

Surgery Illustrated

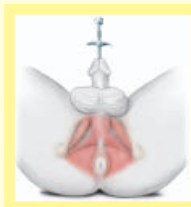
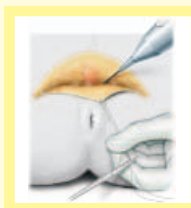
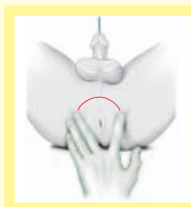
Surgical Atlas

Radical perineal prostatectomy

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



PATIENT SELECTION AND INDICATIONS

Radical perineal prostatectomy is an option for the surgical treatment of patients with clinically organ-confined prostate cancer ($\leq T2$) and a life-expectancy of > 10 years. A staging lymphadenectomy cannot be performed through the same incision, and if indicated must be done laparoscopically or through a small suprapubic incision. In general, patients eligible for retropubic prostatectomy are also candidates for perineal prostatectomy.

Perineal prostatectomy cannot be used if adequate positioning of the patient (in the exaggerated lithotomy position) is impossible. Conditions limiting this positioning are ankylosis of the hip, unstable artificial hip replacement, severe coarthrosis, and a compromised respiratory function requiring high ventilatory pressures. A relative contraindication for the procedure is a large prostate (> 100 g), which should be reserved for experienced surgeons.

Difficult cases or limitations for retropubic prostatectomy such as extreme obesity, previous retropubic surgery (i.e. laparoscopic herniotomy with mesh implantation, renal transplantation), pelvic vascular surgery and

the elderly patient favour perineal access for these patients.

SPECIFIC INSTRUMENTS AND SUTURE MATERIAL

- Curved and straight Lowsley retractors
- Notched Young bulb retractor
- Bipolar electrocautery
- Long right-angle clamps with short branches
- Babcock clamp
- Duval clamp
- Curved scissors (Satinsky)
- Bookwalter self-retaining retractor system (optional)
- Harmonic scalpel (optional)
- Magnifying lenses ($\times 2.5$ – 3.5) and headlight.

Suture material: 4/0 glycolide (Monosyn), double-armed 5/8 needles

PREPARATION OF THE PATIENT BEFORE SURGERY

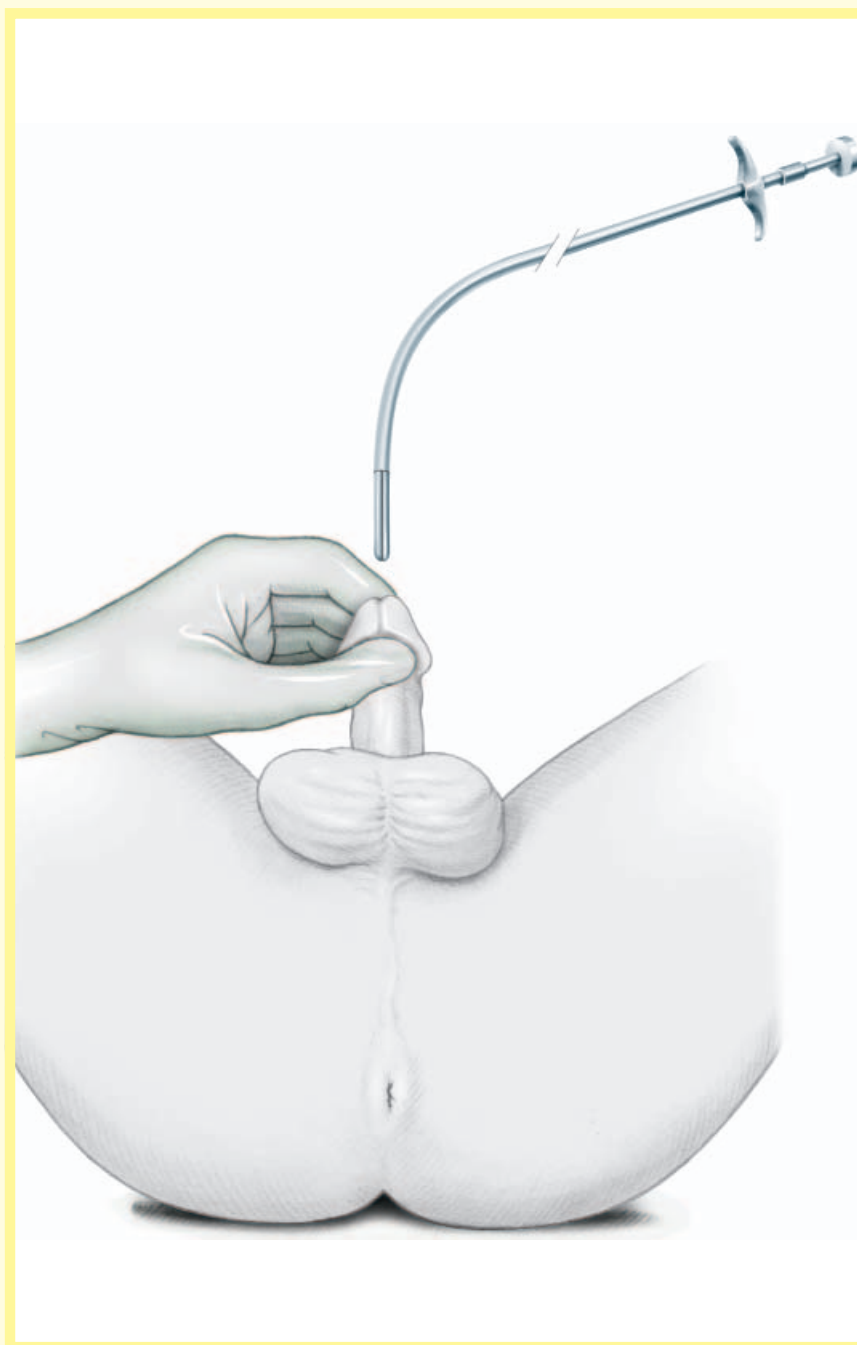
- Osmotic bowel cleansing the night before, combined with an enema on the day of surgery.
- 'Type and screen' blood group.
- Tight and high antithrombotic stockings.

