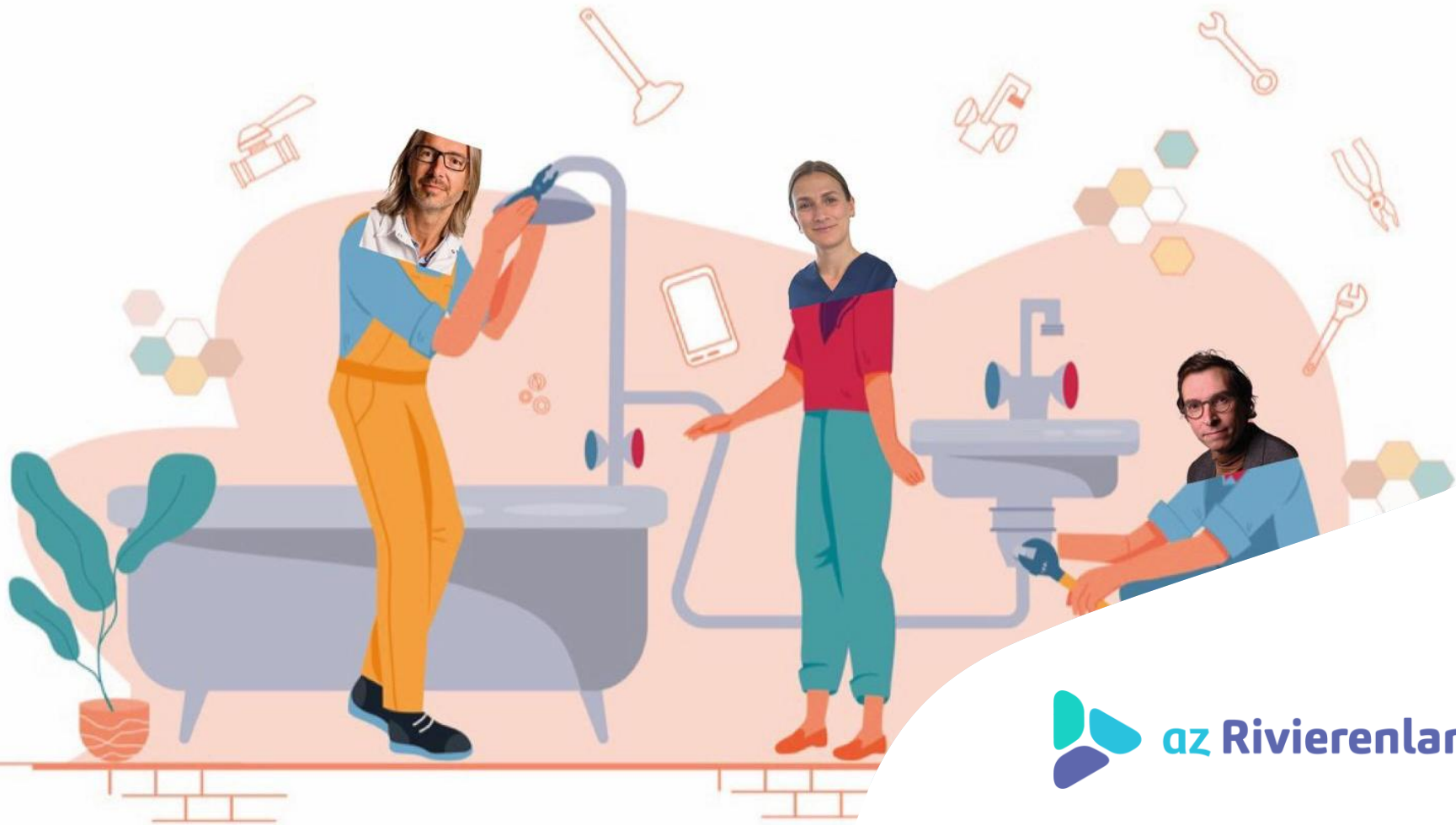




az Rivierenland

Urolithiasis: What's in a stone

Jolien van der Jeugt – Uroloog AZ Rivierenland - Bornem



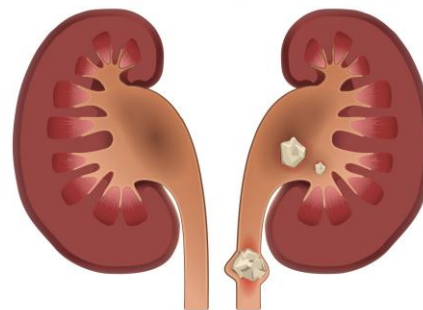
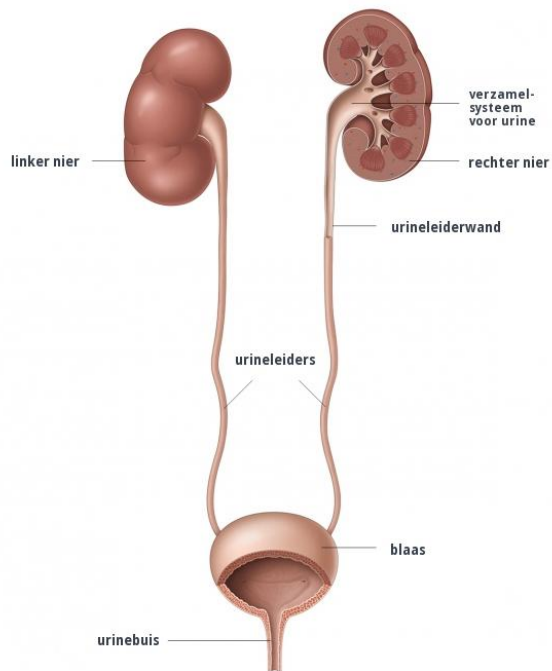
az Rivierenland

