

Serving, Seeing, Striving for
something
greater

Management of Renal Calculi

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Kidney Stones

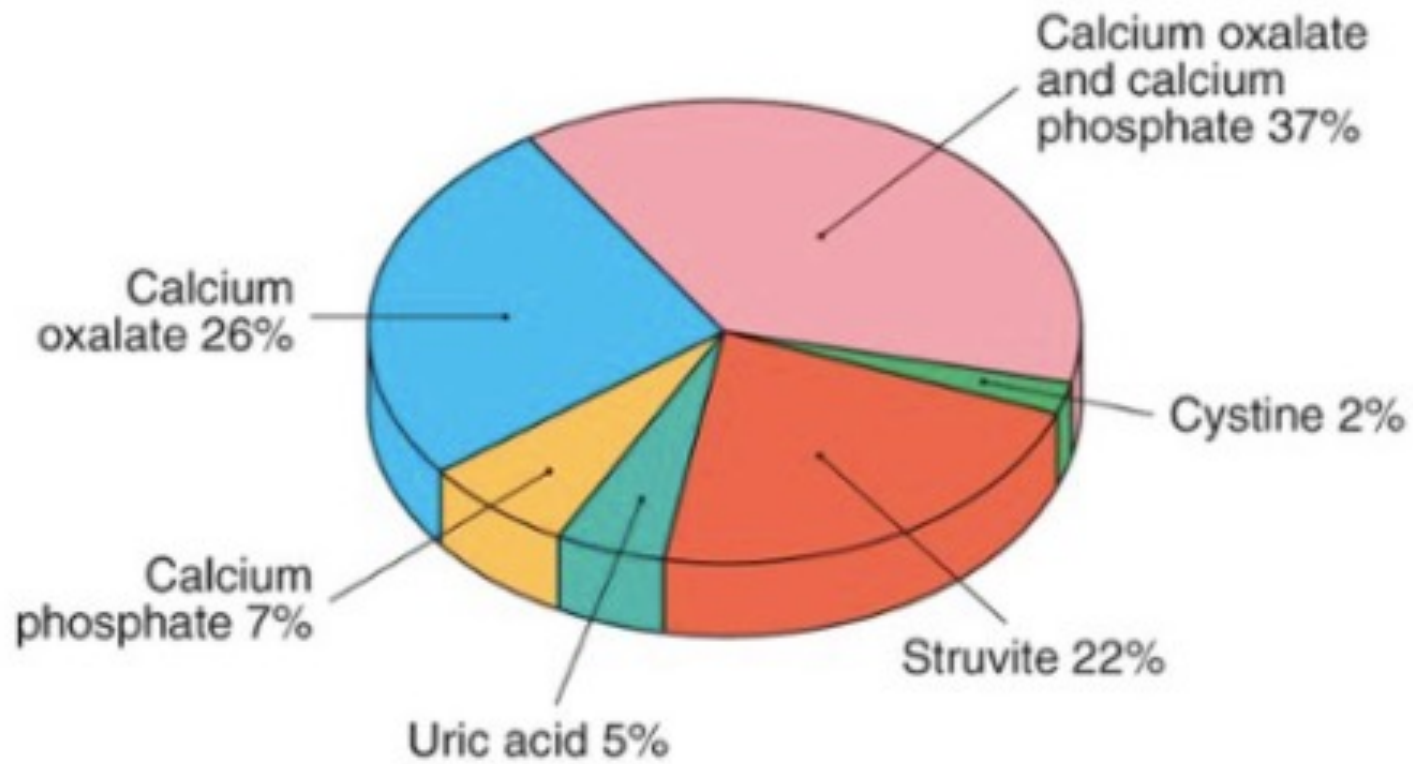
Risk for kidney stones

- 1 in 10 for men and 1 in 35 for women
- Affects 4-8% of Australian population

Risk of recurrence

- After 1st kidney stone: 5-10% each year
- 30-50% of people with a first kidney stone will get a second stone within 5 years

Distribution of Stone Types



General Management

Radiologic evaluation

Analgesia

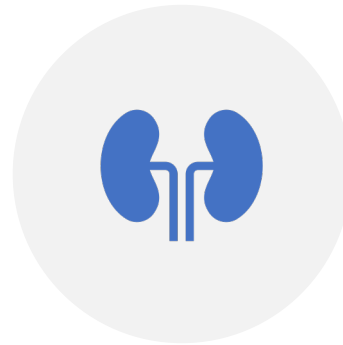
Conservative vs. Surgical Management

- Spontaneous passage rate in 20 weeks:
 - 98% in 0-3mm
 - 81% in 4mm
 - 65% in 5mm
 - 33% in 6mm
 - 9% in ≥ 6.5 mm

When to refer to nephrologists?



COMPLEX/RECURRENT
CASES



KIDNEY STONES WITH
NEPHROCALCINOSIS



METABOLIC
DERANGEMENTS



Medical renal work-up

The Basic Evaluation of Nephrolithiasis

Stone history

Number of stones formed

Frequency of stone formation

Age at first onset

Size of stones passed or still present

Kidney involved (left, right, or both)

Stone type, if known

Need for urologic intervention: ESWL, percutaneous nephrolithotomy, and so on

Response to surgical procedure

Are stones associated with urinary tract infections?

Medical history

Medications

Family history

Occupation and lifestyle

Fluid intake and diet

Medications associated with stone formation

Calcium Stone Formation	Uric Acid Stone Formation	Medications that may precipitate into stones
Loop diuretics	Salicylates	Acyclovir (if infused rapidly IV)
Vitamin D	Probenecid	Indinavir
Corticosteroids	Melamine	Nelfinavir
Calcium supplements		Triamterene
Antacids		

Investigations

Stone analysis

Blood tests

- EUC
- CMP
- Uric acid
- PTH
- Vitamin D

Urine tests

24-hour urine tests

WHEN?
HOW OFTEN?

24-hour urine collection

Volume	pH
Sodium	Creatinine
Potassium	Citrate
Calcium	Oxalate
Phosphate	Uric acid
Magnesium	Cystine

Optimal 24-Hour Urine Values in Recurrent Nephrolithiasis

24-Hour Urine Values

Volume	>2 to 2.5l
Calcium	<4 mg/kg (0.1 mmol/kg), ~300 mg (7.5 mmol) in men, ~250 mg (6.3 mmol) in women
Oxalate	<40 mg (0.36 mmol)
Uric acid	<750 mg (4.5 mmol) in women and <800 mg (4.7 mmol) in men (can be pH dependent)
Citrate	>320 mg (17 mmol)
Sodium	<3000 mg (<130 mmol)
Phosphorus	<1100 mg (35 mmol)
Creatinine	>10 mg/kg (88 μ mol/kg) in women and >15 mg/kg (132 μ mol/kg) in men, if specimen is a complete collection



Dietary
Management

Dietary changes	
Fluid intake	Aim for urine output \geq 2.5L daily
Sodium intake	<2.3-6g daily
Calcium intake	1-1.2g daily

Pharmacological interventions

Stone composition	Pathophysiological factor	Drug
Calcium-containing Stones	Hypercalciuria	Hydrochlorothiazide Indapamide Chlorthalidone
Calcium oxalate/calcium phosphate stones	Hypocitraturia	Potassium citrate
	Primary hyperoxaluria	Pyridoxine
	Hyperuricosuria	Allopurinol
Uric acid stones	Low urinary pH	Potassium citrate
	Hyperuricosuria Hyperuricaemia	Allopurinol
Cystine stones	Low urinary pH	Potassium citrate
	Cystinuria	D-penicillamine