Ureteric stone

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Etiology

Urolithiasis

**Causes:**
- Family history of stone formation
- Diet high in CA, vitamin D, milk, protein, purines
- Obstruction & urinary stasis
- Dehydration
- Use of diuretics, which can cause volume depletion
- Immobilization
- Hypercalcemia, & hyperparathyroidism
- Elevated uric acid, such as gout
Causes

- Metabolic
- Lifestyle
- Genetic Factors
- Drugs
- Others
Types

<table>
<thead>
<tr>
<th>Basic chemical ingredient</th>
<th>Occurrence</th>
<th>Macroscopic view</th>
<th>Nephrolith Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium oxalate monohydrate</td>
<td>39.5%</td>
<td><img src="image1" alt="Image" /></td>
<td>++</td>
</tr>
<tr>
<td>Calcium oxalate dihydrate</td>
<td>20.6%</td>
<td><img src="image2" alt="Image" /></td>
<td>++</td>
</tr>
<tr>
<td>Uric acid</td>
<td>15.1%</td>
<td><img src="image3" alt="Image" /></td>
<td>+++</td>
</tr>
<tr>
<td>Calcium phosphate</td>
<td>0.1%</td>
<td><img src="image4" alt="Image" /></td>
<td>+++</td>
</tr>
<tr>
<td>Magnesium ammonium phosphate</td>
<td>23.3%</td>
<td><img src="image5" alt="Image" /></td>
<td>+++</td>
</tr>
<tr>
<td>Calcium hydrogen phosphate</td>
<td>0.1%</td>
<td><img src="image6" alt="Image" /></td>
<td>+++</td>
</tr>
<tr>
<td>Cystine</td>
<td>1.2%</td>
<td><img src="image7" alt="Image" /></td>
<td>+</td>
</tr>
<tr>
<td>Xanthine</td>
<td>0.1%</td>
<td><img src="image8" alt="Image" /></td>
<td>+</td>
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</tbody>
</table>
Clinical feature

• Ureteric colic: severe pain intermittent • radiation depend on site associated with nausea and sometimes vomiting relieved by analgesia aggravated by movement cold

• Urinary symptoms when stone in • ureterovesical junction •

• Hematuria •
Diagnosis

- ABDOMINAL U/S
- KUB
- NATIVE ABDOMINAL CT SCAN
TREATMENT

Conservative

increase fluid intake

Medications: alpha blocker (tamsulosine)
Calcium channel blocker (nifedipine)
Herbs (cystone, rowatinex)
Treatment

**Intervention**: ESWL in upper ureteric stone

**Surgical**: ureteroscope (URS) and intracorporeal lithotripsy (LASER, PNEUMATIC)

- Open ureterolithotomy
- Laparoscopic ureterolithotomy
TREATMENT

- Ureteric Stone:
  - Conservative management
    ✓ Most stones 5 mm in maximum diameter are likely to pass spontaneously, with high amounts of fluid intake & Diuretics
  - Extracorporeal shockwave lithotripsy
    ✓ Less successful for ureteric stones than renal stones
  - Endoscopic ureterolithotomy
    ✓ With or without stone disintegration
  - Open surgery
    ✓ In case of ureteric pathology, such as stricture
  - Laparoscopy
complications

Infection: pyelonephritis, pyonephrosis •
Hydronephrosis •
  Bilateral lead to Anuria or oliguria (ARF) •
Ureteric injury

Etiology

Trauma: penetrating or blunt

Iatrogenic: surgery

1- gynecological operation especially hysterectomy

2- endoscopy (URS)

3- other surgery for colonic cancer
Mechanism of injury

1. Crushing with clamp - necrosis
2. Ligature - sutures/ linear stapler
3. Transection - Partial/ Complete
4. Angulation with secondary obstruction (kinking) - partial/ complete
5. Ischaemia - Diathermy, Stripping of adventitia
6. Segmental Resection - Intentional/ Accidental
7. Thermal burns - Diathermy (Mono > Bi- Polar), Laser energy
URETERAL INJURY

- Ureteral injuries after external violence are rare, occurring in less than 4% of cases of penetrating trauma and less than 1% of cases of blunt trauma.