Overzicht

- Inleiding
- Diagnostiek
- Therapie
- Metabole screening

Inleiding

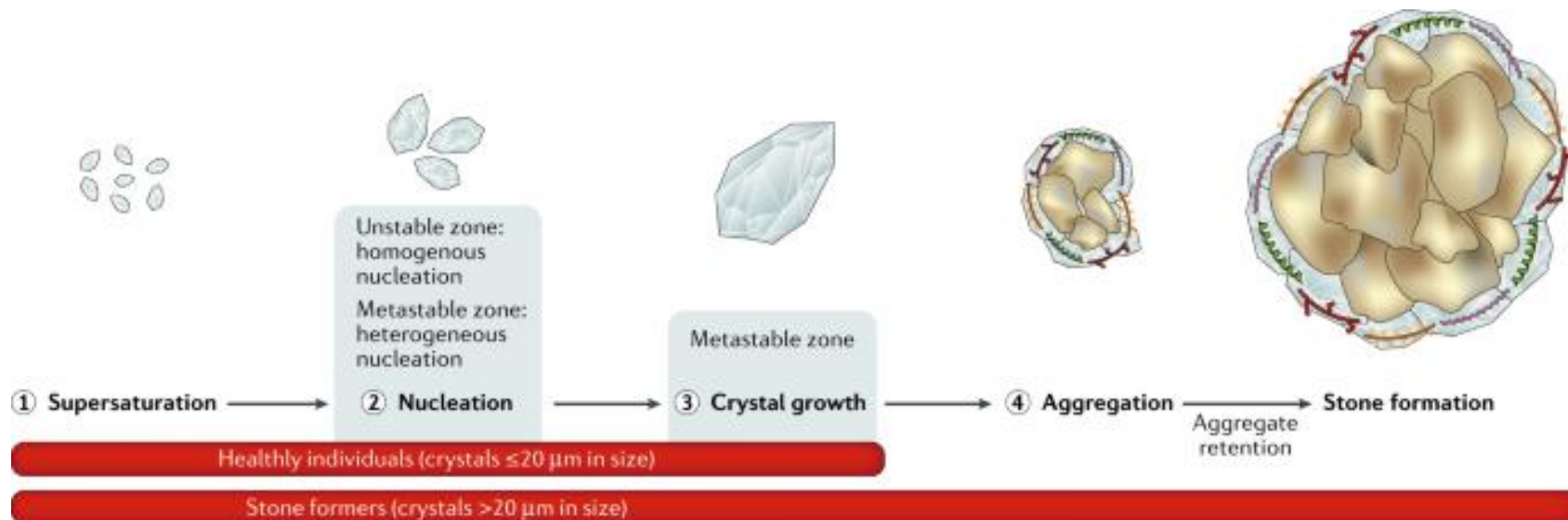
Urolithiasis



Afb. 1. De urinewegen.

- Prevalentie:
 - 1 op 9
- Recidief risico:
 - Binnen 1 jaar: 10%
 - Binnen 10 jaar: 50%
- 2x zo vaak bij mannen als bij vrouwen
- Leeftijd: 30-50 jaar

Ontstaan

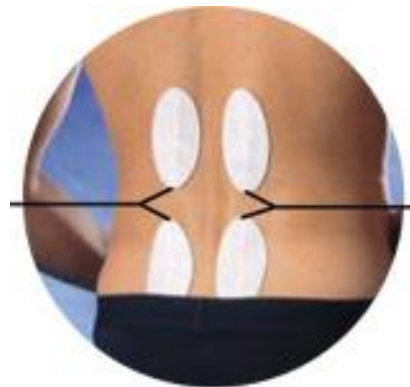
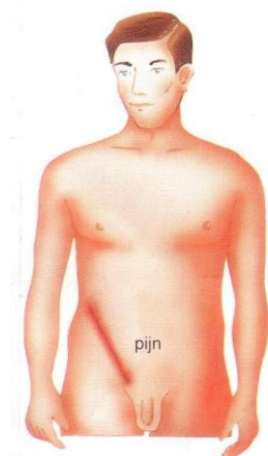


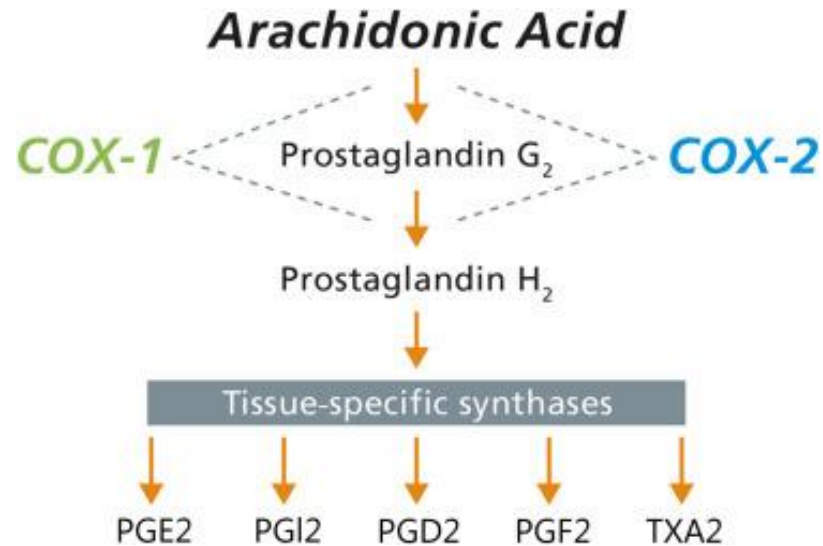
Diagnostiek

Diagnostiek - Anamnese

- Symptomen

tijd	acuut, intermitterend	
localisatie	flankpijn, uitstralend naar inguinaal	<i>te diff met appendicitis – diverticulitis – adnexitis - liesbreuk</i>
geassocieerde symptomen	• nausea • bewegingsdrang • irritatieve mictielast	<i>te diff met lumbalgie</i>
temperatuur	nml	





Indicaties voor dringende beeldvorming?

