Urinary Tract Obstruction

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Obstruction of the urinary tract can occur in the upper or lower tract. Possible sites and causes of obstruction are shown in Figure 1. Lower tract obstruction is almost exclusively a disease of males, whereas upper tract obstruction occurs in both sexes.

Lower urinary tract symptoms occur in 25% of men over the age of 50 years. However, these symptoms are not all caused by obstruction; most patients have a mixture of obstruction and bladder dysfunction. The true incidence of lower tract obstruction is unknown, but it is common. Occasionally, lower urinary tract obstruction occurs in neonates; this is caused by the presence of posterior urethral valves, or by prolapae of an ectopic and distended ureteric orifice (ectopic ureterocele) into the bladder neck, thereby obstructing it.

Presentation

Urinary tract obstruction presents in one of four ways.

**Ureteric colic** is the most dramatic presentation of urinary tract obstruction. It often occurs in young or middle-aged adults, and is more common in men than in women. Patients are often seen in Accident and Emergency departments; the pain is so severe that they may roll about in agony. However, they often have no abdominal signs, and may be diagnosed as hysterical by inexperienced doctors. The passage of blood clot or a tumour embolus can cause colic, but in most cases the cause is ureteric calculi.

**Loin pain** is a less dramatic presentation. Although the discomfort may be severe, these patients are more likely to be seen in an out-patient department. Renal calculi are the usual cause, but any of the extrinsic causes of ureteric obstruction (Figure 1) can present with loin pain. If the loin pain is associated with haematuria, the likely cause is intrinsic rather than extrinsic.

**Insidious presentation** - serious cases of urinary tract obstruction present with weight loss, anorexia and nausea caused by renal failure. This picture is particularly common in obstructive uropathy caused by chronic retention and retroperitoneal fibrosis. Obstructing calculi may occasionally present in this manner.

*Incidental finding* - as ultrasonography becomes more common in the investigation of abdominal pain, more incidental cases of hydronephrosis are discovered.

**Ureteric colic**

**Emergency management**

Initial management of patients with ureteric colic comprises pain relief – better a drug addict should obtain a free shot of analgesia than a genuine patient should be left in agony. Pethidine is recommended by many textbooks, but has been superseded by non-steroidal anti-inflammatory drugs (NSAIDs, e.g. diclofenac) because they inhibit ureteric muscle contractions. However, NSAIDs should be avoided in patients with renal impairment.

**Diagnosis** is confirmed by intravenous urography (IVU). Patients with ureteric colic are often seen in casualty departments in the middle of the night by junior doctors who are uncertain whether to call out the radiologist.

- If the patient has a soft, non-tender abdomen and a dipstick shows blood in the urine, it is safe to delay investigation until the morning.
- If the patient is elderly, there are abdominal signs or the urine is clear, it is wise to ask the opinion of a more senior surgeon.

Most district hospitals see at least one patient per year with a leaking aortic aneurysm who is sent to casualty supposedly suffering from left ureteric colic. Diverticular disease can also masquerade as left-sided ureteric colic, but the presence of abdominal tenderness should alert the doctor. On the right side, biliary colic must be considered in the differential diagnosis.

IVU should be undertaken within 24 hours of admission, for the following reasons.

- Urgent IVU reduces the duration of hospital stay – 70% of patients can be sent home to pass stone naturally.
- If IVU is delayed, a tiny stone may be passed unnoticed. The kidneys then appear normal on radiography, further investigations are ordered because the diagnosis has been missed, and after several expensive and time-wasting procedures the patient is given the unsatisfactory diagnosis of ‘abdominal pain of unknown origin’.
- If urgent intervention is needed, no time has been wasted.

**Urgent management**

Most patients can be sent home with analgesics to pass stone spontaneously, but intervention may be required when the stone is:

- too large (> 8 mm is a rough guide, but shape and contour must be considered)
- too painful (recurrent colic)
- too dangerous (there is total obstruction or infection)
- too slow (a small, non-obstructing stone can be left for many months to pass spontaneously, but some stones fail to clear and need treatment).

