guideline development group considered stone free rate, complications and reinterventions as a critical outcome measure for decision making; and patient comfort, procedural time, hospital stay and costs as an important outcome measure for decision making.

A priori, the working group did not define the outcome measures listed above but used the definitions used in the studies.

For this question clinically relevant differences were not determined at forehand. Therefore, the GRADE default - a difference of 25% in the relative risk for dichotomous outcomes (Schünemann, 2013) and 0.5 standard deviation for continuous outcomes - was taken as a minimal clinically important difference.

<u>Search and select (Methods)</u>

The databases Medline (via OVID) and Embase (via Embase.com) were searched with relevant search terms until September 5th, 2022. The detailed search strategy is presented under the tab Methods. The systematic literature search resulted in 114 hits. Studies that met the following criteria were eligible for selection: studies reporting original data, systematic

reviews, randomized controlled trials (RCTs) and observational studies reporting on the superior laser technique for retrograde surgery in patients with urolithiasis. Twelve studies were initially selected based on title and abstract screening. After reading the full text, ten studies were excluded (see the table with reasons for exclusion under the tab Methods), and two studies were included.

Results

Two RCT's (Martov, 2021 & Ulvik, 2022) were included in the analysis of the literature. Important study characteristics and results are summarized in the evidence tables. The assessment of the risk of bias is summarized in the risk of bias tables.

Summary of literature

Description of studies

The RCT by Martov (2021) aimed to evaluate the efficacy of super pulse thulium fiber laser (SP TFL) and compare it to Ho:YAG for ureterolithotripsy. Inclusion criteria were: single stone, signed informed consent and able and willing to undergo one-month follow-up evaluation. Patients with multiple calculi, upper tract anomalies and conditions preventing laser ureteroscopy were excluded. Of the 174 patients included in the study 87 were treated with SP TFL and 87 with Ho:YAG. Mean age was 48.1 ± 5.2 years and 46.4 ± 4.3 years in the SP TFL and Ho:YAG conditions respectively and the majority of the patients were male (56%). Demographic data and stone parameters were comparable between groups. Outcome measures were operation time, endoscopic view quality, retropulsion grade, stone-free rate, and complication rate. Length of follow-up was one month.

Ulvik (2022) conducted a RCT with the objective to evaluate and compare stone free rates, operative time, complications and rate of postendoscopic ureteral stenting after URS lithotripsy with Ho:YAG and TFL. Adult patients that were scheduled to undergo URS lithotripsy for ureteral and/or renal stones (≥ 5mm) were eligible to participate. Exclusion criteria were inability to give informed consent, untreated urinary infection, anatomic abnormality, urothelial tumour(s), negative URS, direct extraction of the stone(s) without needing laser lithotripsy, and failure to reach the stone in the upper urinary tract with the ureteroscope. A total of 120 patients were included in the study, of which 60 were treated with Ho:YAG and 60 were treated with TFL. Mean age was 54 years (IQR 45 to 65) and 53 years (IQR 38 to 68) in the Ho:YAG and TFL condition respectively. Patients were predominantly male, 65% in the Ho:YAG and 63% in the TFL condition. No baseline differences were detected between study arms. Length of follow-up was three months.

Results

1. Stone-free rate

The outcome measure stone-free rate (SFR) was reported in both studies (Martov, 2021 and Ulvik 2022). Martov (2021) determined SFR at one month follow-up by low-dose control noncontrast CT and Ulvik (2022) at three-month follow-up by noncontrast CT. One study (Ulvik, 2022) used two definitions of SFR based on the radiological findings: 1) zero residual fragments and 2) no residual fragments (≥ 3mm). Martov (2021) did not report this

distinction and defined stone-free rate as no residual fragments ≥ 3mm. The pooled results are presented in Figure 1, using definition 2 as reported by Ulvik (2022) (no residual fragments ≥ 3mm).

In total 146 patients were treated through TFL and 147 patients were treated through Ho:YAG. The RR was 0.22 (95% CI 0.09 to 0.52) (*p*=0.0006) in favour of TFL (Figure 1).

Figure 1 Stone-free rate*, comparison TFL versus Ho:YAG

*Presented as cases with residual stones

In the study by Ulvik (2022) SFR, defined as zero residual fragments was, 47% and 34% in the TFL and Ho:YAG condition respectively (*p*=0.006, adjusted for stratification factors). This was lower than SFR when defined as no residual fragments (≥ 3mm) with 54% and 40% in the TFL and Ho:YAG condition respectively (*p*=0.001, adjusted for stratification factors).

In addition to the two definitions of stone-free rate, Ulvik (2022) presented stone-free rates for ureteral- and renal stones for the TFL and Ho:YAG conditions. Stone-free rate was 100% for ureteral stones for both lasers. For renal stones, stone-free rate was significantly higher after TFL than after Ho:YAG, regardless of the stone-free rate definition.

2. Re-intervention

Re-intervention as reported by Martov (2021) was performed in five cases that received Ho:YAG treatment (n= 87), one month after the initial treatment. Of these cases two were treated with extracorporeal shockwave lithotripsy and three were treated with flexible ureteroscopy. Re-intervention was not necessary in the TFL condition (n=87).

3. Complication rate

Martov (2021) and Ulvik (2022) both reported on the outcome measure complications rate. It was not possible to pool the results due to different categorization of complications between studies. In the RCT by Martov (2021) complication rate was 15% in the TFL condition and 33% in the Ho:YAG condition (n= 87 for both treatments). Reported complications were ureteral perforation, fragment migration, bleeding, fever + antibiotics (Clavien-Dindo Grade II) and fever + stent (Clavien-Dindo Grade III). The study by Ulvik (2022) treated 59 patients through TFL in which 8% experienced minor adverse events intraoperatively (bleeding impairing vision, perforation, and mucosal abrasion) and 3.4% experienced postoperative complications (Clavien-Dindo grade 1). In the 60 patients treated through Ho:YAG, 16% experienced intraoperative complications (*p*= 0.011, adjusted for stratification, in favour of TFL) and 3.3% experienced postoperative complications (*p*= 1).

4. Patient comfort

No studies reported on the outcome patient comfort.

5. Operation time

The outcome measure operation time was reported in both studies (Martov, 2021 and Ulvik, 2022). Pooling of the results was not possible due to missing standard deviations in one study. Martov (2021) reported a mean (± SD) operation time of 24.7 ± 0.7 minutes and 32.4 ± 0.7 minutes in the TFL and Ho:YAG conditions respectively (n=87 per condition) (*p*= <0.05, in favour of TFL). Ulvik (2022) reported a shorter operation time with TFL than Ho:YAG. Mean (IQR) operation time of 49 minutes (32 to 63) compared to 57 minutes (45 to 70) (n= 59 and 60) (*p*= 0.008).

6. Length of hospital stay

Length of hospital stay was reported by Martov (2021) and Ulvik (2022). Pooling the results was not possible due to divergent reporting. Martov (2021) reported a mean (± SD) hospital stay of 2.4 ± 0.1 in the TFL- (n= 87) and 3.2 ± 0.1 days in the Ho:YAG condition (n= 87) (*p*= <0.05, in favour of TFL). In the study by Ulvik (2022) 92% of the patients in the TFL condition (n= 59) and 83% in the Ho:YAG condition (n=60) were discharged on the same day as their surgery (*p*= 0.3). The rest of the patients were discharged the next day.

7. Costs

No studies reported on the outcome measure costs.

Level of evidence of the literature

Randomized controlled trials start at GRADE high.

The level of evidence regarding the outcome measure **stone-free rate** was downgraded to GRADE very low. Two levels because of study limitations (risk of bias; doubts about blinding); and one level for number of included patients (imprecision).

The level of evidence regarding the outcome measure **re-intervention** was downgraded to GRADE very low. Two levels for because of study limitations (risk of bias; doubts about blinding); and one level for number of included patients (imprecision).

The level of evidence regarding the outcome measure **complication rate** was downgraded to GRADE very low. Two levels because of study limitations (risk of bias; doubts about blinding); and one level for number of included patients (imprecision).

The level of evidence regarding the outcome measure **patient comfort** could not be assessed as the included studies did not report on this outcome measure.

The level of evidence regarding the outcome measure **operation time** was downgraded to GRADE very low. Two levels because of study limitations (risk of bias; doubts about blinding); inconsistency); and one level for number of included patients (imprecision).

The level of evidence regarding the outcome measure **length of hospital stay** was downgraded to GRADE very low. Two levels because of study limitations (risk of bias; doubts about blinding); and one level for number of included patients (imprecision).

The level of evidence regarding the outcome measure **costs** could not be assessed as the included studies did not report on this outcome measure.

Conclusions

Very low GRADE	It is uncertain what the effects of treatment with TFL compared to Ho:YAG are on stone-free rate in patients with urolithiasis. *Sources: Martov, 2021 & Ulvik, 2022*

Very low GRADE	It is uncertain what the effects of treatment with TFL compared to Ho:YAG are on re-intervention in patients with urolithiasis. *Sources: Martov, 2021*

Very low GRADE	It is uncertain what effects of treatment with TFL compared to Ho:YAG are on complication rate in patients with urolithiasis. *Sources: Martov, 202 & Ulvik, 2022*

No GRADE	The effects of treatment with TFL compared to Ho:YAG in patients with urolithiasis on patient comfort are unknown. None if the studies reported on patient comfort.

Very low GRADE	It is uncertain what the effect of treatment through TFL compared to Ho:YAG is on operation time in patients with urolithiasis. *Sources: Martov, 2021 & Ulvik, 2022*

Very low GRADE	It is uncertain what effects of treatment with TFL compared to Ho:YAG are on length of hospital stay in patients with urolithiasis. *Sources: Martov, 2021 & Ulvik, 2022*

No GRADE	The effects of treatment with TFL compared to Ho:YAG in patients with urolithiasis on costs are unknown. None if the studies reported on costs.

Overwegingen – van bewijs naar aanbeveling

Voor- en nadelen van de interventie en de kwaliteit van het bewijs

Er zijn twee gerandomiseerde studies gevonden, een van hoge en een van lage kwaliteit, die rapporteren over de uitkomstmaten percentage steenvrij, re-interventie, complicaties, operatietijd en opnameduur. Er zijn geen studies gevonden die rapporteren over de uitkomstmaten patiënt comfort en kosten. Voor het percentage steenvrij en re-interventie lijkt het erop dat behandeling met TFL gunstiger is dan behandeling met Ho:YAG. Voor de overige uitkomstmaten (complicaties, operatietijd, opnameduur) is de bewijskracht te laag om uitspraken over de richting van het effect te doen. Er worden opvallend veel bijwerkingen genoemd bij de TFL. Echter ook hier geldt dat de data niet sufficiënt genoeg is om hier een uitspraak over te doen.

Aanbeveling

Rationale van de aanbeveling: weging van argumenten voor en tegen de interventies

Er is op dit moment te weinig bekend over het effect van de TFL t.o.v. de Ho:YAG bij de behandeling van urolithiasis. De TFL lijkt sneller een hogere kans op steenvrij te geven, echter de data hiervoor is vooralsnog summier.

De werkgroep kan op dit geen aanbeveling doen met een voorkeur voor een bepaalde type laser.

Geen aanbeveling.

Kennislacunes

What is the superior laser technique for retrograde surgery in patients with urolithiasis?
Er is meer onderzoek van hogere kwaliteit nodig over de bovenstaande vraag.

Literatuur

Martov, A. G., Ergakov, D. V., Guseynov, M., Andronov, A. S., & Plekhanova, O. A. (2021). Clinical comparison of super pulse thulium fiber laser and high-power holmium laser for ureteral stone management. *Journal of Endourology*, *35*(6), 795-800.

Ulvik, Ø., Æsøy, M. S., Juliebø-Jones, P., Gjengstø, P., & Beisland, C. (2022). Thulium fibre laser versus holmium: YAG for ureteroscopic lithotripsy: outcomes from a prospective randomised clinical trial. *European Urology*.

Bijlagen bij modules

Bijlagen bij module 1 Radiologisch beleid –toegevoegde waarde van de dual energy CT-scan

Implementatieplan

Aanbeveling	Tijdspad voor implementatie: <1 jaar, 1-3 jaar of >3 jaar	Verwacht effect op kosten	Randvoorwaarden voor implementatie (binnen aangegeven tijdspad)	Mogelijke barrières voor implementatie[1]	Te ondernemen acties voor implementatie[2]	Verantwoordelijken voor acties[3]	Overige opmerkingen
Overweeg een DECT in geval van vermoeden van urinezuursteenlijden.	<1 jaar	Blijven gelijk aan de vorige situatie	Dissemination van de richtlijn	beschikbaarheid van deze techniek	Dissemination van de richtlijn	NVU, NVVR	

[1] Barrières kunnen zich bevinden op het niveau van de professional, op het niveau van de organisatie (het ziekenhuis) of op het niveau van het systeem (buiten het ziekenhuis). Denk bijvoorbeeld aan onenigheid in het land met betrekking tot de aanbeveling, onvoldoende motivatie of kennis bij de specialist, onvoldoende faciliteiten of personeel, nodige concentratie van zorg, kosten, slechte samenwerking tussen disciplines, nodige taakherschikking, etc.

[2] Denk aan acties die noodzakelijk zijn voor implementatie, maar ook acties die mogelijk zijn om de implementatie te bevorderen. Denk bijvoorbeeld aan controleren aanbeveling tijdens kwaliteitsvisitatie, publicatie van de richtlijn, ontwikkelen van implementatietools, informeren van ziekenhuisbestuurders, regelen van goede vergoeding voor een bepaald type behandeling, maken van samenwerkingsafspraken.

[3] Wie de verantwoordelijkheden draagt voor implementatie van de aanbevelingen, zal tevens afhankelijk zijn van het niveau waarop zich barrières bevinden. Barrières op het niveau van de professional zullen vaak opgelost moeten worden door de beroepsvereniging. Barrières op het niveau van de organisatie zullen vaak onder verantwoordelijkheid van de ziekenhuisbestuurders vallen. Bij het oplossen van barrières op het niveau van het systeem zijn ook andere partijen, zoals de NZA en zorgverzekeraars, van belang.

Evidencetabellen

Research question:

Study reference	Study characteristics	Patient characteristics	Index test (test of interest)	Reference test	Follow-up	Outcome measures and effect size	Comments
Bonatti, 2017	Type of study[2]: Retrospective in vivo study Setting and country: October 2012– April 2014. Italy Funding and conflicts of interest: This study did not receive any funding. All the authors declare that they do not have any conflict of interest.	Inclusion criteria: -Presence of renal stones at CT(97/215 patients) and; -Stones extraction or expulsion within 1 month from the CT examination with subsequent stone analysis by means of infrared spectroscopy (32/97). Exclusion criteria: -Incomplete CT examination (1/32 patients) and; -Poor image quality, because of motion artefacts (1/32 patients). N=30 Prevalence: Not reported Mean age ± SD: 56 years (range 34–86) Sex: 60% M / 40% F Other important	Describe index test: dual energy CT: 100/Sn140 kV dual-energy scan Second-generation dual-Source CT scanner (Somatom Definition Flash; Siemens Healthcare, Forchheim, Germany) equipped with a tin filter on the high-energy tube (Sn) for separation between the high- and low-energy spectra Cut-off point(s): Not reported Comparator test[3]: 'regular' single-energy CT: 120 kV preliminary 120 kV single-energy low-dose scan of the abdomen, from the upper renal poles to the pelvic floor Cut-off point(s):	Describe reference test[4]: Infrared spectroscopy analysis Cut-off point(s): Not reported	Time between the index test and reference test: Not reported For how many participants were no complete outcome data available? 0 (%) Reasons for incomplete outcome data described?	Outcome measures and effect size (include 95%CI and p-value if available)[4]: **Recognition of uric acid stones:** <u>Single-energy CT (%)</u> Sensitivity: 94.12 Specificity: 72.73 PPV: 64 NPV: 96 Accuracy: 80 <u>Dual-energy CT (%)</u> Sensitivity: 100 Specificity: 93.4 PPV: 89.47 NPV: 100 Accuracy: 96 **Radiation exposure:** Not reported **Prevention of surgery:** Not reported **Time to healing:** Not reported **Cost:** Not reported	Limitations: Our study population was relatively small, because stone analysis by means of infrared spectroscopy was not available for the majority of patients, in which CT showed the presence of urinary calculi.

[2] In geval van een case-control design moeten de patiëntkarakteristieken per groep (cases en controls) worden uitgewerkt. NB; case control studies zullen de accuratesse overschatten (Lijmer et al., 1999)

[3] Comparator test is vergelijkbaar met de C uit de PICO van een interventievraag. Er kunnen ook meerdere tests worden vergeleken. Voeg die toe als comparator test 2 etc. Let op: de comparator test kan <u>nooit</u> de referentiestandaard zijn.

[4] De referentiestandaard is de test waarmee definitief wordt aangetoond of iemand al dan niet ziek is. Idealiter is de referentiestandaard de Gouden standaard (100% sensitief en 100% specifiek). Let op! dit is niet de "comparison test/index 2".

[4] Beschrijf de statistische parameters voor de vergelijking van de indextest(en) met de referentietest, en voor de vergelijking tussen de indextesten onderling (als er twee of meer indextesten worden vergeleken).