Koorts?

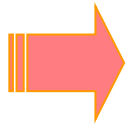


Obstructieve pyelonefritis

Anurie?



Postrenaal nierfalen



Dringende drainage

Diagnostiek – Technische onderzoeken

urine	microhematurie	<i>niet altijd cave pyurie</i>
bloed	• nmle inflamm parameters • nml of licht gestegen creat	<i>cave creat stijging bij unieke nier of bilaterale lithiase</i>

Sediment + cultuur

PBO, CRP
nierfunctie + elektrolyten (Ca)
UZ, PTH

Diagnostiek – Technische onderzoeken

urine	microhematurie	<i>niet altijd cave pyurie</i>
bloed	• nmle inflamm parameters • nml of licht gestegen creat	<i>cave creat stijging bij unieke nier of bilaterale lithiase</i>
Rx abdomen	lithiase over ureterverloop	<i>als radio-opaak</i>
Echo nier	stuwing pyelocalicieel systeem	<i>niet altijd</i>
Echo blaas	evt prevesicale lithiase	
CT à blanc RP	uretersteen	



RX abdomen



Table 3.8: X-ray characteristics

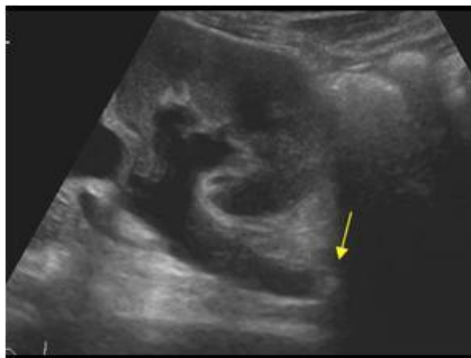
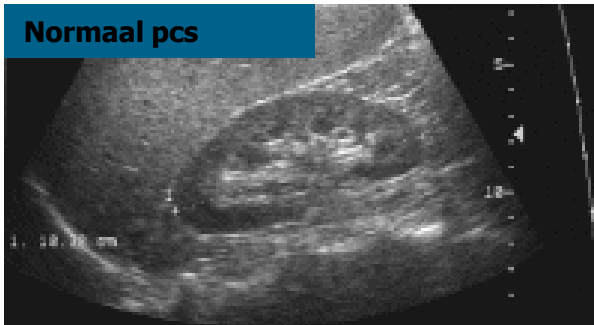
Radiopaque	Poor radiopacity	Radiolucent
Calcium oxalate dihydrate	Magnesium ammonium phosphate	Uric acid
Calcium oxalate monohydrate	Cystine	Ammonium urate
Calcium phosphate		Xanthine
		2,8-Dihydroxyadenine
		Drug-stones (Section 4.11)

+ Goedkoop, lage stralingsbelasting

- Lage sensitiviteit!!

Echo nieren

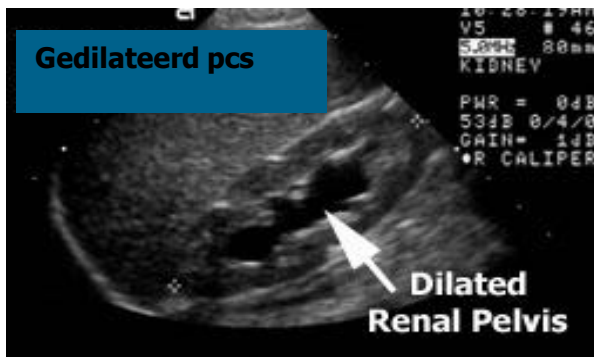
Normaal pcs



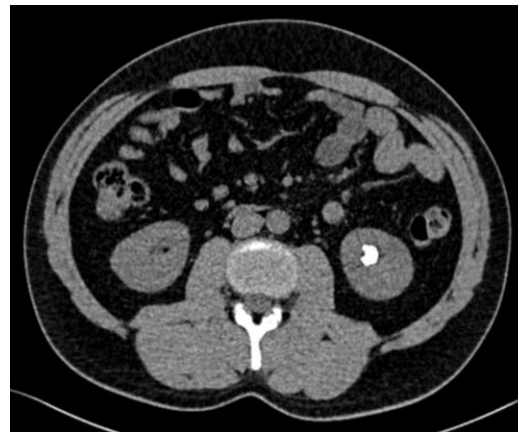
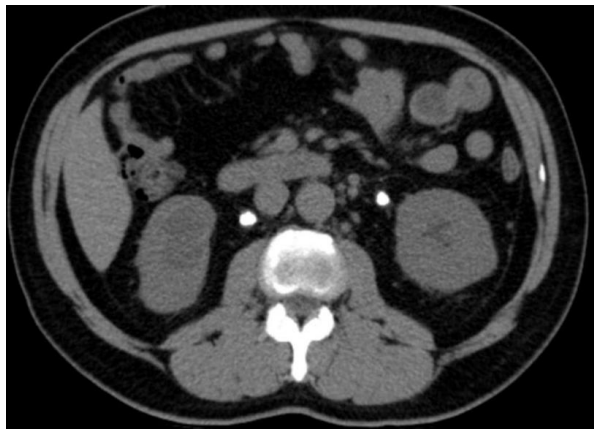
+ Goedkoop, geen stralingsbelasting

- Lage sensitiviteit!!

