Extrinsic obstruction of the ureter

Classification

- **Vascular lesions:**
  - **Arterial obstruction:**
    - Abdominal aortic aneurism.
    - Iliac aneurism.
    - Arterial abnormalities.
    - Arterial repair/replacement.
  - **Venous obstruction:**
    - Ovarian vein syndrome.
    - Thrombophlebitis of the ovarian vein.
    - Retrocaval ureter.

- **Benign processes of the female reproductive tract:**
  - Benign pelvic masses.
  - Pregnancy.
  - Uterine or ovarian masses.
  - Ovarian remnants.
  - Gartner duct cysts.
  - Pelvic inflammations:
    - Tubo-ovarian abscesses.
    - Endometriosis.
  - Uterine prolapse.
  - Ureteral ligation.

- **Diseases of the gastrointestinal tract:**
  - Crohn's disease.
  - Inflammatory appendiceal disease.
  - Diverticulitis.
  - Pancreatic lesions.

- **Diseases of the retroperitoneum:**
  - Retroperitoneal fibrosis:
    - Idiopathic.
    - Secondary to another disease.
    - Secondary to radiotherapy.
  - Retroperitoneal abscess.
  - Retroperitoneal hemorrhage:
    - Primary retroperitoneal hematoma.
    - Hematoma of the rectus abdominis muscle.
  - Retroperitoneal tumors:
    - Primary tumors (see chapter on Retroperitoneal Tumors).
    - Secondary tumors (cervix, prostate, bladder, colon).
  - Other lesions:
    - Lymphocele.
    - Pelvic lipomatosis.

**Abdominal aortic aneurism**

- Ureteral obstruction may be the initial manifestation of an aneurism due to its mass effect or to local inflammation.
- **Symptoms:** may cause a medial or lateral entrapment. The risk of obstruction is greater in cases of medial displacement with a desmoplastic reaction of inflammatory aneurisms (4-15%). Desmoplastic reactions are associated with ureteral obstruction in 21% of cases. When
there is dissection, it presents with pain, pulsating mass, peripheral ischemia, abdominal murmur, and paravertebral calcification.

- **Treatment**: ureterolysis is not usually necessary. Placement of a double J catheter and aneurism repair lead to resolution in 80% of cases.
- **Evolution**: requires long-term monitoring due to possible recurrence.

**Iliac artery aneurism**

- **Frequency**: less common. Approx. 1/3 of primitive iliac artery aneurisms and 20% of internal iliac artery aneurisms cause ureteral obstruction.
- **Mechanism of obstruction**: extrinsic compression or local inflammation.
- **Exploration**: pulsating mass in the DRE.
- **Diagnosis**: CT or MRI.
- **Treatment**:
  - *Primitive iliac artery*: ureterolysis with resection of the aneurism and placement of an endovascular prosthesis (stent).
  - *Internal iliac artery*: ligation with ureterolysis or ureterolysis with graft or prosthesis.

**Retroiliac ureter**

- **Etiology**: rare finding associated with renal hypoplasia, vesicoureteral reflux, ectopia of the ureter or the vas deferens, hypospadias, bifid scrotum, double or hypoplastic uterus, and hydrometrocolpos.
- **Treatment**: resection and anterior transposition of the ureter.

**Obstruction after arterial surgery**

- **Frequency**: reconstructive arterial surgery causes urinary tract obstruction in 10-20% of cases.
- **Etiology**: peri-implant fibrosis, ureteral devascularization, unidentified ureteral ligation, postoperative pseudoaneurism compression, or anterior situation of the vascular graft with respect to the ureter.
- **Symptoms**: manifests in the first year with pain, kidney failure and anuria, and hypertension. If the symptoms appear in the immediate postoperative period without kidney failure, conservative management is recommended.
- **Treatment**: depending on the cause. Fibrosis is treated as idiopathic retroperitoneal fibrosis while anterior graft placement requires reoperation.

**Postpartum thrombophlebitis of the ovarian vein**

- **Etiology**: ureteral obstruction during the postpartum period due to thrombophlebitis of the ovarian vein. More common on the right side. Rare.
- **Symptoms**: fever, abdominal and low back pain 48-72 h after delivery.
- **Diagnosis**: CT or MRI.
- **Treatment**: medical. May require placement of a double J catheter.

