

HYDRONEPHROSIS

- × **Hydronephrosis:** referring to the presence of PCS dilatation and not to the cause of that dilatation.
- × **Obstructive uropathy:** structural impedance to the flow of urine anywhere in the urinary tract.
- × **Obstructive nephropathy :** renal parenchymal damage that results from an obstruction.
- × The terms *obstructive uropathy* and *hydronephrosis* should not be used interchangeably.

CAUSES OF HYDRONEPHROSIS

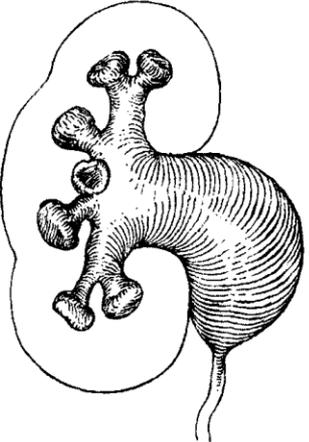
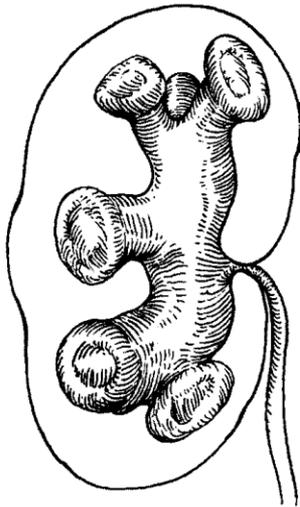
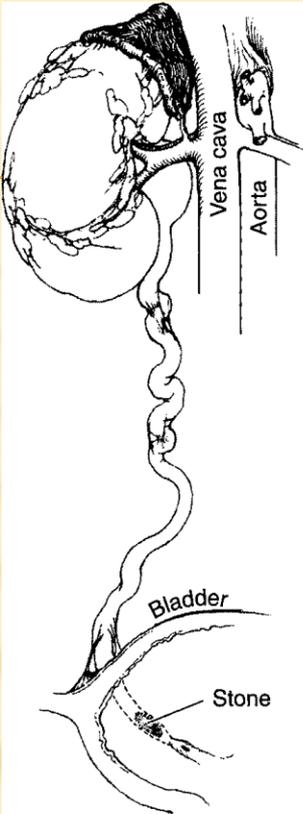
- × (1) **Obstructive dilatation, frequently unilateral**
 - + Stone, papillary necrosis, clot, tuberculous debris, UPJ obstruction, crossing vessel, Inflammatory stenosis of the ureter, retroperitoneal Neoplastic infiltration, Primary neoplasm pelvicalyceal system and ureter, Bladder neoplasm, Mobile (ptotic) kidney,
- × (2) **Obstructive dilatation, frequently bilateral**
 - + Infravesical urinary obstruction(BPH, Stricture)
 - + Neuropathic bladder
 - + Bladder stone, clot in the urinary bladder
 - + Retroperitoneal fibrosis

CAUSES OF HYDRONEPHROSIS

- × **(3) Nonobstructive dilatation, frequently unilateral**
 - + Vesicoureteral reflux
 - + Following relief of obstruction (Residual)
 - + Pregnancy
 - + Megacystis-megaureter syndrome
- × **(4) Nonobstructive dilatation, frequently bilateral**
 - + Full bladder
 - + Urinary tract infection
 - + Bilateral Vesicoureteral reflux

PATHOPHYSIOLOGY OF OBSTRUCTIVE UROPATHY

- ✘ The pressure within the renal pelvis is normally close to zero. When this pressure increases because of obstruction or reflux, the pelvis and calyces dilate. The degree of hydronephrosis that develops depends on the **duration, degree, and site** of the obstruction. **The higher the obstruction, the greater the effect on the kidney.** If the renal pelvis is entirely intrarenal and the obstruction is at the ureteropelvic junction, all the pressure will be exerted on the parenchyma. If the renal pelvis is extrarenal, only part of the pressure produced by a ureteropelvic stenosis is exerted on the parenchyma; this is because the extrarenal renal pelvis is embedded in fat and dilates more readily, thus “decompressing” the calyces



