

Surgery Illustrated



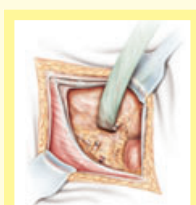
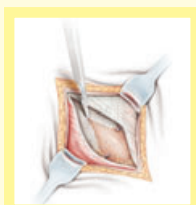
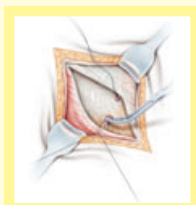
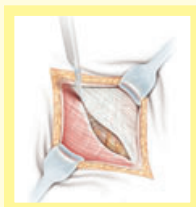
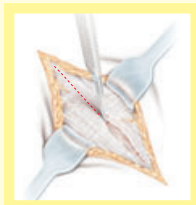
Surgical Atlas

Antireflux surgery: Lich–Gregoir extravesical ureteric tunnelling

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



INTRODUCTION

VUR is the most common urological anomaly in children occurring in 25–40% of cases with acute pyelonephritis. Of children with symptomatic VUR, 30–50% have radiological evidence of renal scarring, resulting from congenital dysplasia, acquired damage after infection, or both. Reflux nephropathy (RN) can be the most common cause of childhood hypertension. Follow-up studies show that 10–20% of children with RN develop hypertension or end-stage renal disease. Older studies consistently attributed 15–30% of chronic renal failure in children and young adults to chronic pyelonephritis and reflux nephropathy. However, awareness of VUR-related morbidity has led to more widespread diagnosis and treatment, which appears to have altered the epidemiology of hypertension and renal failure in children and young adults [1–3].

The management of affected children has been directed at preventing infection and permanent renal parenchymal damage, and its late complications, by antibiotic prophylaxis and/or surgical correction of VUR. There is no single therapeutic strategy for all clinical settings of VUR. The individual choice of management is based on the presence of renal scars, the clinical course, grade of reflux, ipsilateral renal function, bilaterality, bladder

capacity and function, associated anomalies of the urinary tract, age, compliance and parental preference [1,4,5].

Surgical correction is warranted in recurrent febrile infections despite antibiotic prophylaxis ('breakthrough' infections), medical noncompliance, new scars, and if there are associated malformations (e.g. duplex systems, Hutch diverticulum, ectopic ureter). Currently, the most popular procedures are the Lich–Gregoir, Politano–Leadbetter, Cohen and psoas-hitch ureteroneocystostomy. We describe the extravesical tunnelling technique (Lich–Gregoir) as an elegant, simple option with excellent results [6–8].

INDICATIONS

- Uncomplicated primary VUR in boys and girls before puberty.
- Failure of conservative management (breakthrough infections).
- Sequential repair in bilateral reflux.

LIMITATIONS AND RISKS

- Increased risk of urinary retention after simultaneous bilateral extravesical reflux repair (2.5%) [9];

- Ureteric obstruction (<1%);
- Persisting VUR (<2%);
- Periostial formation of a bladder diverticulum.

CONTRAINDICATIONS

- Within the first 12 months of life (due to a high risk of severely damaging bladder function).
- Patients beyond puberty/adolescents;
- Severely dilated ureters/megaureters (urogram).

PREOPERATIVE DIAGNOSTIC PROCEDURES

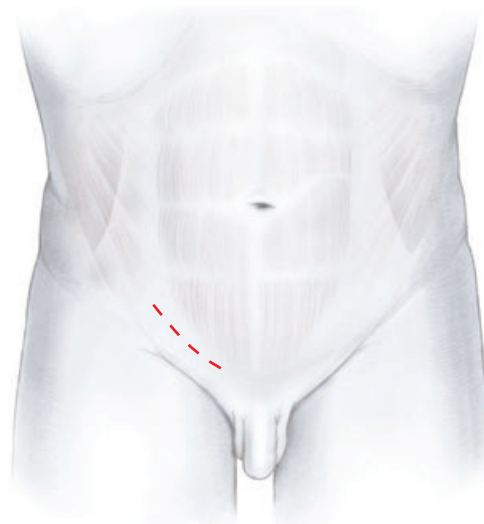
- Medical history, including family history;
- Urine analysis, urine culture;
- Renal and bladder ultrasonography;
- Voiding cysto-urethrography (VCUG) or voiding urosonography with ultrasonographic contrast agents [10];
- DMSA scan/MAG3 clearance;
- Cystoscopy (at the time of surgery, to assess the bladder mucosa, position and configuration of the ureteric orifices and identify additional anatomical abnormalities, e.g. ureteric duplication, ureteric ectopia)