**Testicular vein thrombophlebitis**

- **Symptoms**: similar to those of pyeloureteral obstruction (see chapter on UPJ Syndrome in Adults).
- **Treatment**: usually a surgical finding requiring resection of the testicular vein and ureterolysis.
Retrocaval or circumcaval ureter

- **Incidence**: more common in men (3:1) with a frequency of 1/1000. Usually appears in the 3rd-4th decades of life.
- **Etiology**: congenital anomaly in which the right ureter starts in a posterior position, progresses to the middle, and ends up anterior and lateral to the vena cava. A more accurate term would be preureteral vena cava since the anomaly is venous in nature.
- **Symptoms**: presents with low back pain (which may seem like colic or abdominal pain), urinary infections, and hematuria.
- **Bateson and Atkinson classifications**:
  - Type I: ureter in the form of an italic S, hook, or crook. Crosses the vena cava at the level of L3.
  - Type II: less angled ureter in the form of a sickle. Crosses at the ureteropelvic level.
- **Treatment**: observation if there are no symptoms/caliectasia or if they are minimal. In cases with more serious repercussions, dismembered pyeloplasty is indicated.

Pregnancy

- **Incidence**: ureteral obstruction occurs in 43-100% of cases, being more common in first pregnancies and on the right side. May present as early as the first trimester (10-15%).
- **Etiology**:
  - *Due to mechanical uterine compression*: more common on the right side; the left side is more protected due to the interposition of the sigmoid colon between the uterus and ureter.
  - *Hormonal effects*: progesterone has a muscle relaxant effect, which explains the expansion that occurs during the first trimester in which the uterus does not reach a sufficient large size to exert mechanical compression.
- **Symptoms**: usually asymptomatic.
- **Diagnosis**:
  - **Ultrasound**: the typical sign is uretero-hydronephrosis up to the pelvic rim. If the dilation is more distal, it may be due to other causes.
  - **MRI**: non-invasive method. High-resolution T2 sequences can show filling defects. Allows for differential diagnosis with other pathologies such as lithiasis, ovarian torsion, or adrenal hemorrhage.
- **Treatment**: requires hydration, analgesics, and antibiotics, if necessary. If there are signs of kidney failure or sepsis, a double J catheter must be implanted, taking into account the high degree of encrustation that occurs in pregnant women, thus requiring frequent changes.

Tubo-ovarian abscess

- **Etiology**: this pathology appears in 15% of patients with pelvic inflammatory disease (present in 10% of women at some time in their lives); can cause extrinsic ureteral compression.
- **Diagnosis**: ultrasound, CT, or MRI.
- **Treatment**:
  - **Medical**: antibiotic therapy or transvaginal drainage.
  - **Urinary diversion** if there are signs of urinary sepsis or a high degree of obstruction.

Endometriosis

- **Etiology**: presence of functioning ectopic endometrial tissue. Affects 10-20% of women of childbearing age. Most frequently located in the ovaries, sacral-uterine ligament, and the Douglas pouch. The most common urinary tract location is the bladder (70-80%), followed by the ureter (15-20%). Ureteral involvement may be intrinsic (lamina propria and mucosa) or extrinsic (80%).
• **Symptoms**: cyclic *pain*, *infection*, *hematuria*, *dysuria*, and *tenesmus* (more common in the intrinsic type). 25-43% of intrinsic involvement is asymptomatic and can lead to loss of renal function due to chronic obstruction.

• **Diagnosis**: ultrasound, CT, MRI, or IVP. In patients with pelvic endometriosis, the UUT should be examined to rule out ureteral foci.

• **Treatment**:
  - *Ureterolysis*: if there is periureteral disease.

**Ovarian remnants**

• **Definition**: presence of residual ovarian tissue after bilateral adnexectomy in which removal was difficult.

• **Etiology**: the tissue remnant produces a mass effect or fibrosis, which can cause extrinsic obstruction.

• **Treatment**: resection and ureterolysis.