Study reference	Study characteristics	Patient characteristics	Index test (test of interest)	Reference test	Follow-up	Outcome measures and effect size	Comments
		characteristics: -	Not reported				
Jepperson, 2014	Type of study: A comparative study Setting and country: USA Funding and conflicts of interest: Grant from the National Institutes of Health (Mayo Clinic Urology Research Centre grant DK 83007) and the Mayo Clinic. The authors declare that they have no Conflict of Interest.	Inclusion criteria: Not reported Exclusion criteria: Not reported N= 16 Prevalence: 15 non uric-acid (UA) and 1 UA (6%), reflective of the population prevalence of 5–8% UA calculi. Mean age ± SD: Not reported Sex: % M / % F Not reported Other important characteristics:	Describe index test: Dual-Energy Computed Tomography (DECT) Cut-off point(s): Not reported Comparator test: Hounsfield Unit (HU) measurements Cut-off point(s): Not reported	Describe reference test: Not reported Cut-off point(s): Not reported	Time between the index test and reference test: Not reported For how many participants were no complete outcome data available? Not reported N (%) Reasons for incomplete outcome data described? Not reported	Outcome measures and effect size (include 95%CI and p-value if available): **Diagnostic accuracy:** DECT: Image interpretation 100% (day 1) and 94% (day 2); predicted stone composition 100% (day 1) and 73% (day 2). Overall accuracy: 87% HU: Image interpretation 97% (day 1) and 91% (day 2); predicted stone composition was 45% accurate on both days Overall accuracy: 45% **Prevention of surgery:** Not reported **Time to healing:** Not reported **Cost:** Not reported	-
Jepperson, 2015	Type of study: in vivo retrospective cohort study	Inclusion criteria: patients with suspected urolithiasis	Describe index test: Dual-energy computed tomography (DECT)	Describe reference test: No reference test	Time between the index test and reference test: 2 years	Outcome measures and effect size (include 95%CI and p-value if available):	

Study reference	Study characteristics	Patient characteristics	Index test (test of interest)	Reference test	Follow-up	Outcome measures and effect size	Comments
	Setting and country: May 2012-December 2012. USA Funding and conflicts of interest: Grant from the National Institutes of Health (Mayo Clinic Urology Research Centre grant DK 83007) and the Mayo Clinic. No competing financial interests exist.	Exclusion criteria: Not reported N=65 Prevalence: Not reported Average age: 59.6 years (range 31–86) Sex: 62% M / 38% F Other important characteristics: -	Cut-off point(s): Not reported Comparator test: standard single-energy CT (SECT), low-dose renal stone protocol single-energy CT (LDSECT) Cut-off point(s): Not reported	Cut-off point(s): Not reported	For how many participants were no complete outcome data available? 39 (60%) Reasons for incomplete outcome data described? stone material was available for 16 patients	**Diagnostic accuracy:** DECT :15/16 patients (93%) **Radiation exposure:** DECT performed at 80/140 kVp and 100/140 kVp did not produce a significant difference in radiation exposure compared with LDSECT (p = 0.09 and 0.18, respectively). DECT performed at 80/140 kVp and 100/ 140 kVp produced an average 40% and 31%, respectively, reduction in radiation exposure compared with SECT (p < 0.001). **Prevention of surgery:** Not reported **Time to healing:** Not reported **Cost:** Not reported	
Wisenbaugh, 2014	Type of study: blinded, prospective in vitro	Inclusion criteria: large enough stones to allow analysis	Describe index test: dual-energy CT (DECT), fast-switched kilovolt DECT at 80 and 140	Describe reference test: Not reported	Time between the index test and reference test:	Outcome measures and effect size (include 95%CI and p-value if available):	-

Study reference	Study characteristics	Patient characteristics	Index test (test of interest)	Reference test	Follow-up	Outcome measures and effect size	Comments
	Setting and country: USA Funding and conflicts of interest: The authors declare that they have no relevant financial interests.	Exclusion criteria: Stones sized <3 mm N= 27 stones Prevalence: Not reported Mean age ± SD: Not reported Sex: % M / % F Not reported Other important characteristics:	kilovolt peak (kV[p] Cut-off point(s): Not reported Comparator test: conventional computed tomography (CT), 120 kilovolt peak (kV[p]) Cut-off point(s): Not reported	Cut-off point(s): Not reported	Not reported For how many participants were no complete outcome data available? N (%) Not reported Reasons for incomplete outcome data described? Not reported	**Diagnostic accuracy:** SECT: 14/27(52%) DECT: 2027 (74%) **Radiation exposure:** Not reported **Prevention of surgery:** Not reported **Time to healing:** Not reported **Cost:** Not reported	

Risk of bias table

Study reference	Patient selection	Index test	Reference standard	Flow and timing	Comments with respect to applicability
Bonatti 2017	Was a consecutive or random sample of patients enrolled? Yes Was a case-control design avoided? Yes Did the study avoid inappropriate exclusions? Yes	Were the index test results interpreted without knowledge of the results of the reference standard? Unclear If a threshold was used, was it pre-specified? Unclear	Is the reference standard likely to correctly classify the target condition? Unclear Were the reference standard results interpreted without knowledge of the results of the index test? Unclear	Was there an appropriate interval between index test(s) and reference standard? Yes Did all patients receive a reference standard? No Did patients receive the same reference standard? No Were all patients included in the analysis? Yes	Are there concerns that the included patients do not match the review question? No Are there concerns that the index test, its conduct, or interpretation differ from the review question? No Are there concerns that the target condition as defined by the reference standard does not match the review question? No
	CONCLUSION: Could the selection of patients have introduced bias? **RISK: LOW**	CONCLUSION: Could the conduct or interpretation of the index test have introduced bias?	CONCLUSION: Could the reference standard, its conduct, or its interpretation	CONCLUSION Could the patient flow have introduced bias? **RISK: HIGH**	

Study reference	Patient selection	Index test	Reference standard	Flow and timing	Comments with respect to applicability
		RISK: UNCLEAR	have introduced bias? **RISK: UNCLEAR**		
Jepperson 2014	Was a consecutive or random sample of patients enrolled? Yes Was a case-control design avoided? Yes Did the study avoid inappropriate exclusions? Yes	Were the index test results interpreted without knowledge of the results of the reference standard? Unclear If a threshold was used, was it pre-specified? Unclear	Is the reference standard likely to correctly classify the target condition? Unclear Were the reference standard results interpreted without knowledge of the results of the index test? Unclear	Was there an appropriate interval between index test(s) and reference standard? Unclear Did all patients receive a reference standard? Yes Did patients receive the same reference standard? Yes Were all patients included in the analysis? Yes	Are there concerns that the included patients do not match the review question? No Are there concerns that the index test, its conduct, or interpretation differ from the review question? No Are there concerns that the target condition as defined by the reference standard does not match the review question? No
	CONCLUSION: Could the selection of patients have introduced bias? **RISK: LOW**	CONCLUSION: Could the conduct or interpretation of the index test have introduced bias? **RISK: UNCLEAR**	CONCLUSION: Could the reference standard, its conduct, or its interpretation have introduced bias? **RISK: UNCLEAR**	CONCLUSION Could the patient flow have introduced bias? **RISK: LOW**	
Jepperson 2015	Was a consecutive or random sample of patients enrolled? Yes Was a case-control design avoided? Yes Did the study avoid inappropriate exclusions? Unclear	Were the index test results interpreted without knowledge of the results of the reference standard? Unclear If a threshold was used, was it pre-specified? Unclear	Is the reference standard likely to correctly classify the target condition? Unclear Were the reference standard results interpreted without knowledge of the results of the index test? Unclear	Was there an appropriate interval between index test(s) and reference standard? Unclear Did all patients receive a reference standard? No Did patients receive the same reference standard? No Were all patients included in the analysis? Yes	Are there concerns that the included patients do not match the review question? Yes/No/Unclear Are there concerns that the index test, its conduct, or interpretation differ from the review question? Yes/No/Unclear Are there concerns that the target condition as defined by the reference standard does not match the review question? Yes/No/Unclear

Study reference	Patient selection	Index test	Reference standard	Flow and timing	Comments with respect to applicability
	CONCLUSION: Could the selection of patients have introduced bias? **RISK: LOW**	CONCLUSION: Could the conduct or interpretation of the index test have introduced bias? **RISK: UNCLEAR**	CONCLUSION: Could the reference standard, its conduct, or its interpretation have introduced bias? **RISK: UNCLEAR**	CONCLUSION Could the patient flow have introduced bias? **RISK: HIGH**	
Wisenbaugh 2014	Was a consecutive or random sample of patients enrolled? Unclear Was a case-control design avoided? Unclear Did the study avoid inappropriate exclusions? Unclear	Were the index test results interpreted without knowledge of the results of the reference standard? Yes If a threshold was used, was it pre-specified? Unclear	Is the reference standard likely to correctly classify the target condition? Yes Were the reference standard results interpreted without knowledge of the results of the index test? Yes	Was there an appropriate interval between index test(s) and reference standard? Unclear Did all patients receive a reference standard? Yes Did patients receive the same reference standard? Yes Were all patients included in the analysis? Yes	Are there concerns that the included patients do not match the review question? No Are there concerns that the index test, its conduct, or interpretation differ from the review question? No Are there concerns that the target condition as defined by the reference standard does not match the review question? No
	CONCLUSION: Could the selection of patients have introduced bias? **RISK: UNCLEAR**	CONCLUSION: Could the conduct or interpretation of the index test have introduced bias? **RISK: LOW**	CONCLUSION: Could the reference standard, its conduct, or its interpretation have introduced bias? **RISK: LOW**	CONCLUSION Could the patient flow have introduced bias? **RISK: LOW**	

Table of excluded studies

Author and year	Reason for exclusion
Acharya, 2015	Wrong comparison: no comparison with single-energy CT, only dual-energy CT
Ananthakrishnan, 2018	Wrong comparison: dual-layer spectral detector CT (SDCT) vs dual-source dual-energy CT (dsDECT)
Andrabi, 2015	Wrong study design: narrative review
Apfaltrer, 2020	Right comparison: dual-energy CT with dual-source CT vs dual-source CT using single energy?
Basha, 2018	Wrong comparison: dual-energy CT vs chemical analysis
Cheng, 2016	Article in Chinese
Dawoud, 2017	Standard low-dose renal stone CT was performed, but based on full text no comparison between single-energy CT and dual-energy CT. Comparison between dual-energy CT and crystallography

Duan, 2015	Wrong comparison: no comparison with single-energy CT, only dual-energy CT
Ferrandino, 2010	Wrong comparison: no comparison with single-energy CT, only dual-energy CT
Franken, 2018	Wrong comparison: dual-energy CT at reduced vs standard radiation dose
Große Hokamp, 2020	Wrong comparison: dual-energy CT and machine learning
Habashy, 2016	Wrong comparison: no comparison with single-energy CT, only dual-energy CT
Ilyas, 2018	Wrong comparison: dual-energy CT vs postextraction analysis
Jendeberg, 2021	Wrong intervention: three single-energy CT methods used as index tests
Jendeberg, 2021	Duplicate
Khanduri, 2020	Wrong comparison: dual-energy CT vs laboratory analysis
Kulkarni, 2013	Wrong comparison: no comparison with single-energy CT, only dual-energy CT
Lam, 2021	Wrong comparison: third-generation dual-energy CT vs second-generation dual-energy CT
Lombardo, 2017	Wrong comparison: dual-energy CT vs laboratory results
Manglaviti, 2011	Wrong comparison: dual-energy CT vs crystallography
Martov, 2017	Article in Russian
McGrath, 2020	Wrong comparison: no comparison with single-energy CT, only dual-energy CT
Mella Mohd Ali, 2020	Wrong comparison: dual-energy CT with vs without tin or stannum filter
Morsbach, 2014	Wrong comparison: no comparison with single-energy CT, only dual-energy CT
Mussmann, 2021	Single source CT and dual energy CT both mentioned in abstract. Full text: comparison between standard single energy CT (standard helical) and dual energy CT? Renal stones removed from patients (ex vivo study)
Nakhostin, 2021	Wrong comparison: comparison different dual-energy CTs
Nourian, 2021	Wrong study design: narrative review
Qu, 2015	Wrong comparison: different radiation dose reductions of dual-energy CT
Rompsaithong, 2019	Wrong comparison: dual-energy CT vs postoperative stone analysis
Strittmatter, 2013	Article in German
Villa, 2016	Wrong study design: narrative review
Wang, 2015	Wrong intervention: no dual-energy CT
Yu, 2021	Wrong comparison: no comparison with single-energy CT, only dual-energy CT
Zhang, 2016	Wrong comparison: dual-energy CT vs infrared spectroscopy after surgery
Zheng, 2016	Wrong comparison: no comparison with single-energy CT, only dual-energy CT
Zilberman, 2010	Wrong comparison: no comparison with single-energy CT, only dual-energy CT

Zoekverantwoording
Algemene informatie

Richtlijn: NVU herziening nierstenen	
Uitgangsvraag: Heeft dual energy CT in vergelijking met 'gewone' mono-energy CT de voorkeur bij de diagnose van urinezuurstenen bij volwassen patiënten met steenlijden?	
Database(s): Ovid/Medline, Embase	Datum: 21-3-2022
Periode: 2010-	Talen: nvt
Literatuurspecialist: Ingeborg van Dusseldorp	
BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting: Voor deze vraag is gezocht met de volgende elementen: Urolithiasis EN DECT. Alle sleutelartikelen worden gevonden.	
Te gebruiken voor richtlijnen tekst: In de databases Embase en Ovid/Medline is op 21-3-2022 met relevante zoektermen gezocht naar systematische reviews, RCTs, observationele en diagnostische studies over dual energy CT bij patiënten met steenlijden. De literatuurzoekactie leverde 199 unieke treffers op.	

5 ***Zoekopbrengst***

	EMBASE	**OVID/MEDLINE**	**Ontdubbeld**
SRs	9	4	9
RCTs	9	7	9
Observationele studies	109	74	118
Diagnostische studies	52	56	63
Totaal			199

Zoekstrategie

Embase

No.	Query	Results
#2	#21 AND #23	**4**
#2	#10 OR #11 OR #12 OR #13	**179**

No.	Query	Results
#2	#4 AND #21	**4**
#2	#17 OR #18 OR #19 OR #20	**4**
#2	30076456	**1**
#1	diagnostic AND accuracy AND of AND 'dual energy' AND computed AND tomography AND dect AND to AND differentiate AND uric AND from AND 'non uric' AND acid AND calculi AND systematic AND review AND 'meta analysis' AND mcgrath	**1**
#1	'dual energy' AND computed AND tomography AND for AND characterizing AND urinary AND calcified AND uric AND acid AND calculi AND zheng	**1**
#1	renal AND stones AND composition AND in AND vivo AND determination AND bonatti	**1**
#1	#13 NOT #12 NOT #11 NOT #10 Diagnostisch	**52**
#1	#12 NOT #11 NOT #10 OBS	**109**
#1	#11 NOT #10 RCT	**9**
#1	#4 AND #9	**153**
#1	#4 AND (#7 OR #8)	**122**
#1	#4 AND #6	**11**
#1	#4 AND #5 SR	**9**
#9	'sensitivity and specificity'/de OR sensitiv*:ab,ti OR specific*:ab,ti OR predict*:ab,ti OR 'roc curve':ab,ti OR 'receiver operator':ab,ti OR 'receiver operators':ab,ti OR likelihood:ab,ti OR 'diagnostic error'/exp OR 'diagnostic accuracy'/exp OR 'diagnostic test accuracy study'/exp OR 'inter observer':ab,ti OR 'intra observer':ab,ti OR interobserver:ab,ti OR intraobserver:ab,ti OR validity:ab,ti OR kappa:ab,ti OR reliability:ab,ti OR reproducibility:ab,ti OR ((test NEAR/2 're-test'):ab,ti) OR ((test NEAR/2 'retest'):ab,ti) OR 'reproducibility'/exp OR accuracy:ab,ti OR 'differential diagnosis'/exp OR 'validation study'/de OR 'measurement precision'/exp OR 'diagnostic	**9079884**

No.	Query	Results
	value'/exp OR 'reliability'/exp OR 'predictive value'/exp OR ppv:ti,ab,kw OR npv:ti,ab,kw	
#8	'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR ((('or' OR 'rr') NEAR/6 ci):ab)))	**12970458**
#7	'major clinical study'/de OR 'clinical study'/de OR 'case control study'/de OR 'family study'/de OR 'longitudinal study'/de OR 'retrospective study'/de OR 'prospective study'/de OR 'comparative study'/de OR 'cohort analysis'/de OR ((cohort NEAR/1 (study OR studies)):ab,ti) OR (('case control' NEAR/1 (study OR studies)):ab,ti) OR (('follow up' NEAR/1 (study OR studies)):ab,ti) OR (observational NEAR/1 (study OR studies)) OR ((epidemiologic NEAR/1 (study OR studies)):ab,ti) OR (('cross sectional' NEAR/1 (study OR studies)):ab,ti)	**6767914**
#6	'randomized controlled trial'/exp OR random*:ti,ab OR (((pragmatic OR practical) NEAR/1 'clinical trial*'):ti,ab) OR ((('non	**1839814**

No.	Query	Results
	inferiority' OR noninferiority OR superiority OR equivalence) NEAR/3 trial*):ti,ab) OR rct:ti,ab,kw	
#5	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	**733409**
#4	#3 AND [1-1-2010]/sd NOT ('conference abstract'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it) NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp)	**225**
#3	#1 AND #2	**353**
#2	'dual energy computed tomography'/exp OR ((dual NEAR/3 (energy OR source OR spectral) NEAR/2 (ct OR computed)):ti,ab,kw) OR dect:ti,ab,kw OR 'spectral computed tomography'/exp OR 'spectral computer assisted tomography'/exp	**7985**
#1	'urolithiasis'/exp OR 'urethra stone'/exp OR 'ureter obstruction'/exp OR 'ureteropelvic junction obstruction'/exp OR 'urethra obstruction'/exp OR 'urinary tract obstruction'/de OR (((kidney OR urologic* OR renal OR urinary OR uret* OR urine OR coral OR uro) NEAR/3 (calculi OR calculus OR lithias* OR stone* OR colic* OR obstruct*)):ti,ab,kw) OR urocalculo*:ti,ab,kw OR urol?t*:ti,ab,kw OR nephrolit*:ti,ab,kw OR renolit*:ti,ab,kw OR urocalcul*:ti,ab,kw OR rirs:ti,ab,kw OR 'retrograde intrarenal surg*':ti,ab,kw OR 'retrograde intra renal surg*':ti,ab,kw OR ureteroscop*:ti,ab,kw OR 'ureteropyeloscop*':ti,ab,kw OR 'pyeloureteroscop*':ti,ab,kw	**126148**

Ovid/Medline

#	Searches	Results
17	14 not 13 not 12 not 11 Diagnostisch	56
16	13 not 12 not 11 OBS	74
15	12 not 11 RCT	7
14	5 and 10	120
13	5 and (8 or 9)	80
12	5 and 7	8
11	5 and 6 SR	4
10	exp "Sensitivity and Specificity"/ or (Sensitiv* or Specific*).ti,ab. or (predict* or ROC-curve or receiver-operator*).ti,ab. or (likelihood or LR*).ti,ab. or exp Diagnostic Errors/ or (inter-observer or intra-observer or interobserver or intraobserver or validity or kappa or reliability).ti,ab. or reproducibility.ti,ab. or (test adj2 (re-test or retest)).ti,ab. or "Reproducibility of Results"/ or accuracy.ti,ab. or Diagnosis, Differential/ or Validation Study/	7296578
9	Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.))	5110085

8	Epidemiologic studies/ or case control studies/ or exp cohort studies/ or Controlled Before-After Studies/ or Case control.tw. or cohort.tw. or Cohort analy$.tw. or (Follow up adj (study or studies)).tw. or (observational adj (study or studies)).tw. or Longitudinal.tw. or Retrospective*.tw. or prospective*.tw. or consecutive*.tw. or Cross sectional.tw. or Cross-sectional studies/ or historically controlled study/ or interrupted time series analysis/ [Onder exp cohort studies vallen ook longitudinale, prospectieve en retrospectieve studies]	4097774
7	(exp randomized controlled trial/ or randomized controlled trials as topic/ or random*.ti,ab. or rct?.ti,ab. or ((pragmatic or practical) adj "clinical trial*").ti,ab,kf. or ((non-inferiority or noninferiority or superiority or equivalence) adj3 trial*).ti,ab,kf.) not (animals/ not humans/)	1360221
6	(meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf.) not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/))	553691
5	4 not ((exp animals/ or exp models, animal/) not humans/) not (letter/ or comment/ or editorial/)	178
4	limit 3 to yr="2010 -Current"	186
3	1 and 2	203
2	(exp Tomography, X-Ray Computed/ and dual energy.ti,ab,kf.) or ((dual adj3 (energy or source or spectral) adj2 (ct or computed)) or dect).ti,ab,kf.	6757
1	exp Urolithiasis/ or Renal Colic/ or exp Urinary Calculi/ or exp Ureteroscopy/ or Ureteral Obstruction/ or exp Urethral Obstruction/ or ((kidney or urologic* or renal or urinary or uret* or urine or coral or uro) adj3 (calcul* or lithias* or stone* or colic* or obstruct*)).ti,ab,kf. or urocalculo*.ti,ab,kf.	92584

	or urol?t*.ti,ab,kf. or nephrolit*.ti,ab,kf. or renolit*.ti,ab,kf. or urocalcul*.ti,ab,kf. or rirs.ti,ab,kf. or retrograde intrarenal surg*.ti,ab,kf. or retrograde intra renal surg*.ti,ab,kf. or ureteroscop*.ti,ab,kf. or ureteropyeloscop*.ti,ab,kf. or pyeloureteroscop*.ti,ab,kf.	

