Surgical Therapy

D. Hauri

Urologische Universitätsklinik, Zürich, Schweiz

Key Words
Extracorporeal shock-wave lithotripsy
Percutaneous litholapaxy
Ureterorenoskopical stone removal
Ureter, surgery
Kidney parenchyma, surgery

Abstract
Conventional stone operations have decisively receded into the background due to modern methods of stone removal, e.g., extracorporeal shock-wave lithotripsy and endoscopic stone removal. The disadvantages of these modern methods are discussed. Because there are no complications by the conventional technics, which are still practised, the technical details are also discussed.

Extracorporeal shock-wave lithotripsy, percutaneous litholapaxy and ureterorenoscoptic stone removal are elegant and attractive methods, which have doubtlessly enriched modern stone surgery. For the patients they mean less stress and a shortened convalescence. For this reason we must not conceal their disadvantages. The considerable physical stress of the X-rays, which to date are unavoidable in modern procedures, is indisputable. Additionally it is a fact that open surgical operations have a clearly shorter operation and anesthesia time than the two endoscopic procedures. At least, the present trend results in the situation that fewer and fewer good urologists will be qualified to perform open stone operations. For example, some authors prefer ureterendosscopic stone removal to ureterolithotomy because the latter is said to show a complication rate of 10% and more. In this case the technical inability of the surgically active urologist must be taken into account. In the following the operative concepts are not detailed; for that purpose there are enough textbooks available. We confine ourselves to a key word-like description of some well-tried operation principles.

Surgery of the Ureters

It is recommendable to expose the ureter extraperi-toneally to guarantee an uncomplicated postoperative process. As we know from the anatomy, the ureter vessels are supplied by arteries which run along the adven-titia and divide intramurally. From this follows – as an old surgical principle – that the ureter should be exposed carefully, without trauma and outside the adventitia. Hard forceps and nonelastic bridles produce the typical presuppositions for postoperative necroses and fistulas. To avoid the involuntary ‘back-floating’ of the stone into the renal pelvis in case of wide ureters, the stone must be located carefully and the ureter immediately bridled proximally. Unnecessary surgical trauma and expansion of the surgical access can thus be saved, which is very important for the postoperative phase. Removal of the stone by proper incision and careful detachment (e.g. by a fine-bellied bougie) avoids local necroses and postoperative fistulas. The ureter is washed out proximally and distally to prove whether any other concrements exist. Temporary endogenous drainage of the ureter is advan-
Hauri
tageous in cases of extended ureterotomies, anatomically unreliable conditions of the ureter walls
or strongly edematous mucosa of the ureter. However, this splint should better not be derived
transureterally but end in the bladder blindly. Closure of the ureterotomy has to be done by the
most fine, atraumatic and resorbable sutures, which seize only the adventitia of the ureter.
Postoperative stenoses can be avoided by this procedure. We recommend drainage of the
retroperitoneal area because urine extravasation may happen postoperatively. This drainage
avoids peritonitis on the one side and postoperative stenosis due to periureteritis on the other. If a
lasting urine fistula happens postoperatively, the ureter should remain in splints for several
weeks. In this way the fistula certainly disappears and stenosis of the ureter, which often follows
in this situation, can simultaneously be avoided.

Surgery of the Pyelon
The following procedure is suited best for locating the renal pelvis. The proximal ureter, which is
adherent to the peritoneum, is located first and then pursued up to the pyelon. A proper
intrasinusoidal preparation of the renal pelvis with the ramifications of the main calix before
opening the hollow system makes the operative procedure easier. Postoperative problems after
pyelotomy are less than those after surgery of the ureter if the pyeloureteral area is not touched.
A transversal pyelotomy is recommended therefore in case of a large size, or in calix necks
growing stones, a V-shaped pyelotomy is recommended. Removal of the stone should also be
most sparing and is best performed by a fine-bellied bougie and, if possible, without traumatizing
stone forceps. Before closing the renal pelvis, the hollow system should be washed out
thoroughly to avoid peripheral stones remaining behind. Additionally the ureter should be
explored by a catheter through the respective ostium up to the bladder because a peripheral
obstruction (mostly caused by remaining stones) can result in a permanent urinary fistula. Good
postoperative drainage of the retroperitoneum is indispensable in this case.

Surgery of the Kidney Parenchyma
Peripheral calix stones or partial as well as total coral-liform stones of the kidney are
advantageously removed through the parenchyma. This procedure spares the organ more and
guarantees less postoperative complications. To preserve the parenchyma optimally,
nephrotomies (multiple, if necessary) are preferred to partial resection of the kidney. For the same
reason nephrotomies should be installed in a radial direction, corresponding to the distribution of
the vessels. The intraparenchymatous run of the vessels is easily ascertainable by ultrasonic
diagnostics. If sure removal of the stone is not possible within 10 min of warm ischemia (just
clamping the kidney vessels), the whole organ should be cooled down on 20 °C at least. Two
equivalent methods concerning this are available: the method of perfusion, and local
hypothermia (the organ is laid in sterile ice). The in situ operation in case of good possibilities of
access during the whole operation is preferred to the temporally limited explantation of the organ
(work bank surgery). Clamping of the respective vessels has to happen most atraumatically with
the respective instruments for surgery of the vessels (Satinski forceps, etc.). If possible, the
vessels should not be exposed and denuded anatomically; a remaining layer of fat diminishes the
risk of intraoperative vascular lesions. According to the extent of the operation and the quantity
of the perioperative loss of blood, splinting of the ureter and perhaps the installation of a
nephrostomy is recommended in the immediate postoperative phase. Tissue adhesives can be
advantageous to close the nephrotomies. In this connection the leading principle must be: the
most reliable hemostasis is achieved by exact adaptation of the kidney parenchyma. A postoperative drainage of the retroperitoneal area is also indispensable in this case.