Infection is damaging to the kidney. If the patient is toxic as a result of infection and obstruction, the kidney should be drained percutaneously under antibiotic cover and the fever allowed to resolve before the stone is removed. If the patient is not toxic but has a fever, the infection should be treated with antibiotics. If there is no resolution within 48 hours, the kidney should be protected by percutaneous drainage. Before sensitivities are known,

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antibiotics are started with ceftazidime plus amoxicillin in severely ill and toxic patients. Cephalosporin, co-amoxiclav and fluoroquinolones are appropriate oral agents in non-toxic patients.

Elective management
In patients with no infection or in whom infection has been treated successfully, the two common treatment options are extracorporeal shock-wave lithotripsy and ureteroscopy.

**Extracorporeal shock-wave lithotripsy** is the treatment of choice; it is non-invasive and is successful in 70% of cases of ureteric stone. Contraindications are anticoagulant treatment (bleeding is common) and the presence of a cardiac pacemaker (electronic interference may occur). Patients must not be too obese and must be able to lie flat for the duration of treatment. Not all ureteric stones are amenable to lithotripsy. Stones overlaying the sacroiliac joint may be difficult to visualize. Complications of extracorporeal lithotripsy include infection, bleeding (more common with renal stones) and colic as the fragments pass.

**Ureteroscopy** may be used when a lithotriptor is not promptly available or treatment has failed. General anaesthetic is required, the ureteric orifice may need to be dilated and antibiotic cover should be given. Small stones can be removed intact under direct vision using a wire basket. Large stones require disintegration using a lithotriptor passed up the ureteroscope; the types of lithotriptor are:
- ultrasonic (safe but slow, sucks out fragments during treatment)
- lithoclast (works like a small pneumatic drill, shatters hard stones)
- laser (elegant and effective but expensive)
- electrohydraulic (effective but too violent for ureteric stone). Flexible ureteroscopes are available. The future for this procedure is a trend towards use of less invasive instruments.

**Other methods** – some upper ureteric stones are best treated by pushing them back into the kidney and undertaking extracorporeal lithotripsy (‘push–bang’) or percutaneous surgery (‘push–pull’). A large, impacted upper ureteric stone may be best approached from above using a percutaneous tract. Occasionally, open ureterolithotomy is required.

**Loin pain**

**History and examination**
- If the pain is brought on by drinking (particularly alcohol), consider pelviureteric junction (PUJ) obstruction.
If the pain is worse in the morning and associated with lumbar stiffness, it is likely to be musculoskeletal in origin.

If the pain is made worse by breathing, the patient may have pleurisy.

If the pain is brought on by fatty foods, the gallbladder may be responsible.

If the patient has had a pelvic malignancy (particularly cervical or ovarian in women, prostate or bladder in men), malignant ureteric obstruction is likely. Rectal examination is mandatory to exclude prostate cancer nipping the lower ureters. Pelvic examination in women can often be avoided if the abdomen is to be scanned.

A history of recent pelvic surgery suggests that ureteric damage or ligation may have occurred.

Investigations: a mid-stream urine sample is sent for renal function tests and a blood sample for haemoglobin measurement. IVU or ultrasonography is required; the choice of which is debated.

Ultrasonography may miss a small stone or a small transitional cell carcinoma of the renal pelvis or ureter, though not if it is causing obstruction.

IVU is expensive, time-consuming and more uncomfortable for the patient, and is associated with morbidity and mortality. Ultrasonography is a good initial screening test, but IVU may be required later for greater detail.

Congenital PUJ obstruction
Findings of unilateral hydronephrosis but no ureteric dilatation suggest congenital PUJ obstruction, in which contractile waves are poorly transmitted across the PUJ.

The two questions clinicians must ask are as follows.

- Is the kidney truly obstructed?
- If it is, how severely?

These questions are resolved by use of a MAG3 or DTPA isotope scan.

Management: nephrectomy is usually advised in patients with less than 10% renal function. Those with more than 10% function require pyeloplasty, in which the adynamic PUJ is excised and the ureter is rejoined to the renal pelvis. If there is any doubt about the diagnosis, the surgeon injects contrast up to the ureter (ascending ureterography) to confirm the site of obstruction. In the ‘endoburst’ procedure, a balloon catheter is passed up the
urate to lie across the PUJ and the balloon is then inflated. This reduces pain, but its success in relieving obstruction is variable.