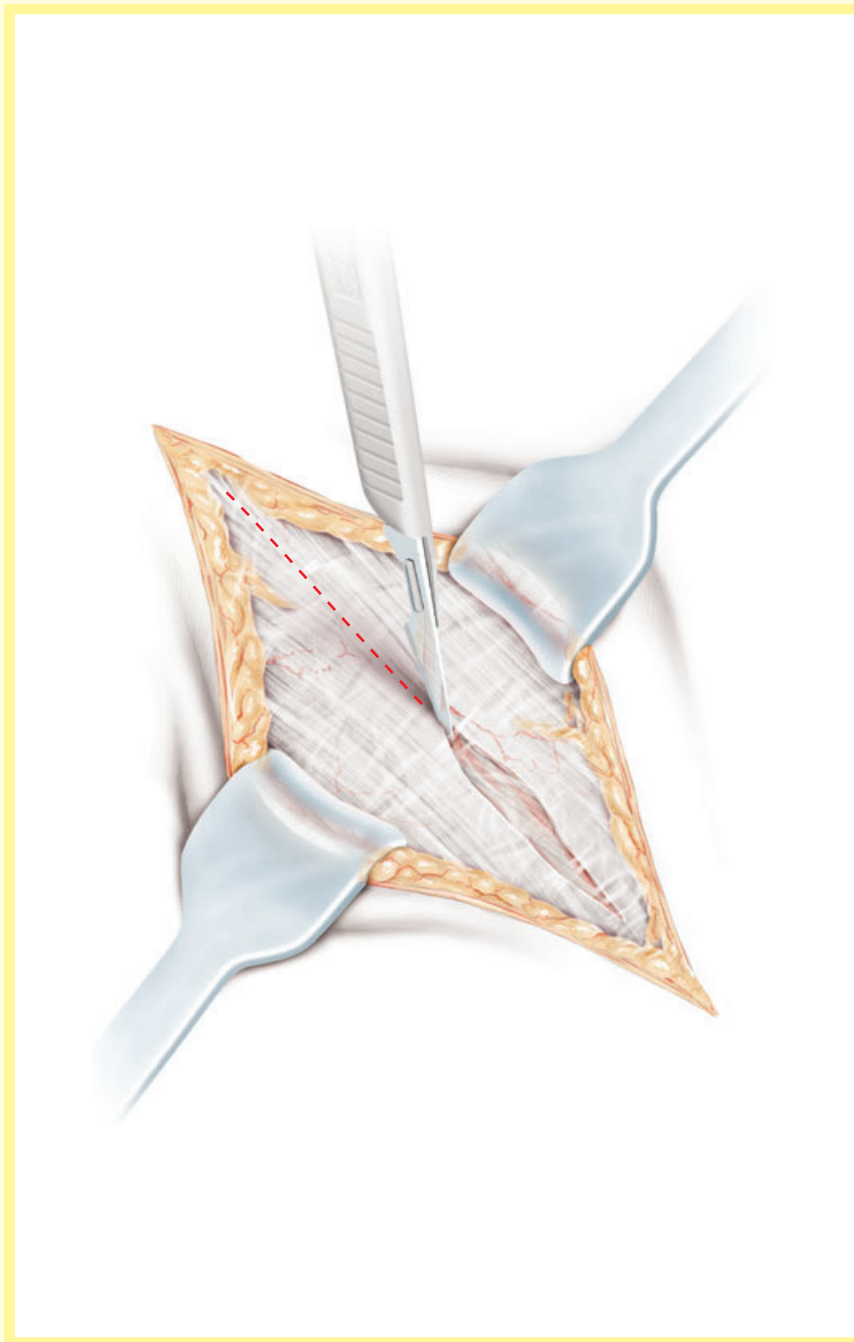
MATERIALS

- Delicate instruments;
- Bipolar coagulation devices;
- Bladder wall stay sutures: 4/0 polyglactin rapide;
- Detrusor re-approximation: 4/0 or 5/0 polydioxanone;
- Penrose drain;
- Skin closure: intracutaneous running suture (4/0 poliglecaprone 25)

Figure 1

The patient is placed supine, with the lower abdomen exposed (partial Trendelenburg); an indwelling catheter is inserted. Gibson incision (oblique incision in the right or left lower quadrant, extending from 2 cm medial to the anterior superior iliac spine, running 1–2 cm above the inguinal fold to the border of the rectus muscle).

