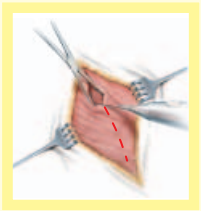
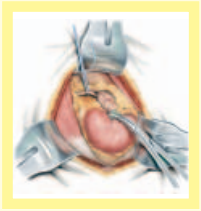
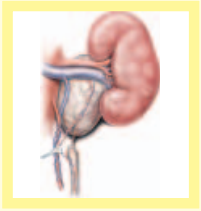
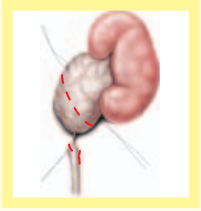
Surgery Illustrated









Surgery Illustrated Pyeloplasty (Anderson–Hynes)

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ILLUSTRATIONS by STEPHAN SPITZER, www.spitzer-illustration.com

INTRODUCTION

PUJ obstruction has been described as the most common congenital anomaly of the urinary tract and in the past as the most common cause of abdominal mass in infancy. However, currently PUJ obstruction almost never presents as an abdominal mass but almost always as antenatally or neonatally detected hydronephrosis on screening ultrasonography. Neonatal hydronephrosis is a relatively common problem which is detected in ≈1.5% of all pregnancies. Spontaneous resolution of antenatally detected hydronephrosis is also relatively common and occurs in about half of the infants in whom hydronephrosis has been diagnosed antenatally. In those neonates where the hydronephrosis persists, ≈40% is secondary to VUR and the other 60% is caused by abnormalities in the transport of urine from the renal pelvis to the bladder, but not all persistent neonatal hydronephrosis is secondary to obstruction. In about half of the children followed for persistent neonatal hydronephrosis renal function will be preserved and the hydronephrosis will improve over time. However, the other half need to be evaluated carefully to identify and correct real anatomical obstruction when it is present.

The determination of which neonates and infants with hydronephrosis have significant obstruction at the PUJ is not always easy. The criteria for determining the significance of hydronephrosis include: (i) the amount of dilation present on ultrasonography; (ii) the relative function of the individual renal unit, as measured by radionuclide scan; and (iii) the rate of radionuclide washout with diuretic augmentation ($T_{1/2}$).

PATIENT SELECTION

In those neonates and infants who have significant and persistent renal pelvic dilation on ultrasonography, some decrease in relative renal function, as determined by a scan, and a prolonged washout curve on radionuclide scan, the diagnosis of true PUJ obstruction can safely be entertained and correction of that obstruction is usually indicated.

Specific equipment and materials for infant pyeloplasty include:

- Inflatable fluid bag attached to a hand pump (blood pressure).
- Baby Richardson retractors.
- Peanuts or Kitners.
- A Dennis-Brown ring retractor.
- Sutures for traction.
- Marking pen.
- Fine vascular forceps (Bishop-Harmon forceps).
- Fine vascular needle holders.
- 6–0/7–0 monofilament absorbable suture.
- 3.5/5.0 F feeding tube.
- Optical magnification (loupes).

PREPARATION AND POSITIONING

A decision about the need for preoperative retrograde pyelography has to be made individually. A retrograde pyelogram is not routinely taken, or necessary, in neonates and infants having the PUJ repaired. However, there are individuals who have simultaneous obstruction at the PUJ and vesico-ureteric junction.

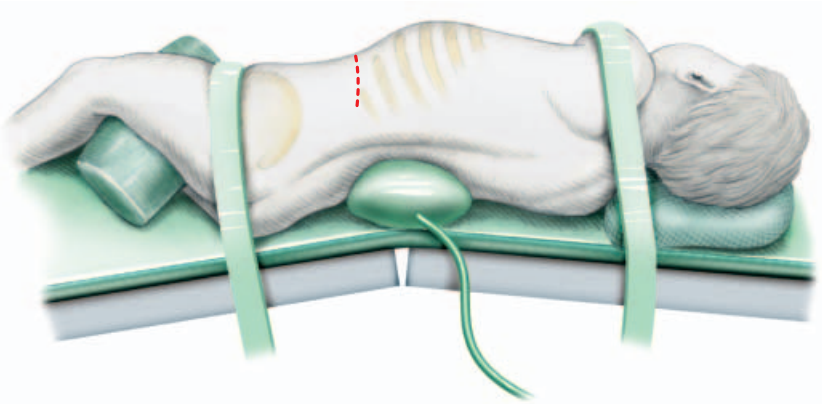
A Foley catheter is placed in the bladder and the patient positioned with the affected side up and tipped up slightly, so the incision can be made anteriorly just beneath the 12th rib. An empty intravenous fluid bag is placed under the patient and inflated to extend the subcostal space.

SURGICAL STEPS

Adherence to rigid principles of surgical technique offers the best chance for obtaining favourable results in PUJ repair no matter what technique is selected. The Anderson-Hynes dismembered pyeloplasty, because it is simple, is the preferred technique at most paediatric centres around the world.