Gedilateerd pcs



CT abdomen blanco – (ultra) low dose



- + Hoge sensitiviteit, steenkenmerken, andere focus?
- Stralingsbelasting



→ Gouden standaard

RX abdomen

0.5 – 1 mSv

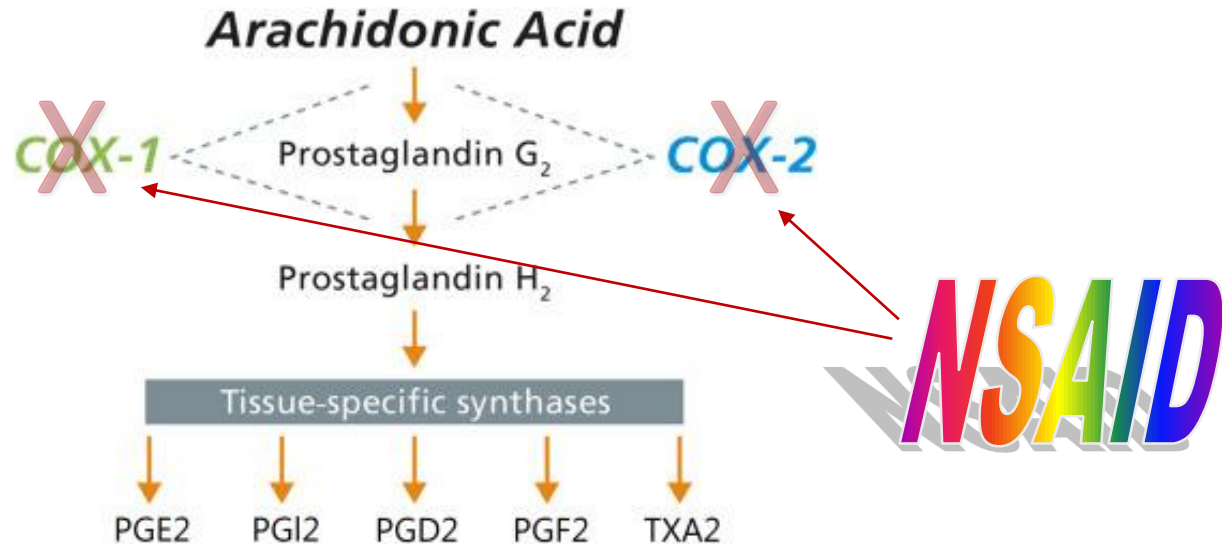
vs

CT abdomen
(ultra) LOW DOSE

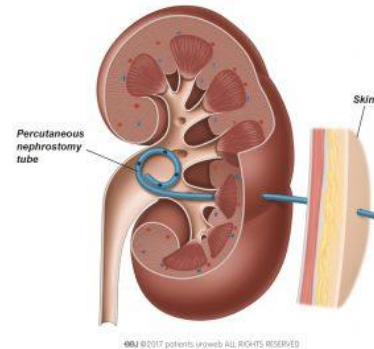
2 – 4 mSv

Therapie

NSAID



- NSAIDS !
- Andere pijnstilling: paracetamol, opiaten
- Diurese verminderen
- Chirurgische drainage
 - JJ stent
 - Nefrostomie



Verwijzen vs niet verwijzen

Koorts



Obstructieve pyelonefritis

Anurie



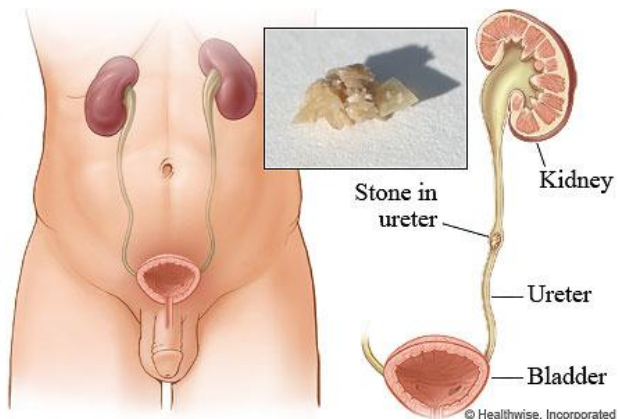
Postrenaal nierfalen

Onvoldoende pijncontrole met maximale pijnstilling

Spontane evacuatie weinig waarschijnlijk

- Spontane evacuatie
- MET : Medical expulsive therapie
- ESWL : Extracorporele niersteenverbrijzeling
- URS : Ureterorenoscopie
- PCNL / ECIRS : Percutane niersteenbehandeling

Therapie - Spontane evacuatie



Distaal
Klein (<5mm)

> Proximaal
> Groot (>5mm)

Distale steen < 5mm →

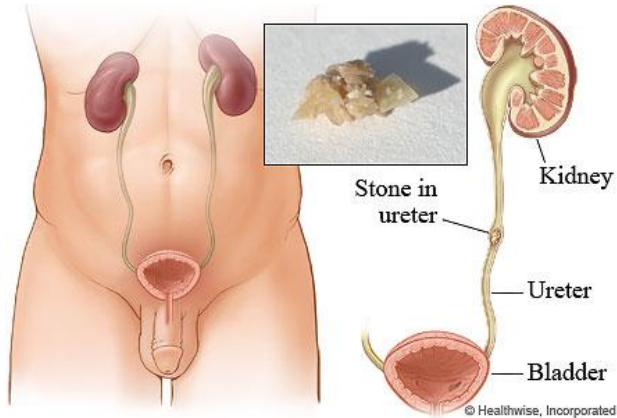
89% spontane evacuatie

Proximale steen < 5mm →

71% spontane evacuatie

Urine zeven

Spontane evacuatie + Medical Expulsive Therapy (MET)