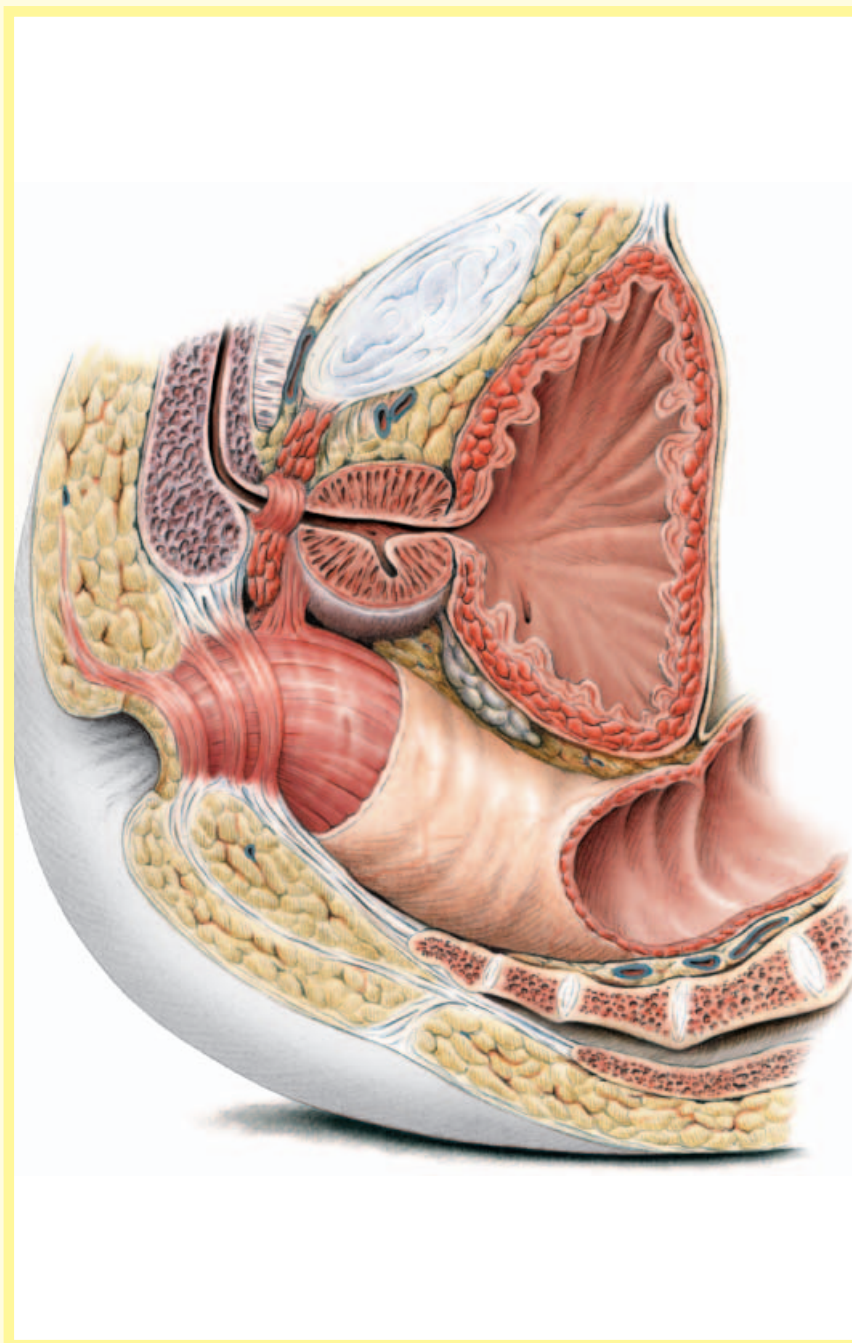
**Figure 1**

The patient is placed in the exaggerated dorsal lithotomy position, which brings the perineum into a 45° plane from horizontal, with the buttocks just off the table edge. The legs are supported by cushioned restraints at the ankles, with the calves hanging free to avoid developing compartment syndrome. Patient draping includes a rectal shield to allow for digital rectal guidance during the procedure and checking for a rectal lesion.