PATHOPHYSIOLOGY OF OBSTRUCTIVE UROPATHY

- ✘ The **earliest** changes in the development of hydronephrosis are seen in the **calyces**. The end of a normal calyx is concave because of the papilla that projects into it; with increase in intrapelvic pressure, the fornices become blunt and rounded. With persistence of increased intrapelvic pressure, the papilla becomes flattened, then convex (clubbed) as a result of compression enhanced by ischemic atrophy. The parenchyma between the calyces is affected to a lesser extent. The changes in the renal parenchyma are due to (a) **compression atrophy** from increase in intrapelvic pressure (more accentuated with intrarenal pelves) and (b) **ischemic atrophy from hemodynamic** changes, mainly manifested in arcuate vessels that run at the base of the pyramids parallel to the kidney outline and are more vulnerable to compression between the renal capsule and the centrally increasing intrapelvic pressure.

PATHOPHYSIOLOGY OF OBSTRUCTIVE UROPATHY

- ✘ Hydronephrosis causes tubular dilation with cellular atrophy and interstitial fibrosis
- ✘ Within **7 days**, atrophy is seen in the **distal tubules**.
- ✘ By **14 days**, there is progressive dilation of the **distal tubules** and atrophy of **the proximal tubular** epithelial cells.
- ✘ At **28 days**, there is loss of **50% of the medulla** with marked atrophy of the proximal tubules and thinning of the cortex.
- ✘ So obstruction should be relieved as early as possible up to 4-6 weeks
- ✘ **Glomerular changes** are not seen before **28 days** of obstruction.
- ✘ reduced blood flow :no evidence of microscopic changes in the arterial wall

PATHOPHYSIOLOGY OF OBSTRUCTIVE UROPATHY

- ✘ Venous drainage is impaired, causing some of the renal damage
- ✘ Urine exits the renal pelvis in complete ureteral obstruction by:
 - ✘ extravasation (high pressures)
 - ✘ pyelolymphatic backflow (low-pressure)
 - ✘ pyelovenous backflow (chronic hydronephrosis)

PATHOPHYSIOLOGY OF OBSTRUCTIVE UROPATHY

- × if one kidney is removed or rendered nonfunctioning by obstruction, the opposite kidney would undergo compensatory hypertrophy
 - + unilateral ureteral obstruction result in:
 - × decreased renal blood flow to the ipsilateral kidney (thromboxanes, angiotensin, endothelin, and mesangial-cell contact)
 - × increased blood flow to the unobstructed contralateral kidney (prostaglandins)
- × After unilateral ureteral obstruction,
 - + first week: there is a bilateral increase in renal mass.
 - + followed by atrophy in the obstructed kidney.
 - + continued hypertrophy in the opposite unobstructed kidney.

DIAGNOSTIC APPROACH

- × **History**
- × Severe **flank pain** suggests a more acute onset of obstruction and, if very sudden in onset, a ureteric stone may well be the cause.
- × Pain induced by a diuresis (e.g. following consumption of alcohol) suggests a possible PUjO.
- × **Anuria** (the symptom of bilateral ureteric obstruction or complete obstruction of a solitary kidney).
- × If renal function is impaired, symptoms of **renal failure** may be present (e.g. nausea, lethargy, anorexia).
- × Extrinsic causes of obstruction (e.g. compression of the ureters by retroperitoneal malignancy) usually have a more insidious onset, whereas intrinsic obstruction (ureteric stone) is often present with severe pain of very sudden onset.
- × An **increase in urine output** may be reported by the patient due to poor renal concentrating ability.
- × Obstruction in the presence of **bacterial urinary tract infection**—signs and symptoms of pyelonephritis (flank pain and tenderness, fever) or sepsis.