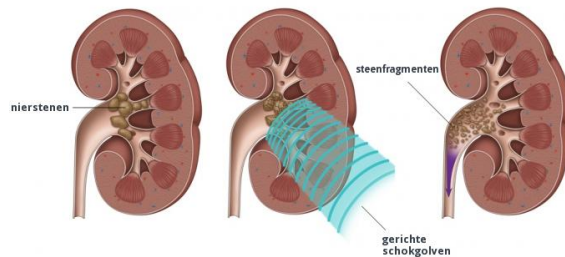
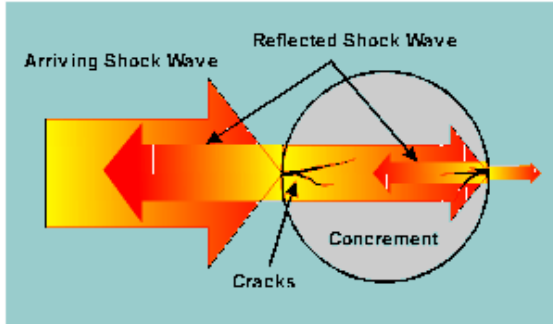


= Start Tamsulosine 1dd

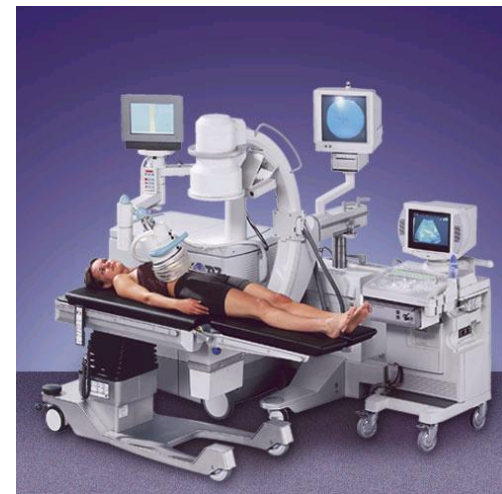
Urine zeven

Therapie - ESWL

- Hoogfrequente geluidsgolven



Afb. 1. Gerichte schokgolven breken de stenen in fragmenten



Indicaties

- Unieke steen
- Nier of proximale ureter
- <1cm

Indicaties

- Unieke steen
- Nier of proximale ureter
- <1cm

Voordelen

- Ambulant
- Weinig complicaties

Aritmieën
Perirenaal hematoom (0.66%)
UWI (1%)



Indicaties

- Unieke steen
- Nier of proximale ureter
- <1cm

Voordelen

- Ambulant
- Weinig complicaties

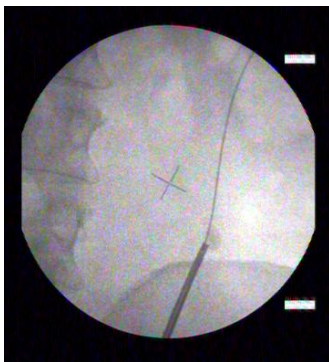
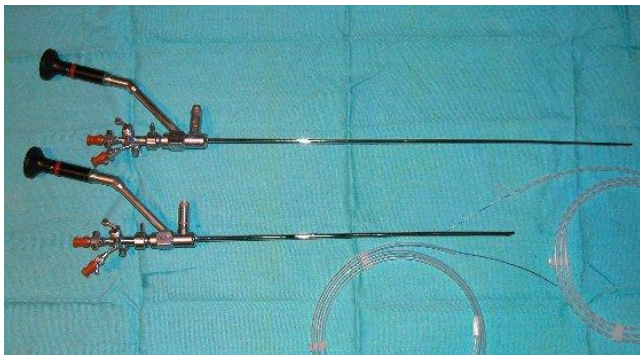
Beperkingen

- Wisselende success rate 30-90%
 - Harde stenen
 - Obesitas
 - Grote stenen
 - Steenpositie

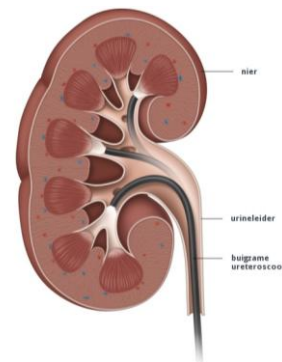
→ Beperkte indicaties

Therapie – Ureterorenoscopie (URS)

Semirigide URS voor ureterstenen



Flexibele URS voor ureter- én nierstenen

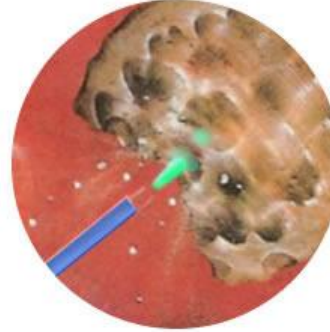


Therapie - URS

Basket



Laser



Indicaties

- Multipele stenen
- Thv ureter en nier
- <2cm

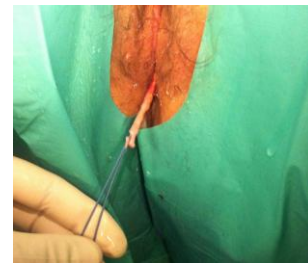
Indicaties

- Multipiele stenen
- Thv ureter en nier
- <2cm

Voordelen

- Dagziekenhuis
- Weinig complicaties
- Goede success rate

Nakoliek/hydronefrose
UWI
Ureterschade-avulsie



Indicaties

- Multipiele stenen
- Thv ureter en nier
- <2cm

Voordelen

- Dagziekenhuis
- Weinig complicaties
- Goede success rate

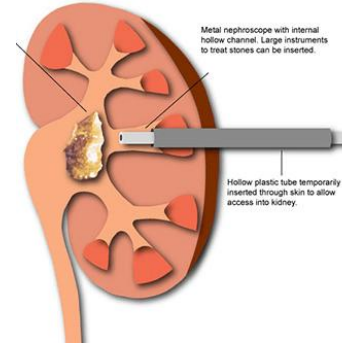
Beperkingen

- Nauwe ureter
- Grote steenload

Therapie – Percutane niersteenbehandeling (PCNL / ECIRS)