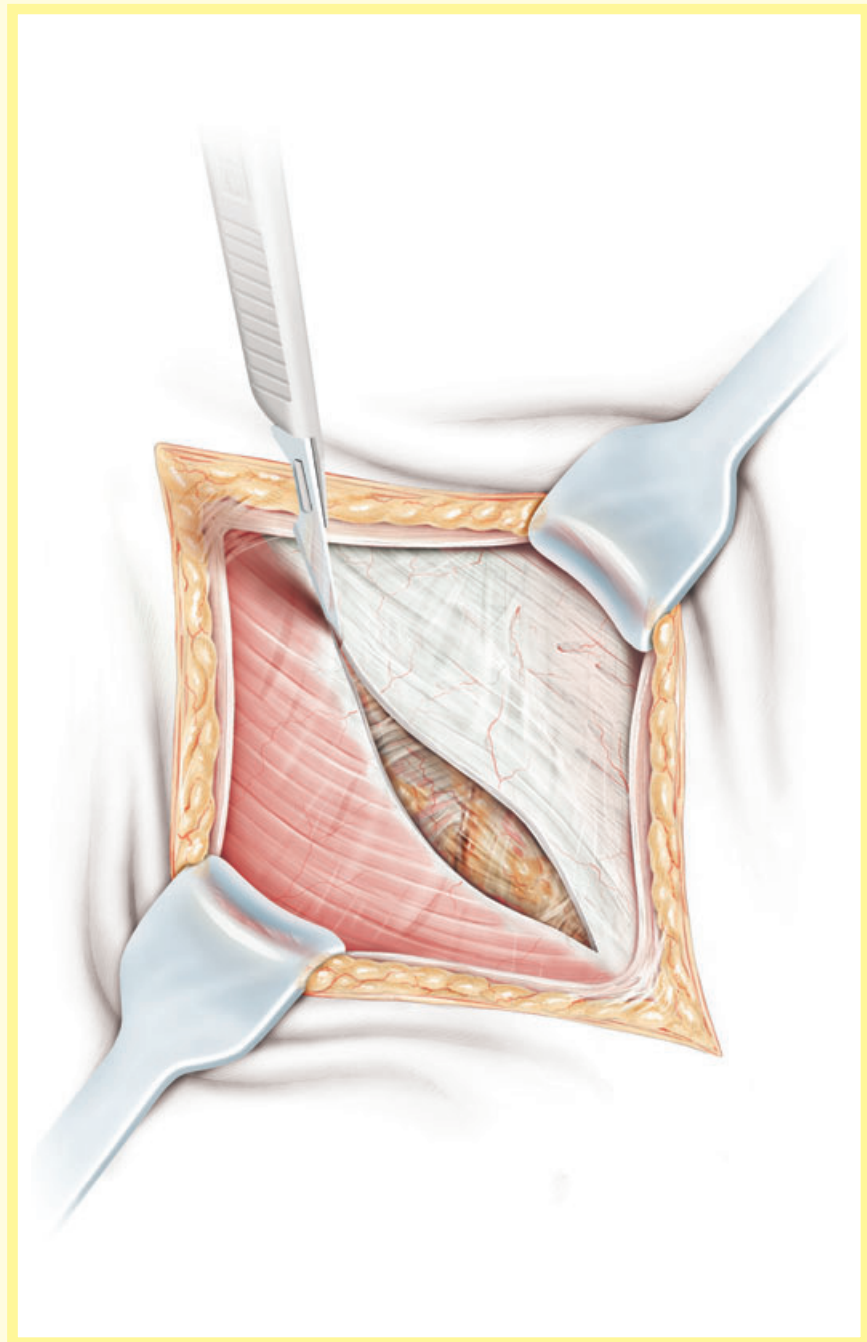


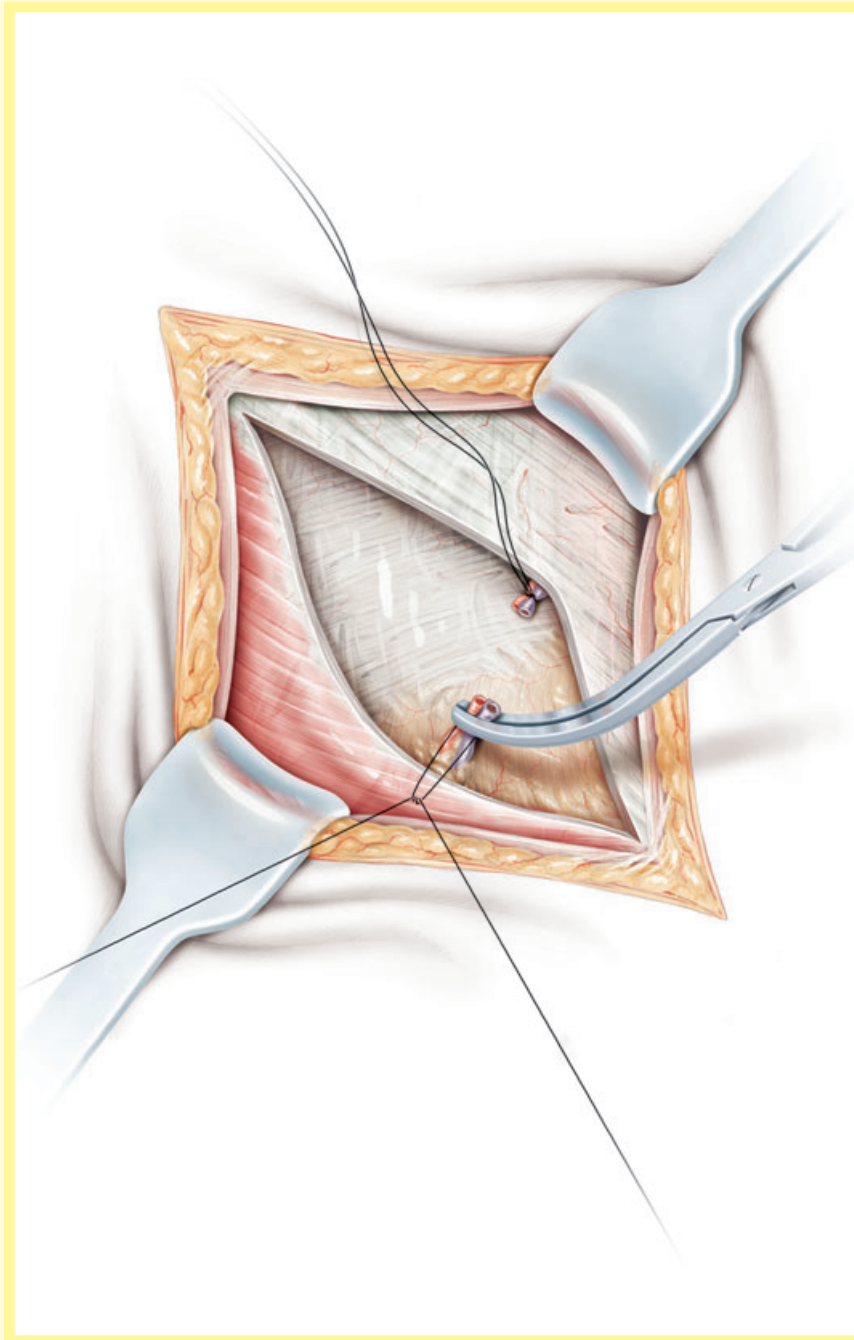
**Figure 2**

Muscle-sparing pararectal approach. Division of the external oblique aponeurosis in the direction of the fibres.

Figure 3

Separation of the internal oblique muscle and the transversalis abdominis muscle.