DIAGNOSTIC APPROACH

× Examination

- × Measure **blood pressure**—elevated in high pressure chronic retention (HPCR) due to benign prostatic obstruction (caused by fluid overload).
- × Bilateral **oedema** (due to fluid overload).
- × Abdominal examination—percuss and palpate for an enlarged **bladder**.
- × **DRE** (?prostate or rectal cancer) and in women, vaginal examination (?cervical cancer).
- × Check **serum creatinine** to determine the functional effect of the hydronephrosis.

DIAGNOSTIC APPROACH

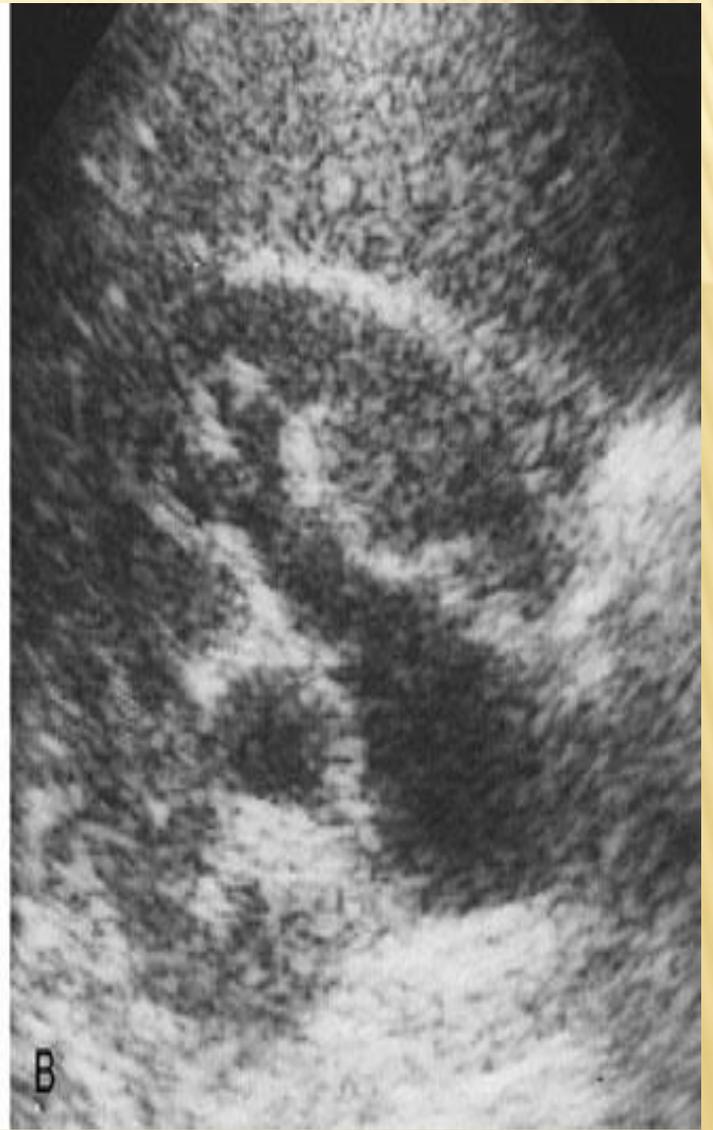
× Ultrasound

× Ultrasound

- × is a rapid, inexpensive, and reasonably accurate method of detecting hydronephrosis and hydroureter;
- × however, accuracy can depend on the user. Ultrasound generally serves as the **preferred screening test** to establish the diagnosis of hydronephrosis.

× Ultrasound is inferior to other modalities for identifying the presence, source, or duration of obstruction.

- × A chronically obstructed system may remain dilated long after the obstructive process resolves.