Bijlagen bij module 2 Conservatieve behandeling: de rol van buscopan IV bij koliekaanvallen

Implementatieplan

Aanbeveling	Tijdspad voor implementatie: < 1 jaar, 1 tot 3 jaar of > 3 jaar	Verwacht effect op kosten	Randvoorwaarden voor implementatie (binnen aangegeven tijdspad)	Mogelijke barrières voor implementatie[1]	Te ondernemen acties voor implementatie[2]	Verantwoordelijken voor acties[3]	Overige opmerkingen
Geef geen buscopan bij de behandeling van obstructieve urolithiasis. Doseer en titreer bij patiënten met pijn op basis van urolithiasis pijnstilling middels paracetamol, NSAID's en morfine mimetica zonder toevoeging van buscopan iv.	1-3 jaar	Minder kosten dan de vorige situatie	Dissemination van de richtlijn	Onbekend of Ingesleten gewoontes op de werkvloer (ook bij verpleegafdelingen)	Dissemination van de richtlijn, aandacht voor richtlijn in onderwijs huisartsen en SEH artsen en verpleegkundigen urologische afdelingen	NVU	

[1] Barrières kunnen zich bevinden op het niveau van de professional, op het niveau van de organisatie (het ziekenhuis) of op het niveau van het systeem (buiten het ziekenhuis). Denk bijvoorbeeld aan onenigheid in het land met betrekking tot de aanbeveling, onvoldoende motivatie of kennis bij de specialist, onvoldoende faciliteiten of personeel, nodige concentratie van zorg, kosten, slechte samenwerking tussen disciplines, nodige taakherschikking, etc.

[2] Denk aan acties die noodzakelijk zijn voor implementatie, maar ook acties die mogelijk zijn om de implementatie te bevorderen. Denk bijvoorbeeld aan controleren aanbeveling tijdens kwaliteitsvisitatie, publicatie van de richtlijn, ontwikkelen van implementatietools, informeren van ziekenhuisbestuurders, regelen van goede vergoeding voor een bepaald type behandeling, maken van samenwerkingsafspraken.

[3] Wie de verantwoordelijkheden draagt voor implementatie van de aanbevelingen, zal tevens afhankelijk zijn van het niveau waarop zich barrières bevinden. Barrières op het niveau van de professional zullen vaak opgelost moeten worden door de beroepsvereniging. Barrières op het niveau van de organisatie zullen vaak onder verantwoordelijkheid van de ziekenhuisbestuurders vallen. Bij het oplossen van barrières op het niveau van het systeem zijn ook andere partijen, zoals de NZA en zorgverzekeraars, van belang.

Evidence table for intervention studies

Study reference	Study characteristics	Patient characteristics [2]	Intervention (I)	Comparison / control (C) [3]	Follow-up	Outcome measures and effect size [4]	Comments
Weltings, 2021	Type of study: Multicenter double-blind randomized-controlled trial Setting and country: Two general hospitals in the Netherlands (between January 2018 and November 2019) Funding and conflicts of interest: A research grant was given by the science bureau of Haga teaching hospital. No conflicts of interest	Inclusion criteria: - Adults presenting with a renal colic admitted to the urological ward for analgesics when pain was not under control with oral NSAIDs - Confirmation of a renal calculus by ultrasound or CT-scan was required Exclusion criteria: - Pregnancy or lactation - Contra-indication or known allergy to any of the drugs used (NSAIDs, morphine, paracetamol) - Temperature >38.5 °C in the 24 h before inclusion or receiving antibiotics for urinary tract infection - Indication for Immediate drainage of the upper urinary tract	Describe intervention (treatment/procedure/test): Butylscopolamine 100 mg/24 h via intravenous continuous infusion For both intervention and control: All patients were given 1000 mg oral paracetamol four times daily and 50 mg oral diclofenac three times daily. They also received oral tamsulosin 0.4 mg once daily. Escape analgesics consisted of piritramide 15 mg subcutaneously as needed up to a maximum of five times. An IV anti-emetic was prescribed as needed.	Describe control (treatment/procedure/test): Placebo (saline)	Length of follow-up: Mean follow-up was 68 days in butylscopolamine group and 60 days in placebo group. Loss-to-follow-up: 128 patients were randomized and data of 124 patients were available for analysis. Three of the four patients that were excluded after randomization developed fever soon after admission and required urgent upper tract drainage. The fourth patient withdrew for personal reasons. Incomplete outcome data: Not reported	Outcome measures and effect size (include 95% CI and p-value if available): *Reduction in pain (measured with Numeric Rating Scale)* Both groups showed a similar decrease in pain over time *Side effects* Side effects were reported by 24 patients with no statistical differences between the groups *Surgical interventions necessary for ongoing pain* No surgical interventions for ongoing pain during the study period	Author's conclusion Placebo is non-inferior to continuous IV butylscopolamine for pain relief in patients with renal colic. Based on this study and previous evidence, there is no role for continuous butylscopolamine IV in the treatment of renal colic.

		N total at baseline: Intervention: 62 Control: 62 Important prognostic factors[2]: *Age ± SD: I: 49 ± 14 C: 45 ± 15* *Sex: I: 44 (71%) M C: 41 (66%) M* Groups were comparable at baseline					
Song, 2011	Type of study: Prospective, randomized, controlled, double-blind clinical trial Setting and country: Adult emergency department of a tertiary-care urban academic hospital in Bundang, Korea between 1 November 2007 to 30 December 2008. Funding and conflicts of interest: No funding or	Inclusion criteria: - Patients with a clinical presentation of 'typical renal colic' rather than 'confirmed urinary stone by CT scan' - Patients presenting to the emergency department who were at least 18 years of age whose flank pain was consistent with an abrupt onset of severe paroxysmal unilateral location Exclusion criteria: - Patient pain rating <5 on a 10 cm visual	Describe intervention (treatment/procedure/test): Placebo (50 mL of normal saline) For both intervention and control: All patients received standard treatment defined as 1 L of normal saline hydration at 240 mL per hour, 30 mg ketorolac i.v. and 5 mg morphine i.v. over 5 min at time zero.	Describe control (treatment/procedure/test): Butylscopolammonium bromide 20 mg i.v. diluted with 50 mL of normal saline	Length of follow-up: 40 minutes Loss-to-follow-up: No loss-to-follow-up Incomplete outcome data: No incomplete outcome data	Outcome measures and effect size (include 95% CI and p-value if available): *Pain reduction (measured on a 10 cm VAS at time 0, 20, and 40 minutes)* Mean pain scores (±SD) 0 min: 8.4 ± 1.4 vs. 8.4 ± 1.4 p = 0.823 20 min: 3.1 ± 2.4 vs. 2.6 ± 2.4 p = 0.343 40 min: 2.5 ± 2.6 vs. 1.3 ± 1.9 p = 0.023 After 20 minutes: mean difference is -0.6 cm (95% CI -1.6 to 0.5, P = 0.287).	Author's conclusion Although the addition of BB to morphine and ketorolac appeared to show a statistically significant reduction in pain compared with morphine and ketorolac alone, a reduction of 1.2 cm on VAS is unlikely to be clinically significant.

	conflicts of interest	analogue scale (VAS) - Confirmed or suspected pregnancy - Breastfeeding - Contraindication to NSAIDs, opioids or BBs - History of peptic ulcer or renal disease - Use of analgesics within 6 h of presentation - Current use of anticoagulants - History of bleeding tendency - Suspicious surgical condition - Hemodynamic instability defined as pulse >110/min and systolic blood pressure <100 mmHg - Previous participation in the study <u>N total at baseline</u>: Intervention: 43 Control: 46 <u>Important prognostic factors</u>[2]: *Age ± SD:* *I: 41.9 ± 9.6* *C: 38.8 ± 9.8*				After 40 minutes: mean difference is -1.2 cm (95% CI -2.2 to -0.2, P = 0.024) *Adverse effects* I: 3/43 (6.9%) C: 3/46 (6.5%) *Rescue morphine (to control sustained pain)* I: 14/43 (32.6%) C: 7/46 (15.2%) OR = 0.372, 95% CI 0.133 to 1.038, p = 0.059	

		Sex: *I: 34 (79.1%) M* *C: 38 (82.6%) M* Groups were comparable at baseline					
Holdgate, 2005	Type of study: Randomized controlled trial Setting and country: Emergency Department of a tertiary teaching hospital in Australia. Funding and conflicts of interest: Not reported.	Inclusion criteria: Adult patients between age 18 and 75 years whose presenting clinical symptoms and signs consistent with renal colic as adjudged by a senior doctor and who required parenteral opioid analgesia Exclusion criteria: - Received parenteral opioid analgesia or buscopan within 4 hours before presentation - Pregnancy - Glaucoma - Urinary retention - Allergy to morphine or buscopan N total at baseline: Intervention: 91 Control: 101 Important prognostic factors[2]:	Describe intervention (treatment/procedure/test): Buscopan (20 mg intravenous Buscopan diluted to 10 ml) For both intervention and control: All patients received standardized treatment which consisted of 1 L normal saline for 2 hours, incremental doses of intravenous morphine in 2.5 mg aliquots at 5-minute intervals, 100 mg rectal indomethacin (unless stratified to no NSAID group) and the study drug/placebo.	Describe control (treatment/procedure/test): Placebo (10 ml intravenous saline)	Length of follow-up: 4 hours Loss-to-follow-up: I: 6/91 (6.6%) C: 8/101 (7.9%) 14 patients were excluded from study because of protocol violations (7 patients), inadequate recording of pain data (4 patients), withdrawal of consent (2 patients) and patient absconding before completion of trial (1 patient) Incomplete outcome data: Not reported	Outcome measures and effect size (include 95% CI and p-value if available): *Required further morphine* I: 28/85 (33%) C: 35/93 (38%) p = 0.5 *Adverse event rates (nausea/vomiting, urinary retention, and allergic reaction, or other events)* I: 15/85 (18%) C: 17 (18%) p = 0.9	Author's conclusion There is no evidence that the addition of Buscopan to standard treatment reduces the amount of opioid required to achieve initial analgesia in renal colic or the rate of pain recurrence. We do not support the use of Buscopan in the treatment of renal colic

		Age *I: 45.4* *C: 45.6* *Sex:* *I: 75% M* *C: 81% M* Groups were comparable at baseline					

Risk of bias table

Study reference (first author, publication year)	**Was the allocation sequence adequately generated?** Definitely yes Probably yes Probably no Definitely no	**Was the allocation adequately concealed?** Definitely yes Probably yes Probably no Definitely no	**Blinding: Was knowledge of the allocated interventions adequately prevented?** **Were patients blinded?** **Were healthcare providers blinded?** **Were data collectors blinded?** **Were outcome assessors blinded?** **Were data analysts blinded?** Definitely yes Probably yes Probably no Definitely no	**Was loss to follow-up (missing outcome data) infrequent?** Definitely yes Probably yes Probably no Definitely no	**Are reports of the study free of selective outcome reporting?** Definitely yes Probably yes Probably no Definitely no	**Was the study apparently free of other problems that could put it at a risk of bias?** Definitely yes Probably yes Probably no Definitely no	**Overall risk of bias** **If applicable/necessary, per outcome measure** **LOW** **Some concerns** **HIGH**
Weltings, 2021	Definitely yes Reason: Randomization of treatment was determined in advance using random numbers table.	Definitely yes Reason: Opaque sealed envelopes were used.	Definitely yes Reason: Patients, clinical staff, and investigators were blinded to the allocation. Study allocation remained blinded until completion of the entire study.	No information Reason: Loss to follow-up not specified for intervention and control group.	Probably yes Reason: All relevant outcomes were reported.	Probably no Reason: Principles of an intention-to-treat analysis were not followed because some patients were excluded after randomisation and not included in the analysis.	Some concerns
Song, 2011	Definitely yes Reason: Randomization table was used.	No information	Probably yes Reason: All patients, attending physician and clinical research nurse (who collected data) were blinded. The triage nurse (who did the	Definitely yes Reason: No loss to follow-up reported.	Probably yes Reason: All relevant outcomes were reported.	Probably no Reason: The sample size did not provide enough statistical power for analysing the secondary outcomes.	Some concerns

			randomisation) and treating nurse were not. Blinding of data analysts not reported.				
Holdgate, 2005	Definitely yes Reason: Randomization of treatment was determined in advance using a random numbers table.	Definitely yes Reason: Opaque sealed envelopes were used.	Definitely no Reason: Doctor may have inadvertently informed the patient or treating nurse which drug they had given. This may have resulted in unblinded scoring of pain scores and vital signs by patients and nurses. No identical ampoules for buscopan and placebo.	Probably yes Reason: Loss to follow-up was infrequent in intervention and control group.	Probably yes Reason: All relevant outcomes were reported.	Probably no Reason: No information provided on conflicts of interest or funding.	High

Table of excluded studies

Reference	Reason for exclusion
Afshar, 2018	Wrong comparison: no comparison Buscopan with painkiller vs painkiller alone
Anonymous, 2009	Wrong study design: narrative review
Carley, 2006	Article not traceable
Forster, 2008	Article in German
Jones, 2001	Wrong intervention: hyoscyamine sulfate instead of buscopan
Kheirollahi, 2020	Wrong comparison: intramuscular hyoscine N-butyl bromide vs intranasal desmopressin with intramuscular hyoscine N-butyl bromide
Papadopoulos, 2014	Wrong study design: narrative review
Singh, 2011	Wrong study design: narrative review
Yakoot, 2014	Wrong intervention: rectal suppositories containing ketoprofen and hyoscine butylbromide
Yencilek, 2008	Wrong comparison: hyoscine-N-butylbromide vs papaverine hydrochloride vs pethidine

Literature search strategy

Algemene informatie

Richtlijn: NVU Herziening nierstenen	
Uitgangsvraag: Wat zijn (on)gunstige effecten van intraveneuze buscopan in vergelijking met normale pijnstilling (combinatie van paracetamol, NSAID, morfinomimetica) bij opgenomen volwassenen met koliekpijn bij niersteenlijden?	
Database(s): Ovid/Medline, Embase	Datum: 28-2-2022
Periode: 2000-	Talen: nvt
Literatuurspecialist: Ingeborg van Dusseldorp	
BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting: Voor deze vraag is gezocht met de volgende elementen: Urolithiasis EN buscopan EN koliek Alhoewel het aantal gevonden referenties voor urolithiasis en buscopan te overzien is, is in overleg met de adviseur besloten om koliek toe te voegen aan de zoekstrategie omdat koliek het hoofdonderwerp is. Daarnaast worden in deze combinatie alle sleutelreferenties nog steeds gevonden.	
Te gebruiken voor richtlijnen tekst: In de databases Embase en Ovid/Medline is op 2022 met relevante zoektermen gezocht naar systematische reviews en RCTs over de effecten van intraveneuze buscopan bij opgenomen volwassenen met koliekpijn bij niersteenlijden. De literatuurzoekactie leverde 69 unieke treffers op.	

5

Zoekopbrengst

	EMBASE	OVID/MEDLINE	Ontdubbeld
SRs	19	4	21
RCTs	53	16	48

Observationele studies			
Overig			
Totaal			69

Zoekstrategie

Embase

No.	Query	Results
#49	#47 AND #48 sleutelartikelen gevonden	**4**
#48	#42 OR #43	**61**
#47	#44 OR #45 OR #46	**4**
#46	is AND there AND a AND role AND for AND antimuscarinics AND in AND renal AND colic AND holdgate	**1**
#45	hyoscine AND 'n butylbromide' AND buscopan® AND in AND the AND treatment AN D of AND acute AND ureteral AND colic	**2**
#44	the AND buscopan AND study AND weltings	**1**
#43	#39 AND #41 RCT	**53**
#42	#39 AND #40 SR	**19**
#41	'randomized controlled trial'/exp OR random*:ti,ab OR (((pragmatic OR practical) NEAR/1 'clinical trial*'):ti,ab) OR ((('non inferiority' OR noninferiority OR superiority OR equivalence) NEAR/3 trial*):ti,ab) OR rct:ti,ab,kw	**1880101**
#40	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab)	**803497**

No.	Query	Results
	OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	
#39	#38 AND [1-1-2000]/sd NOT ('conference abstract'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it) NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp)	**146**
#38	#35 AND #36 AND #37	**239**
#37	'colic'/exp OR 'kidney colic'/exp OR colic*:ti,ab,kw	**25077**
#36	'scopolamine butyl bromide'/exp OR 'spasmolytic agent'/exp OR 'muscarinic receptor blocking agent'/exp OR 'buscolysin':ti,ab,kw OR 'buscopan':ti,ab,kw OR 'buscopax':ti,ab,kw OR 'buscopoxan':ti,ab,kw OR 'scobutil':ti,ab,kw OR 'scobutyl':ti,ab,kw OR 'skf 1637':ti,ab,kw OR 'sporamin':ti,ab,kw OR butylscopolam*:ti,ab,kw OR (((hyoscin* OR hyoscein* OR hyascin* OR hyocin* OR joscin* OR bromid* OR scopolam*) NEAR/3 butyl*):ti,ab,kw)	**534962**
#35	'urolithiasis'/exp OR 'urethra stone'/exp OR (((kidney OR urologic* OR renal OR urinary OR ureteral OR urine OR coral OR uro) NEAR/3 (calcul* OR lithias* OR stone* OR obstruct*)):ti,ab,kw) OR urocalculo*:ti,ab,kw OR urolit*:ti,ab,kw OR nephrolit*:ti,ab,kw OR renolit*:ti,ab,kw	**106846**

Ovid/Medline

Search Strategy:

#	Searches	Results
10	5 and 8 RCT	16
9	5 and 7 SR	4
8	(exp randomized controlled trial/ or randomized controlled trials as topic/ or random*.ti,ab. or rct?.ti,ab. or ((pragmatic or practical) adj "clinical trial*").ti,ab,kf. or ((non-inferiority or noninferiority or superiority or equivalence) adj3 trial*).ti,ab,kf.) not (animals/ not humans/)	1355792

7	(meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf.) not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/))	550300
6	5 not ((exp animals/ or exp models, animal/) not humans/) not (letter/ or comment/ or editorial/)	23
5	limit 4 to yr="2000 -Current"	25
4	1 and 2 and 3	55
3	exp Colic/ or exp Renal Colic/ or colic*.ti,ab,kf.	16037
2	exp Scopolamine Derivatives/ or Parasympatholytics/ or exp Muscarinic Antagonists/ or buscolysin.ti,ab,kf. or buscopan.ti,ab,kf. or buscopax.ti,ab,kf. or buscopoxan.ti,ab,kf. or scobutil.ti,ab,kf. or scobutyl.ti,ab,kf. or skf 1637.ti,ab,kf. or sporamin.ti,ab,kf. or butylscopolam*.ti,ab,kf. or ((hyoscin* or hyoscein* or hyascin* or hyocin* or joscin* or bromid* or scopolam*) adj3 butyl*).ti,ab,kf.	67800
1	exp Urolithiasis/ or Urinary Bladder Calculi/ or Renal Colic/ or ((kidney or urologic* or renal or urinary or ureteral or urine or coral or uro) adj3 (calcul* or lithias* or stone* or obstruct*)).ti,ab,kf. or urocalculo*.ti,ab,kf. or urolit*.ti,ab,kf. or nephrolit*.ti,ab,kf. or renolit*.ti,ab,kf.	68906

Bijlagen bij Module 3 Conservatieve behandeling: de rol van alfablokkers

5 **Implementatieplan**

Aanbeveling	Tijdspad voor implementatie: < 1 jaar, 1 tot 3 jaar of > 3 jaar	Verwacht effect op kosten	Randvoorwaarden voor implementatie (binnen aangegeven tijdspad)	Mogelijke barrières voor implementatie[1]	Te ondernemen acties voor implementatie[2]	Verantwoordelijken voor acties[3]	Overige opmerkingen
Overweeg het gebruik van alfablokkers voor een hogere percentage en snellere passage van distale ureter stenen. Geef geen alfablokkers voor een hoger percentage en snellere passage van proximale	<1 jaar	Blijven gelijk aan de vorige situatie	Dissemination van de richtlijn	Onbekend	Dissemination van de richtlijn	NVU	

ureterstenen. Geef geen alfablokkers ter pijnstilling of om chirurgische behandeling te voorkomen.							