Figure 2

Transurethral insertion of the curved Lowsley retractor into the bladder and opening of the blades. This retractor increases manoeuvrability of the prostate in the operative field.

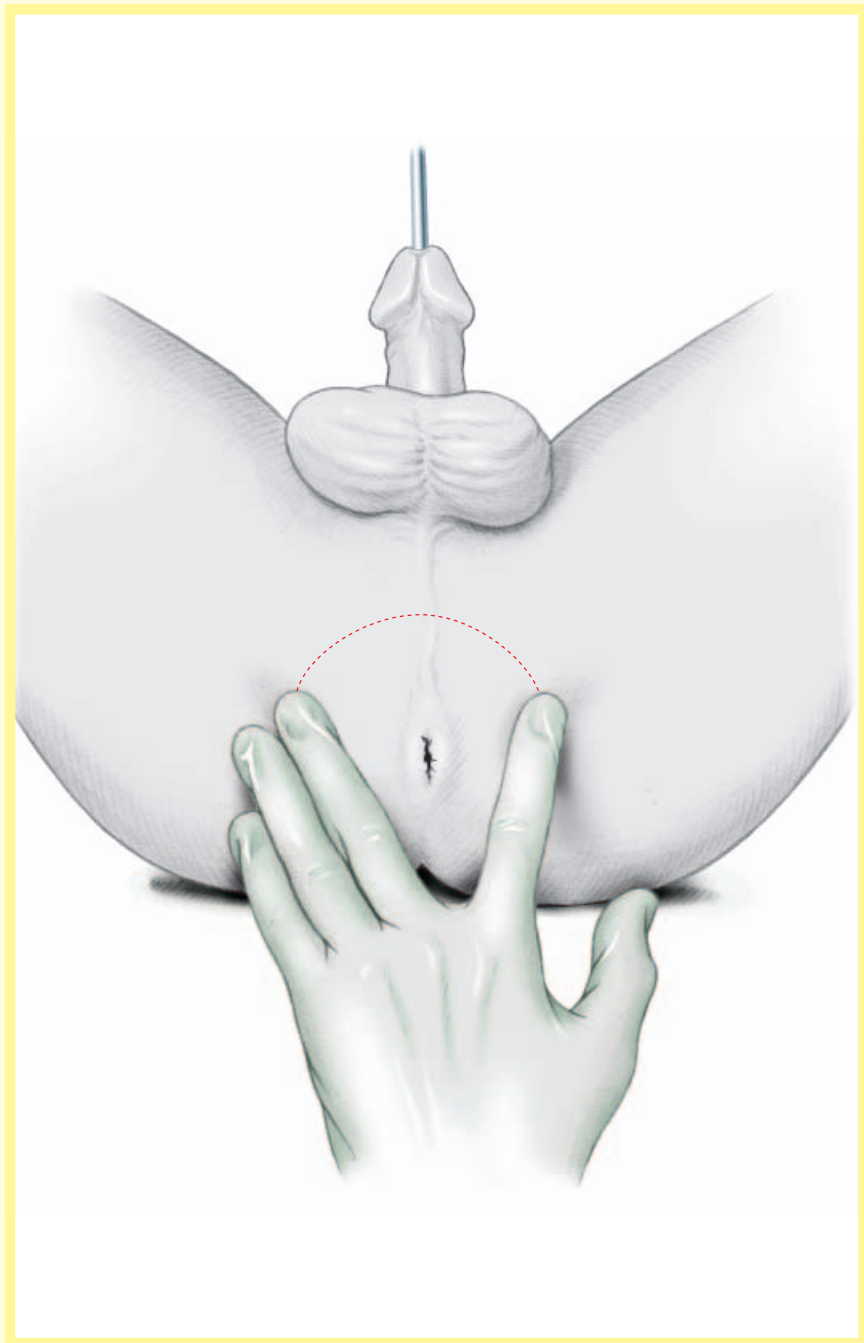


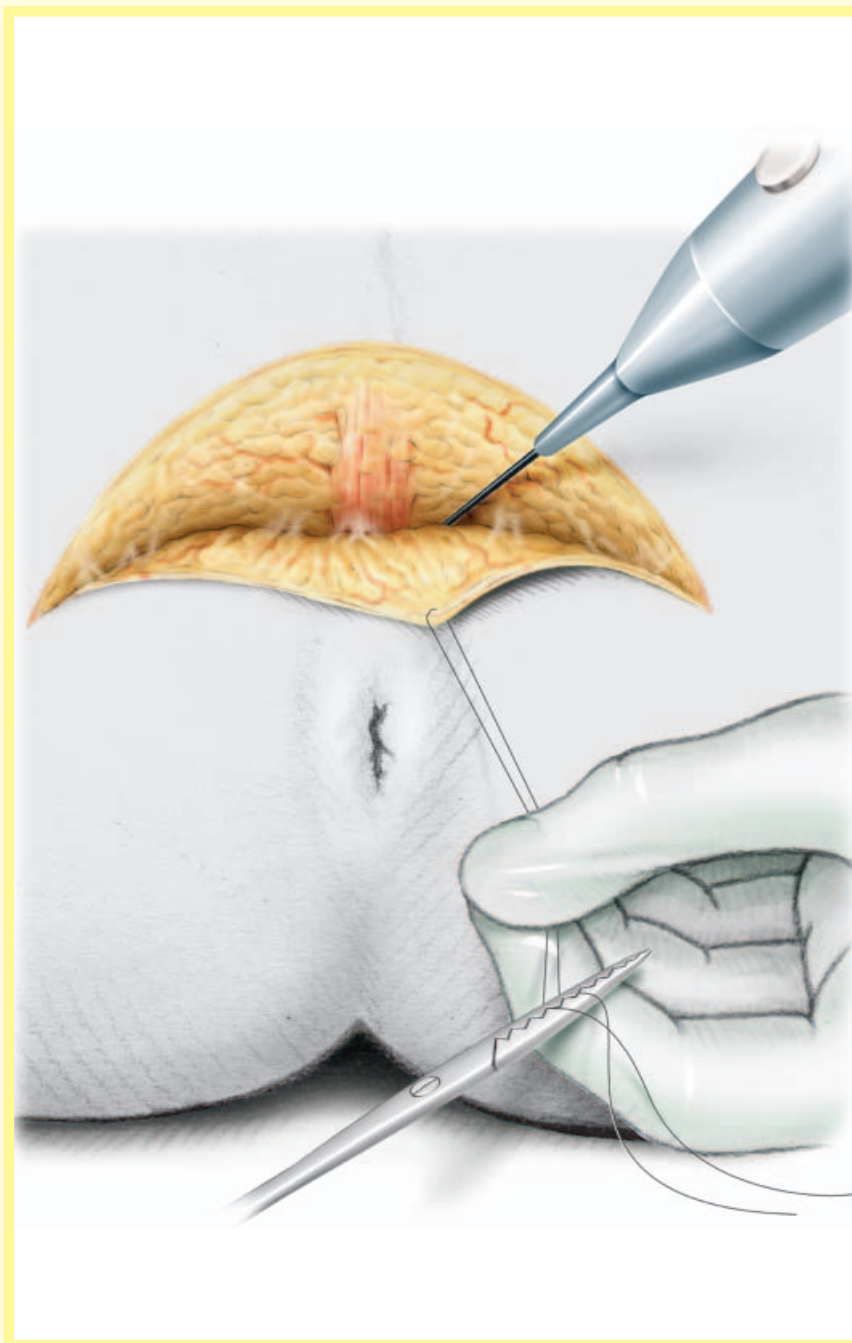
**Figure 3**

We prefer Young's 'suprasphincteric' route (arrow), which follows a plane through the central tendon below the bulbocavernosus muscle of the urethra and above the sphincter ani externus muscle. Another widely used route elevates the sphincter ani externus muscle ('subsphincteric'), and uses the anterior rectal surface as a landmark to reach the prostate ('highway to the prostate' of Paulson).

Figure 4

Semicircular incision above the anus, medial from one ischial tuberosity to the other. Section of the subcutaneous fatty tissue with electrocautery.