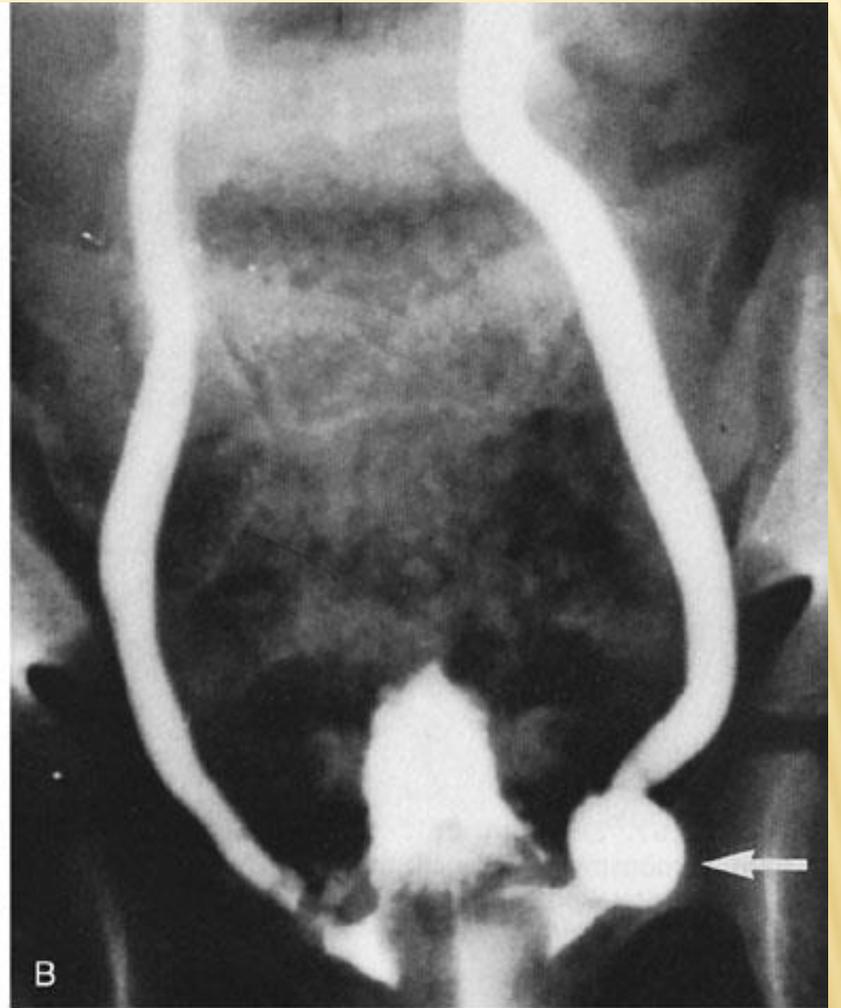
DIAGNOSTIC APPROACH

× **IVU findings in renal obstruction**

- + Persistence of dense nephrogram.
- + A delay in filling of the collecting system with contrast material.
- + Dilatation of the collecting system.
- + An increase in renal size.
- + Rupture of fornices (junction between renal papilla and its calyx) with urinary extravasation.
- + Ureteric dilatation and tortuosity.
- + A standing column of contrast material in the ureter.

× **Others (CT-Scan, MRI,)**





MANAGEMENT

Depends on the cause and duration of obstruction with im ✘
to relieve obstruction or correction of reflux .

Decision of nephrectomy can be made after assessing ✘
the function by radioisotope or some consider temporary
relieve of obstruction (DJ or PCN) then re-assessmnt of
function ,

Hydronephrosis in pregnancy may be physiological esp. ✘
on Rt side due to dextro rotated uterus, but in some cases
may be associated with UTI or obstructive stone so the
treatment is antibiotics (cephalosporines or penicillines
PCN to be which are safe) for UTI and DJ stenting or
considered till pregnancy completed it is mentioned that
rapid shot IVP is accepted during the last trimester .

THANK YOU✕

Please prepare a paper and write your name ✕
To answer the followig Quiz ✕

1) What are the causes of hydronephrosis? ✕

2) Write briefly about the pathogenesis of ✕
urinary tract infection.

Good luck ✕