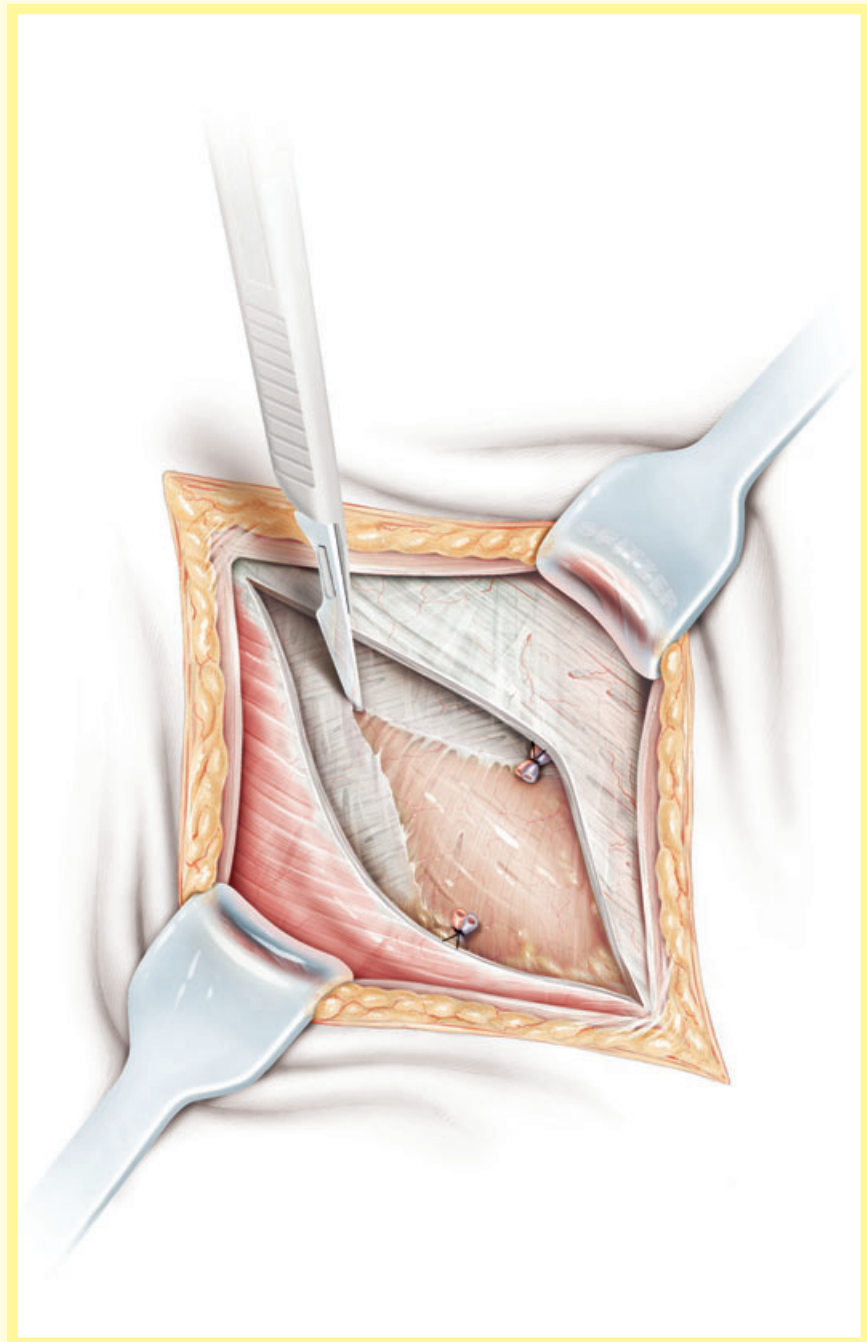


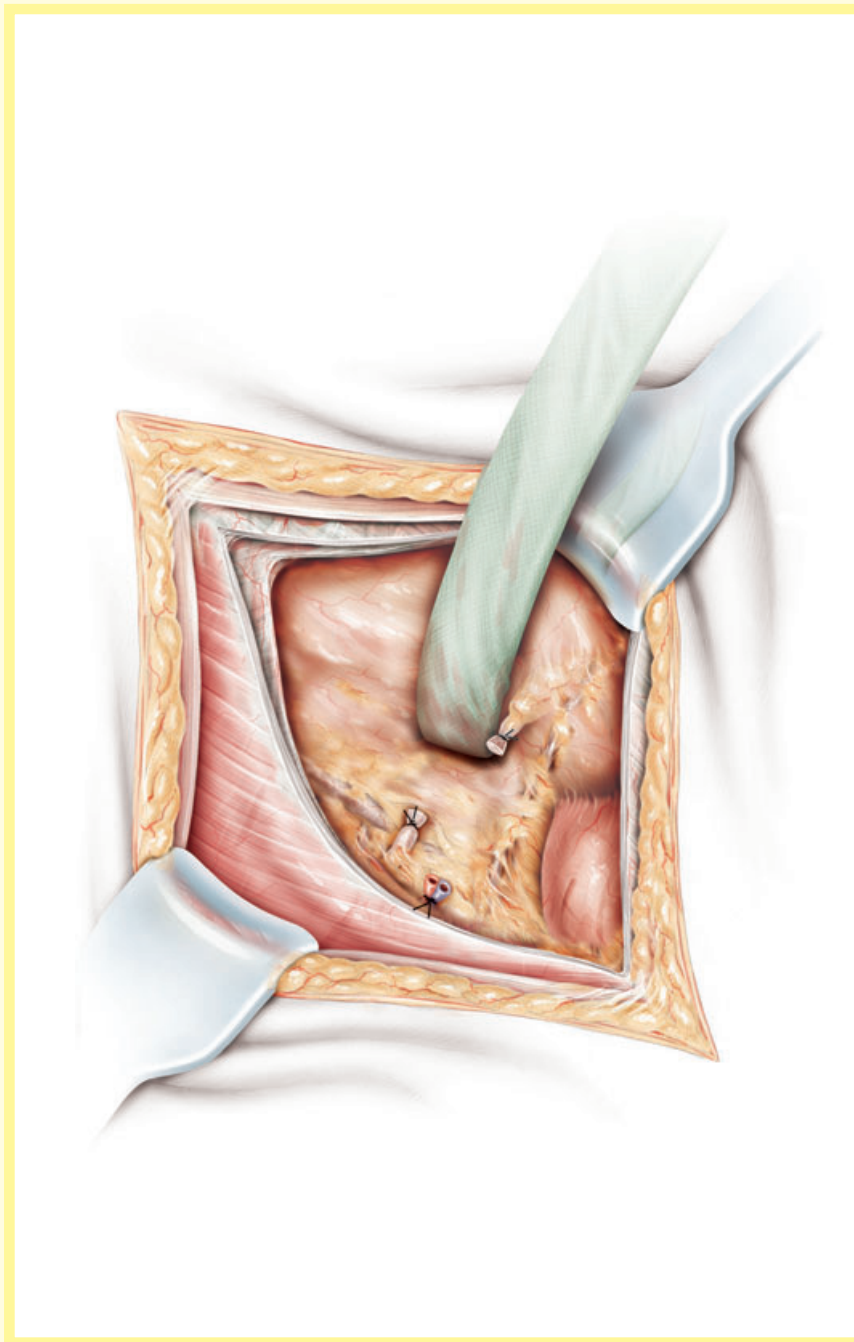
**Figure 4**

Ligation and division of the epigastric vessels.

Figure 5

Division of the transversalis fascia, which is a thin structure in this area.