**Utero-ovarian masses**

• **Etiology**: a uterine fibroid, hydrometrocolpos, or an ovarian cyst can divert the ureter. Rupture of a vestigial follicle can cause a retroperitoneal reaction capable of obstructing the ureter.

• **Diagnosis**: MRI and CT are essential for defining the mass and its limits.

• **Treatment**: resection or ablation of the mass.

**Gartner duct cysts**

• **Etiology**: the Wolffian duct drains the embryonic pronephros and later the mesonephros. In women, after the ureters have grown from the distal end, the Wolffian duct atrophies, giving rise to the Gartner duct, a vestigial structure that extends below the anterolateral edge of the vagina. Its incomplete obliteration and subsequent secretory activity can lead to retention cyst compression.

**Uterine prolapse**

• **Etiology**: if severe, can produce uretero-hydronephrosis in up to 80% of cases due to ureteral compression near the bladder. Upon herniation of the bladder, uterus, and ureters through the weak wall of the levator ani, the ureters become compressed between the uterus/bladder and the elevating muscles.

• **Treatment**: hysterectomy and complete perineal repair.

**Ureteral ligation**

• **Etiology**: over 50% occur during gynecological surgery, although it may also occur during colorectal surgery. The most common lesions occur in the ovarian fossa during excision of tumors near the infundibulum-pelvic ligament, in hysterectomies, in the dissection or ligation of the uterine artery, or in the vesicovaginal space during retroperitonization (see *chapter on Ureteral Trauma*).

**Crohn’s disease**

• **Etiology**: up to 7% of ureteral obstruction caused by retroperitoneal extension of the inflammatory process results in intestinal microperforations with or without fistulas/abscesses.

• **Most frequently involves the right side of the ureter** (the predominant area of Crohn’s disease is the terminal ileum).
Usual complications include: calcium oxalate stones, bladder fistulas, and nephritic syndrome secondary to renal amyloidosis.

Treatment: same as for inflammatory disease. Ureterolysis is rarely necessary.

**Appendiceal inflammatory disease**

- **Etiology:** acute appendicitis and peritonitis, along with appendiceal abscesses, can cause hydronephrosis. A differential diagnosis must be made when the patient goes to the ER with symptoms suggestive of right renal colic.

**Diverticulitis**

- **Etiology:** the most common complication of diverticulosis, a disease that affects 5% of the population. Ureteral compression is caused by extension of the inflammatory process through abscessified perforations in the retroperitoneum.

**Pancreatic lesions**

- **Etiology:** usually on the left side due to the proximity of the tail of the pancreas. Pancreatic pseudocysts rarely cause perinephritic involvement, which can, however, arise from advanced stage carcinomas.

**Idiopathic retroperitoneal fibrosis** *(see chapter on Retroperitoneal Fibrosis)*.

**Radiation retroperitoneal fibrosis**

- **Etiology:** occurs between 6-12 months and 10 years after RT and is related to reduced blood supply due to endarteritis obliterans and connective tissue proliferation with the contraction of fibrous tissue. However, it is important to note that the majority of later post-RT ureteral obstructions are secondary to cancer recurrence.

**Retroperitoneal abscesses**

- **Etiology:** the retroperitoneal space is divided into anterior and posterior sections (where the ureters and kidneys are located). Hence these abscesses can also be differentiated into anterior (derived from the gastrointestinal tract) and posterior (due to extravasations resulting from renal lithiasis, pyonephrosis, Pott’s disease, or sepsis).
- **Symptoms:** present with fever, malaise, pain upon abdominal pressure, psoas sign.
- **Treatment:** drainage through ultrasound or CT-guided puncture or surgical drainage.

**Retroperitoneal tumors** *(See chapter on Retroperitoneal Tumors)*.

**Lymphocele**

- **Etiology:** complication of radical pelvic surgery (12-24%) and kidney transplants (4-5%). 90% of lymphoceles are already detectable 3 weeks after surgery.
- **Treatment:** bed-rest to reduce pain and edema. If unresolved, an evacuation puncture and subsequent sclerosis with Povidone-iodine or drainage with marsupialization is indicated.

**Pelvic lipomatosis** *(See chapter on Pelvic Lipomatosis)*.