[1] Barrières kunnen zich bevinden op het niveau van de professional, op het niveau van de organisatie (het ziekenhuis) of op het niveau van het systeem (buiten het ziekenhuis). Denk bijvoorbeeld aan onenigheid in het land met betrekking tot de aanbeveling, onvoldoende motivatie of kennis bij de specialist, onvoldoende faciliteiten of personeel, nodige concentratie van zorg, kosten, slechte samenwerking tussen disciplines, nodige taakherschikking, etc.

[2] Denk aan acties die noodzakelijk zijn voor implementatie, maar ook acties die mogelijk zijn om de implementatie te bevorderen. Denk bijvoorbeeld aan controleren aanbeveling tijdens kwaliteitsvisitatie, publicatie van de richtlijn, ontwikkelen van implementatietools, informeren van ziekenhuisbestuurders, regelen van goede vergoeding voor een bepaald type behandeling, maken van samenwerkingsafspraken.

[3] Wie de verantwoordelijkheden draagt voor implementatie van de aanbevelingen, zal tevens afhankelijk zijn van het niveau waarop zich barrières bevinden. Barrières op het niveau van de professional zullen vaak opgelost moeten worden door de beroepsvereniging. Barrières op het niveau van de organisatie zullen vaak onder verantwoordelijkheid van de ziekenhuisbestuurders vallen. Bij het oplossen van barrières op het niveau van het systeem zijn ook andere partijen, zoals de NZA en zorgverzekeraars, van belang.

Evidence table for systematic review of RCTs and observational studies (intervention studies)

Research question: What are the (un)favorable effects of oral alpha-blockers (uroselective) compared to pain relief alone (combination of paracetamol, NSAID, morphinomimetics) in patients with symptomatic ureteral stone disease?

Study reference	Study characteristics	Patient characteristics	Intervention (I)	Comparison / control (C)	Follow-up	Outcome measures and effect size	Comments
Campschroer, 2018 [individual study characteristics deduced from Campschroer, 2018] PS., study characteristics and results are extracted from the SR (unless stated otherwise)	SR and meta-analysis of RCTs *Literature search up to November 2017* Study design: RCT [parallel / cross-over] Setting and Country: Not reported. Source of funding and conflicts of interest: See full text.	Inclusion criteria SR: - RCTs and quasi-RCTs undertaken to investigate alpha-blockers for the treatment of adult patients with ureteral stones regardless of their publication status or language of publication. Participants: - Adult patients (aged 18 years or older) - Symptoms of ureteral stones including flank or abdominal pain, possibly radiating to the groin or external genitalia - Diagnosis confirmed upon imaging (e.g. plain film of the kidney, ureter, and bladder (KUB); computed tomography (CT); intravenous pyelography (IVP); ultrasonography (US))	Describe intervention: Alpha-blocker (e.g., tamsulosin, alfuzosin, doxazosin, terazosin, naftopidil, silodosin)	Describe control: Standard therapy (e.g., non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids, antispasmodics).	End-point of follow-up: See full text. For how many participants were no complete outcome data available? See full text.	Outcome measure-1 *Stone clearance* Pooled effect (random effects model) with RR and 95% CI: RR = 1.46 (1.36 to 1.57) favouring alpha blockers Outcome measure-2 *Stone expulsion time (days)* Pooled effect (random effects model) with mean difference and 95% CI: MD = -3.43 (-4.26 to -2.60) favouring alpha blockers	Brief description of author's conclusion Results of both the main analysis and a predefined subgroup analysis of placebo-controlled studies indicate that alpha-blockers improve stone clearance but may slightly increase the risk of major adverse events. Use of alpha-blockers may also improve several other patient-important outcomes Personal remarks on study quality, conclusions, and other issues (potentially) relevant to the research question For distal ureter stones, only stone clearance and stone expulsion time were reported Level of evidence: - Stone clearance: low GRADE because of risk of bias, inconsistency

		- Single stone measuring 10 mm or smaller <u>Exclusion criteria SR:</u> - Excluded studies in which researchers evaluated alpha-blockers as an adjuvant to surgery or lithotripsy Participants: - Evidence of UTI or hydronephrosis with complicated factors (e.g. sepsis, uncontrollable pain, deterioration of renal function) - Kidney or ureteral abnormalities (e.g., single kidney, ureteral malformation) - Pregnant or lactating women - Bilateral stones - Taking an alpha-blocker or a calcium channel blocker, or having allergies to these medications *67 studies included* Not reported if groups were comparable at baseline					and publication bias - Stone expulsion time: low GRADE because of risk of bias, inconsistency and imprecision <u>Sensitivity analyses</u> - Solely placebo-controlled trials, excluding trials with standard therapy as the control group. - Solely high-quality trials, excluding trials with high risk of bias. <u>Heterogeneity: clinical and statistical heterogeneity; explained versus unexplained (subgroupanalysis)</u> Clinically heterogeneity was 77.34% for stone clearance and 94.61% for stone expulsion time.

Table of quality assessment for systematic reviews of RCTs and observational studies

Study First author, year	Appropriate and clearly focused question?[1] Yes/no/unclear	Comprehensive and systematic literature search?[2] Yes/no/unclear	Description of included and excluded studies?[3] Yes/no/unclear	Description of relevant characteristics of included studies?[4] Yes/no/unclear	Appropriate adjustment for potential confounders in observational studies?[5] Yes/no/unclear/notapplicable	Assessment of scientific quality of included studies?[6] Yes/no/unclear	Enough similarities between studies to make combining them reasonable?[7] Yes/no/unclear	Potential risk of publication bias taken into account?[8] Yes/no/unclear	Potential conflicts of interest reported?[9] Yes/no/unclear
Campschroer, 2018	Yes. Study aim and inclusion criteria are given.	Yes. Search date and search strategies are provided. Searches were performed in Central, Medline, Embase, ClinicalTrials.gov and conference proceedings.	Yes. Reason for exclusion is mentioned per individual study.	Yes. Characteristics of individual studies are described.	Not applicable (RCTs).	Yes. Risk of bias assessment with Cochrane Risk of bias assessment tool	Yes. Statistical heterogeneity with Chi-square.	Yes. Funnel plots are given.	Yes. Also indicated for individual studies.

Table of excluded studies

Reference	Reason for exclusion
Aboumarzouk, 2018	Older SR
Alsaikhan, 2020	Wrong intervention: preoperative use of alpha-blockers
Bayar, 2019	Wrong intervention: preoperative use of tamsulosin or mirabegron
Burrows, 2017	Wrong study design: methodology paper
Campschroer, 2018	Duplicate
Cui, 2019	Better SR available: only tamsulosin
De Bessa, 2019	Wrong study design: narrative review
De Coninck, 2019	Older SR
Demir, 2022	Wrong intervention: preoperative use of tamsulosin
Eulufi, 2019	Spanish article
Falahatkar, 2021	Wrong comparison: no comparison between alpha-blocker and control
Gharib, 2018	Wrong comparison: no comparison between alpha-blocker and control
Gur, 2021	Wrong comparison: no comparison between alpha-blocker and control
Hsu, 2018	Wrong comparison: no comparison between alpha-blocker and control
Kaplan, 2018	Not matching with PICO: not only ureteral stones and no control group
Koski, 2018	Wrong study design: narrative review
Li, 2019	Wrong intervention: phosphodiesterase 5 inhibitor
Liu, 2018	Better SR available: only silodosin
Liu, 2019	Wrong intervention: phosphodiesterase 5 inhibitor
Liu, 2020	Older SR
Ma, 2020	Better SR available: only doxazosin
Meltzer, 2018	Included in SR of Campschroer 2018
Oestreich, 2020	Wrong intervention: combination with lithotripsy
Ouyang, 2021	Wrong intervention: combination with lithotripsy
Sen, 2017	Wrong comparison: no direct comparison between alpha-blockers and no alpha-blocker
Sharma, 2021a	Better SR available: better study quality
Sharma, 2021b	Wrong intervention: not only alpha-blockers
Skolarikos, 2018	Wrong study design: narrative review
Sridharan, 2018	Older SR
Sun, 2019	Better SR available: only tamsulosin
Tao, 2019	Better SR available: only tamsulosin
Tawfeek, 2020	Wrong intervention: perioperative use of alpha-blockers
Tzelves, 2021	Wrong outcome: fragility index
Villa, 2019	Wrong study design: narrative review
Wang, 2019	Chinese article
Yang, 2017	Wrong intervention: after extracorporeal shock wave lithotripsy
Ye, 2018	Included in SR of Campschroer 2018
Yu, 2021a	Better SR available: only a few studies included
Yu, 2021b	Better SR available: only doxazosin

Literature search strategy

Algemene informatie

Richtlijn: NVU herhaalde richtlijn nierstenen	
Uitgangsvraag: Wat zijn (on)gunstige effecten van alfablokkers (uroselectief) oraal in vergelijking met alleen pijnverlichting (combinatie van paracetamol, NSAID, morfinomimetica) bij patiënten met symptomatisch uretersteenlijden (distaal)?	
Database(s): Ovid/Medline, Embase	Datum: 28-2-2022
Periode: 2000-	Talen: nvt
Literatuurspecialist: Ingeborg van Dusseldorp	
BMI zoekblokken: voor verschillende opdrachten wordt (deels) gebruik gemaakt van de zoekblokken van BMI-Online https://blocks.bmi-online.nl/ Bij gebruikmaking van een volledig zoekblok zal naar de betreffende link op de website worden verwezen.	
Toelichting: Voor deze richtlijn is gezocht met de volgende elementen: Urolithiasis EN alfablokkers De beide sleutelartikelen worden gevonden in de basisstrategie. Vanwege de tijdslimiet wordt het artikel van Hollingsworth (2016) uiteindelijk niet gevonden.	
Te gebruiken voor richtlijnen tekst: In de databases Embase en Ovid/Medline is op 28-2-2022 met relevante zoektermen gezocht naar systematische reviews en RCTs over de effecten van alfablokkers bij patiënten met symptomatisch uretersteenlijden. De literatuurzoekactie leverde 97 unieke treffers op.	

5 ***Zoekopbrengst***

	EMBASE	**OVID/MEDLINE**	**Ontdubbeld**
SRs	36	34	47
RCTs	41	53	50
Observationele studies			
Overig			
Totaal			97

Zoekstrategie

Embase

No.	Query	Results
#15	#7 AND #13 sleutelartikel Hollingworth wel in basisbestand	**3**
#14	#8 AND #13 sleutelartikel Hollingworth niet vanaf 1-11-2017	**2**
#13	#11 OR #12 sleutelartikelen	**3**
#12	27908918 AND hollingsworth	**1**

No.	Query	Results
#11	'alpha blockers' AND as AND medical AND expulsive AND therapy AND for A ND ureteral AND stones AND campschroer	**2**
#10	#2 AND #8	**41**
#9	#1 AND #8	**36**
#8	#7 AND [1-11-2017]/sd NOT ('conference abstract'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it) NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp)	**107**
#7	#5 AND #6	**704**
#6	'alpha adrenergic receptor blocking'/exp OR 'doxazosin'/exp OR 'alfuzosin'/exp OR 'afluzosin':ti,ab,kw OR 'alcinin':ti,ab,kw OR 'alfabax':ti,ab,kw OR 'alfetim':ti,ab,kw OR 'alfoten':ti,ab,kw OR 'alfu':ti,ab,kw OR 'alfudex':ti,ab,kw OR 'alfugen':ti,ab,kw OR 'alfulek':ti,ab,kw OR 'alfunar':ti,ab,kw OR 'alfural':ti,ab,kw OR 'alfuro':ti,ab,kw OR 'alfusin*':ti,ab,kw OR 'alfuzin':ti,ab,kw OR 'alfuzosin*':ti,ab,kw OR 'alfuzostad':ti,ab,kw OR 'alfuzozin':ti,ab,kw OR 'altofen':ti,ab,kw OR 'alugen':ti,ab,kw OR 'azosin':ti,ab,kw OR 'benestan':ti,ab,kw OR 'besavar':ti,ab,kw OR 'dalfaz':ti,ab,kw OR 'danafusin':ti,ab,kw OR 'faralzin':ti,ab,kw OR 'flotral':ti,ab,kw OR 'lafunomyl':ti,ab,kw OR 'mittoval':ti,ab,kw OR 'ofuxal':ti,ab,kw OR 'prostazosin':ti,ab,kw OR 'rilif':ti,ab,kw OR 'sl 77499':ti,ab,kw OR 'taurazil sr':ti,ab,kw OR 'taurazil xl':ti,ab,kw OR 'unibenestan':ti,ab,kw OR 'urion':ti,ab,kw OR 'urobene':ti,ab,kw OR 'uroxatral':ti,ab,kw OR 'vasran xl':ti,ab,kw OR 'xatger':ti,ab,kw OR 'xatral':ti,ab,kw OR 'zochek':ti,ab,kw OR 'zoprost':ti,ab,kw OR 'sl77499':ti,ab,kw OR 'cardular':ti,ab,kw OR 'carduran':ti,ab,kw OR 'doxazosin':ti,ab,kw OR 'uk 33274':ti,ab,kw OR ((alpha NEAR/4 (block* OR adrenergic OR antagonist*)):ti,ab,kw)	**29186**
#5	'urolithiasis'/exp OR 'urethra stone'/exp OR (((kidney OR urologic* OR renal OR urinary OR ureteral OR urine OR coral OR uro) NEAR/3 (calcul* OR lithias* OR stone* OR obstruct*)):ti,ab,kw) OR urocalculo*:ti,ab,kw OR uro?lit*:ti,ab,kw OR nephrolit*:ti,ab,kw OR renolit*:ti,ab,kw	**105212**
#2	'randomized controlled trial'/exp OR random*:ti,ab OR (((pragmatic OR practical) NEAR/1 'clinical trial*'):ti,ab) OR ((('non inferiority' OR noninferiority OR superiority OR equivalence) NEAR/3 trial*):ti,ab) OR rct:ti,ab,kw	**1839814**
#1	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic	**733409**

No.	Query	Results
	reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	

Ovid/Medline

#	Searches	Results
11	6 and 9 RCT	53
10	5 and 9 SR	34
9	4 not ((exp animals/ or exp models, animal/) not humans/) not (letter/ or comment/ or editorial/)	112
8	4 and 6	66
7	4 and 5	34
6	(exp randomized controlled trial/ or randomized controlled trials as topic/ or random*.ti,ab. or rct?.ti,ab. or ((pragmatic or practical) adj "clinical trial*").ti,ab,kf. or ((non-inferiority or noninferiority or superiority or equivalence) adj3 trial*).ti,ab,kf.) not (animals/ not humans/)	1354591
5	(meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or	549449

	comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf.) not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/))	
4	limit 3 to yr="2018 -Current"	140
3	1 and 2	631
2	exp Adrenergic alpha-Antagonists/ or exp Doxazosin/ or afluzosin.ti,ab,kf. or alcinin.ti,ab,kf. or alfabax.ti,ab,kf. or alfetim.ti,ab,kf. or alfoten.ti,ab,kf. or alfu.ti,ab,kf. or alfudex.ti,ab,kf. or alfugen.ti,ab,kf. or alfulek.ti,ab,kf. or alfunar.ti,ab,kf. or alfural.ti,ab,kf. or alfuro.ti,ab,kf. or alfusin*.ti,ab,kf. or alfuzin.ti,ab,kf. or alfuzosin*.ti,ab,kf. or alfuzostad.ti,ab,kf. or alfuzozin.ti,ab,kf. or altofen.ti,ab,kf. or alugen.ti,ab,kf. or azosin.ti,ab,kf. or benestan.ti,ab,kf. or besavar.ti,ab,kf. or dalfaz.ti,ab,kf. or danafusin.ti,ab,kf. or faralzin.ti,ab,kf. or flotral.ti,ab,kf. or lafunomyl.ti,ab,kf. or mittoval.ti,ab,kf. or ofuxal.ti,ab,kf. or prostazosin.ti,ab,kf. or rilif.ti,ab,kf. or sl 77499.ti,ab,kf. or taurazil sr.ti,ab,kf. or taurazil xl.ti,ab,kf. or unibenestan.ti,ab,kf. or urion.ti,ab,kf. or urobene.ti,ab,kf. or uroxatral.ti,ab,kf. or vasran xl.ti,ab,kf. or xatger.ti,ab,kf. or xatral.ti,ab,kf. or zochek.ti,ab,kf. or zoprost.ti,ab,kf. or sl77499.ti,ab,kf. or cardular.ti,ab,kf. or carduran.ti,ab,kf. or doxazosin.ti,ab,kf. or uk 33274.ti,ab,kf. or (alpha adj4 (block* or adrenergic or antagonist*)).ti,ab,kf.	83071
1	exp Urolithiasis/ or Urinary Bladder Calculi/ or Renal Colic/ or ((kidney or urologic* or renal or urinary or ureteral or urine or coral or uro) adj3 (calcul* or lithias* or stone* or obstruct*)).ti,ab,kf. or urocalculo*.ti,ab,kf. or urolit*.ti,ab,kf. or nephrolit*.ti,ab,kf. or renolit*.ti,ab,kf.	68883

Bijlagen bij Module 4a Drainage met dubbel J katheter versus nefrostomie katheter in de behandeling van obstructieve ureterolithiasis

Implementatieplan

Aanbeveling	Tijdspad voor implementatie: <1 jaar, 1-3 jaar of >3 jaar	Verwacht effect op kosten	Randvoorwaarden voor implementatie (binnen aangegeven tijdspad)	Mogelijke barrières voor implementatie[1]	Te ondernemen acties voor implementatie[2]	Verantwoordelijken voor acties[3]	Overige opmerkingen
Bespreek met patiënten met obstructieve ureterolithiasis de voor- en nadelen van het plaatsen van een nefrostomie katheter en het plaatsen van een dubbel J katheter. Bespreek met patiënt dat zowel	<1 jaar	scheelen per instituut in kosten gezien de sterk wisselende logistiek.	Dissemination van de richtlijn	Onbekend	Dissemination van de richtlijn	NVU	

een nefrostomie katheter als een dubbel J katheter ter drainage van obstructieve ureterolithiasis even goed zijn ter behandeling van: Infectie, Pijn, Nierfunctie, Complicaties, Spontane steenlozing, Succes rate Geef de voorkeur aan drainage met een nefrostomie katheter bij patiënten met							

dreigen de septische shock.							