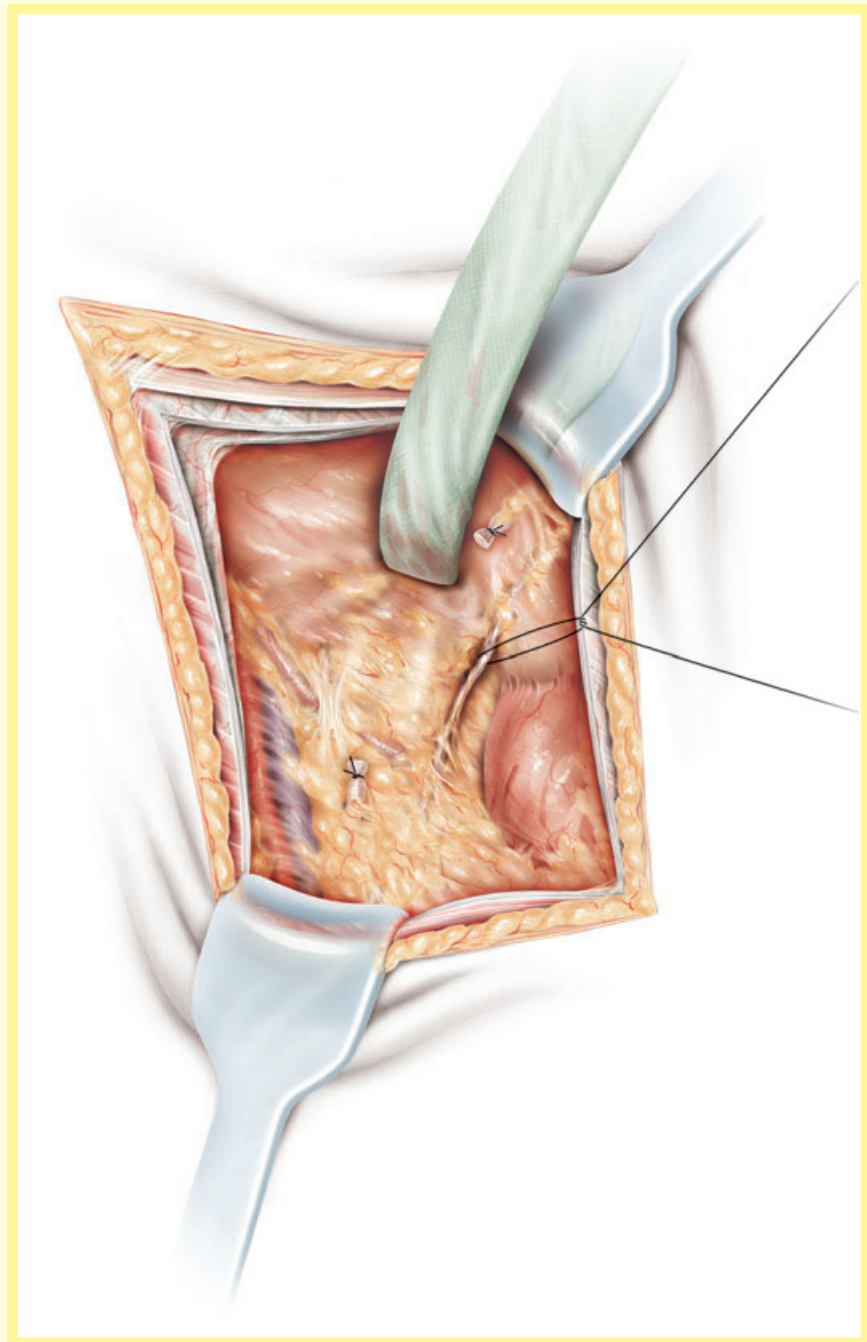


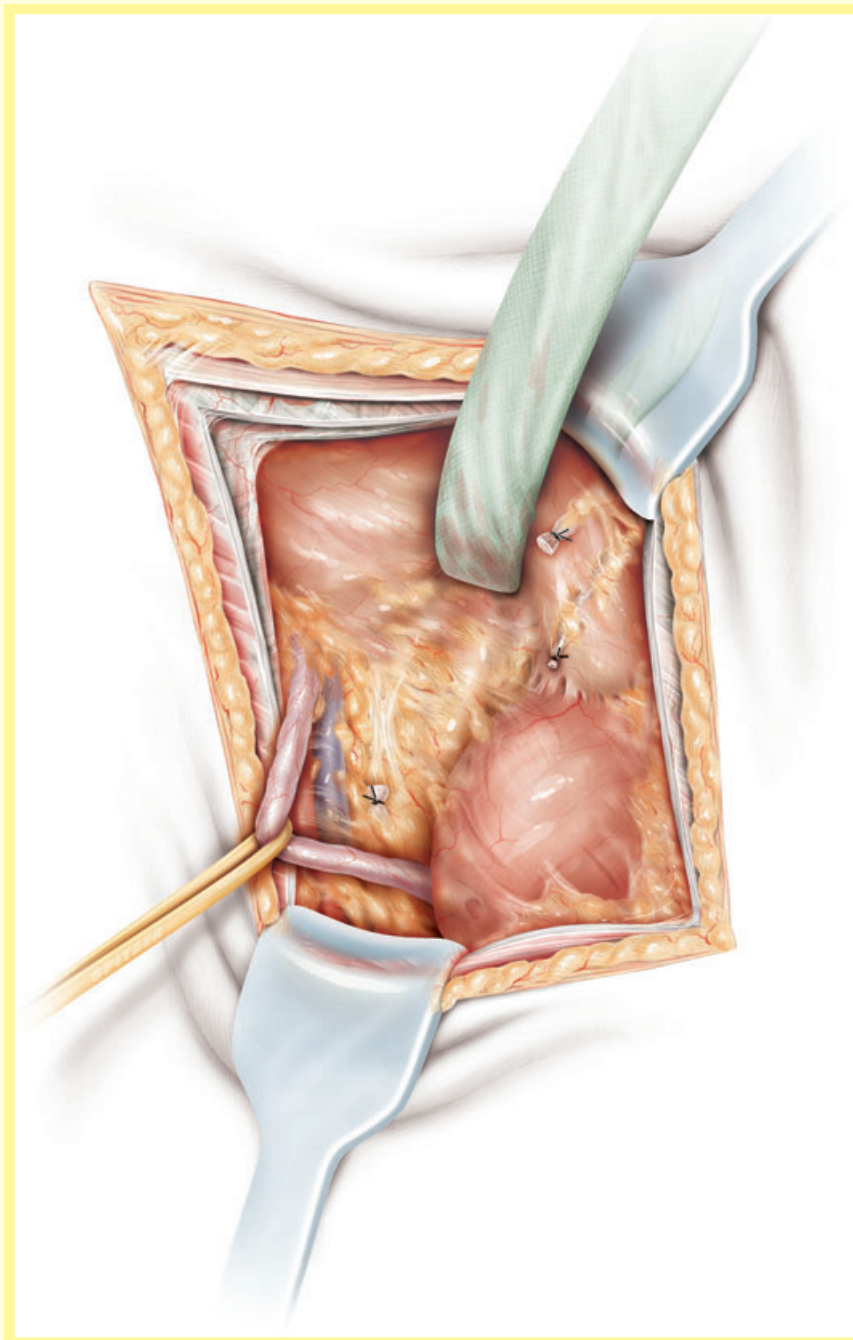
**Figure 6**

Division of the round ligament in girls/careful dissection and encircling of the spermatic chord with a surgical loop in boys (division of the residuum of the processus vaginalis at the internal ring) so that the peritoneum can be mobilized craniomedially. The lateral subperitoneal space is opened and the iliac vessels are exposed.

Figure 7

Dissection and division of the obliterated hypogastric vessels (lateral umbilical ligament) which are crossing the ureter.