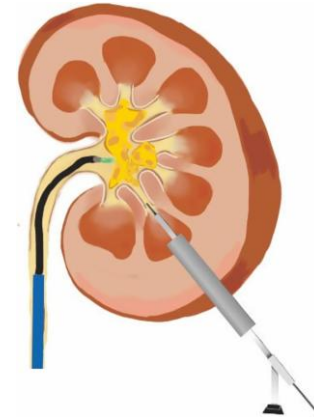
- PCNL

= Percutane nefrolitholapaxie



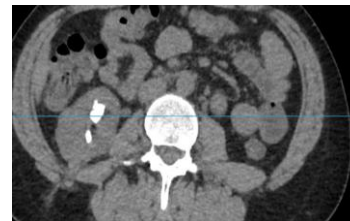
- ECIRS

= Endoscopic combined intrarenal surgery



Indicaties

- Grote complexe stenen
- >2cm
- Thv de nier
- Afwijkende anatomie



Indicaties

- Grote complexe stenen
- >2cm
- Thv de nier
- Afwijkende anatomie

Voordelen

- Beste success rate



- Gr...
- >2
- Thv de nier

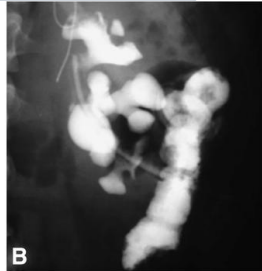
Voordelen

- Beste success rate

Infectie
Bloeding
Orgaanschade
(milt, lever, darm, long)

Beperkingen

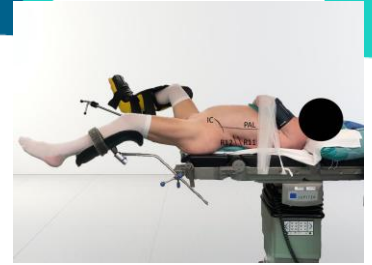
- Complicaties



Beperking van de complicaties door ... evolutie

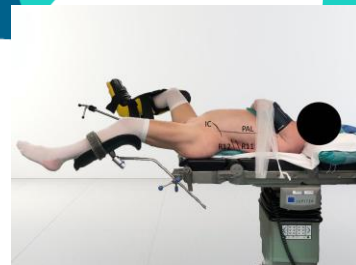
Beperking van de complicaties door ... evolutie

- Aangepaste positionering



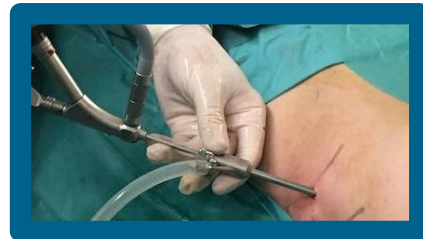
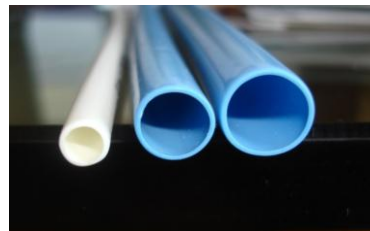
Beperking van de complicaties door ... evolutie

- Aangepaste positionering



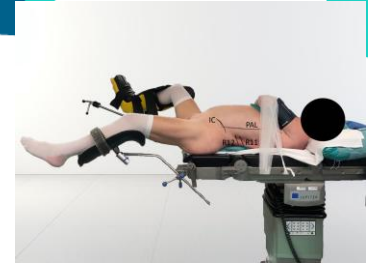
- Dunne instrumenten:

30Fr - 20Fr - 15Fr - 10Fr

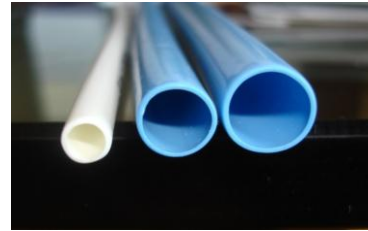


Beperking van de complicaties door ... evolutie

- Aangepaste positionering



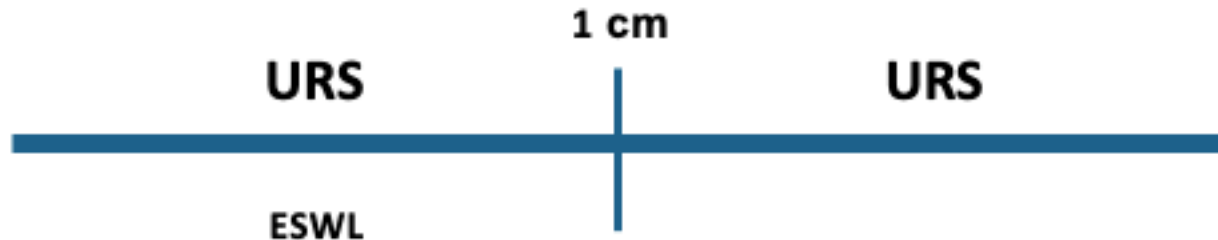
- Dunne instrumenten:
30Fr - 20Fr - 15Fr - 10Fr



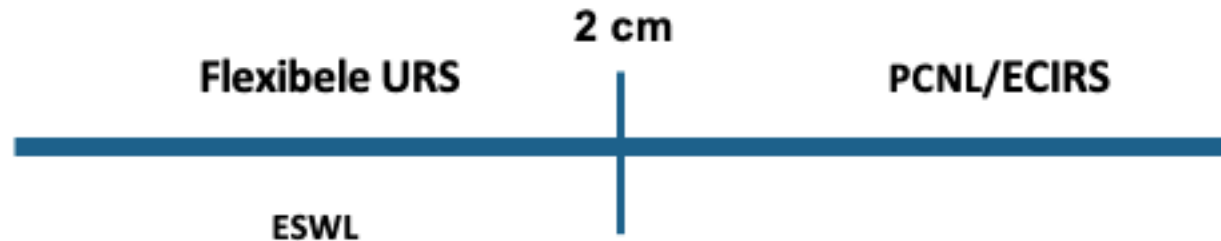
- High power lasers



Therapie ureterstenen



Therapie nierstenen



Metabole screening

= onderzoek naar onderliggende afwijkingen

Metabole screening

- Wanneer?
 - Na de steenbehandeling
 - Steenvrije patiënt
- Wat?
 - Start = Steenanalyse