Figure 1

An incision is made from the tip of the 12th rib and carried medially to a point about 5 cm lateral to the rectus abdominus muscle. This incision allows the surgeon direct access to the renal hilum and the PUJ.



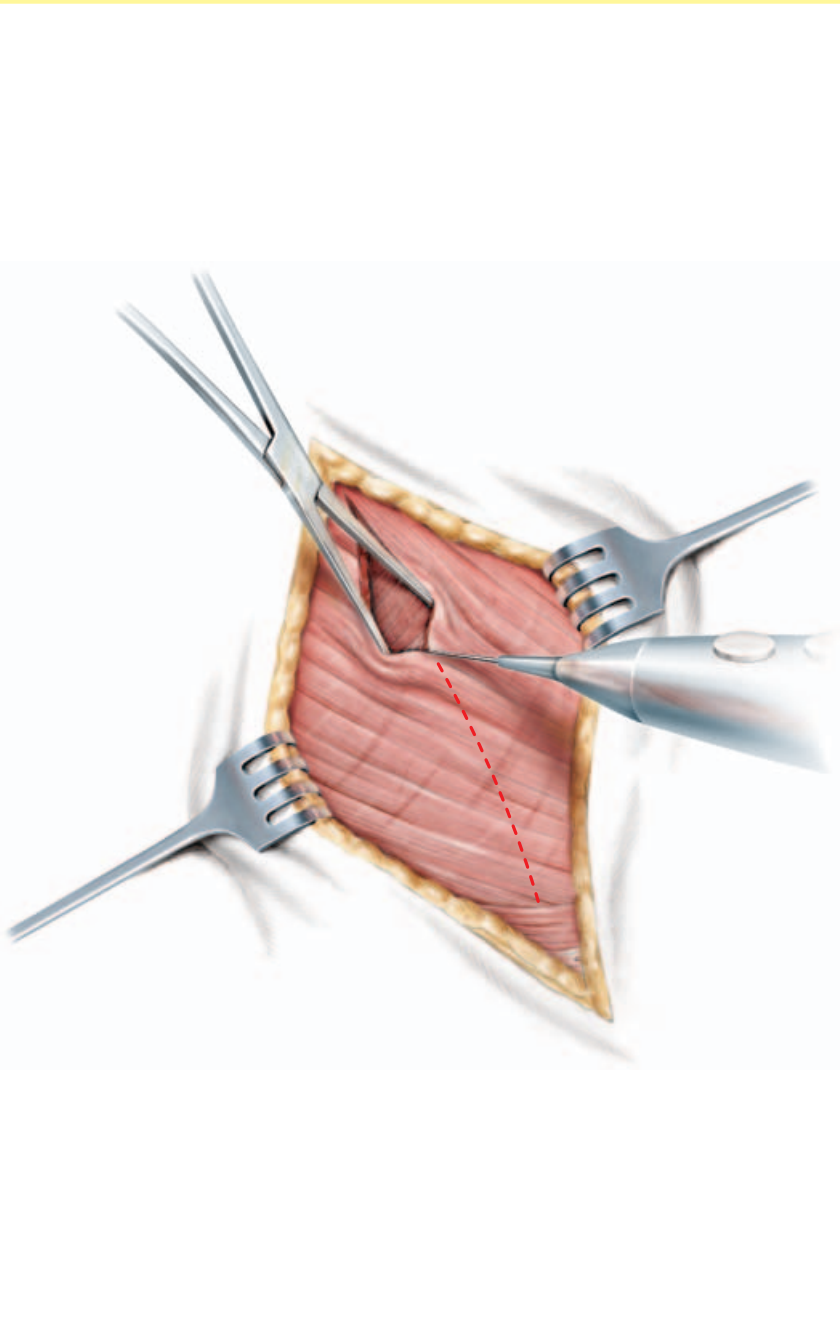
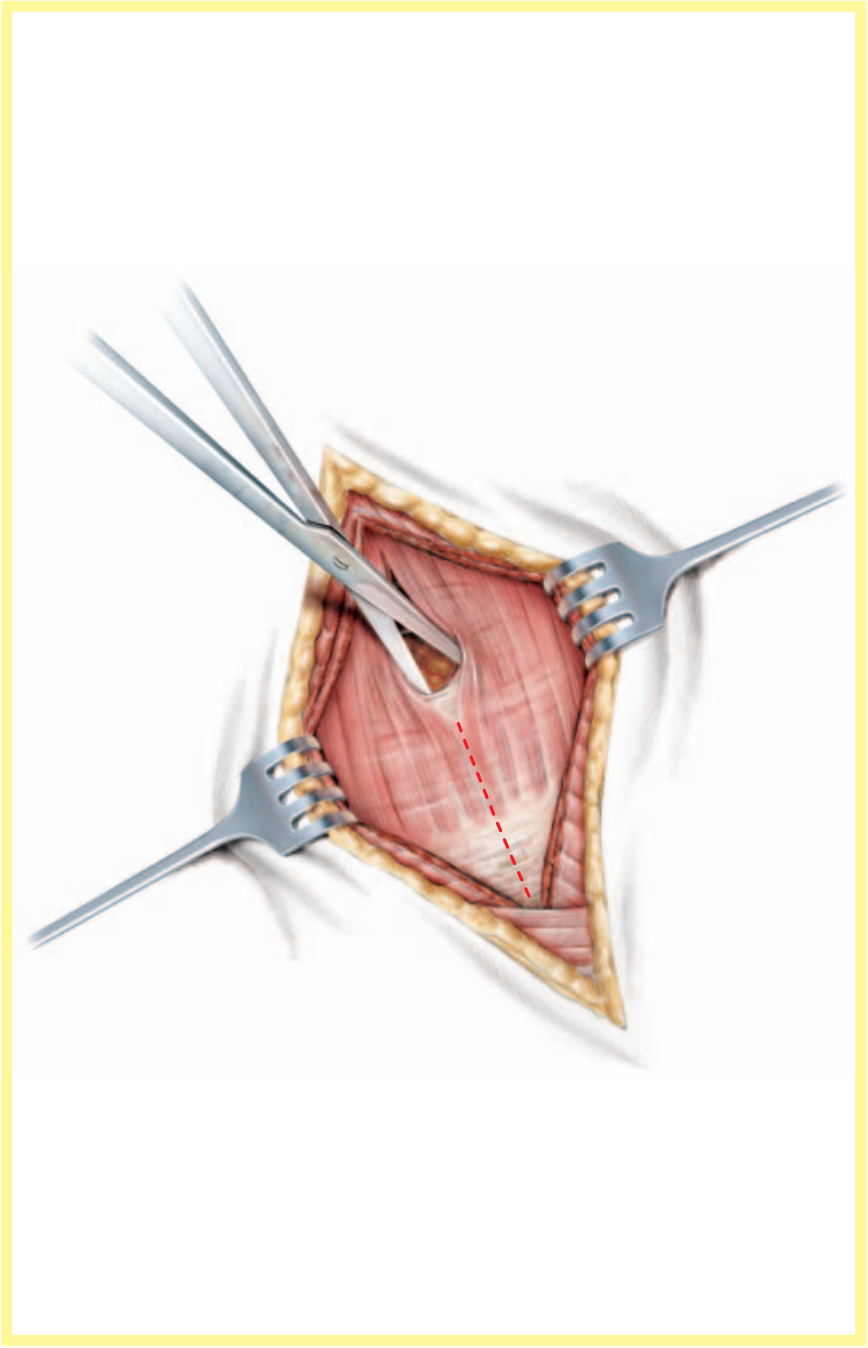