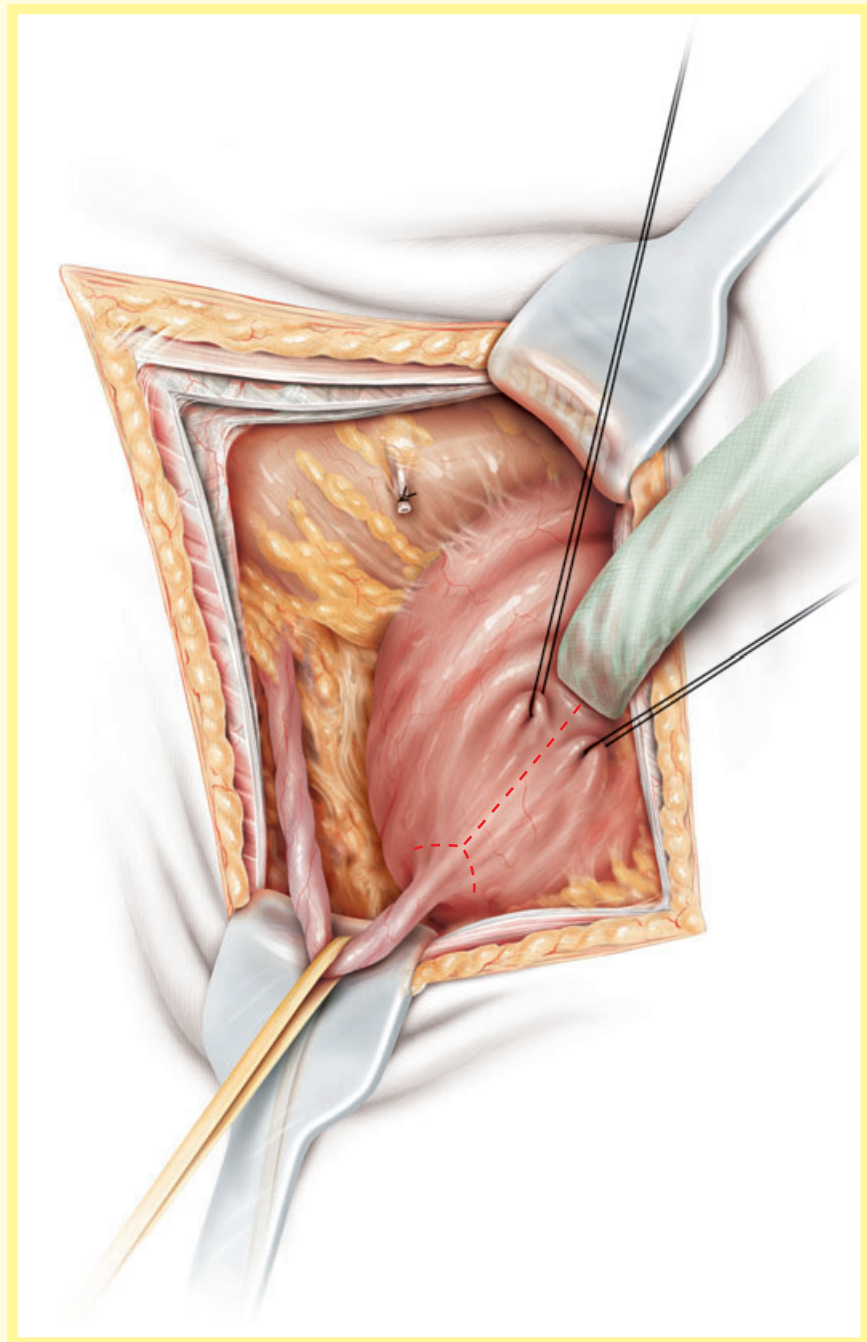


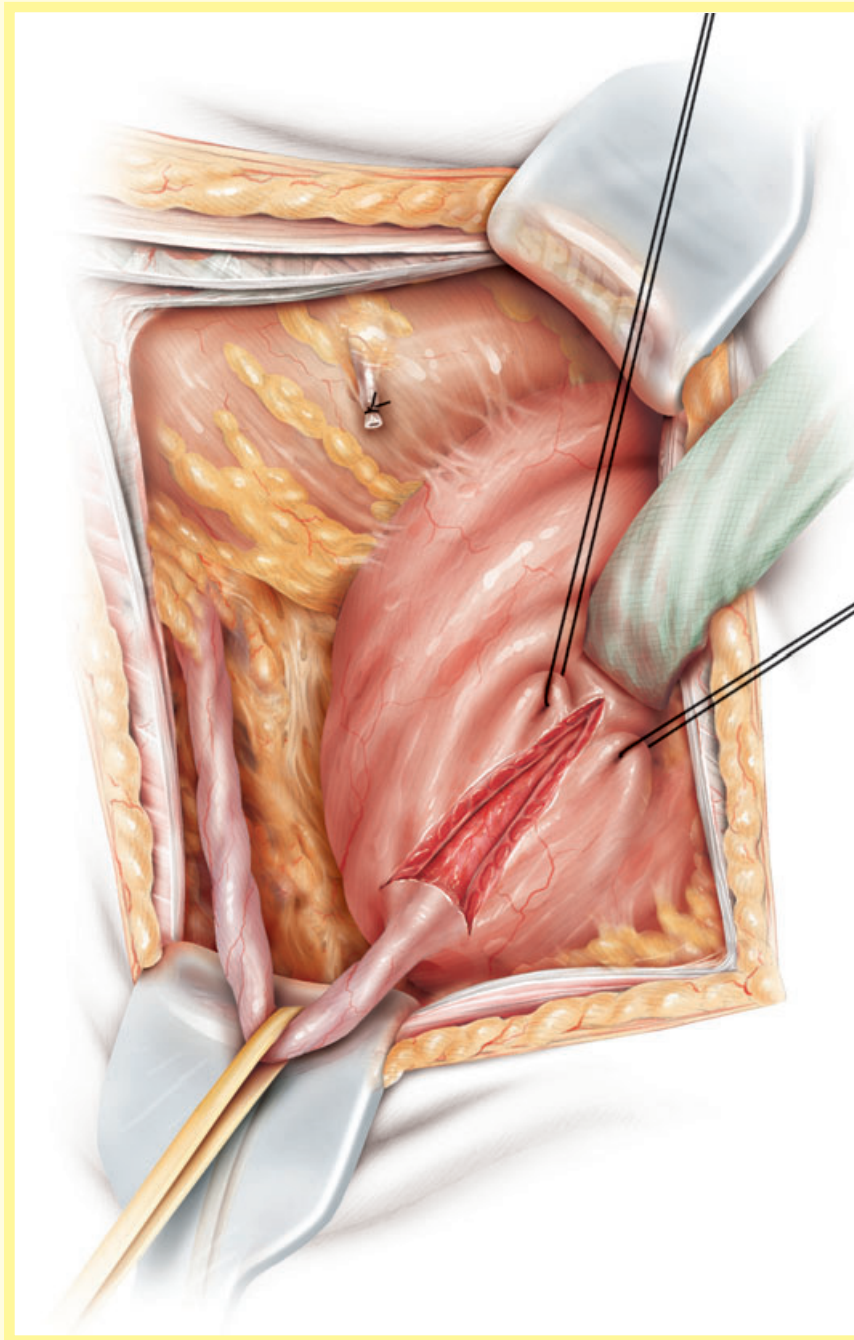
**Figure 8**

Identification of the ureter against the peritoneum as it crosses the iliac vessels. Encircling the ureter with a surgical loop. Mobilization of the ureter from the iliac vessels towards its entry into the bladder. Ligation of the several perforating vessels behind the ureter, preserving as much of the adventitial vasculature as possible.

Figure 9

Placing stay sutures on the lateral wall of the bladder to outline the division of the detrusor muscle. With the bladder rotated medially, the incision should be perpendicular, following the natural course of the ureter.