[1] Barrières kunnen zich bevinden op het niveau van de professional, op het niveau van de organisatie (het ziekenhuis) of op het niveau van het systeem (buiten het ziekenhuis). Denk bijvoorbeeld aan onenigheid in het land met betrekking tot de aanbeveling, onvoldoende motivatie of kennis bij de specialist, onvoldoende faciliteiten of personeel, nodige concentratie van zorg, kosten, slechte samenwerking tussen disciplines, nodige taakherschikking, etc.

[2] Denk aan acties die noodzakelijk zijn voor implementatie, maar ook acties die mogelijk zijn om de implementatie te bevorderen. Denk bijvoorbeeld aan controleren aanbeveling tijdens kwaliteitsvisitatie, publicatie van de richtlijn, ontwikkelen van implementatietools, informeren van ziekenhuisbestuurders, regelen van goede vergoeding voor een bepaald type behandeling, maken van samenwerkingsafspraken.

[3] Wie de verantwoordelijkheden draagt voor implementatie van de aanbevelingen, zal tevens afhankelijk zijn van het niveau waarop zich barrières bevinden. Barrières op het niveau van de professional zullen vaak opgelost moeten worden door de beroepsvereniging. Barrières op het niveau van de organisatie zullen vaak onder verantwoordelijkheid van de ziekenhuisbestuurders vallen. Bij het oplossen van barrières op het niveau van het systeem zijn ook andere partijen, zoals de NZA en zorgverzekeraars, van belang.

Evidence tables

Study reference	Study characteristics	Patient characteristics [2]	Intervention (I)	Comparison / control (C) [3]	Follow-up	Outcome measures and effect size [4]	Comments
Ahmad 2013	Type of study: RCT Setting and country: single centre, Pakistan Funding and conflicts of interest: Not reported	Inclusion criteria: - patients with obstructive uropathy Exclusion criteria: Patients with: - severe coagulopathies - uremia due to bladder outflow obstruction N total at baseline: Intervention: 200 Control: 100 Important prognostic factors[2]: For example age ± SD: I: 40 ± 10,35 C: 43 ± 9,65 (p=<0,0001) *Sex: in full sample* 72,7% male 27,3% female Groups comparable at baseline? No. age differed significantly with on average older patients in	Describe intervention (treatment/procedure/test): Relief of urinary tract obstruction by PCN	Describe control (treatment/procedure/test): Relief of urinary tract obstruction by JJ ureteric stent	Length of follow-up: Immediately after procedure and 15 days to 3 months Loss-to-follow-up: Not reported Incomplete outcome data: Not reported	Outcome measures and effect size (include 95%CI and p-value if available): Outcome measure 1 **Infection** Not reported Outcome measure 2 **Kidney function** Not reported Outcome measure 3 **Pain** Not reported Outcome measure 4 **Length of hospital stay (days)** Not reported Outcome measure 5 **Complications** (N, (%)) *I:* 25 (17,5) *C:* 37 (37) Outcome measure 6 **Spontaneous stone passage** Not reported Outcome measure 7 **Success rate** *I:* 97,5% *C:* 97%	Authors conclude: *"Ultrasound guided percutaneous nephrostomy is a safe, quick and better method of temporary urinary diversion than double J stenting for management of obstructive uropathy with lower incidence of complications".* Reported complications per condition: I: Fever/septicemia (7), hematuria (9), PCN dislodgement (9) C: Fever/septicemia (7), hematuria (10), painful trigone irritation (12), ureteral perforation (1), stent migration (2), stent

		JJ stent group. In addition, **not all patients had an obstruction due to stone disease** (25% in jj stent group and 35% in PCN group) but due to for instance carcinomas				<u>Outcome measure 8</u> **Side effects (bijwerkingen)** Not reported <u>Outcome measure 9</u> **ICU admissions** Not reported <u>Outcome measure 10</u> **Costs** Not reported	encrustation (5)

Study reference	**Study characteristics**	**Patient characteristics**	**Intervention (I)**	**Comparison / control (C)**	**Follow-up**	**Outcome measures and effect size**	**Comments**
1st author, year of publication individual study characteristics deduced from Hinojosa-Gonzalez 2021 PS., study characteristics and results are extra	SR and meta-analysis of 5 RCTs, 3 retrospective- and 2 prospective trials *Literature search up to August 2020* **A**: Pearle, 1998 **B**: Mokhalji, 2001 **C**: Yoshimura, 2005 **D**: Goldsmith, 2013 **E**: Rammohan, 2015 **F**: Wang, 2015 **G**: De sousa, 2018	Inclusion criteria SR: Comparison of demographic outcomes, clinical outcomes, QoL, and resource allocations of adult subjects with acute obstructive urolithiasis is associated with infection or kidney injury treated through either URS or PCN Exclusion criteria	Describe intervention: All studies: adult subjects with treatment of acute obstructive urolithiasis treated through either URS or PCN – Details of individual studies not reported	Describe control: Not applicable/not reported	<u>Endpoint of follow-up</u>: Not reported <u>For how many participants were no complete outcome data available?</u> Not reported	<u>Outcome measure 1</u> **Infection – Time to normal white blood cell count** Effect measure: mean difference [95% CI]: **A**: -0,30 (-0,92 to 0,32) **B**: Not reported **C**: Not reported **D**: Not reported **E**: 0,20 (-0,24 to 0,64) **F**: -0,37 (-0,95 to 0,21) **G**: Not reported **H**: -0,83 (-1,69 to 0,03) **I**: Not reported **J:** Not reported Pooled effect (fixed effects model): -0,16 [95% CI -0,45 to 0,13] (p= 0.28) Heterogeneity (I^2): 47%	<u>Facultative</u>: Brief description of author's conclusion "*In the absence of evidence favoring PCN or URS in the setting of stone-related obstruction requiring urinary tract decompression, both methods prove to be effective, with no superiority in clinical outcomes or impact on QoL during the first stage of treatment*". "*Intraoperative parameters such as operative time might be influenced by local staff expertise.*

cted from the SR (unless stated otherwise)	**H**: Shoshany, 2019 **I**: Elbotouany, 2020 **J:** Haas, 2020 <u>Study design</u>: **A**: RCT, parallel **B**: RCT, parallel **C**: retrospective cohort **D**: retrospective cohort **E**: RCT, parallel **F**: RCT, parallel **G**: Prospective trial **H**: Prospective trial **I**: RCT, parallel **J:** retrospective cohort <u>Setting and Country</u>: **A**: Single centre, USA **B**: Multi centre, Germany & Syria **C**: Single centre, Japan **D**: Single centre, USA **E**: **F**: Multi centre, Taiwan **G**: Multi centre, Portugal **H**: Multi centre, Israel **I**: Single centre, Egypt **J**:	SR: - no statistical comparisons - children - pregnancy *10 studies included.* Total of 772 patients of whom 420 were treated with URS and 352 with PCN. <u>Important patient characteristics at baseline</u>: <u>N, mean age (yrs)</u> **A**: URS: 21, 41,3 PCN: 21, 41,3 **B**: Not reported **C**: URS: 53, 59,5 PCN: 24, 67,3 **D**: URS: 71, 55,25 PCN: 59, 38,75 **E**: URS: 20, 46,05, PCN: 20, 46,5 **F**: URS: 54, 57,52 PCN:53, 58,21 **G**: URS: 32, 54,5 PCN: 18, 63,1 **H**: URS: 45, 55 PCN:30, 53,53				**Time to normal temperature** Effect measure: mean difference [95% CI]: **A**: 0,30 (-0,80 to 1,40) **B**: Not reported **C**: Not reported **D**: Not reported **E**: 0,95 (-0,66 to 0,76) **F**: -0,10 (-0,64 to 0,44) **G**: Not reported **H**: -0,09 (-0,33 to 0,15) **I**: Not reported **J:** Not reported Pooled effect (fixed effects model): 0,01 [95% CI -0,17 to 0,20] (p= 0.88) Heterogeneity (I^2): 21% <u>Outcome measure 1.1</u> ***In patients with sepsis:*** **Infection - Time to normal white blood cell count** Effect measure: mean difference [95% CI]: **A**: Not reported **B**: Not reported **C**: Not reported **D**: Not reported **E**: 0,20 (-0,24 to 0,64) **F**: -0,37 (-0,95 to 0,21) **G**: Not reported **H**: Not reported **I**: Not reported **J:** Not reported Pooled effect (fixed effects model): -0,00 [95% CI -0,35 to 0,35] (p = 0,98) Heterogeneity (I^2): 57% **Time to normal**	*Physicians should advise patients based on their preference after a thorough and honest discussion on the side effect profiles of each technique, on local skill levels, and on resource availability in order to tailor urinary drainage methods better until definitive treatment*". Personal remarks on study quality, conclusions, and other issues (potentially) relevant to the research question "*Study heterogeneity and scarcity of randomized controlled trials with low patient populations limit the quality evidence produced by this study. Further studies could aim to replicate RCTs described in the current review with larger patient pools*". Level of evidence: GRADE (per comparison and outcome measure) including reasons for down/upgrading Not reported.

	Source of funding and conflicts of interest: For included studies not reported. For SR authors report no conflicts of interest and no financial support received for the study.	**I**: URS: 72, 51 PCN: 71, 48,6 **J:** URS: 50, 50,2 PCN: 36, 59,5 *Sex:* Not reported in SR *BMI (N, mean):* **A:** URS: 21, 29,7 PCN: 21, 25,7 **B**: Not reported **C**: URS: 53, 31,15 PCN: 24, 30,5 **D**: URS: 71, 25,14 PCN: 59, 25,52 **E**: Not reported **F**: URS: 54, 25,14 PCN: 53, 25,52 **G**: URS: 32, 28,1 PCN: 18, 28,1 **H**: URS: 45, 27,5 PCN: 30, 27,1 **I**: Not reported **J:** Not reported Groups comparable at baseline? Yes, no significant differences in mean age and BMI				**temperature** Effect measure: mean difference [95% CI]: **A**: Not reported **B**: Not reported **C**: Not reported **D**: Not reported **E**: 0,35 (-0,06 to 0,76) **F**: -0,10 (-0,64 to 0,44) **G**: Not reported **H**: Not reported **I**: Not reported **J:** Not reported Pooled effect (fixed effects model): 0,19 [95% CI -0,14 to 0,51] (p = 0,26) Heterogeneity (I^2): 42% Outcome measure 2 **Kidney function** Not reported Outcome measure 3 **Pain** Effect measure: OR [95% CI]: **A**: Not reported **B**: Not reported **C**: Not reported **D**: Not reported **E**: Not reported **F**: Not reported **G**: 1,46 (0,46 to 4,67) **H**: 0,84 (0,33 to 2,11) **I**: Not reported **J:** Not reported Pooled effect (random effects model): 1,04 [95% CI 0,50 to 2,14] (p = 0,92) Heterogeneity (I^2): 0% Outcome measure 4 **Length of hospital stay** Effect measure: mean	"*Randomized control trials were assessed for bias using Cochrane's Risk of Bias Tool. Overall, all studies were graded for evidence level using the Oxford Centre for Evidence-Based Medicine—Levels of Medicine grading system*". Sensitivity analyses (excluding small studies; excluding studies with short follow-up; excluding low quality studies; relevant subgroup-analyses); mention only analyses which are of potential importance to the research question Not reported Heterogeneity: clinical and statistical heterogeneity; explained versus unexplained (subgroupanalysis) Not applicable

						difference [95% CI]: **A**: -1,30 (-3,28 to 0,68) **B**: Not reported **C**: 7,60 (-0,99 to 16,19) **D**: Not reported **E**: Not reported **F**: -2,01 (-3,01 to -1,01) **G**: Not reported **H**: -2,34 (-3,52 to -1,16) **I**: Not reported **J:** -1,94 (-2,57 to -1,30) Pooled effect (fixed effects model): -1,94 [95% CI -2,57 to -1,30] (p < 0.0001) favoring URS Heterogeneity (I^2): 29% <u>Outcome measure 5</u> **Complications** Effect measure: OR [95% CI]: **A**: Not reported **B**: Not reported **C**: Not reported **D**: Not reported **E**: Not reported **F**: 3,06 (0,31 to 30,38) **G**: 0,52 (0,15 to 1,81) **H**: Not estimable **I**: 24,02 (1,38 to 418,35) **J:** Not reported Pooled effect (random effects model): *OR 95% CI* 2,62 [0,25 to 27,50] (p = 0,42) Heterogeneity (I^2): 74% <u>Outcome measure 6</u> **Spontaneous stone passage** Effect measure: OR [95% CI]: **A**: Not reported **B**: Not reported **C**: Not reported	

						D: 0,70 (0,24 to 2,05) **E**: 1,59 (0,24 to 10,70) **F**: Not reported **G**: Not reported **H**: 0,52 (0,15 to 1,81) **I**: 4,12 (0,45 to 37,78) **J:** Not reported Pooled effect (fixed effects model): *OR 95% CI* 0,91 [0,46 to 1,79] (p = 0,78) Heterogeneity (I^2): 3% <u>Outcome measure 7</u> **Success rate** Effect measure: OR [95% CI]: **A**: Not reported **B**: Not reported **C**: Not reported **D**: 0,59 (0,05 to 6,73) **E**: Not reported **F**: 1,02 (0,14 to 7,52) **G**: Not reported **H**: Not reported **I**: 0,37 (0,11 to 1,24) **J:** 1,19 (0,19 to 7,35) Pooled effect (fixed effects model): *OR 95% CI* 0,59 (0,26 to 1,35] (p = 0,21) Heterogeneity (I^2): 0% <u>Outcome measure 8</u> **Side effects (bijwerkingen)** Not reported <u>Outcome measure 9</u> **ICU admissions** Not reported <u>Outcome measure 10</u> **Costs** Not reported	

Study reference	Study characteristics	Patient characteristics [2]	Intervention (I)	Comparison / control (C) [3]	Follow-up	Outcome measures and effect size [4]	Comments
1st author, year of publication Xu 2021	Type of study: RCT Setting and country: Hospital, single centre, Japan Funding and conflicts of interest: Funding not reported. No conflict of interest.	<u>Inclusion criteria</u>: -upper urinary tract stones and urosepsis upon admission <u>Exclusion criteria</u>: - urethral or ureteral stricture, urinary diversion - pregnancy - solitary kidney - severe sepsis (diagnosed as bacterial septic shock) - septic shock - unwillingness or impossibility to commit to the study follow-up protocol <u>N total at baseline</u>: Intervention: 35 Control: 30 (started with 37, but failed treatment, not	Describe intervention (treatment/procedure/test): Percutaneous nephrostomy (PCN) for treatment of upper urinary trat obstruction with urosepsis	Describe control (treatment/procedure/test): Retrograde ureteric stent (RUS) for treatment of upper urinary trat obstruction with urosepsis	<u>Length of follow-up</u>: Time for patients' body temperature to return to normal and biochemical indicators 3 days after treatment <u>Loss-to-follow-up</u>: No loss to follow-up <u>Incomplete outcome data</u>: *I* (PCN): Complete outcome data *C* (RUS) N (%): 7 (19%) Reasons: Discontinued intervention, reason given as "failure cases"	Outcome measures and effect size (mean, IQR and p-value): <u>Outcome measure 1</u> **Infection – Postoperative white blood cell count** (10^9/L) *I:* 7,67 (6,13 to 17,24) *C:* 7,12 (5,05 to 9,39) p= 0,422 **Postoperative CRP (mg/L)** *I:* 23,2 (12,4 to 38) *C:* 32,2 (21,1 to 73,9) p= 0,029 **Time to normal temperature (hours)** *I:* 3 (3 to 4) *C:* 5 (4 to 6) p= <0,001 <u>Outcome measure 2</u> **Kidney function** **Postoperative**	Authors conclusion: "*Both RUS and PCN are effective drainage methods. RUS has a higher failure rate than PCN. RUS was less effective than PCN in improving symptoms in patients with urosepsis. Therefore, PCN is recommended as the primary emergency drainage method for patients with urosepsis, especially for patients with high fever and severe inflammation*". - No postoperative complications during the follow-up period - 7 treatments failed in the RUS grou

		included in analysis) <u>Important prognostic factors</u>[2]: *Age, mean (IQR):* *I:* 65 (49 to 72) *C:* 64,5 (54 to 70) *Sex:* *I: 37% M* *C: 37% M* *BMI, mean (IQR)* *I:* 23,44 (21,97 to 25, 78) *C: 23,99 (21,48 to 26,25)* Groups comparable at baseline? Yes. No differences were observed between the two groups in terms of height, body weight, BMI, hospital stay, hypertension, diabetes mellitus, or history of urolithiasis or acute pyelonephritis.				**serum creatinine (µmol/L)** *I:* 78,4 (65,4 to 104,6) *C:* 82,1 (64,1 to 113,6) p= 0,916 <u>Outcome measure 3</u> **Pain** Not reported <u>Outcome measure 4</u> **Length of hospital stay (days)** *I:* 8 (7 to 11) *C:* 7,5 (5,75 to 11) p= 0,354 <u>Outcome measure 5</u> **Complications** Not reported <u>Outcome measure 6</u> **Spontaneous stone passage** Not reported <u>Outcome measure 7</u> **Success rate** Not reported <u>Outcome measure 8</u> **Side effects (bijwerkingen)** Not reported <u>Outcome measure</u>	p (control group started with n=37, failed treatments were not analysed)