Figure 2

The internal and external oblique muscles are incised in the direction of the skin incision using a knife or needle tip Bovie coagulator, and the muscle incision is carried laterally to the latissimus dorsi.

Figure 3

The transversus abdominus is split bluntly in the direction of the fibres and the lumbodorsal fascia opened sharply.



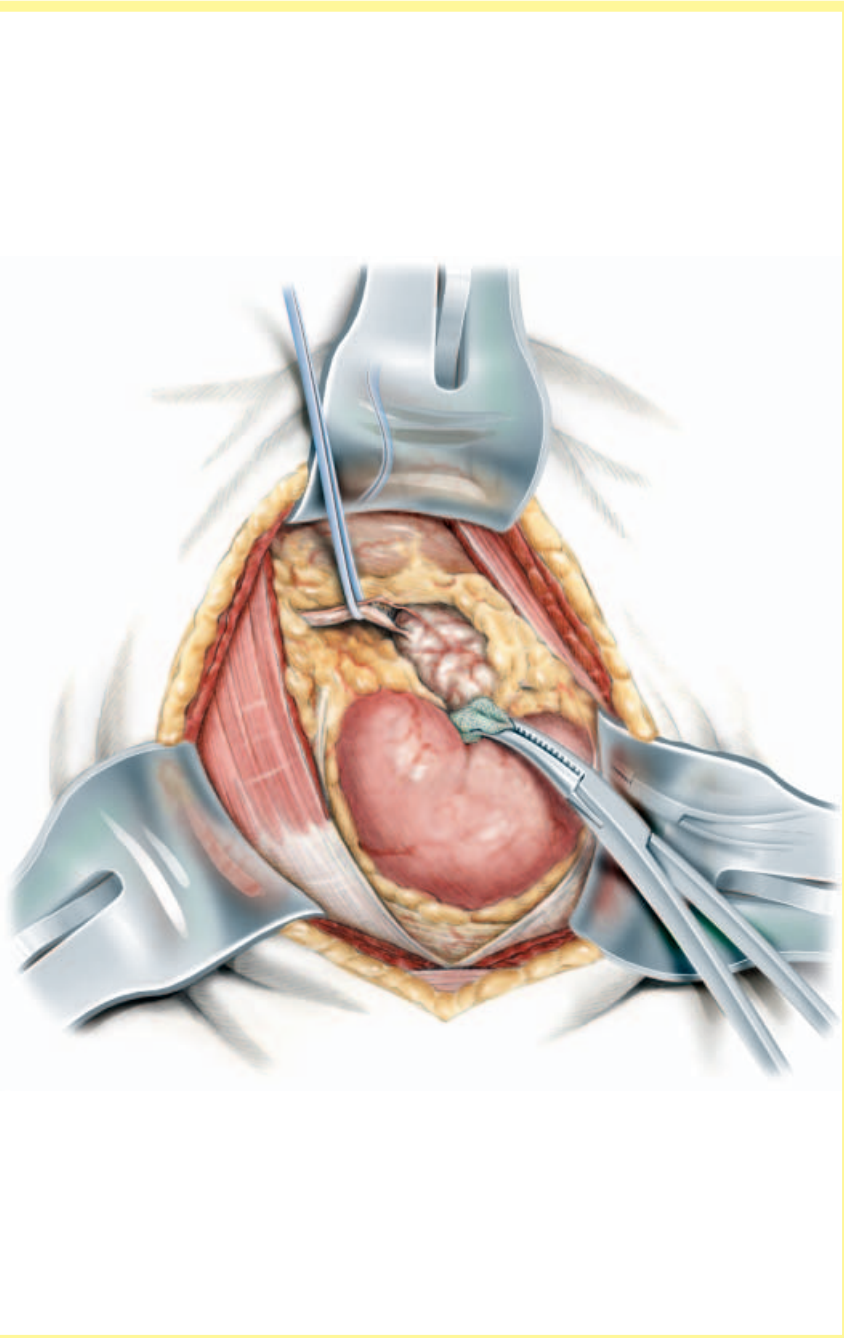
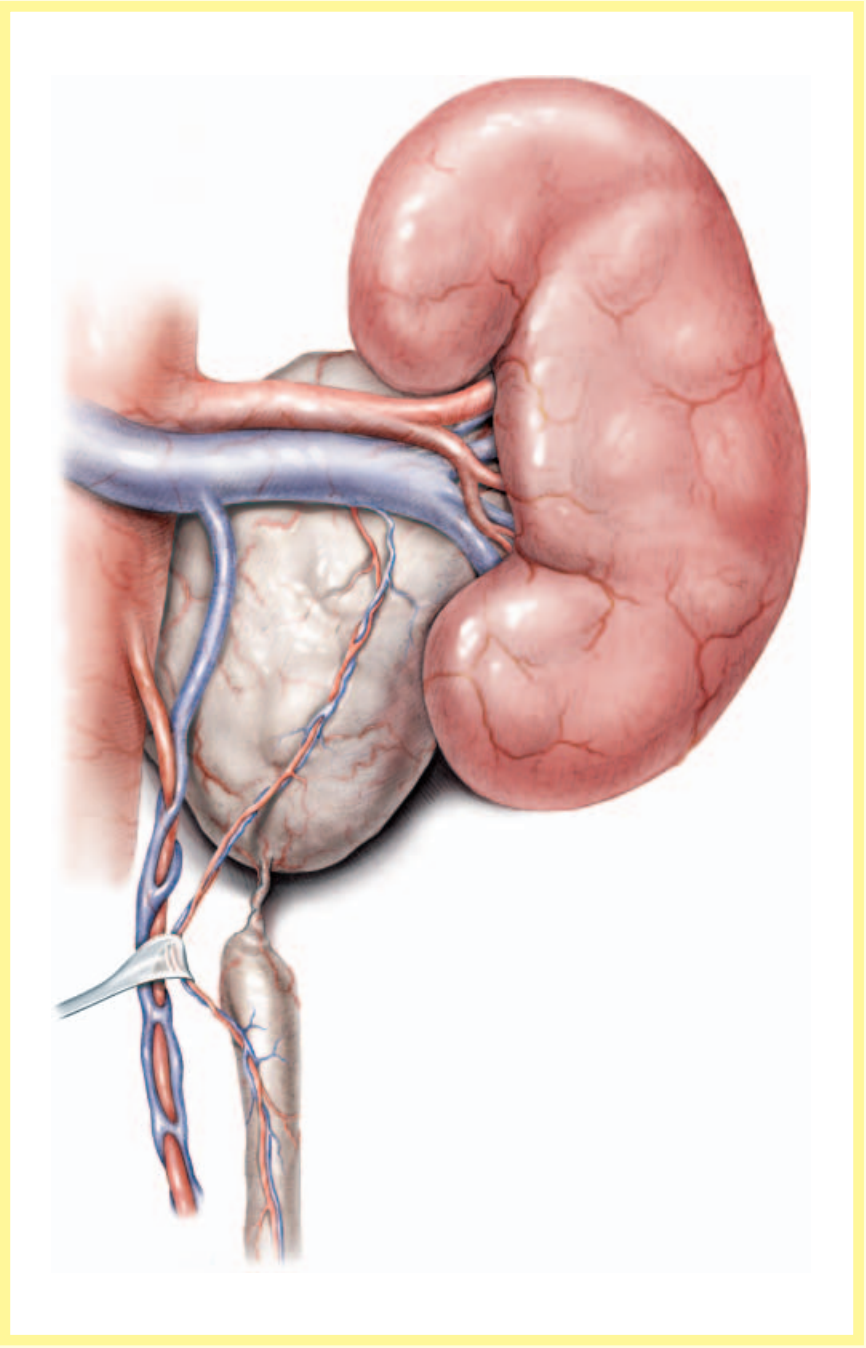


