URETERS

I. INTRODUCTION

The ureters are muscular paired tubes that transport urine from the kidneys to the bladder. They are continuous superiorly with the renal pelvis and inferiorly with the bladder.

At three points along their course the ureters are constricted. Kidney stones can become lodged at these constrictions.

II. DESCRIPTIVE ANATOMY

A- SITUATION

The ureter passes down in the lax connective tissue of retroperitoneum. It occupies 3 parts: lumbar, iliac and pelvic. (Figure 1)

In the lumbar part, it lies medial to the tips of the transverse processes of the lumbar vertebrae.

In the iliac part, it passes down on major psoas under cover of the peritoneum.

In the pelvic part, it crosses the pelvic brim at the sacroiliac joint, passes to the ischial spine and thence, foreshortened, to the pubic tubercle.

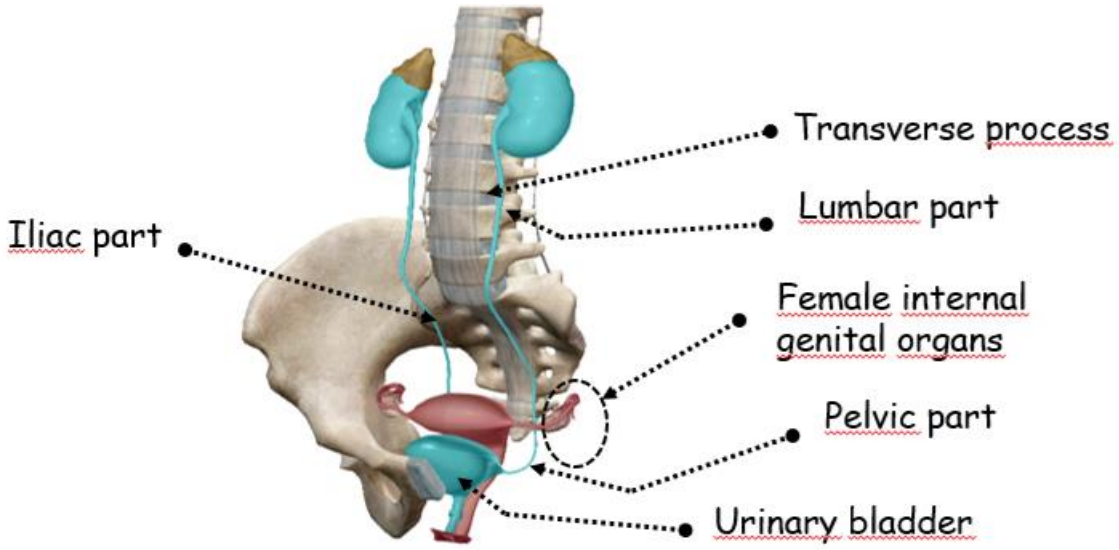

Figure 1: Anterior view showing the situation of the ureters

B- DIMENSIONS

The ureter is 25 cm to 30 cm long. The lumbar part measures 30 centimetres, the iliac 3 centimetres, the pelvic is 14 centimetres long and the termination in the bladder mucosa 1 centimetre. Its diameter is about 6 to 10 millimetres and is reduced in the three points of narrowest calibre. These points are visible during urination and are situated in the pelviureteric junction, the halfway mark where it crosses the pelvic brim and its termination in the bladder mucosa.

C- SHAPE

The ureter is J-shaped. Thus, it has one vertical part and one arched part.

The vertical part is 15 cm long, it occupies the lumbar and iliac parts and lies between the L1 vertebra and the pelvic brim.

The arched part is 14 cm long, it is, itself, subdivided into two parts: one descending and one transverse. The descending part is parietal, it passes down against the pelvic wall until the greater ischial notch. The transverse part passes forwards in the midline to the posterior wall of the bladder.

It can be identified from vessels and nerves in the living body by the fact that it is a whitish cord which is non-pulsatile and which shows peristaltic activity when gently pinched with forceps.

III. STRUCTURE

The ureter is a tube of smooth muscle lined internally by mucous membrane. The muscle often appears histologically to be arranged as a middle circular layer with inner and outer longitudinal layers. However, it is more accurate to consider the muscle as a single coat with fibres running in many different directions because they are parts of intertwining helices. The lax mucous membrane is lined by transitional epithelium; there is no muscularis mucosae.