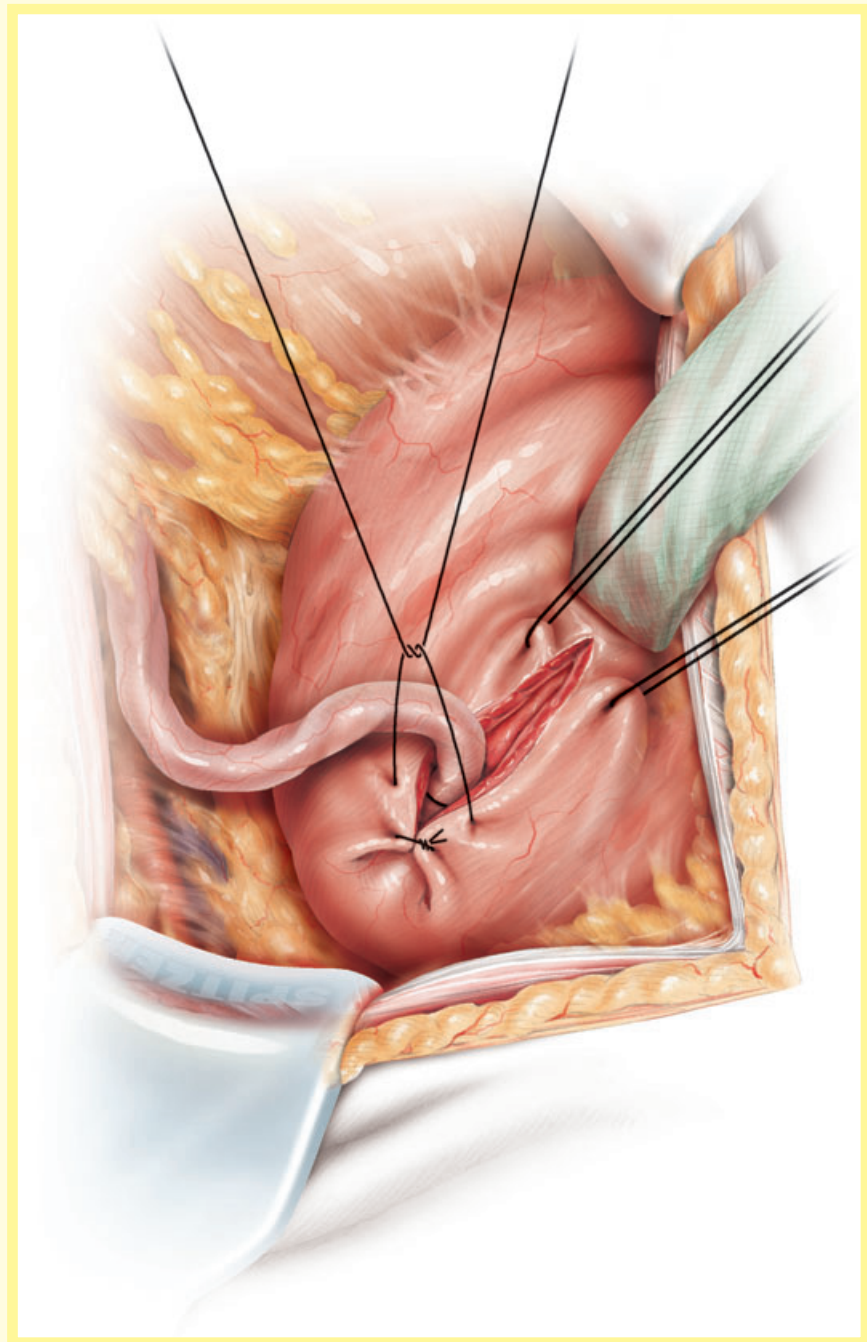


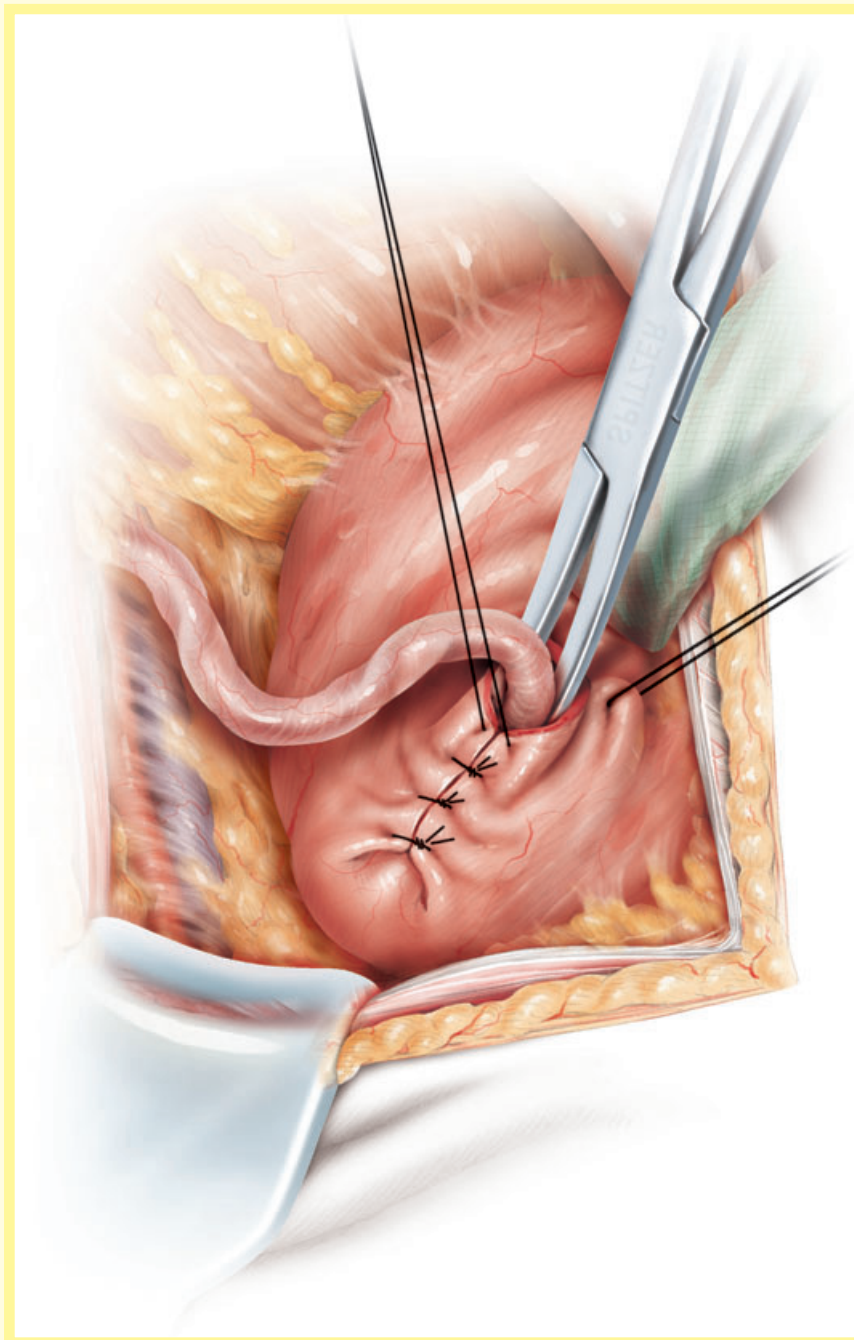
**Figure 10**

Complete division of the detrusor muscle between the stay sutures down to the epithelium, cutting in a vertical direction for 3–4 cm (depending on the child's age) from the ureter. Filling the bladder to one-third capacity facilitates the dissection (50–100 mL saline). Undermining the bladder muscle against the urothelium to provide lateral flaps to cover the ureter. Y-shaped incision proximally to release the flaps longitudinally and allow complete embedding. Circumferential dissection of the ureter at its entry into the bladder should be avoided to preserve the posterior ureteric artery. If the bladder is opened accidentally, the urothelium is closed immediately with resorbable sutures.