Figure 4

The peritoneum is bluntly displaced medially and lumbodorsal fascia incised. At this point, the Dennis-Brown ring retractor or some other self-retaining retractor can be placed in the wound for maximum exposure.

Figure 5

Great care must be taken to minimize trauma and preserve blood supply in the region of the upper ureter.



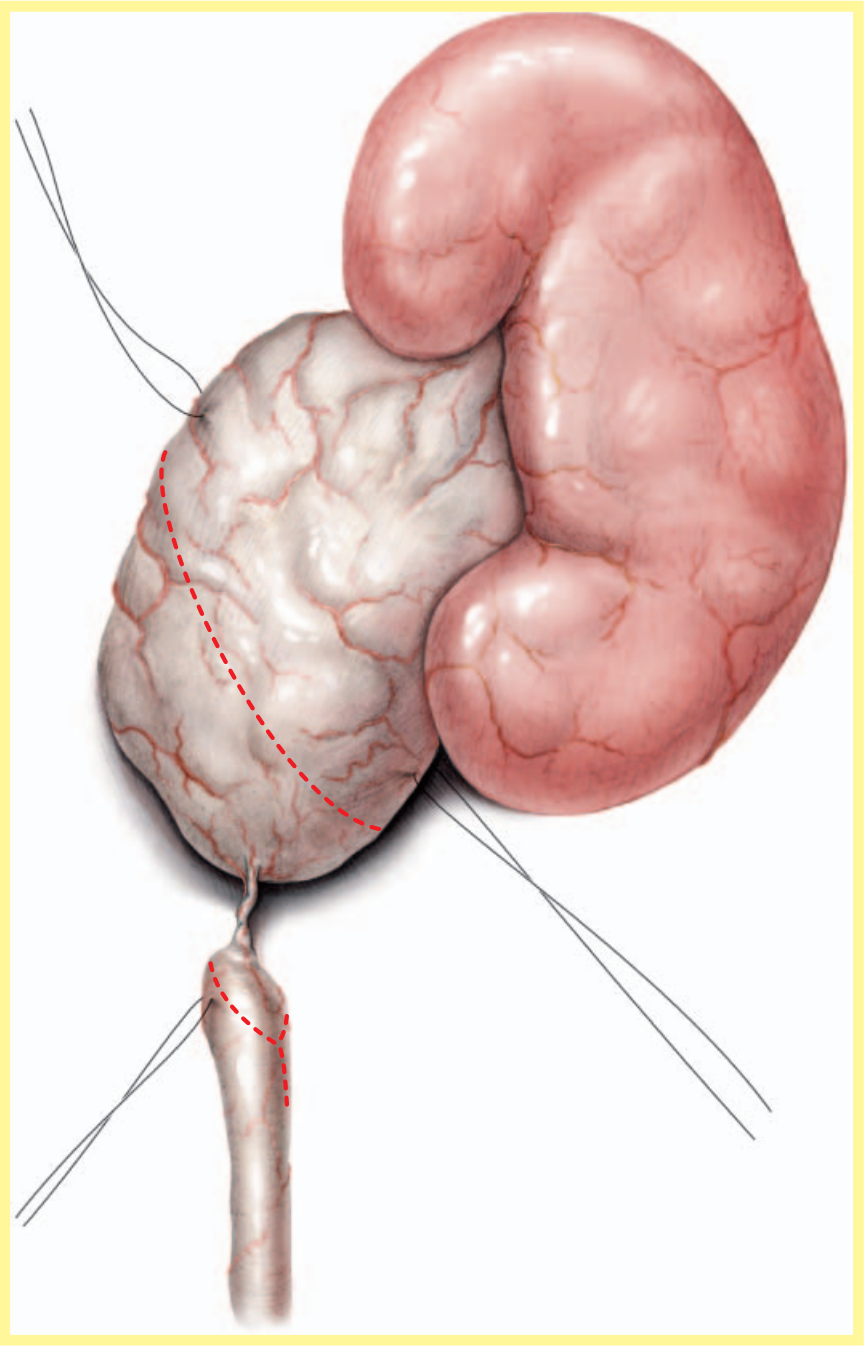
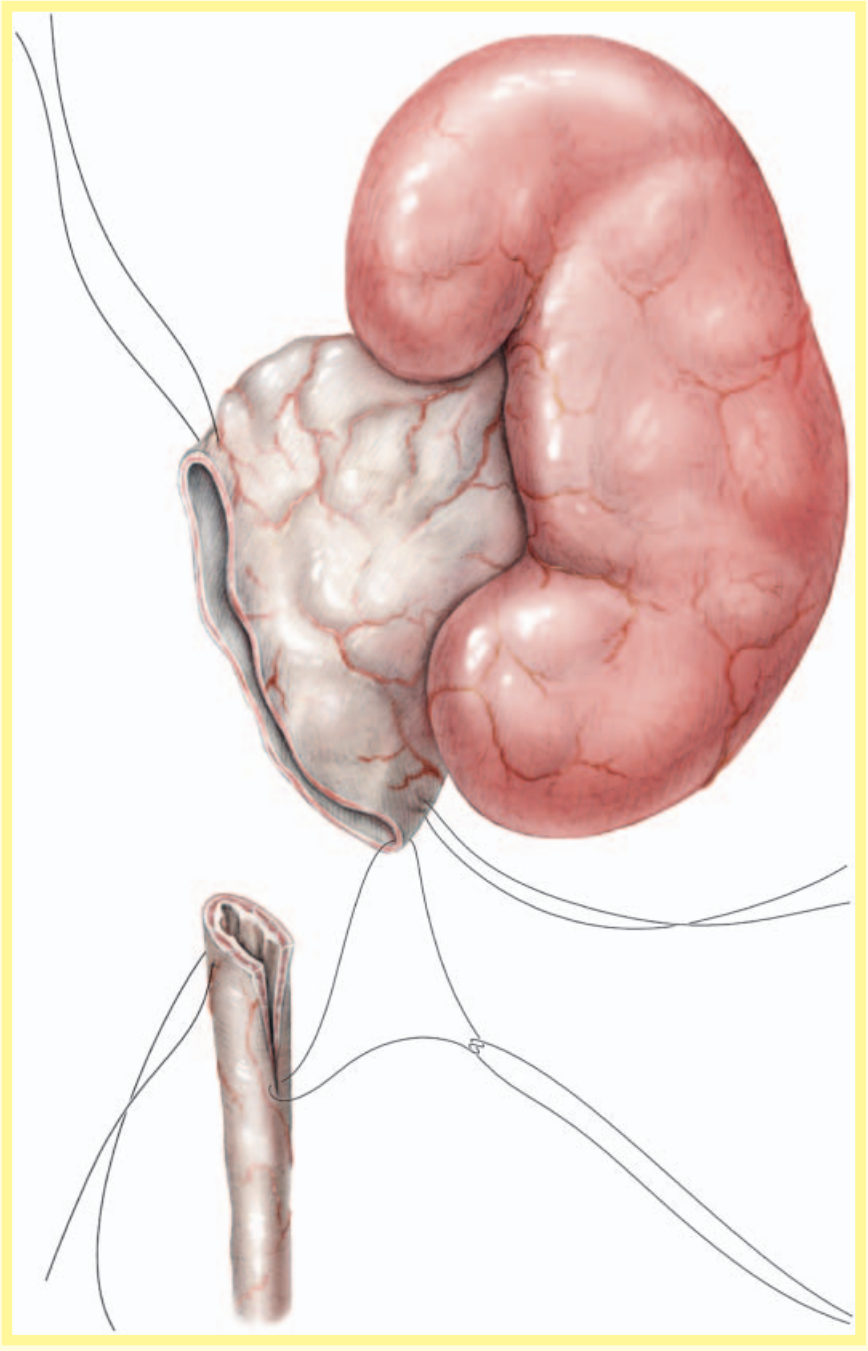


Figure 6

Once the PUJ has been exposed, fine stay sutures are placed in the anterior portion of the upper ureter and the anterior portion of the renal pelvis, and both structures gently mobilized. Methylene blue or a marking pen can be used to outline the area of incision or the renal pelvis and the upper ureter including the obstructed area.

Figure 7

The upper ureter is then transected above the traction suture obliquely and anterior to posterior, leaving the medial blood supply undisturbed. The renal pelvis and obstructed PUJ are transected similarly, leaving the traction suture in place at the most dependent portion of the inferior renal pelvis. The ureter is then incised for 2–3 cm on its inferior (posterior) border, to provide an open tube for triangulated anastomoses to be made eventually. At the same time the renal pelvis is trimmed to exclude redundant tissue.