Subtype Main	Main crystalline phase	Main morphological characteristics	Surface	Section	Etiology
la	Whewellite	Mamillary surface. Section made of concentric layers with radiating organization. Color: brown. Frequent umbilication and Randall's plaque indicative of papillary origin			Randall's plaque, low diuresis, excessive urine oxalate concentration. Medullary sponge kidney (MSK)
lb	Whewellite	Mamillary and rough surface. No umbilication. Unorganized section. Color: brown to dark brown			Moderate hyperoxaluria, stasis, crystalline conversion from COD to COM.
lc	Whewellite	Budding surface. Finely granular and poorly organized section. Light color, cream to pale yellow-brown			Primary hyperoxaluria type I.
ld	Whewellite	Smooth surface. Compact, section made of thin concentric layers. Color: beige or pale brown			Anatomic anomaly, obstruction with multiple stones.
le	Whewellite	Locally budding, mamillary or rough surface. Section: locally unorganized or radiating structure. Color: pale yellow-brown to brown			Enteric hyperoxaluria

Subtype Main	Main crystalline phase	Main morphological characteristics	Surface	Section	Etiology
IIa	Weddellite	Spiculated surface showing aggregated bipyramidal crystals with sharp angles and edges. Section showing loose radial crystallization. Color: pale yellow-brown			Idiopathic hypercalciuria
IIb	Weddellite	Spiculated surface showing aggregated bipyramidal crystals with blunt angles and ridges. Section showing compact unorganized crystallization. Color: pale yellow-brown			Idiopathic hypercalciuria + moderate hyperoxaluria.
IIc	Weddellite	Rough surface. Section: unorganized core with diffuse concentric structure in periphery. Color: gray-beige to dark yellow-brown			Hypercalciuria + anatomic anomaly + multiple stones and obstruction.

Morphological subtype	Stone morphology		Common etiology	Morphological subtype	Stone morphology		Common etiology
Main component	Surface	Section		Main component	Surface	Section	
Weddellite				Carbapatite			
Type IIa (surface)			Hyperoxaluria + hypercalciuria Nucleation of stone on carbapatite Randall's plaque (RP) (white arrow)	Type IVa1			Hypercalciuria, urinary tract infection Etiology may be oriented by the presence of other crystalline species and by the carbonation rate of carbonated calcium phosphates (see text)
Type Ia+IIa (section)							
Type IVa (nucleus=RP)				Type IVa2			Inherited or acquired distal renal tubular acidosis Sjögren syndrome Chronic hepatitis
Whewellite				Carbapatite			
Type Ia+IIa (surface)			Intermittent or moderate hypercalciuria, crystalline conversion, moderately high oxalate concentration, low diuresis nucleation on carbapatite tubular plug or RP	Type IVb			Urinary tract infection, Hypercalciuria, primary hyperparathyroidism
Type Ib+IIb (section)							
Type IVa+IIb (core) (black arrow)				Type IVc			Urinary tract infection by urea-splitting bacteria
Whewellite				Struvite			
Type Ia+IIb (surface)			Moderately high oxalate concentration, low diuresis, Intermittent hypercalciuria, Vitamine D hypersensitivity	Type IVd			Hypercalciuria, primary hyperparathyroidism, phosphate leak, medullary sponge kidney
Type Ia (section)							
Type IVa (nucleus = RP)				Brushite			
Weddellite				Type IVd			
Type IIa+IVa1 (surface)			Hypercalciuria, whatever its origin	Stage)			
Type (IIa+IVa1) (section)							
Weddellite				Stage)			
Type IIa+IVa1 (surface)			Resorptive or absorptive hypercalciuria, primary hyperparathyroidism	Stage)			
Type (IIa+IVa1) (section)							

Opaline silica
(surface and section)

Calcium oxalate
L-lysine
Calcium oxalate
Risks: Transmembrane and metabolic

Nuclei
Nuclei
Nuclei
Nuclei

Hydrate
Hydrate
Hydrate
Hydrate

Aluminum
Aluminum
Aluminum
Aluminum

Acetate
Acetate
Acetate
Acetate

C A L C I U M	CALCIUM OXALATE MONOHYDRATE (Whewellite) Type I	55%	Opaque 1700-2800 UH	N	DIETARY hyperoxaluria Low ratio Ca/oxa Randall's plaque	
	CALCIUM OXALATE DIHYDRATE (Weddellite) Type II	18%	Opaque 1400-2000 UH	N	Hypercalciuria High ratio Ca/Oxa Randall's plaque	
N O C A L C I U M	URIC ACID Type III	8%	Lucent 200-450 UH	↓	Hyperuricosuria Low pH Type II Diabetes Urinary stasis	
	STRUVITE (Magnesium ammonium phosphate) Type IVc	4%	Opaque 600-900 UH	↑	Urinary tract infection, urea-splitting bacteria	
C A L C I U M	BRUSHITE (Dicalcium phosphate dihydrate) Type IVd	3%	Opaque 1700-2800 UH	↑	Hypercalciuria Hyperparathyroidism Medullary sponge kid.	
	CARBAPATITE (Carbonated apatite, calcium Phosphate) Type IVa	11%	Opaque 1200-1600 UH	↑	Hypercalciuria Urinary tract infection Renal Tubular acidosis Sjogren Syndrome	
N O C A C	Cystine Type V	<1%	Relatively lucent 600-1100 UH	↓	Cystinuria (AR disease) ↑	