Figure 11

Placing the ureter in the groove in contact with the bladder epithelium and loose closure of the muscle over the ureter with interrupted 4-0/5-0 synthetic absorbable sutures. The suture is started exactly at the level or even caudally of the vesico-ureteric junction with appropriate muscular support to avoid formation of an iatrogenic diverticulum. Constriction of the ureter at the point of entry into the tunnel must be carefully avoided. In duplex systems, both ureters are placed in a common groove without separating Waldeyer's sheath.

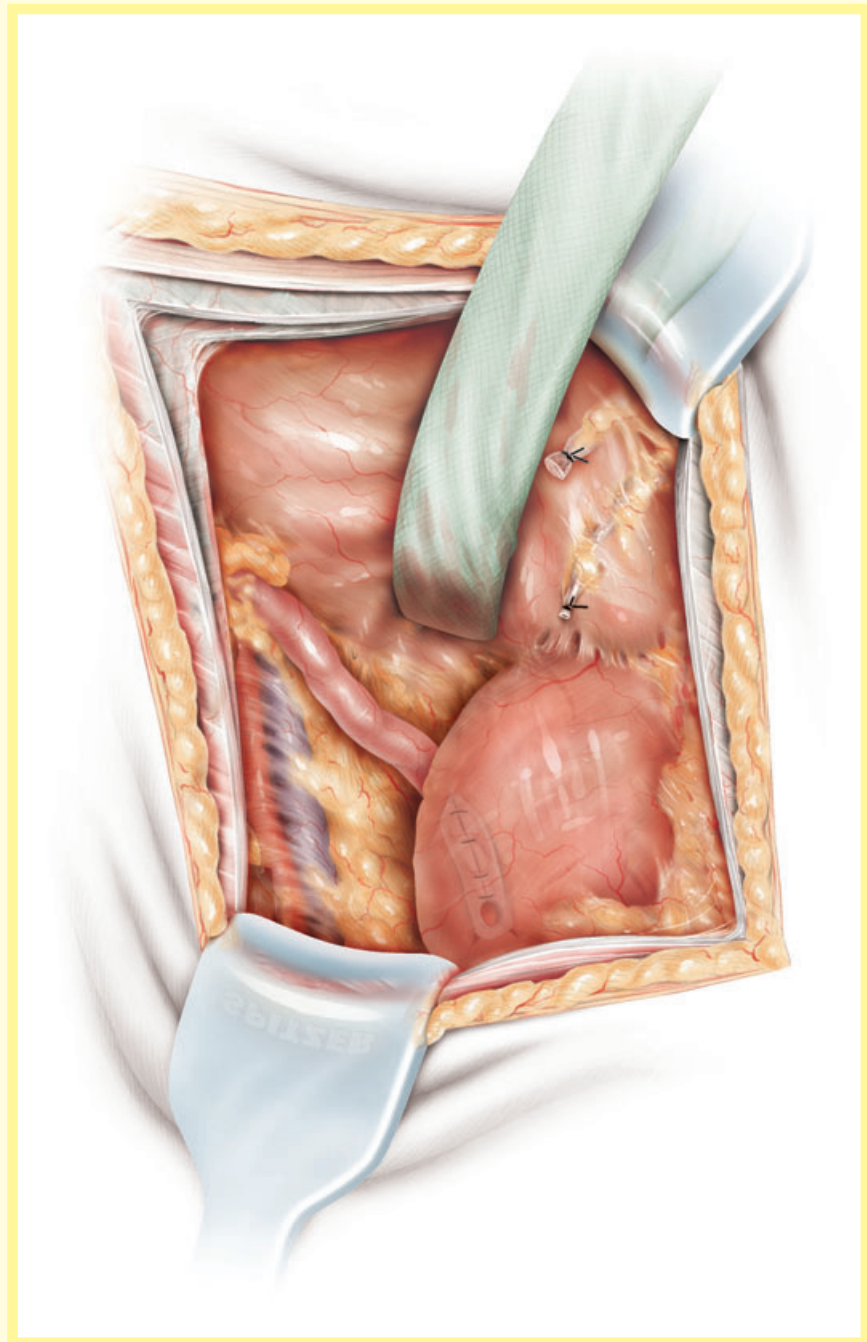


**Figure 12**

An Overholt clamp is used to ensure a sufficiently wide entry of the tunnel. To avoid haematomas within the submucosal tunnel and subsequent ipsilateral hydronephrosis, meticulous haemostasis is essential.

Figure 13

Allowing the bladder to fall back and resume its physiological position. The ureter should follow its natural course without kinking of the distal segment. Insertion of a Penrose drain, and closure of the wound in layers.



POSTOPERATIVE CARE

- Removal of drain and indwelling catheter on the third day after surgery (fifth day if the mucosa had been injured).
- Ultrasonography of the upper urinary tract and estimation of residual urine after removing the catheter and 3 months after surgery.
- In the rare case of upper urinary tract obstruction, temporary stenting might be warranted.
- In an uneventful postoperative course, VCUG is optional.
- The follow-up protocol should include blood pressure measurement and urine analysis

COMMENTS/SURGEON-TO-SURGEON

Various intra- and extravesical techniques have been described for the surgical correction of VUR. Although the different methods have specific advantages and complications, they all share the basic principle of lengthening the intramural part of the ureter by submucosal embedding of the ureter. As all techniques have been shown to be safe, with low complication and excellent success rates (92–98%) [11], the choice of the procedure in the individual case is more a matter of the surgeon's personal preference than a result of an evidence-based analysis. In our experience the vast majority of defects at

the level of the vesico-ureteric junction can be solved successfully with a repertoire of two highly standardized, reproducible and therefore easy-to-teach procedures, both using the above described Gibson approach: if the Lich-Gregoir technique carries a high risk of failure (as in adolescents and/or severely dilated ureters) the psoas-hitch ureteroneocystostomy offers equally excellent results.

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