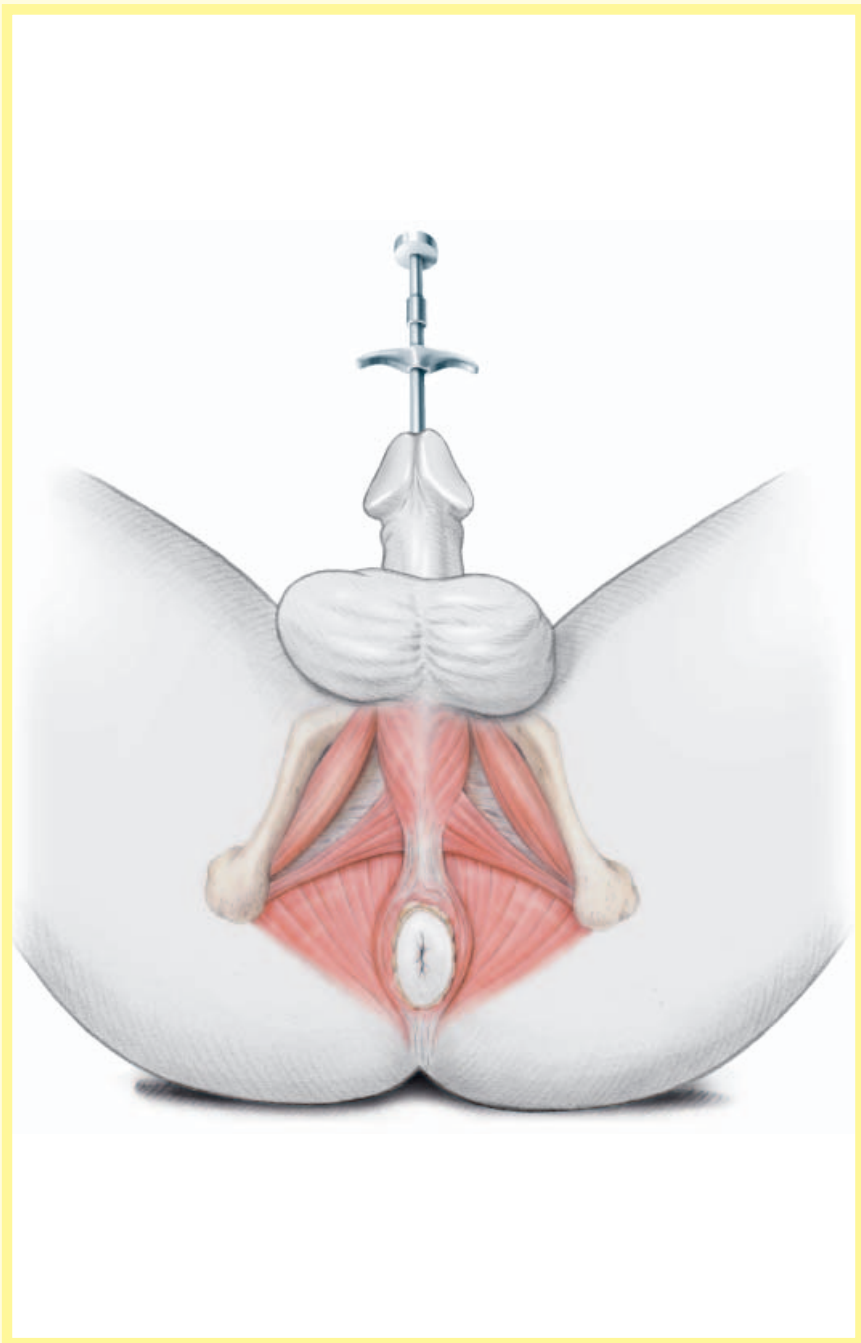
**Figure 5**

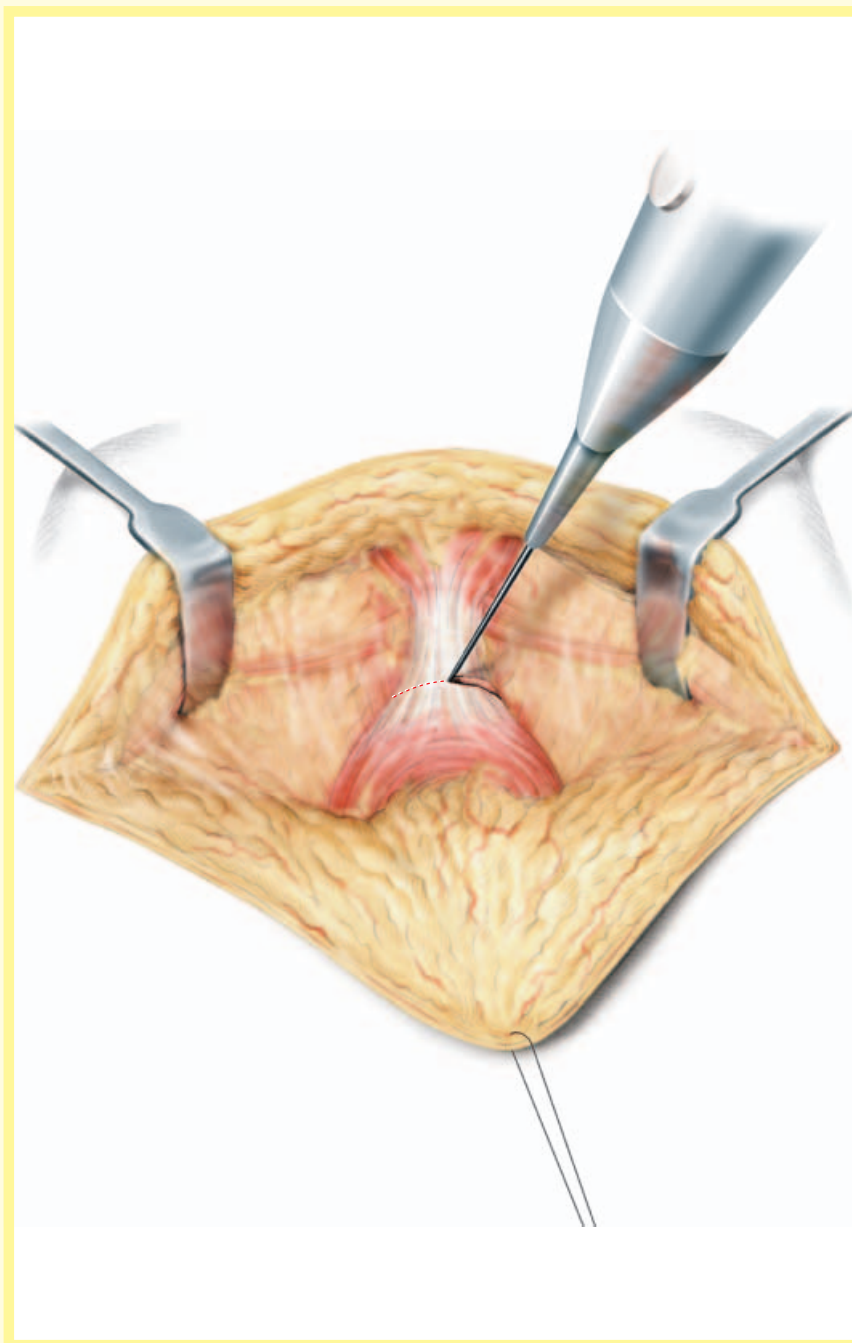
Placement of a traction suture on the skin flap at the level of the perineal raphe. Traction on this suture will exert tension on the tissues, and specifically the central tendon, and accentuate its course, making identification easier.

Further sectioning of the subcutaneous fatty tissue. In the midline muscular fibres of the subcutaneous portion of the external anal sphincter may be encountered and should be transected with electrocautery.

Figure 6

Schematic view of the relevant muscular structures in perineal prostatectomy. The central tendon connects the bulbospongiosus muscle with the middle and deep portions of the external anal sphincter.