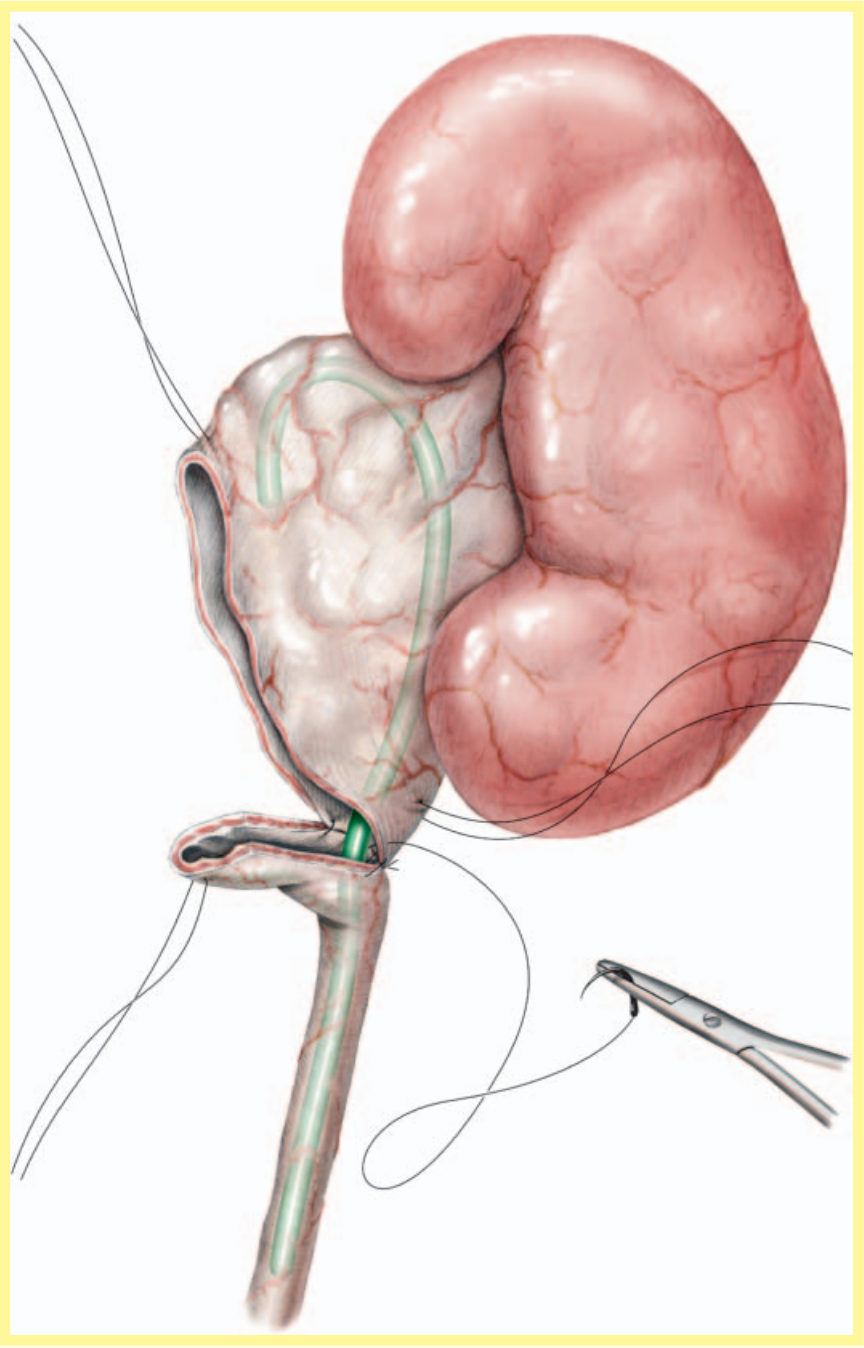
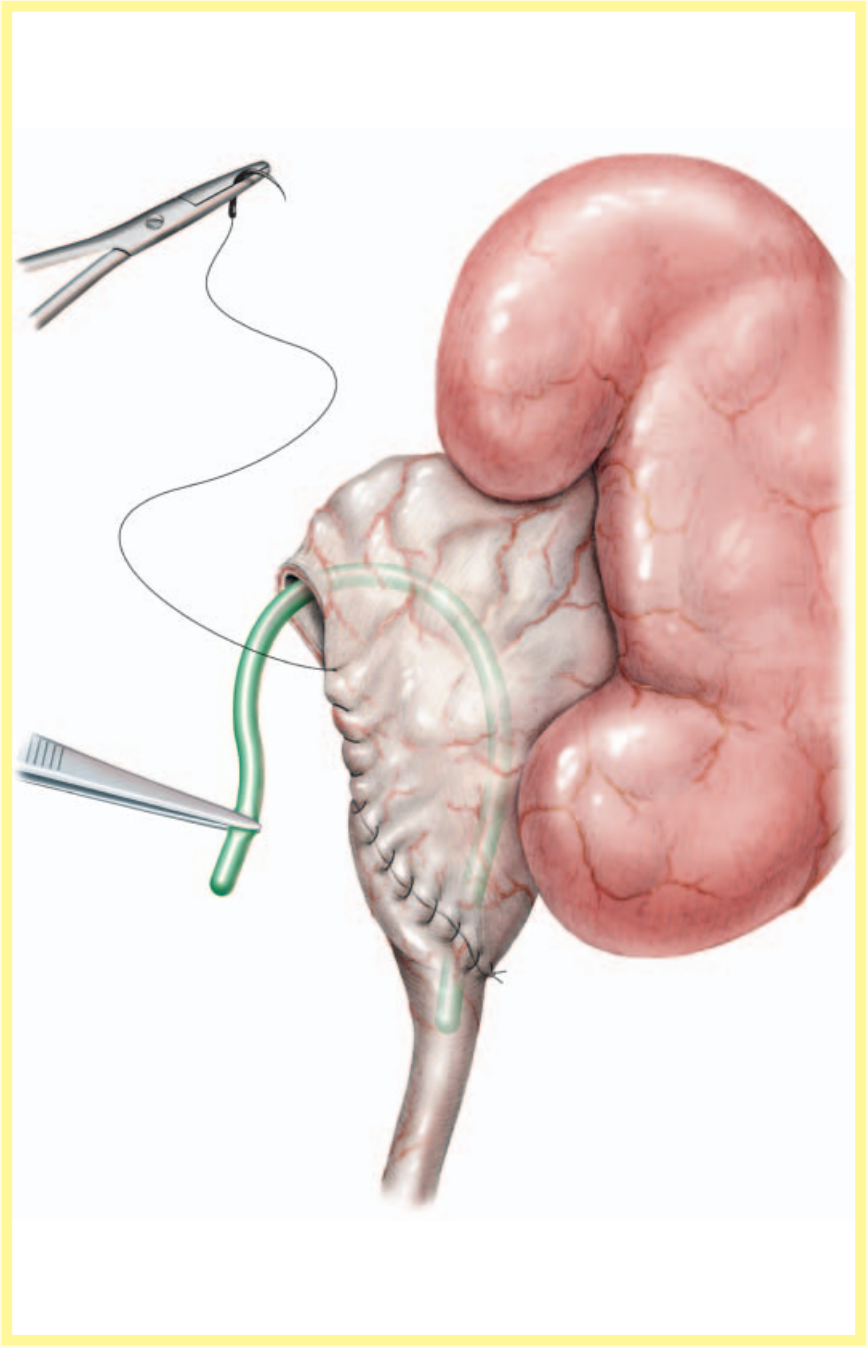