The typical transverse histological section has a characteristic stellate lumen, but in life when containing urine, the lumen is round.

The outer adventitial layer receives the incoming blood vessels and is continuous with the renal and vesical fascia and the lax connective tissue of retroperitoneum giving it a high degree mobility essential for the bladder filling phase of micturition.

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IV. ANATOMICAL RELATIONS

The ureter is a lumbar, iliac and pelvic organ. Therefore, its anatomical relations differ from right to left, from man to woman and are numerous.

A- LUMBAR AND ILIAC PARTS

Backwards, the ureter lies on the psoas muscle and its iliac fascia under the parietal peritoneum and, thus, is in contact with the tips of the transverse processes of lumbar vertebrae and crosses in front the genitofemoral nerve.

Laterally, it adheres to the lower end of the kidney and is next to the colon.

Medially, on the right, it lies next to the vena cava and right common iliac vessels and, then, surmounts the external iliac vessels.

On the left, it comes next to the abdominal aorta as the left common iliac vessels bifurcate higher.

Forwards, it is crossed superficially by the gonadal vessels at the level of L3 vertebra and is covered by posterior parietal peritoneum.

On the right, it is in contact, from top to bottom, with duodenum, pancreas, their fascia (of Treitz) and superior mesenteric vessels, then, the ascending colon and mesocolon (Toldt's fascia) and right colic vessels and, finally, the root of mesentery and ileocolic vessels.

On the left, the upper part is behind the descending colon and mesocolon, inferior mesenteric artery and left colic vessels when the lower part is behind the sigmoid colon and mesocolon and sigmoid vessels. The apex of the sigmoid mesocolon is the guide to it as it enters the pelvis.

B- PELVIC PART

In men, the pelvic ureter enters the pelvis in front of the internal iliac vessels and their branches and the obturator nerve, travels the pelvis minor under the pelvic peritoneum outside the pararectal fossae and the rectum and joins the bladder in the midline behind the terminal part of ductus deferens.

In women, the pelvic ureter enters the pelvis behind the internal iliac vessels and their branches and leaves the obturator nerve more laterally. It travels the pelvis minor behind the broad ligament alongside the posteromedial border of the uterine artery until its sub-ligamentary part that crosses in front the ureter.

V. BLOOD SUPPLY, LYMPH DRAINAGE AND NERVE SUPPLY

A- ARTERIES

The blood supply of the ureter is arranged in three levels.

The upper end is supplied by the ureteric branch of the renal artery and the lower end by branches from the inferior and superior vesical and middle rectal (and uterine) arteries. The middle reaches of the ureter are supplied by branches from the gonadal artery, and, in many cases, by branches from the common iliac as well.

All these vessels make a fairly good anastomosis with each other in the adventitia of the ureter,

forming longitudinal channels. The blood supply is endangered if the ureter is stripped clean of its surrounding tissue.

B- VEINS

The veins of the ureter correspond to the arteries. They drain into the renal, gonadal and internal iliac veins.

C- LYMPH DRAINAGE

The lymphatics run back alongside the arteries; the abdominal portion of the ureter drains into para-aortic nodes below the renal arteries, the pelvic portion into nodes on the side wall of the pelvis alongside the internal iliac arteries.

D- NERVES

Although sympathetic fibres from T11-L2 segments of the cord reach the ureter via the coeliac and hypogastric plexuses, together with parasympathetic fibres from the pelvic splanchnic nerves, their functional significance is not clear. Intact innervation of the renal pelvis or ureter is not necessary for the initiation or propagation of peristalsis from the calyceal pacemakers. There are no ganglion cells in or on the ureter. Pain fibres accompany sympathetic nerves, as from the kidney.

VI. CONCLUSION

The ureters constitute the excretory system of urine. They travel the entire abdominal cavity and pierce the vesical wall in a kind of anti-backflow system. In their course, they are in contact with several peritoneal, visceral and vascular relations. Their 3 floors anastomosed adventitial blood supply makes it easier to dissect them during surgery as long as the adventitial layer is conserved.