- Majority of ureteral injury are iatrogenic injuries.

- Hysterectomy responsible for the majority of ureteral injury (54%), followed by colorectal surgery (14%), pelvic surgery such as ovarian tumor removal (8%), and abdominal vascular surgery (6%)
COMMON SITES OF INJURY

UTEROSACRAL LIGAMENTS
PELVIC BRIM
CROSSING OF UTERINE ART
TUNNEL OF WERTHEIM
NEAR THE URETERO-VESTI JUNCTION
Common sites

1. **At the pelvic brim** - dorsal to IPL (parallel to ovarian vessels) (<1 cm from surgeon's needle)
2. **Lateral pelvic wall** - just above uterosacral ligament
3. **Base of Broad lig** - crossing by uterine artery
4. **Tunnel of Mackenrodt's lig** - over ant vaginal fornix
5. **Intramural portion** - Inside bladder
Figure 2 – A) Preoperative intravenous pyelogram showed asymmetric renal enhancement. The right kidney was poorly enhanced 9 hours after iodine-based contrast material injection, and the right pelviocaliceal system and ureter were not enhanced on this exam. B) Postoperative intravenous pyelogram 30 days after surgery demonstrated mild right renal enlargement associated with delayed excretion and dilatation of the right collecting system and upper third of the ureter, compatible with post-surgical status.
Diagnosis

- U/S
- IVU
- ABDOMINAL CT SCAN
# TREATMENT

## M/m Based on Site of injury

<table>
<thead>
<tr>
<th>Site of injury</th>
<th>Reconstruction options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper ureter</td>
<td>Uretero-ureterostomy</td>
</tr>
<tr>
<td></td>
<td>Transuretero-ureterostomy</td>
</tr>
<tr>
<td></td>
<td>Uretero-calycostomy</td>
</tr>
<tr>
<td>Mid ureter</td>
<td>Uretero-ureterostomy</td>
</tr>
<tr>
<td></td>
<td>Transuretero-ureterostomy</td>
</tr>
<tr>
<td></td>
<td>Ureteral reimplantation and a Boari flap</td>
</tr>
<tr>
<td>Lower ureter</td>
<td>Ureteral reimplantation</td>
</tr>
<tr>
<td></td>
<td>Ureteral reimplantation with a psoas hitch</td>
</tr>
<tr>
<td>Complete</td>
<td>Ileal interposition graft</td>
</tr>
<tr>
<td></td>
<td>Autotransplantation</td>
</tr>
</tbody>
</table>
Ureteric injuries...

- Treatment options:
  - JJ stenting
  - Primary closure of partial transection of the ureter
  - Direct ureter to ureter anastomosis
  - Reimplantation of the ureter into the bladder (ureteroneocystostomy), either using a psoas hitch or a Boari flap
  - Transureteroureterostomy
  - Autotransplantation of the kidney into the pelvis
  - Replacement of the ureter with ileum
  - Permanent cutaneous ureterostomy
  - Nephrectomy
Surgical Management for Ureteral Injury

- UPPER
  - Open ureteroureterostomy
  - Transureteroureterostomy

- MIDLE
  - Open ureteroureterostomy
  - Transureteroureterostomy

- LOWER
  - Reimplantation
  - Psoas hitch
Psoas Hitch Procedure

A: Division of urachus
   - Psoas muscle
   - Peritoneum
   - Dividing obliterated umbilical artery
   - Bladder distended

B: Obliterated umbilical artery
   - Incising bladder

C: Bladder
   - Mucosa
   - Ureter
   - Enlarged bladder muscle

D: Cross-section
Preventive strategies to reduce the risk of ureteric injuries

- Appropriate operative approach (thorough case study)
- Adequate exposure
- Avoid blind clamping of blood vessels
- Direct visualisation
- Mobilise bladder away from operative site
- Short diathermy applications