Ureteropelvic Junction Obstruction

What causes a UPJ obstruction?

The main job of the kidney is to filter the blood, remove waste products, and deliver the waste products (urine) to the ureter and bladder. The urine leaves the kidney, enters the renal pelvis, and then passes into the ureter through a funnel called the ureteropelvic junction (UPJ).

In some children there is a partial blockage at the UPJ. The blockage may be severe (high grade), minimal (low grade) or intermittent.

What are the symptoms of a UPJ obstruction?

We detect many patients with UPJ problems before birth because of enlargement of the kidney (hydronephrosis).

Newborns and infants may have an abdominal mass or may become very sick because of urinary infection. The stagnation of urine cause by the UPJ blockage can lead to pus in the collecting system (pyonephrosis). Some cases of UPJ obstruction are discovered during investigation of a baby for "failure to thrive."

Older children may have pain related to the blockage. Sometimes the blockage can cause stones to form. Prolonged blockage, particularly with infection, is harmful to kidney function.
The cause of the blockage may be a malformation of the UPJ, a crossing blood vessel, a fibrous band, or an abnormal position of the ureter on the renal pelvis.

**What tests are done for UPJ obstruction?**

Ultrasonography and intravenous urography (IVU) will show the hydronephrosis related to a UPJ obstruction - but may not necessarily prove that the enlargement of the system is due to blockage. A diuretic renal scan (DRS) usually will prove if there is a true blockage. This is performed by injecting a tiny amount of nuclear tracer into a vein and watching it accumulate and wash out of the kidney. To help it wash out a diuretic (furosemide also known as Lasix) is given intravenously. This test also shows how well each kidney is working. Normally each kidney does 50% of the total work. A bladder catheter must be placed before the test is started.

In unusual cases, even the DRS will not prove that an obstruction exists so we go further with a Pressure-Perfusion Test (Whitaker Test). In children this usually requires an anesthetic. Two needles or one large tube are passed through the skin and kidney into the collecting system. Contrast material is infused by a pump. As we watch on the fluoroscope, pressures are recorded. In a normal UPJ the contrast material fills up the renal pelvis and passes through the UPJ into the ureter without a rise in pressure. In an obstructed system the contrast may not pass into the ureter at all - or it may pass through, but with high pressures. Some patients may not obstruct at low flow rates or low pelvic volumes, but do obstruct under other conditions.

When a patient presents with pyonephrosis or very poor kidney function, we may place a tube into the kidney through the skin (percutaneous nephrostomy) to achieve drainage. A DRS after stabilization will then show if there is enough kidney function to merit pyeloplasty - otherwise one would remove such a
poorly functioning kidney (nephrectomy).

**How is a UPJ obstruction corrected?**
The usual repair of a UPJ (pyeloplasty) involves removal of the abnormal UPJ and fashioning a new funnel. Sometimes excess renal pelvis is removed. The incision may be made from the front of the abdomen, the flank, or the back.

![Pyeloplasty Diagram]

Depending on the individual circumstances a tube may be left across the pyeloplasty (stent) and a tube may be left above the repair to decompress the kidney (nephrostomy.) A drain is left near the repair to allow any leaking urine, blood, or serum to exit. When we have a nephrostomy we try to perform a Pressure Perfusion Test several weeks after surgery before removing the tube.

Complications include bleeding, infection, kidney damage, air in the chest cavity (pneumothorax), pain, persisting drainage of urine, or delayed drainage of the kidney across the site of repair. Scarring or stricture at the pyeloplasty may produce recurrent UPJ obstruction. Persisting drainage, or delayed emptying of the UPJ may require replacement of a ureteral catheter or percutaneous nephrostomy.

A new and experimental form of surgery for UPJ obstruction is done through a nephrostomy (percutaneous endopyelotomy.)

**What is the follow-up process after Pyeloplasty?**
After successful repair of UPJ, the deformity in the kidney (mainly the hydronephrosis) usually persists and an ultrasound or IVU will still "look abnormal." The DRS is usually the best way to know if the result is successful and this is usually performed around three months after pyeloplasty - the child remaining on prophylactic low-dose antibiotics in the meantime. Occasionally, an equivocal postoperative DRS may be repeated or may lead to a Pressure-Perfusion study. Late stricture or obstruction can be handled by balloon-dilation or endoscopic incision, although re-operation is required in unusual instances.

A child should be followed for at least several years after a pyeloplasty. If the postoperative DRS is normal and the child is doing well, a urine analysis, abdominal exam, blood pressure check, and ultrasound is performed a year after surgery.