Figure 8

At times a 3.5 or 5.0 F feeding tube is used as a temporary ureteric stent to protect the back wall of the ureter from the sutures used for anastomoses. The ureter is anastomosed to the transected renal pelvis using 6–0 or 7–0 monofilament absorbable sutures. The suture line is made with a combination of interrupted sutures at the most dependent portion of the ureter and renal pelvis, and a running suture up either side of the anastomoses.

Figure 9

Before the anastomoses is completed the temporary stent is removed. Once an anastomosis has been completed a Penrose drain is placed near the area of anastomoses and the wound closed in layers using running absorbable suture to the internal oblique, external oblique, subcutaneous tissue, and skin.



TROUBLE SHOOTING

If there is a question about the adequacy of the anastomoses a needle can be placed in the anterior portion of the renal pelvis and the pelvis infused with fluid to test the potency of the anastomoses. Stents and nephrostomy tubes are not routinely used.

POSTOPERATIVE CARE

The patient has a Telfa and Tegaderm dressing applied with absorbing gauze over the area of the Penrose drain, which has been brought out through the end of the incision. The drain and Foley catheter are usually removed on the first day after surgery and the patient discharged 2 days after.

'SURGEON TO SURGEON'

There are several key issues that make this operation proceed smoothly. The first is to make sure enough redundant renal pelvis is removed to provide good drainage and avoid stasis. The second issue is to make a wide enough incision into the recipient ureter to provide an open anastomosis. The third is to ensure that the anastomoses are not twisted. The most common cause for torsion of the anastomoses is when the lower pole of the kidney is elevated into the wound and then replaced into the retroperitoneum. The anastomoses are best done *in situ* rather than elevating the kidney into the wound.

The worst thing that can happen during the procedure is when placing the temporary stent down the ureter, as it is possible that the vesico-ureteric junction cannot be traversed with a fine feeding tube or wire and access gained to the bladder. This usually indicates some problem at this junction and at that point the surgeon should consider leaving a nephrostomy tube for postoperative management.