Calcium-oxalaat

86%

Calcium-fosfaat

		%	RX	pH	ETIOLOGY	IMAGE
CALCULI	CALCIUM OXALATE MONOHYDRATE (Whewellite) Type I	55%	Opaque 1700-2800 UH	N	DIETARY hyperoxaluria Low ratio Ca/oxa Randall's plaque	
	CALCIUM OXALATE DIHYDRATE (Weddellite) Type II	18%	Opaque 1400-2000 UH	N	Hypercalciuria High ratio Ca/Oxa Randall's plaque	
CALCULI	URIC ACID Type III	8%	Lucent 200-450 UH	↓	Hyperuricosuria Low pH Type II Diabetes Urinary stasis	
	STRUVITE (Magnesium ammonium phosphate) Type IVc	4%	Opaque 600-900 UH	↑	Urinary tract infection, urea-splitting bacteria	
CALCULI	(Dicalcium phosphate dihydrate) Type IVd	3%	Opaque 1700-2800 UH	↑	Hypercalciuria Hyperparathyroidism Medullary sponge kid.	
	CARBAPATITE (Carbonated apatite, calcium Phosphate) Type IVa	11%	Opaque 1200-1600 UH	↑	Hypercalciuria Urinary tract infection Renal Tubular acidosis Sjogren Syndrome	
AMINOACIDS	Cystine Type V	<1%	Relatively lucent 600-1100 UH	↓	Cystinuria (AR disease) ↑	

13%

Metabole screening

- Wat?
 - Start = Steenanalyse
 - Metabool bilan:
 - Labo
 - 24u urine collectie (2x)
 - Uitgebreide dieetanamnese
 - Eventueel: urinair pH profiel

- Wie
 - Gemotiveerde patiënten!!
 - Hoog - risico steenvormers:

→ STEENANALYSE: NON-CALCIUM stenen (Brushiet – UZ en Uraat – Struviet- Cystine)

→ Leeftijd (<25j) – Familiaal risico (x3) – Bilaterale lithiasis

→ ANATOMIE: Solitaire nier – PUJ stenose – ureterocoele – calyxdivertikel – ureterstrictuur - VUReflux – medullaire sponsnier – hoefijzernier

→ GI: Crohn, GI bypass, malabsorptie

→ HyperPTH – Sarcoïdose

→ GENETICA: cystinurie, RTA, primair hyperoxalurie, Muco...

→ Aantal nierkolieken/jaar ??

- Waarom?
 - Metabool bilan bij hoog-risico groep → 96% heeft een afwijking
 - Calciumoxalaat stenen hebben **meeste baat** bij metabool bilan
 - Recidief gebaseerd op interventie:

• Placebo	<	Dieetmaatregelen	<	Medicatie
26/100		23/100		9/100

Behandeling high risk steenvormer

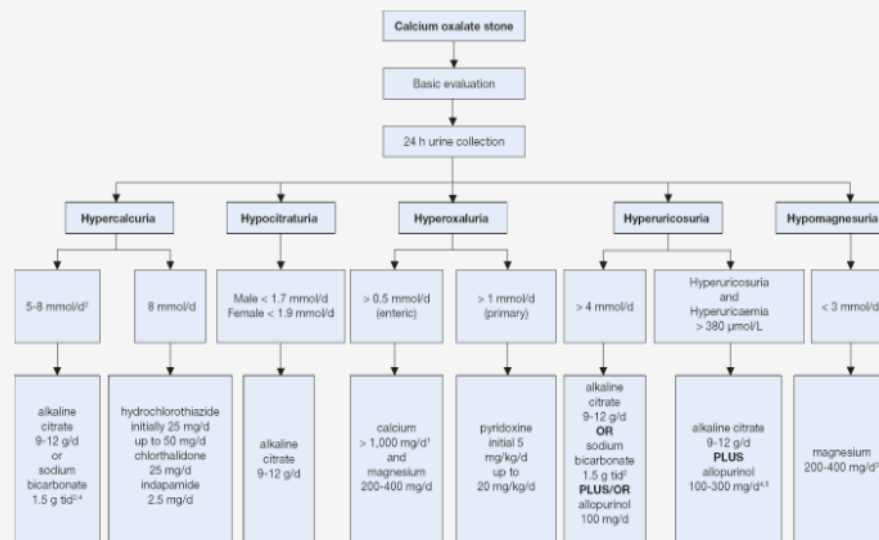
- Dieetmaatregelen via diëtist
- Opstart medicatie
- Verwijzing nefroloog – endocrinoloog
- Opvolging



Afh van het metabool bilan

Voorbeeld calciumoxalaat stenen

Figure 4.2: Diagnostic and therapeutic algorithm for calcium oxalate stones



Behandeling andere patiënten

- Algemene dieetmaatregelen

Fluid intake (drinking advice)	Fluid amount: 2.5-3.0 L/day
	Circadian drinking
	Neutral pH beverages
	Diuresis: 2.0-2.5 L/day
	Specific weight of urine: < 1,010 g/day
Nutritional advice for a balanced diet	Balanced diet*
	Rich in vegetables and fibre
	Normal calcium content: 1-1.2 g/day
	Limited NaCl content: 4-5 g/day
	Limited animal protein content: 0.8-1.0 g/kg/day
Lifestyle advice to normalise general risk factors	BMI: Retain a normal BMI level
	Adequate physical activity
	Balancing of excessive fluid loss

Caution: Protein requirements are age dependent; therefore, protein restriction in childhood should be handled carefully.

** Avoid excessive consumption of vitamin supplements.*

Referenties

- <https://www.sciencedirect.com/science/article/pii/S2211913215300620>
- EAU guidelines 2025

Bedankt voor de aandacht!