						9 **ICU admissions** Not reported Outcome measure 10 **Costs** Not reported	

Risk of bias systematic review

Study First author, year	Appropriate and clearly focused question?[1] Yes/no/unclear	Comprehensive and systematic literature search?[2] Yes/no/unclear	Description of included and excluded studies?[3] Yes/no/unclear	Description of relevant characteristics of included studies?[4] Yes/no/unclear	Appropriate adjustment for potential confounders in observational studies?[5] Yes/no/unclear/notapplicable	Assessment of scientific quality of included studies?[6] Yes/no/unclear	Enough similarities between studies to make combining them reasonable?[7] Yes/no/unclear	Potential risk of publication bias taken into account?[8] Yes/no/unclear	Potential conflicts of interest reported?[9] Yes/no/unclear
Hinojosa-Gonzalez 2021	Yes	Yes	Yes	unclear Potential confounders not reported per study	Unclear	Yes	Yes	No No mention of publication bias	No Only reported for the systematic review

Risk of bias assessment intervention studies

5

Study reference (first author, publication year)	Was the allocation sequence adequately generated? Definitely yes Probably yes Probably no Definitely no	Was the allocation adequately concealed? Definitely yes Probably yes Probably no Definitely no	Blinding: Was knowledge of the allocated interventions adequately prevented? Were patients blinded? Were healthcare providers blinded? Were data collectors blinded? Were outcome assessors blinded? Were data analysts blinded? Definitely yes	Was loss to follow-up (missing outcome data) infrequent? Definitely yes Probably yes Probably no Definitely no	Are reports of the study free of selective outcome reporting? Definitely yes Probably yes Probably no	Was the study apparently free of other problems that could put it at a risk of bias? Definitely yes Probably yes Probably no	Overall risk of bias If applicable/necessary, per outcome measure LOW Some concerns HIGH

			Probably yes Probably no Definitely no		Definitely no	Definitely no	
Ahmad, 2013	Definitely yes; Reason: Randomization with random numbers table	**Probably n**o; Reason: Random numbers table was used, no mention of concealment	**Definitely no;** Reason: Patients, health care providers not blinded (blinding of outcome assessors and data analysts not reported)	Probably yes; Reason: No loss to follow-up reported in intervention and control group and measurement was taken immediately after the procedure	Probably yes; Reason: Relevant outcomes were reported	**Probably no;** Reason: Sample consisted of patients with varying afflictions, not only stone disease	**High**
Xu, 2021	Definitely yes; Reason: Randomization with random numbers table	**Probably no;** Reason: Random numbers table was used, no mention of concealment	**Definitely no;** Reason: Patients, health care providers not blinded (blinding of outcome assessors and data analysts not reported)	Probably yes; Reason: Loss to follow-up was infrequent in intervention and control group. Incomplete outcome data was due to treatment failure	Probably yes; Reason: Relevant outcomes were reported;	**No information**; Reason: No information	**High**

Table of excluded studies

Author and year	Reason for exclusion
Blanco, 2017	In pregnant patiënts
Dai, 2021	In pregnant patiënts
De Sousa Morais, 2019	Included in SR Hinojosa 2021
Deng, 2020	In Chinese
Doronchuk, 2010	In Russian
Elbatanouny, 2020	Included in SR Hinojosa 2021
Ghous, 2021	Cross sectional study
Goldsmith, 2013	Included in SR Hinojosa 2021
Low, 2021	No comparison JJ vs PCN
Mokhmalji, 2001	Included in SR Hinojosa 2021
Netsch, 2016	In German
Osorio, 2008	Narrative review
Osorio, 2018	Bundel of abstracts
Pandey, 2018	Outcomes do not match PICO
Pasiechnikov, 2015	Outcomes do not match PICO
Pearle, 1998	Included in SR Hinojosa 2021
Qi, 2020	In Chinese
Ramsey, 2010	Narrative review
Scheidt, 2020	Summary of data
Shoshany, 2019	Included in SR Hinojosa 2021
Trapeznikova, 1999	In Russian
Wang, 2016	Included in SR Hinojosa 2021
Weltings, 2019	More recent systematic review that fit the PICO available
Zul, 2021	Systematic review available that better fits the PICO

Literature search strategy

5

Search date: 9-3-2022

Search results

Embase

No.	Query	Results
#19	#16 NOT #15 NOT #14 OBS	600
#18	#15 NOT #14 RCT	101

No.	Query	Results
#17	#14 OR #15 OR #16	657
#16	#13 AND (#2 OR #3)	629
#15	#2 AND #13	100
#14	#1 AND #13 SR	58
#13	#12 AND [1-1-1990]/sd NOT ('conference abstract'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it) NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp)	1623
#12	#9 AND #10 AND #11	2738
#11	'nephrostomy'/exp OR 'nephrostomy catheter'/exp OR 'nephrostomy tube'/exp OR 'nephrostom*':ti,ab,kw OR nephrotom*:ti,ab,kw	12482
#10	'double j stent'/exp OR 'double j catheter'/exp OR 'biosoft':ti,ab,kw OR (((jj OR dj OR uret*) NEAR/2 (stent* OR catheter*)):ti,ab,kw) OR 'pyelostent*':ti,ab,kw OR 'stenostent*':ti,ab,kw OR 'vortek':ti,ab,kw OR 'double j':ti,ab,kw OR 'pigtail stent*':ti,ab,kw OR 'pigtail ureteral stent*':ti,ab,kw OR 'ureter stent'/exp OR 'ascerta':ti,ab,kw OR 'bard fluoro-4 silicone ureteral stent':ti,ab,kw OR 'carbosoft':ti,ab,kw OR 'contour suredrive':ti,ab,kw OR 'contour vl':ti,ab,kw OR 'convertx nephroureteral stent system':ti,ab,kw OR 'endo-sof':ti,ab,kw OR 'inlay optima':ti,ab,kw OR 'mardis soft':ti,ab,kw OR 'memokat':ti,ab,kw OR 'opti-j':ti,ab,kw OR 'percuflex plus suredrive':ti,ab,kw OR 'percuflex urinary diversion stent':ti,ab,kw OR 'polaris loop':ti,ab,kw OR 'retromax plus':ti,ab,kw OR 'silhouette scaffold ureteral stent':ti,ab,kw OR 'sof-curl':ti,ab,kw OR 'universa':ti,ab,kw OR 'uriprene':ti,ab,kw OR 'uventa':ti,ab,kw OR 'bare metal ureteral stent':ti,ab,kw OR 'bare-metal ureteral stent':ti,ab,kw OR 'polymeric ureteral stent':ti,ab,kw OR 'removal ureteral stent':ti,ab,kw OR 'ureter stent':ti,ab,kw OR 'ureter stents':ti,ab,kw OR 'ureteral stent':ti,ab,kw OR 'ureteral stents':ti,ab,kw OR 'ureteric stent':ti,ab,kw OR 'ureteral stenting'/exp OR 'ureter stenting':ti,ab,kw OR 'ureteral stenting':ti,ab,kw	24761
#9	'urolithiasis'/exp OR 'urethra stone'/exp OR 'urinary tract obstruction'/exp OR (((kidney OR urologic* OR renal OR urinary OR uret* OR urine OR coral OR uro OR uropathology) NEAR/3 (calcul* OR lithias* OR stone* OR colic* OR obstruct*)):ti,ab,kw)	130553

No.	Query	Results
	OR urocalculo*:ti,ab,kw OR urol?t*:ti,ab,kw OR nephrolit*:ti,ab,kw OR renolit*:ti,ab,kw OR urocalcul*:ti,ab,kw	
#8	#5 OR #6 OR #7	3
#7	optimal AND method AND urgent AND decompression AND of AND the AND collecting AND system AND for AND obstruction AND infection AND due AND to AND ureteral AND calculi AND miller	1
#6	percutaneous AND nephrostomy AND versus AND retrograde AND ureteral AND stent AND for AND acute AND upper AND urinary AND tract AND obstruction AND with AND urosepsis AND xu	1
#5	nephrostomy AND versus AND double AND j AND ureteral AND catheterization AND in AND patients AND with AND obstructive AND urolithiasis AND weltings	1
#4	'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR ((('or' OR 'rr') NEAR/6 ci):ab)))	127335 36

No.	Query	Results
#3	'major clinical study'/de OR 'clinical study'/de OR 'case control study'/de OR 'family study'/de OR 'longitudinal study'/de OR 'retrospective study'/de OR 'prospective study'/de OR 'comparative study'/de OR 'cohort analysis'/de OR ((cohort NEAR/1 (study OR studies)):ab,ti) OR (('case control' NEAR/1 (study OR studies)):ab,ti) OR (('follow up' NEAR/1 (study OR studies)):ab,ti) OR (observational NEAR/1 (study OR studies)) OR ((epidemiologic NEAR/1 (study OR studies)):ab,ti) OR (('cross sectional' NEAR/1 (study OR studies)):ab,ti)	6767914
#2	'randomized controlled trial'/exp OR random*:ti,ab OR (((pragmatic OR practical) NEAR/1 'clinical trial*'):ti,ab) OR ((('non inferiority' OR noninferiority OR superiority OR equivalence) NEAR/3 trial*):ti,ab) OR rct:ti,ab,kw	1839814
#1	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	733409

Ovid/Medline

#	Searches	Results
15	limit 12 to yr="1990 -Current" OBS	594
14	limit 11 to yr="1990 -Current" RCT	116
13	limit 10 to yr="1990 -Current" SR	35
12	5 and (8 or 9)	628
11	5 and 7	118
10	5 and 6	35
9	Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or	5101458

	single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.))	
8	Epidemiologic studies/ or case control studies/ or exp cohort studies/ or Controlled Before-After Studies/ or Case control.tw. or cohort.tw. or Cohort analy$.tw. or (Follow up adj (study or studies)).tw. or (observational adj (study or studies)).tw. or Longitudinal.tw. or Retrospective*.tw. or prospective*.tw. or consecutive*.tw. or Cross sectional.tw. or Cross-sectional studies/ or historically controlled study/ or interrupted time series analysis/ [Onder exp cohort studies vallen ook longitudinale, prospectieve en retrospectieve studies]	4088318
7	(exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw.) not (animals/ not humans/)	2231297
6	(meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1	551553

	review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf.) not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/))	
5	4 not ((exp animals/ or exp models, animal/) not humans/) not (letter/ or comment/ or editorial/)	1424
4	2 and 3	1460
3	exp Urinary Catheterization/ or (biosoft or ((jj or dj or uret*) adj2 (stent* or catheter*)) or pyelostent* or stenostent* or vortek or double j or pigtail stent* or pigtail ureteral stent* or ascerta or bard fluoro-4 silicone ureteral stent or carbosoft or contour suredrive or contour vl or convertx nephroureteral stent system or endo-sof or inlay optima or mardis soft or memokat or opti j or percuflex plus suredrive or percuflex urinary diversion stent or polaris loop or retromax plus or silhouette scaffold ureteral stent or sof-curl or universa or uriprene or uventa or bare metal ureteral stent or bare-metal ureteral stent or polymeric ureteral stent or removal ureteral stent or ureter stent or ureter stents or ureteral stent or ureteral stents or ureteric stent or ureter stenting or ureteral stenting).ti,ab,kf.	23726
2	Nephrotomy/ or nephrostom*.ti,ab,kf. or nephrotom*.ti,ab,kf.	5085
1	exp Urolithiasis/ or Renal Colic/ or exp Urinary Calculi/ or exp Ureteroscopy/ or Ureteral Obstruction/ or exp Urethral Obstruction/ or ((kidney or urologic* or renal or urinary or uret* or urine or coral or uro) adj3 (calcul* or lithias* or stone* or colic* or obstruct*)).ti,ab,kf. or urocalculo*.ti,ab,kf. or urol?t*.ti,ab,kf. or nephrolit*.ti,ab,kf. or renolit*.ti,ab,kf. or urocalcul*.ti,ab,kf. or rirs.ti,ab,kf. or retrograde intrarenal surg*.ti,ab,kf. or retrograde intra renal surg*.ti,ab,kf. or ureteroscop*.ti,ab,kf. or ureteropyeloscop*.ti,ab,kf. or pyeloureteroscop*.ti,ab,kf.	92471

Bijlagen bij Module 4b Behandeling van nierstenen bij zwangerschap

Implementatieplan

Aanbeveling	Tijdspad voor implementatie: <1 jaar, 1-3 jaar of >3 jaar	Verwacht effect op kosten	Randvoorwaarden voor implementatie (binnen aangegeven tijdspad)	Mogelijke barrières voor implementatie[1]	Te ondernemen acties voor implementatie[2]	Verantwoordelijken voor acties[3]	Overige opmerkingen
EXPERTS OPINION	<1 jaar	onbekend	Dissemination van de richtlijn	Onbekend	Dissemination van de richtlijn	NVU	

[1] Barrières kunnen zich bevinden op het niveau van de professional, op het niveau van de organisatie (het ziekenhuis) of op het niveau van het systeem (buiten het ziekenhuis). Denk bijvoorbeeld aan onenigheid in het land met betrekking tot de aanbeveling, onvoldoende motivatie of kennis bij de specialist, onvoldoende faciliteiten of personeel, nodige concentratie van zorg, kosten, slechte samenwerking tussen disciplines, nodige taakherschikking, etc.

[2] Denk aan acties die noodzakelijk zijn voor implementatie, maar ook acties die mogelijk zijn om de implementatie te bevorderen. Denk bijvoorbeeld aan controleren aanbeveling tijdens kwaliteitsvisitatie, publicatie van de richtlijn, ontwikkelen van implementatietools, informeren van ziekenhuisbestuurders, regelen van goede vergoeding voor een bepaald type behandeling, maken van samenwerkingsafspraken.

[3] Wie de verantwoordelijkheden draagt voor implementatie van de aanbevelingen, zal tevens afhankelijk zijn van het niveau waarop zich barrières bevinden. Barrières op het niveau van de professional zullen vaak opgelost moeten worden door de beroepsvereniging. Barrières op het niveau van de organisatie zullen vaak onder verantwoordelijkheid van de ziekenhuisbestuurders vallen. Bij het oplossen van barrières op het niveau van het systeem zijn ook andere partijen, zoals de NZA en zorgverzekeraars, van belang.

Evidence tables

Study reference	Study characteristics	Patient characteristics	Intervention (I)	Comparison / control (C) [3]	Follow-up	Outcome measures and effect size [4]	Comments
1st author, year of publication Song 2013	Type of study: Retrospective clinical database study Setting and country: Hospital, China Funding and conflicts of interest: Funding not reported, authors declare no conflicts of interest	Inclusion criteria: Pregnant patients with urolithiasis with persistent pain, fever, positive urine culture, suspected uncontrolled infection, and evidence of ongoing obstruction Exclusion criteria: Not reported N total at baseline: Total: 54 Ureteroscopy: 21 Percutaneous nephrostomy (PCN): 16 Internal ureteral stent (IUS): 17 Important prognostic factors[2]: *age (± SD not reported):* Total: 27,1 Ureteroscopy: 27,1 PCN: 26,9 IUS: 27,2 *Gestational age (± SD not reported):*	Describe intervention (treatment/procedure/test): 1. Ureteroscopy 2. Percutaneous nephrostomy 3. Internal ureteral stent	Describe control (treatment/procedure/test): Differences among the three interventions were analysed	Length of follow-up: Not reported. Data analysed from an 11-year period Loss-to-follow-up: No loss to follow-up Incomplete outcome data: N.a.	Outcome measures and effect size (p-value): Differences among the 3 groups were analyzed by Student t test and X^2 test. No correction for confounders was undertaken Outcome measure 1 **Mortality and morbidity** (child and maternal) **Gestational age at delivery** (wk) Ureteroscopy: 39,1 PCN: 39,3 IUS: 39,1 p= 0,902 No cases of premature rupture of membranes or neonatal death among the 3 groups	Detailed information about complications: • Ureretoscopy:

		Total: 26,5 Ureteroscopy: 26,3 PCN: 26,7 IUS: 26,5 Groups comparable at baseline? Yes, no demographic differences found among treatment groups				1 woman in the IUS group had preterm labor **Mode of delivery** (N, (%)) <u>Cesarian</u> Ureteroscopy: 17 (81,0) PCN: 13 (81,2) IUS: 13 (76,5) <u>Vaginal</u> Ureteroscopy: 4 (19,0) PCN: 3 (18,8) IUS: 4 (23,5) <u>Outcome measure 2</u> **Kidney function** Not reported <u>Outcome measure 3</u> **Pain** Not reported <u>Outcome measure 4</u> **Complications** (N, (%)) Ureteroscopy: 3 (14,3) PCN: 5 (31,2) IUS: 9 (52,9) p= 0,039 in favor of ureteroscopy and PCN <u>Outcome measure 5</u> **Admission to ICU**	One patient complained of mild bladder irritability because of the stent. Two patients experienced mild hematuria after the procedure • PCN: Two patients had localized skin infections requiring antibiotic treatment, and one complained of constant pain and had mild hematuria. In this group, four patients (25.0%) experienced a tube obstruction that necessitated flushing, and for one patient (6.3%) the catheter became permanently obstructed and required

						Not reported <u>Outcome 6</u> **Re-intervention** Not reported	replacement. • IUS: Four developed a retained, encrusted stent problem, which was later successfully resolved by cystolitholapaxy and ureteroscopy. Six patients complained of pain and bladder irritation, and 1 of them underwent preterm labour.