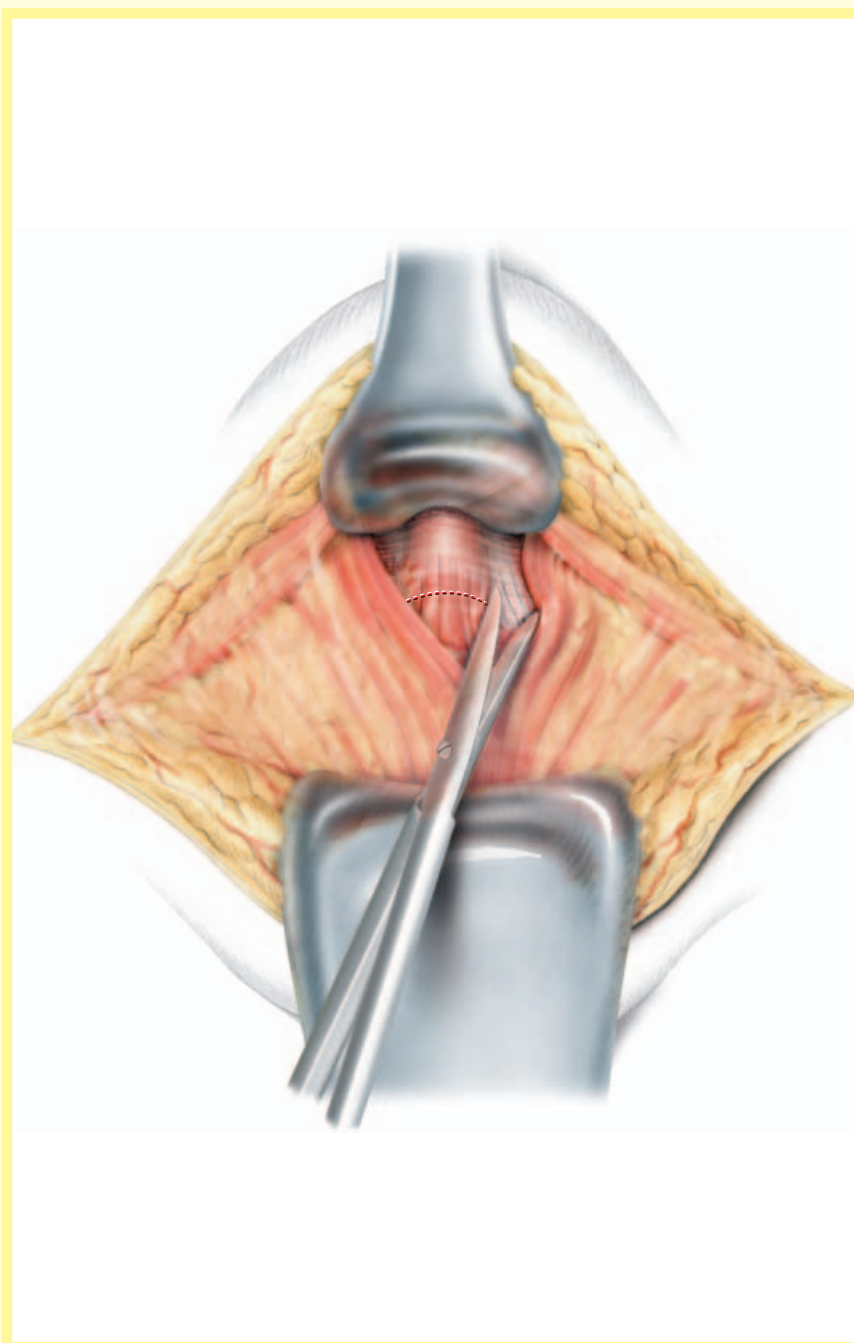
**Figure 7**

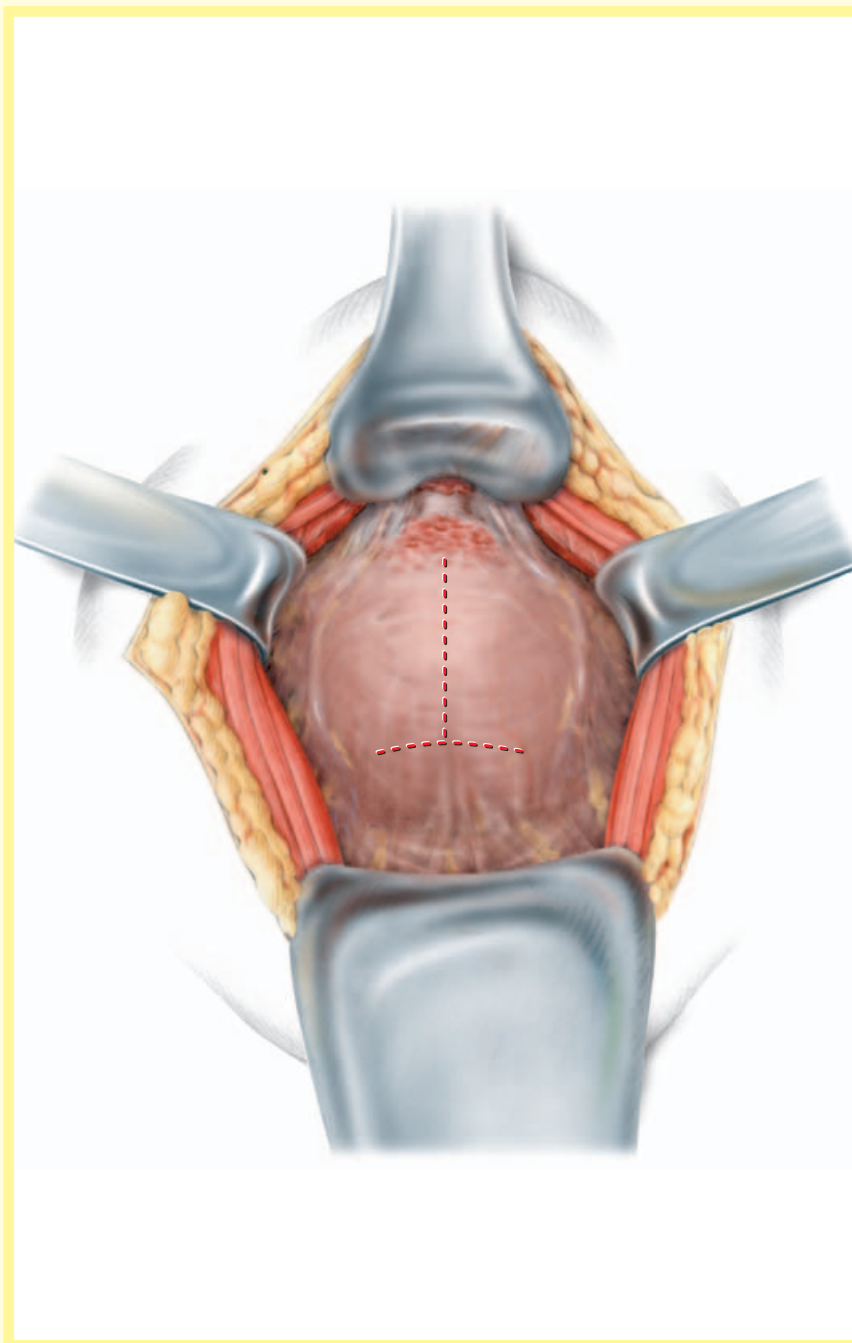
Transect the central tendon. Sometimes the bulbospongiosus muscle and the external anal sphincter will be clearly separated by this tendinous structure. Deaver retractors sweep the superficial transverse perineal muscles from the operative field, but this is usually not required. Note that continuous traction is exerted on the skin flap to better define the anatomical structures.

