

# Adult Nursing II

## **Renal Calculi – Urolithiasis**

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# Renal Calculi: Description

- Renal calculi occur from a super-saturation of urine
- This leads to crystallisation and gravel or stone formation

# Renal Calculi: Prevalence

- Highest prevalence is in 30-50 year males
- Risk is increased by a lack of substances like magnesium and citrates in the urine (substances which prevent crystallisation)

# Renal Calculi: Classification

- Main types of stones are:
- **Calcium oxalate** (*major type, independent of urine pH*) }75%
- **Calcium phosphate** (*alkaline urine*)
- **Uric acid** (*acid urine*) (5-10%)
- **Struvite** (related to bacteria and infection (*alkaline urine*)) (15%)

# Renal Calculi: Aetiology

- Family history: genetic pre-disposition
- Dehydration: hot climates, inadequate fluid intake, sports activities
- Frequent urine infections/ catheter
- Stasis
- Immobility
- Calcium imbalance related to disease
- Diet rich in animal protein (↑ calcium/ uric acid)

# Renal Calculi: Related Complications

- Obstruction of renal tract. Leads to:
  - Retention and stasis of urine
  - Hydroureter and hydronephrosis
  - Destruction of nephrons
  - Non-functioning kidney/ renal failure
- Infection
- Direct destruction of nephrons: (“Staghorn” calculus as a space-occupying lesion)

# Renal Calculi: Clinical Manifestations

- May be symptomless
- If in renal pelvis, deep ache over loin, may track to suprapubic area or genitalia
- Haematuria; pyuria
- Acute pain when fragment dislodged (inflammation, trauma, oedema)
- Extreme colic if fragment sticks in ureter = “Renal colic”

# Renal Colic

- Severe colicky spasmodic pain over loin, wave-like reaching genitalia
- Nausea and vomiting, sweating
- May have diarrhoea
- Haematuria
- Desire to void but little urine output
- (Prostaglandin E2 release increases contractility to forward stone, ↑ blood flow and pressure in ureter = pain)



# Renal Calculi: Diagnosis

- Xray: KUB (kidneys, ureters, bladder)
- Ultrasound scan
- Intravenous or retrograde pyelogram (not if acute)
- Kidney function tests (KFT): blood urea, creatinine, calcium, phosphorus, uric acid
- Urine culture; 24 hour urine calcium, uric acid, creatinine, sodium, pH

# Renal Calculi/ Colic: Acute Management

- Pain relief:
- Narcotic often required
- NSAID ( $\downarrow$  prostaglandin synthesis)
- Antispasmodic
- Anti-emetic
- Antibiotics
- Intravenous fluid (flushing and dilution effect)
- Removal of calculi (sieve urine)

# Renal Calculi: Methods of Removal

- Lithotripsy with flushing and retrieval:
  - Via cystoscopy
  - Extra-corporeal shock-wave lithotripsy (ESWL)
  
- Surgery

# Renal Calculi: Methods of Removal

- **Via Cystoscopy:**
- Laser, ultrasound or shock-wave lithotripsy to fragment the stone
- Irrigation and flushing
- Forceps/ basket retrieval of stone or fragments
- Ureteric catheter (stent) left 48 hours to keep patency until inflammation subsides (and following all surgical procedures)

# Renal Calculi: Methods of Removal

- **ESWL: Extra-corporeal Shock-Wave Lithotripsy**
- Irrigation and flushing
- Several treatments as an outpatient to fragment the calculus

# Renal Calculi: Methods of Removal

- **Surgery:**
- Percutaneous Pyelolithotomy (“Staghorn”) or Ureterolithotomy and forceps/ basket retrieval
- Open surgery: Pyelolithotomy or Ureterolithotomy and irrigation of fragments (less often used now)

# Renal Calculi: Long-term Management

- Diet and fluids
- Lifestyle
- Medications

# Renal Calculi:

## Long-term Management/ Diet

- Diet (according to type of calculi):
- Reduce animal protein, salt, oxalates
- Increase fluid intake especially before sleeping at night
- Juices as cranberry to acidify alkaline urine where appropriate
- Potassium citrate to alkalise acid urine where appropriate



# Renal Calculi:

## Long-term Management/ Lifestyle

- Lifestyle:
- Avoid dehydration
- Avoid exposure to hot weather
- Avoid strenuous exercise
- Increase water intake especially at night
- Void regularly to avoid stasis of urine

# Renal Calculi:

## Long-term Medications

- Calcibind: binds dietary calcium in the intestinal tract
- Thiazide diuretic: monitors calcium levels related to increased parathormone
- Allopurinol: reduces uric acid levels in blood and urine
- Prophylactic antibiotics where chronic infection

# Renal Calculi:

## Nursing Considerations

- Health education about condition and measures to control
- Awareness of acute management of renal colic
- Preparation for surgical procedures and post-operative care
- Watch for signs of obstruction from fragments. Sieve all urine