Risk of bias tables

5

Author, year	Selection of participants Was selection of exposed and non-exposed cohorts drawn from the same population?	Exposure Can we be confident in the assessment of exposure?	Outcome of interest Can we be confident that the outcome of interest was not present at start of study?	Confounding-assessment Can we be confident in the assessment of confounding factors?	Confounding-analysis Did the study match exposed and unexposed for all variables that are associated with the outcome of interest or did the statistical analysis adjust for these confounding variables?	Assessment of outcome Can we be confident in the assessment of outcome?	Follow up Was the follow up of cohorts adequate? In particular, was outcome data complete or imputed?	Co-interventions Were co-interventions similar between groups?	Overall Risk of bias

	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Definitely yes, probably yes, probably no, definitely no	Low, Some concerns, High
Author, year Song, 2013	Definitely yes Reason: Participants were selected from a database	Definetely yes Reason: Data from medical charts	Definitely yes Reason: Outcomes were procedural outcomes and obstetric outcomes	**Definetely no** Reason: No assessment of and correction for confounders	**Definitely no** Reason: No correction for confounders	Definitely yes Reason: Data from medical charts	Definitely yes Reason: No missing outcome data	No information	**RoB high** **Outcome #1** Mortality and morbidity (maternal & child) **Outcome # 4** Complications
Author, year Drescher, 2019	Definitely yes Reason: Participants were selected from a database	Definitely yes Reason: Data from medical charts	Probably yes Reason: Outcomes were obstetric (risk of UTI and preterm labor). UTI may have been present at the start of the study, but it can be argued that this is not problematic for the objective of the study	Definetely yes Reason: Corrected for confounders based on data from medical charts (demographic factors and medical comorbidities)	Definetely yes Reason: Patient charts were retrospectively analyzed for risk of UTI and preterm labor	Definitely yes Reason: Data from medical charts	Probably yes Reason: Not reported, however follow-up was immediate, as the outcome was UTI and preterm labor	No information	**RoB low** **Outcome #1** Mortality and morbidity (maternal & child)

Table of excluded studies

Author and year	Reason for exclusion
Abedi, 2017	URS only
Adanur, 2014	URS only
Akpinar, 2006	URS only
Andreoiu, 2009	Description of treatment only
Assimos, 2013	only surgical management, not specifically pregnancy
Banon, 2000	In Spanish
Bayar, 2015	In Spanish
Blanco, 2017	Narrative review
Bozkurt, 2012	URS only
Bozkurt, 2013	URS only
Clennon, 2019	Simulated cohort
Dai, 2021	Narrative review
Fathelbab, 2016	URS and JJ stent in same patients
Fontaine-Poitrineau, 2014	Description of treatment only
Georgescu, 2014	Description of treatment only
Hoşcan, 2012	Description of treatment only
Isen, 2012	Description of treatment only
Ishii, 2014	URS only
Johnson, 2012	URS only
Juan, 2007	Description of treatment only
Keshvari Shirvan, 2013	URS only
Kim, 2006	In Korean
Laing, 2012	URS only
Lee, 2021	Narrative review
Lemos, 2002	Description of treatment only
Li, 2021	URS only
Lifshitz, 2002	Description of treatment only
Navalón Verdejo, 2015	In Spanish
Ngai, 2013	JJ only
Omani, 2017	Narrative review
Parulkar, 1998	Description of treatment only
Polat, 2011	URS and JJ stent in same patients
Rana, 2009	URS and JJ stent in same patients
Rashid, 2021	URS only
Rivera, 2014	Outcomes do not match PICO
Savoie, 2021	Narrative review
Scarpa, 1996	URS only
Semins, 2009	URS only
Semins, 2010	URS only
Semins, 2009	URS only
Shalaby, 2021	
Spradling, 2020	Description of treatment only
Tan, 2018	Outcomes do not match PICO
Teleb, 2014	Outcomes do not match PICO

Thakur, 2020	No mention of drainage or uretereoscopie
Travassos, 2009	URS only
Ulvik, 1995	URS only
Wang, 2014	Description of treatment only
Watterson, 2002	URS only
Wymer, 2015	Hypothetical cohort
Zhang, 2016	URS and JJ stent in same patients

Literature search strategy
Search date: 9-3-2022
Search results

	EMBASE	OVID/MEDLINE	Doubles
SRs	24	19	27
RCTs	30	19	32
Observational studies	75	65	63
Total			**122**

5 **Embase**

No.	Query	Results
#26	#22 AND #25	2
#25	#23 OR #24	3
#24	urolithiasis AND in AND pregnancy AND wymer	2
#23	anesthetic AND exposure AND the AND treatment AND of AND symptomatic AND urinary A ND calculi AND in AND pregnant AND women	1
#22	#19 OR #20 OR #21	99
#21	#14 AND (#17 OR #18) OBS	75
#20	#14 AND #16 RCT	30
#19	#14 AND #15 SR	24
#18	'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de	12948231

No.	Query	Results
	OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR ((('or' OR 'rr') NEAR/6 ci):ab)))	
#17	'major clinical study'/de OR 'clinical study'/de OR 'case control study'/de OR 'family study'/de OR 'longitudinal study'/de OR 'retrospective study'/de OR 'prospective study'/de OR 'comparative study'/de OR 'cohort analysis'/de OR ((cohort NEAR/1 (study OR studies)):ab,ti) OR (('case control' NEAR/1 (study OR studies)):ab,ti) OR (('follow up' NEAR/1 (study OR studies)):ab,ti) OR (observational NEAR/1 (study OR studies)) OR ((epidemiologic NEAR/1 (study OR studies)):ab,ti) OR (('cross sectional' NEAR/1 (study OR studies)):ab,ti)	6950944
#16	'clinical trial'/exp OR 'randomization'/exp OR 'single blind procedure'/exp OR 'double blind procedure'/exp OR 'crossover procedure'/exp OR 'placebo'/exp OR 'prospective study'/exp OR rct:ab,ti OR random*:ab,ti OR 'single blind':ab,ti OR 'randomised controlled trial':ab,ti OR 'randomized controlled trial'/exp OR placebo*:ab,ti	3491947
#15	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR ((((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	806683
#14	#5 NOT ('conference abstract'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it) NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp)	188
#13	#10 OR #12	365
#12	#9 AND #11	363
#11	'ureteroscopy'/exp OR 'urethroscopy'/exp OR 'urethroscopy':ti,ab,kw OR 'pyeloureteroscop*':ti,ab,kw OR 'ureteropyeloscop*':ti,ab,kw OR 'ureteroscop*':ti,ab,kw OR 'ureteroscopy assisted retrograde nephrostomy'/exp	15064
#10	#8 AND #9	2

No.	Query	Results
#9	'pregnancy'/exp OR 'named groups by pregnancy'/exp OR 'pregnancy disorder'/exp OR 'child bearing':ti,ab,kw OR 'childbearing':ti,ab,kw OR 'gestati*':ti,ab,kw OR 'gravidity':ti,ab,kw OR 'labor presentation':ti,ab,kw OR 'labour presentation':ti,ab,kw OR 'pregnan*':ti,ab,kw	1410270
#8	#6 AND #7	124
#7	'urogenital endoscopy'/de	410
#6	'urolithiasis'/exp OR 'urethra stone'/exp OR 'urinary tract obstruction'/exp OR (((kidney OR urologic* OR renal OR urinary OR uret* OR urine OR coral OR uro OR uropathology) NEAR/3 (calcul* OR lithias* OR stone* OR colic* OR obstruct*)):ti,ab,kw) OR urocalculo*:ti,ab,kw OR urol?t*:ti,ab,kw OR nephrolit*:ti,ab,kw OR renolit*:ti,ab,kw OR urocalcul*:ti,ab,kw	130553

Medline

#	Searches	Results
12	5 and (8 or 9) OBS	65
11	5 and 7RCT	19
10	5 and 6 SR	19
9	Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or	5101458

	('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.))	
8	Epidemiologic studies/ or case control studies/ or exp cohort studies/ or Controlled Before-After Studies/ or Case control.tw. or cohort.tw. or Cohort analy$.tw. or (Follow up adj (study or studies)).tw. or (observational adj (study or studies)).tw. or Longitudinal.tw. or Retrospective*.tw. or prospective*.tw. or consecutive*.tw. or Cross sectional.tw. or Cross-sectional studies/ or historically controlled study/ or interrupted time series analysis/ [Onder exp cohort studies vallen ook longitudinale, prospectieve en retrospectieve studies]	4088318
7	(exp clinical trial/ or randomized controlled trial/ or exp clinical trials as topic/ or randomized controlled trials as topic/ or Random Allocation/ or Double-Blind Method/ or Single-Blind Method/ or (clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or controlled clinical trial or randomized controlled trial or multicenter study or clinical trial).pt. or random*.ti,ab. or (clinic* adj trial*).tw. or ((singl* or doubl* or treb* or tripl*) adj (blind$3 or mask$3)).tw. or Placebos/ or placebo*.tw.) not (animals/ not humans/)	2231297
6	(meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf.) not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/))	551553
5	4 not ((exp animals/ or exp models, animal/) not humans/) not (letter/ or comment/ or editorial/)	145
4	2 and 3	163

3	Ureteroscopy/ or pyeloureteroscop*.ti,ab,kf. or ureteropyeloscop*.ti,ab,kf. or ureteroscop*.ti,ab,kf. or urethroscop*.ti,ab,kf.	7679
2	exp Pregnancy/ or exp Pregnancy Complications/ or Pregnant Women/ or child bearing.ti,ab,kf. or childbearing.ti,ab,kf. or gestation.ti,ab,kf. or gravidity.ti,ab,kf. or labor presentation.ti,ab,kf. or labour presentation.ti,ab,kf. or pregnan*.ti,ab,kf.	1146556
1	exp Urolithiasis/ or Renal Colic/ or exp Urinary Calculi/ or exp Ureteroscopy/ or Ureteral Obstruction/ or exp Urethral Obstruction/ or ((kidney or urologic* or renal or urinary or uret* or urine or coral or uro) adj3 (calcul* or lithias* or stone* or colic* or obstruct*)).ti,ab,kf. or urocalculo*.ti,ab,kf. or urol?t*.ti,ab,kf. or nephrolit*.ti,ab,kf. or renolit*.ti,ab,kf. or urocalcul*.ti,ab,kf. or rirs.ti,ab,kf. or retrograde intrarenal surg*.ti,ab,kf. or retrograde intra renal surg*.ti,ab,kf. or ureteroscop*.ti,ab,kf. or ureteropyeloscop*.ti,ab,kf. or pyeloureteroscop*.ti,ab,kf.	92471

Bijlagen bij Module 5 Nieuwe interventietechnieken bij behandeling van nierstenen

Implementatieplan

Aanbeveling	Tijdspad voor implementatie: <1 jaar, 1-3 jaar of >3 jaar	Verwacht effect op kosten	Randvoorwaarden voor implementatie (binnen aangegeven tijdspad)	Mogelijke barrières voor implementatie[1]	Te ondernemen acties voor implementatie[2]	Verantwoordelijken voor acties[3]	Overige opmerkingen
Geen aanbeveling.	-	onbekend	Dissemination van de richtlijn	Onbekend	Dissemination van de richtlijn	NVU	

[1] Barrières kunnen zich bevinden op het niveau van de professional, op het niveau van de organisatie (het ziekenhuis) of op het niveau van het systeem (buiten het ziekenhuis). Denk bijvoorbeeld aan onenigheid in het land met betrekking tot de aanbeveling, onvoldoende motivatie of kennis bij de specialist, onvoldoende faciliteiten of personeel, nodige concentratie van zorg, kosten, slechte samenwerking tussen disciplines, nodige taakherschikking, etc.

[2] Denk aan acties die noodzakelijk zijn voor implementatie, maar ook acties die mogelijk zijn om de implementatie te bevorderen. Denk bijvoorbeeld aan controleren aanbeveling tijdens kwaliteitsvisitatie, publicatie van de richtlijn, ontwikkelen van implementatietools, informeren van ziekenhuisbestuurders, regelen van goede vergoeding voor een bepaald type behandeling, maken van samenwerkingsafspraken.

[3] Wie de verantwoordelijkheden draagt voor implementatie van de aanbevelingen, zal tevens afhankelijk zijn van het niveau waarop zich barrières bevinden. Barrières op het niveau van de professional zullen vaak opgelost moeten worden door de beroepsvereniging. Barrières op het niveau van de organisatie zullen vaak onder verantwoordelijkheid van de ziekenhuisbestuurders vallen. Bij het oplossen van barrières op het niveau van het systeem zijn ook andere partijen, zoals de NZA en zorgverzekeraars, van belang.

Evidence tables

Study reference	Study characteristics	Patient characteristics [2]	Intervention (I)	Comparison / control (C) [3]	Follow-up	Outcome measures and effect size [4]	Comments
1st author, year of publication Ulvik, 2022	Type of study: RCT Setting and country: Hospital, single centre, Norway Funding and conflicts of interest: One author received honoraria for lectures sponsored by Olympus. Olympus was not involved in the current study. No other conflicts of interest to disclose.	<u>Inclusion criteria</u>: Adult patients scheduled to undergo elective day-case URS lithotripsy were invited to participate in the study. Consecutive patients with ureteral and/or renal stones (!5 mm), confirmed on preoperative noncontrast computed tomography (NCCT) and for which conservative treatment had failed, were assessed for possible recruitment <u>Exclusion criteria</u>: Patients who opted for: • Inability to give informed consent • Untreated urinary infections • Known anatomic abnormality	Describe intervention (treatment/procedure/test): URS lithotripsy thulium fiber laser (TFL)	Describe control (treatment/procedure/test): URS lithotripsy with Ho:YAG laser	<u>Length of follow-up</u>: 3 months <u>Loss-to-follow-up</u>: N =1 in the TFL condition <u>Incomplete outcome data</u>: N.a	Outcome measures: **Stone-free rate** 1) No residual fragments ≥ 3mm *I:* 92% *C:* 67% (*p*=.001) * 2) Zero fragments *I:* 80% *C:* 57% (*p*=.006) * **p-value adjusted for stratification group (stone location (ureteral or renal) and stone density above or below 1000 HU)* **Re-intervention** *Not reported* **Complication rate** *Minor adverse events (intraoperative):* *I:* n= 5 (8%) n= 3 bleeding impairing vision n= 0 perforation n= 2	The authors conclude: *"Significantly higher SFRs were achieved after single-session URS lithotripsy for renal stones using TFL compared to Ho:YAG. In addition, operative time was significantly shorter and there were significantly fewer intraoperative complications associated with TFL use. The results of this randomized trial support the movement towards TFL as the laser of choice for endoscopic renal stone*

		• Urothelial tumor(s) • Negative URS • No need for lithotripsy • Failure to reach stone in upper urinary tract with ureteroscope <u>N total at baseline</u>: Intervention: 60 Control: 60 <u>Important prognostic factors</u>[2]: *age* *Mean ± IQR:* *I:* 53 (38 to 68) *C:* 54 (45 to 64 *Sex:* *I:* 63% M *C:* 65% M Stone density: *Mean (IQR)* *I:* 896 (600 to 1257) HU *C:* 911 (620 to 1200) HU Stone size: *Median (IQR) (mm)* *I:* 8 (6-11) *C:* 7 (6-10) Groups comparable at baseline? Yes				mucosal abrasion *C:* n=16 (27%) n= 13 bleeding impairing vision n= 1 perforation n= 6 mucosal abrasion (*p*=.011) * *Early postoperative:* *I:* n=2 (3.3%) *C:* n=2 (3.4%) *all Clavien-Dindo grade 1* (*p*= 1.) *Postoperative complications leading to readmissions:* *I:* n=7 (12%) n= 4 infection n= 4 obstruction n= 1 other *C:* n=8 (13%) n= 6 infection n= 2 obstruction n= 1 other *all Clavien-Dindo grade 2 except 1 in the TFL condition with Grade 3.* (*p*= 1.) * *p-value adjusted for stratification group (stone location*	*lithotripsy*".

						(ureteral or renal) and stone density above or below 1000 HU) **Patient comfort** *Not reported* **Operation time** Mean (IQR) (minutes) *I:* 49 (32 to 63) *C:* 57 (45 to 70) (*p*=.008) **Hospital stay** (days) *I:* 92% was discharged on the day of the procedure and 8% the next day. *C:* 83% was discharged on the day of the procedure and 17% the next day. (*p*=.3) **Costs** *Not reported*	

Study reference	**Study characteristics**	**Patient characteristics [2]**	**Intervention (I)**	**Comparison / control (C) [3]**	**Follow-up**	**Outcome measures and effect size [4]**	**Comments**
1st author, year of publication Martov, 2021	Type of study: RCT Setting and country: Hospital, single-centre, Russia	Inclusion criteria: • Single stone • signed infor	Describe intervention (treatment/procedure/test): laser ureterolithotripsy	Describe control (treatment/procedure/test): laser ureterolithotripsy with high-power Ho:YAG laser	Length of follow-up: 1 month Loss-to-follow-up:	Outcome measures: **Stone-free rate** (at 1 month	Parameters that were considered complications SP TFL vs Ho:YAG: Ureteral perforation 0 vs 1

	Funding and conflicts of interest: Authors report no conflicts of interest	med cons ent • able and willin g to unde rgo 1-month follo w-up evalu ation <u>Exclusion criteria</u>: • multi ple calcu li • uppe r tract ano mali es • othe r cond ition s prev entin g laser uret erosc opy <u>N total at baseline</u>: Intervention: 87 Control: 87 <u>Important prognostic factors</u>[2]: *age* *Mean ± SD:* *I:* 48 ± 5.2 *C:* 46.4 ± 4.3 *Sex:* *I:* 57 % M *C:* 48 % M Stone density: *Mean ± SD* *I:* 1001 ± 266	with super pulse thulium fiber laser		No loss to follow-up <u>Incomplete outcome data</u>: N.a	follow-up) *I:* 100% *C:* 94% **Re-intervention** *I:* 0% *C:* 6% **Complication rate** *I:* n=13 (14.9%) *C:* n= 29 (33.3%) **Patient comfort** *Not reported* **Operation time** (minutes) *I:* 24.7 ± 0.7 95% CI 23.0 to 26.4 *C:* 32.4 ± 2.7 95% CI 29.7 to 35.1 (*p*= < 0.05) **Hospital stay** Not reported **Costs** *Not reported*	Fragment migration 3 vs 7 Bleeding 1 vs 5 Fever+antibiotics (Clavien II) 8 vs 12 Fever+stent (Clavien III) 1 vs 4 Residual stone at 1 month 0 vs 5 Auxiliary treatment 0 vs 5 (2 flexible ureteroscopy and 3 extracorporeal shockwave lithotripsy) The authors conclude: *"The SP TFL technology is associated with considerably lower fragmentation and surgery times in comparison to Ho:YAG technology. The reduced working time could be at-tributed to increased efficiency of stone fragmentation, significantly lower retropulsion rate, and better endoscopic view."*

		HU *C:* 994 ± 214 HU Stone size: *Mean ± SD* *I:* 12.2 ± 0.1 *C:* 11.3 ± 0.1 Groups comparable at baseline? Yes					

Risk of bias assessment

Study reference (first author, publication year)	**Was the allocation sequence adequately generated?** Definitely yes Probably yes Probably no Definitely no	**Was the allocation adequately concealed?** Definitely yes Probably yes Probably no Definitely no	**Blinding: Was knowledge of the allocated interventions adequately prevented?** **Were patients blinded?** **Were healthcare providers blinded?** **Were data collectors blinded?** **Were outcome assessors blinded?** **Were data analysts blinded?** Definitely yes Probably yes Probably no Definitely no	**Was loss to follow-up (missing outcome data) infrequent?** Definitely yes Probably yes Probably no Definitely no	**Are reports of the study free of selective outcome reporting?** Definitely yes Probably yes Probably no Definitely no	**Was the study apparently free of other problems that could put it at a risk of bias?** Definitely yes Probably yes Probably no Definitely no	**Overall risk of bias** **If applicable/necessary, per outcome measure** **LOW** **Some concerns** **HIGH**
Martov, 2022	Probably yes; Reason: Not described how randomization was carried out.	**Probably no;** Reason: Not stated.	**Probably no;** Reason: Unclear if patients, outcome assessors and data analysts were blinded. Health care providers not blinded.	Probably yes; Reason: No Loss to follow-up reported.	Probably yes; Reason: All relevant outcomes were reported;	Probably yes; Reason: No other problems noted	High

