Ureteral trauma

Etiology and location of injury

- **Incidence**: by location and morphology, this represents only 1% of all urological trauma cases.
- **Etiology**:  
  - Iatrogenic trauma (75%): avulsion, perforation, ligation, crushing, burns.  
    - Injuries stemming from gynecological procedures (73%).  
    - Injuries from general surgery (14%).  
    - Injuries from urological surgery (14%). Mainly due to endourological procedures.  
  - Open trauma (7%).  
  - Blunt trauma (18%).  
- **Location of injury**:  
  - Proximal third: 13%.  
  - Middle third: 13%.  
  - Distal third: 73%.

AAST ureteral injury grading scale

Depending on their severity, traumatic injuries are classified as follows:

<table>
<thead>
<tr>
<th>Classification of ureteral injury (AAST)</th>
<th>Description</th>
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<tbody>
<tr>
<td>Grade I</td>
<td>Hematoma only</td>
</tr>
<tr>
<td>Grade II</td>
<td>Laceration &lt; 50% of circumference</td>
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<tr>
<td>Grade III</td>
<td>Laceration &gt; 50% of circumference</td>
</tr>
<tr>
<td>Grade IV</td>
<td>Complete transection with &lt; 2 cm of devascularization</td>
</tr>
<tr>
<td>Grade V</td>
<td>Complete transection with &gt; 2 cm of devascularization</td>
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</tbody>
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Diagnosis

- **Diagnoses should be made on the basis of suspicion**, since there are no specific signs. Possible trauma should be suspected in cases of penetrating abdominal injuries (e.g. gunshot wounds) and deceleration injuries (more common in children).
- **Clinical symptoms**: **hematuria** is not a consistently reliable sign (23-45%).
- **Diagnosis**:  
  - CT: high sensitivity for detecting extravasation. Shows obstruction on the affected side.  
  - IVP: requires late images to reach a diagnosis.  
  - **Retrograde pyelography**: high sensitivity. Less feasible in cases of acute trauma.

Treatment

- **Timing of repair**:  
  - The best option is immediate repair for diagnoses in situ.  
  - A delayed diagnosis requires individualized care:  
    - Less than 5 days duration: immediate treatment recommended.  
    - More than 5 days duration, sepsis, or poor general condition: requires percutaneous drainage of the urinoma and urinary diversion with double J catheter or percutaneous nephrostomy, with surgical repair at a later date.  
- **Partial injury (grade I-II)**: insertion of a double J stent with a hydrophilic guidewire. The placement of an internal tutor facilitates healing of mucosal injury. If insertion of a double J stent is not possible, the second option entails a percutaneous nephrostomy.  
- **Partial injury (grade II-III) discovered during surgical exploration**: primary repair with an end-to-end anastomosis over a double J stent.  
- **Grade III-IV injury**: surgical repair.
**Principles of surgical repair**
- Debridement of ureteral ends to fresh tissue
- Spatulation of ureteral ends
- Placement of internal stent
- Watertight closure of reconstructed ureter with absorbable suture
- Placement of external, non-suction drain
- Isolation of injury with peritoneum or omentum

- **Complete ureteral injury (along the length of the ureter):** ileal interposition or autotransplantation.

**Options for repair of complete injuries**

- **Ureteral injury grade III-V**
  - **Upper third injury**
    - Uretero-ureterostomy
    - Ureterocalycecostomy
    - Transuretero-ureterostomy
  - **Middle third injury**
    - Uretero-ureterostomy
    - Boari flap and reimplantation
    - Transuretero-ureterostomy
  - **Lower third injury**
    - Direct reimplantation
    - Psoas hitch

- **Complete injury**
  - Ileal interposition
  - Autotransplantation