**Insidious and incidental cases**

A history should be taken, and clinical examination and investigations should be performed as for loin pain.

**Obstructive uropathy**

Findings of bilateral hydronephrosis, hydroureters and a distended bladder suggest obstructive uropathy.

**Management:** if the patient is well and creatinine is less than 200 µmol/litre, transurethral resection of the prostate (TURP) should be arranged. Patients who are unwell or in whom creatinine is more than 200 µmol/litre should be catheterized and appropriate fluid replacement arranged, guided by urine output. Elective TURP should be arranged when creatinine has stabilized and the patient is well. Dialysis is occasionally required in patients with obstructive uropathy.

**Bilateral ureteric obstruction by pelvic mass**

Findings of bilateral hydronephrosis and hydroureters down to the vesicoureteric junction but no bladder distension suggest a pelvic malignancy. In men, the prostate should be examined and, if the findings are suspicious, biopsy should be performed and prostate-specific antigen levels checked.

**Management:** when prostate cancer is strongly suspected on clinical grounds, hormone therapy should be started. Luteinizing hormone-releasing hormone should be avoided because of the initial flare; treatment should begin with a receptor blocker (e.g. bicalutamide, flutamide, cyproterone acetate).

In patients receiving hormone treatment, ureteric obstruction is a sign of hormone resistance and no emergency action should be taken before it has been discussed with the patient and his relatives. If the obstruction is relieved by nephrostomy or ureteric stenting, the patient may suffer a painful death if bone metastases develop.

When the prostate feels normal, cystoscopy is indicated to exclude a cancer on the base of the bladder obstructing the ureteric orifices; this is uncommon. It can be treated by radical cystectomy and urinary diversion if the disease is confined to the bladder and the patient is fit. Renal function must be corrected by nephrostomy drainage or dialysis.

Rectal and cervical cancers may produce these findings by local spread. Before relieving the obstruction, doctors should ensure that this is in the patient’s best interests.

**Retroperitoneal fibrosis**

Findings of bilateral hydronephrosis, hydroureters down to the level of the sacroiliac joint, the ureters drawn medially at this level and no bladder distension suggest retroperitoneal fibrosis. Whether this is benign or malignant (primary or, more commonly, secondary) should be assessed. The diagnosis can be confirmed by CT-guided biopsy, but this may be hazardous and is seldom necessary.

**Benign, idiopathic fibrosis** is suspected in the following situations:

- ESR > 100 mm/hour
- CT fails to show a pelvic primary
- a retrograde catheter passes through the obstructed area. Retroperitoneal fibrosis is well shown by CT.

**Malignant disease** is suspected when:

- there is a history of pelvic malignancy
- pelvic examination is abnormal
- CT demonstrates pelvic disease or retroperitoneal mass
- a retrograde catheter will not pass through the stricture.

**Management:** in malignant disease, it should be ensured that therapy to prolong a good quality of life is available before the obstructed kidneys are relieved by stenting (this is not a simple procedure).

There are two treatments for idiopathic retroperitoneal fibrosis. Ureterolysis involves laparotomy, which should also allow confirmatory biopsy; the ureters are released from the encasing fibrosis and placed within the peritoneal cavity. Alternatively, the ureters are stented and the patient is treated with corticosteroids; the dose is monitored using ESR measurements.

**Ureteric stricture**

Findings of hydronephrosis and a hydroureter that tapers into the normal ureter suggest a ureteric stricture. The stricture may result from passage of a stone or instrumentation to retrieve a stone. Tuberculosis involving the ureter may heal during treatment with silent scarring and stricture formation, causing ‘autonephrectomy’. Such inflammatory strictures can be kept open by temporary stents until therapy is finished.

Non-inflammatory strictures are best excised, but can be treated by balloon dilatation or occasionally by permanent stents.

**FURTHER READING**


**Practice points**

- Urinary tract obstruction may present with ureteric colic or loin pain, insidiously or incidentally
- Treat ureteric colic with non-steroidal analgesia and perform IVU within 24 hours
- Remember differential diagnoses such as leaking aortic aneurysm when ‘ureteric colic’ is associated with a tender abdomen
- Consider the prognosis and treatment options before relieving upper tract obstruction caused by known malignant disease