Ulvik, 2022	Definitely yes; Reason: Randomization sequence generation was performed electronically and before patient participation.	Definitely yes; Reason: Consecutively numbered, sealed envelopes were used. At the time of laser lithotripsy, the envelope was opened by a designated nurse and the assigned laser machine could then be used.	Probably yes; Reason: patients remained blinded throughout the study, health care providers were blinded until the moment of the procedure. Unclear if outcome assessors were blinded.	Definitely yes; Reason: one patient was lost to follow-up.	Probably yes; Reason: All relevant outcomes were reported;	Probably yes; Reason: No other problems noted	Low

Table of excluded studies

Author and year	Reason for exclusion
Aldoukhi, 2019	Wrong study design: narrative review
Andreeva, 2020	Wrong outcome: stone fragmentation and dusting performance
Blackmon, 2010	Wrong comparison: use of a short taper for expanding the Thulium fiber laser beam at the distal tip of a small-core fiber
Blackmon, 2010	Wrong outcome: stone vaporization rates
Blackmon, 2011	Wrong outcome: stone ablation threshold, ablation rate, and retropulsion
Busalto-Martinez, 2020	Wrong intervention: no thulium fiber laser
Carrera, 2021	Wrong comparison: no comparison between thulium and YAG laser
Corrales, 2021	Wrong comparison: no comparison between thulium and YAG laser
Corrales, 2022	Wrong study design: narrative review
Enikeev, 2020	Wrong study design: narrative review
Enikeev, 2020	Wrong comparison: no comparison between thulium and YAG laser
Enikeev, 2021	Wrong comparison: no comparison between thulium and YAG laser
Gao, 2020	Wrong study design: scoping review
Geavlete, 2021	Wrong comparison: no comparison between thulium and YAG laser
Hardy, 2019	Wrong outcome: ablation rate (in dusting mode)
Jones, 2021	Wrong study design: narrative review
Kamal, 2016	Wrong outcomes: retropulsion (Tm:YAG vs Ho:YAG laser)
Khusid, 2021	Wrong study design: narrative review
Kraft, 2022	Wrong comparison: p-Tm:YAG vs thulium fiber
Kronenberg, 2019	Wrong study design: narrative review
Kronenberg, 2021	Wrong study design: narrative review
Liu, 2021	Wrong comparison: p-Tm:YAG vs thulium fiber

Mahajan, 2022	Wrong procedure percutaneous nephrolithotomie
Moore, 2022	Wrong outcome: noise levels for operating room staff
Noureldin, 2020	Wrong study design: narrative review
Panthier, 2022	Wrong outcome: optimal displacement velocity
Petzold, 2021	Wrong outcome: dusting performance
Rapoport, 2020	Article in Russian
Rice, 2021	Wrong comparison: no comparison thulium vs YAG laser for urolithiasis
Taratkin, 2020	Wrong comparison: no comparison between thulium and YAG laser
Taratkin, 2021	Wrong comparison: no comparison between thulium and YAG laser
Traxer, 2020	Wrong study design: narrative review
Traxer, 2021	Wrong study design: narrative review
Uzan, 2021	Wrong outcome: fiber fracture
Ventimiglia, 2020	Wrong outcome: pulse shape, stone retropulsion and ablation efficiency
Ventimiglia, 2021	Wrong study design: narrative review
Wilson, 2015	Wrong comparison: no comparison between thulium and YAG laser

Literature search strategy

5

Search date: 5-9-2022
Hits: 114

Search results

Embase

No.	Query	Results
#15	#4 AND #10 sleutelartikel gevonden	1
#14	#12 NOT #11 NOT #10 OBS	53
#13	#11 NOT #10 RCT	9
#12	#5 AND (#8 OR #9)	80
#11	#5 AND #7	17
#10	#5 AND #6 SR	15
#9	'case control study'/de OR 'comparative study'/exp OR 'control group'/de OR 'controlled study'/de OR 'controlled clinical trial'/de OR 'crossover	12940098

No.	Query	Results
	procedure'/de OR 'double blind procedure'/de OR 'phase 2 clinical trial'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'pretest posttest design'/de OR 'pretest posttest control group design'/de OR 'quasi experimental study'/de OR 'single blind procedure'/de OR 'triple blind procedure'/de OR (((control OR controlled) NEAR/6 trial):ti,ab,kw) OR (((control OR controlled) NEAR/6 (study OR studies)):ti,ab,kw) OR (((control OR controlled) NEAR/1 active):ti,ab,kw) OR 'open label*':ti,ab,kw OR (((double OR two OR three OR multi OR trial) NEAR/1 (arm OR arms)):ti,ab,kw) OR ((allocat* NEAR/10 (arm OR arms)):ti,ab,kw) OR placebo*:ti,ab,kw OR 'sham-control*':ti,ab,kw OR (((single OR double OR triple OR assessor) NEAR/1 (blind* OR masked)):ti,ab,kw) OR nonrandom*:ti,ab,kw OR 'non-random*':ti,ab,kw OR 'quasi-experiment*':ti,ab,kw OR crossover:ti,ab,kw OR 'cross over':ti,ab,kw OR 'parallel group*':ti,ab,kw OR 'factorial trial':ti,ab,kw OR ((phase NEAR/5 (study OR trial)):ti,ab,kw) OR ((case* NEAR/6 (matched OR control*)):ti,ab,kw) OR ((match* NEAR/6 (pair OR pairs OR cohort* OR control* OR group* OR healthy OR age OR sex OR gender OR patient* OR subject* OR participant*)):ti,ab,kw) OR ((propensity NEAR/6 (scor* OR match*)):ti,ab,kw) OR versus:ti OR vs:ti OR compar*:ti OR ((compar* NEAR/1 study):ti,ab,kw) OR (('major clinical study'/de OR 'clinical study'/de OR 'cohort analysis'/de OR 'observational study'/de OR 'cross-sectional study'/de OR 'multicenter study'/de OR 'correlational study'/de OR 'follow up'/de OR cohort*:ti,ab,kw OR 'follow up':ti,ab,kw OR followup:ti,ab,kw OR longitudinal*:ti,ab,kw OR prospective*:ti,ab,kw OR retrospective*:ti,ab,kw OR observational*:ti,ab,kw OR 'cross sectional*':ti,ab,kw OR cross?ectional*:ti,ab,kw OR multicent*:ti,ab,kw OR 'multi-cent*':ti,ab,kw OR consecutive*:ti,ab,kw) AND (group:ti,ab,kw OR groups:ti,ab,kw OR subgroup*:ti,ab,kw OR versus:ti,ab,kw OR vs:ti,ab,kw OR compar*:ti,ab,kw OR 'odds ratio*':ab OR 'relative odds':ab OR 'risk ratio*':ab OR 'relative risk*':ab OR 'rate ratio':ab OR aor:ab OR arr:ab OR rrr:ab OR ((('or' OR 'rr') NEAR/6 ci):ab)))	
#8	'major clinical study'/de OR 'clinical study'/de OR 'case control study'/de OR 'family study'/de OR 'longitudinal study'/de OR 'retrospective study'/de OR 'prospective study'/de OR 'comparative study'/de OR 'cohort analysis'/de OR ((cohort NEAR/1 (study OR studies)):ab,ti) OR (('case control' NEAR/1 (study OR studies)):ab,ti) OR (('follow up' NEAR/1 (study OR studies)):ab,ti) OR (observational NEAR/1 (study OR studies)) OR ((epidemiologic NEAR/1 (study OR studies)):ab,ti) OR (('cross sectional' NEAR/1 (study OR studies)):ab,ti)	6767914
#7	'randomized controlled trial'/exp OR random*:ti,ab OR (((pragmatic OR practical) NEAR/1 'clinical trial*'):ti,ab) OR ((('non inferiority' OR noninferiority OR superiority OR equivalence) NEAR/3 trial*):ti,ab) OR rct:ti,ab,kw	1839814
#6	'meta analysis'/exp OR 'meta analysis (topic)'/exp OR metaanaly*:ti,ab OR 'meta analy*':ti,ab OR metanaly*:ti,ab OR 'systematic review'/de OR 'cochrane	733409

No.	Query	Results
	database of systematic reviews'/jt OR prisma:ti,ab OR prospero:ti,ab OR (((systemati* OR scoping OR umbrella OR 'structured literature') NEAR/3 (review* OR overview*)):ti,ab) OR ((systemic* NEAR/1 review*):ti,ab) OR (((systemati* OR literature OR database* OR 'data base*') NEAR/10 search*):ti,ab) OR (((structured OR comprehensive* OR systemic*) NEAR/3 search*):ti,ab) OR (((literature NEAR/3 review*):ti,ab) AND (search*:ti,ab OR database*:ti,ab OR 'data base*':ti,ab)) OR (('data extraction':ti,ab OR 'data source*':ti,ab) AND 'study selection':ti,ab) OR ('search strategy':ti,ab AND 'selection criteria':ti,ab) OR ('data source*':ti,ab AND 'data synthesis':ti,ab) OR medline:ab OR pubmed:ab OR embase:ab OR cochrane:ab OR (((critical OR rapid) NEAR/2 (review* OR overview* OR synthes*)):ti) OR ((((critical* OR rapid*) NEAR/3 (review* OR overview* OR synthes*)):ab) AND (search*:ab OR database*:ab OR 'data base*':ab)) OR metasynthes*:ti,ab OR 'meta synthes*':ti,ab	
#5	#3 NOT ('conference abstract'/it OR 'editorial'/it OR 'letter'/it OR 'note'/it) NOT (('animal'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'nonhuman'/exp) NOT 'human'/exp)	136
#4	managing AND urolithiasis AND with AND thulium AND fiber AND laser AND trax er	1
#3	#1 AND #2	2496
#2	'thulium'/exp AND ('laser'/exp OR 'laser lithotripsy'/exp OR 'laser therapy'/exp) OR 'thulium fiber laser'/exp OR 'thulium laser'/exp OR 'thulium yag laser'/exp OR 'laser ablation system'/exp OR 'actionii':ti,ab,kw OR 'cvx-300':ti,ab,kw OR 'cooltouch (laser ablation system)':ti,ab,kw OR 'cooltouch ctev':ti,ab,kw OR 'cooltouch coollipo':ti,ab,kw OR 'cooltouch ez pass 400':ti,ab,kw OR 'cooltouch renew':ti,ab,kw OR 'cooltouch saphfire':ti,ab,kw OR 'deka smartlipo':ti,ab,kw OR 'lucid ly':ti,ab,kw OR 'lykos':ti,ab,kw OR 'odyssey 30':ti,ab,kw OR 'periolase':ti,ab,kw OR 'soltive':ti,ab,kw OR 'venacure':ti,ab,kw OR 'versapulse p20':ti,ab,kw OR 'assisted reproduction laser system':ti,ab,kw OR 'general/multiple surgical solid-state laser system':ti,ab,kw OR 'laser ablation device':ti,ab,kw OR 'laser ablation system':ti,ab,kw OR 'varicose vein lasing procedure kit':ti,ab,kw OR 'tm yag':ti,ab,kw OR 'thulium yag':ti,ab,kw OR 'thulium yttrium aluminium garnet laser':ti,ab,kw OR 'thulium yttrium aluminum garnet laser':ti,ab,kw OR (((superpulse* OR fiber) NEAR/3 thulium*):ti,ab,kw)	1986
#1	'urolithiasis'/exp OR 'ureteroscopy'/exp OR 'urethra stone'/exp OR 'urinary tract obstruction'/exp OR (((kidney OR urologic* OR renal OR urinary OR uret* OR urine OR coral OR uro) NEAR/3 (calcul* OR lithias* OR stone* OR colic* OR obstruct*)):ti,ab,kw) OR urocalculo*:ti,ab,kw OR urol?t*:ti,ab,kw OR nephrolit*:ti,ab,kw OR renolit*:ti,ab,kw OR urocalcul*:ti,ab,kw OR rirs:ti,ab,kw OR 'retrograde	134577

No.	Query	Results
	intrarenal surg*':ti,ab,kw OR 'retrograde intra renal surg*':ti,ab,kw OR ureteroscop*:ti,ab,kw OR 'ureteropyeloscop*':ti,ab,kw OR 'pyeloureteroscop*':ti,ab,kw	

Ovid/Medline

#	Searches	Results
11	4 and (7 or 8) OBS	56
10	4 and 6 RCT	12
9	4 and 5 SR	11
8	Case-control Studies/ or clinical trial, phase ii/ or clinical trial, phase iii/ or clinical trial, phase iv/ or comparative study/ or control groups/ or controlled before-after studies/ or controlled clinical trial/ or double-blind method/ or historically controlled study/ or matched-pair analysis/ or single-blind method/ or (((control or controlled) adj6 (study or studies or trial)) or (compar* adj (study or studies)) or ((control or controlled) adj1 active) or "open label*" or ((double or two or three or multi or trial) adj (arm or arms)) or (allocat* adj10 (arm or arms)) or placebo* or "sham-control*" or ((single or double or triple or assessor) adj1 (blind* or masked)) or nonrandom* or "non-random*" or "quasi-experiment*" or "parallel group*" or "factorial trial" or "pretest posttest" or (phase adj5 (study or trial)) or (case* adj6 (matched or control*)) or (match* adj6 (pair or pairs or cohort* or control* or group* or healthy or age or sex or gender or patient* or subject* or participant*)) or (propensity adj6 (scor* or match*))).ti,ab,kf. or (confounding adj6 adjust*).ti,ab. or (versus or vs or compar*).ti. or ((exp cohort studies/ or epidemiologic studies/ or multicenter study/ or observational study/ or seroepidemiologic studies/ or (cohort* or 'follow up' or followup or longitudinal* or prospective* or retrospective* or observational* or multicent* or 'multi-cent*' or consecutive*).ti,ab,kf.) and ((group or groups or subgroup* or versus or vs or compar*).ti,ab,kf. or ('odds ratio*' or 'relative odds' or 'risk ratio*' or 'relative risk*' or aor or arr or rrr).ab. or (("OR" or "RR") adj6 CI).ab.))	5100444
7	Epidemiologic studies/ or case control studies/ or exp cohort studies/ or Controlled Before-After Studies/ or Case control.tw. or cohort.tw. or Cohort analy$.tw. or (Follow up adj (study or studies)).tw. or (observational adj	4087194

	(study or studies)).tw. or Longitudinal.tw. or Retrospective*.tw. or prospective*.tw. or consecutive*.tw. or Cross sectional.tw. or Cross-sectional studies/ or historically controlled study/ or interrupted time series analysis/ [Onder exp cohort studies vallen ook longitudinale, prospectieve en retrospectieve studies]	
6	(exp randomized controlled trial/ or randomized controlled trials as topic/ or random*.ti,ab. or rct?.ti,ab. or ((pragmatic or practical) adj "clinical trial*").ti,ab,kf. or ((non-inferiority or noninferiority or superiority or equivalence) adj3 trial*).ti,ab,kf.) not (animals/ not humans/)	1357067
5	(meta-analysis/ or meta-analysis as topic/ or (metaanaly* or meta-analy* or metanaly*).ti,ab,kf. or systematic review/ or cochrane.jw. or (prisma or prospero).ti,ab,kf. or ((systemati* or scoping or umbrella or "structured literature") adj3 (review* or overview*)).ti,ab,kf. or (systemic* adj1 review*).ti,ab,kf. or ((systemati* or literature or database* or data-base*) adj10 search*).ti,ab,kf. or ((structured or comprehensive* or systemic*) adj3 search*).ti,ab,kf. or ((literature adj3 review*) and (search* or database* or data-base*)).ti,ab,kf. or (("data extraction" or "data source*") and "study selection").ti,ab,kf. or ("search strategy" and "selection criteria").ti,ab,kf. or ("data source*" and "data synthesis").ti,ab,kf. or (medline or pubmed or embase or cochrane).ab. or ((critical or rapid) adj2 (review* or overview* or synthes*)).ti. or (((critical* or rapid*) adj3 (review* or overview* or synthes*)) and (search* or database* or data-base*)).ab. or (metasynthes* or meta-synthes*).ti,ab,kf.) not (comment/ or editorial/ or letter/ or ((exp animals/ or exp models, animal/) not humans/))	551318
4	3 not ((exp animals/ or exp models, animal/) not humans/) not (letter/ or comment/ or editorial/)	116
3	1 and 2	127
2	(Thulium/ and (exp Lasers/ or Lithotripsy, Laser/ or Laser Therapy/)) or actionii.ti,ab,kf. or cvx-300.ti,ab,kf. or cooltouch ctev.ti,ab,kf. or cooltouch coollipo.ti,ab,kf. or cooltouch ez pass 400.ti,ab,kf. or cooltouch renew.ti,ab,kf. or cooltouch saphfire.ti,ab,kf. or deka smartlipo.ti,ab,kf. or lucid ly.ti,ab,kf. or lykos.ti,ab,kf. or odyssey 30.ti,ab,kf. or periolase.ti,ab,kf. or soltive.ti,ab,kf. or venacure.ti,ab,kf. or versapulse p20.ti,ab,kf. or assisted reproduction laser system.ti,ab,kf. or laser ablation device.ti,ab,kf. or laser ablation system.ti,ab,kf. or tm yag.ti,ab,kf. or thulium yag.ti,ab,kf. or thulium yttrium aluminium garnet laser.ti,ab,kf. or thulium yttrium	895

	aluminum garnet laser.ti,ab,kf. or ((superpulse* or fiber) adj3 thulium*).ti,ab,kf.	
1	exp Urolithiasis/ or Renal Colic/ or exp Urinary Calculi/ or exp Ureteroscopy/ or Ureteral Obstruction/ or exp Urethral Obstruction/ or ((kidney or urologic* or renal or urinary or uret* or urine or coral or uro) adj3 (calcul* or lithias* or stone* or colic* or obstruct*)).ti,ab,kf. or urocalculo*.ti,ab,kf. or urol?t*.ti,ab,kf. or nephrolit*.ti,ab,kf. or renolit*.ti,ab,kf. or urocalcul*.ti,ab,kf. or rirs.ti,ab,kf. or retrograde intrarenal surg*.ti,ab,kf. or retrograde intra renal surg*.ti,ab,kf. or ureteroscop*.ti,ab,kf. or ureteropyeloscop*.ti,ab,kf. or pyeloureteroscop*.ti,ab,kf.	92459