Figure 8

Placing the Young retractor on the bulbospongiosus muscle is important to delineate the fibres of the rectum. Caudal traction can be accomplished by pulling on the skin flap suture or with a speculum. Dissect the levator ani muscles laterally off the apex of the prostate by advancing and opening the branches of Metzenbaum scissors immediately lateral on either side of the prostatic apex. The rectourethralis is the last attachment of the rectum to the prostatourethral junction. Once the ischiorectal fossa is open, the attachment of the rectum to the rectourethralis muscle will be apparent. The rectum is fixed to the distal end of Denonvilliers' fascia by the rectourethralis muscle, so that (in this position) it assumes the configuration of a tent, and may be easily injured if dissection is continued caudally. The combination of sharp and blunt dissection and digital guidance through the rectal shield allow the correct plane of dissection to be defined, and the rectourethralis muscle is incised (dotted line) in little increments as dissection progresses. Once the rectourethralis muscle has been divided, the rectum can be swept off the prostate and the prostatic dorsal surface with Denonvilliers' fascia covering it as a whitish membrane will be visualized.

(As an alternative, the ischiorectal fossa on both sides of the prostate may be developed by incising the superficial perineal fascia and inserting the index and the middle fingers of the left hand, respectively, medial to each ischial tuberosity and parallel to the prostate. Caudal traction on both sides will delineate the plane of attachment of the rectum by the rectourethralis muscle to the prostatic apex and facilitate dissection.)



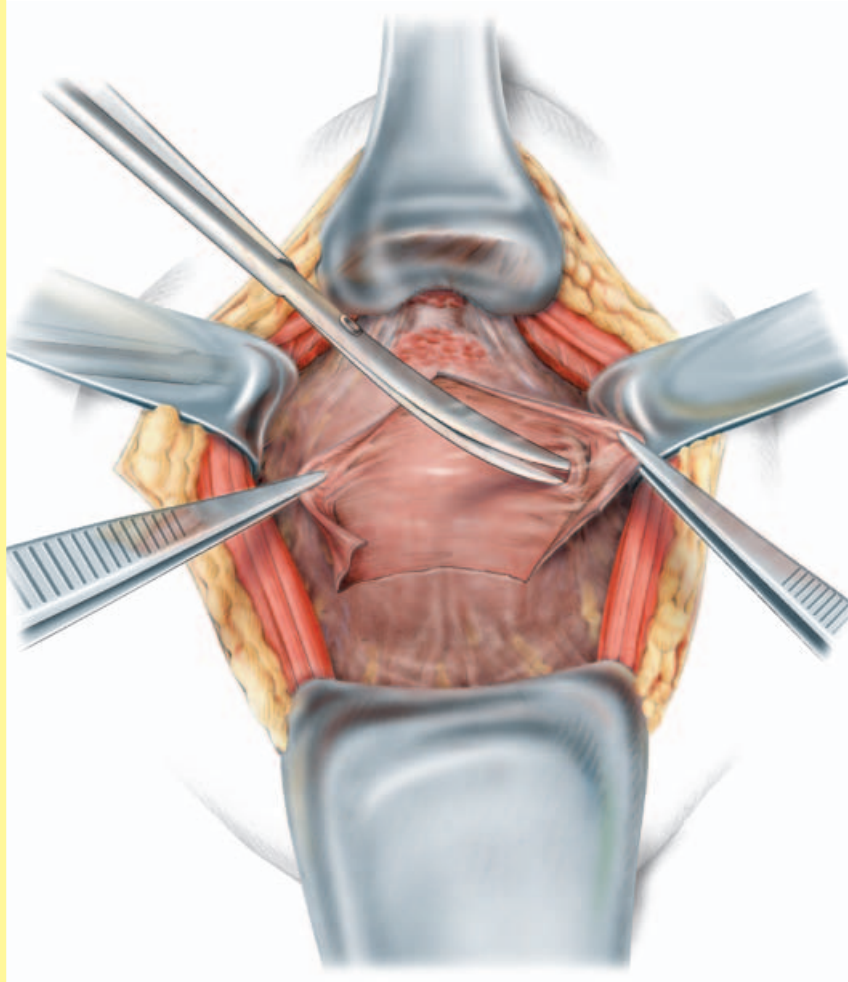
**Figure 9**

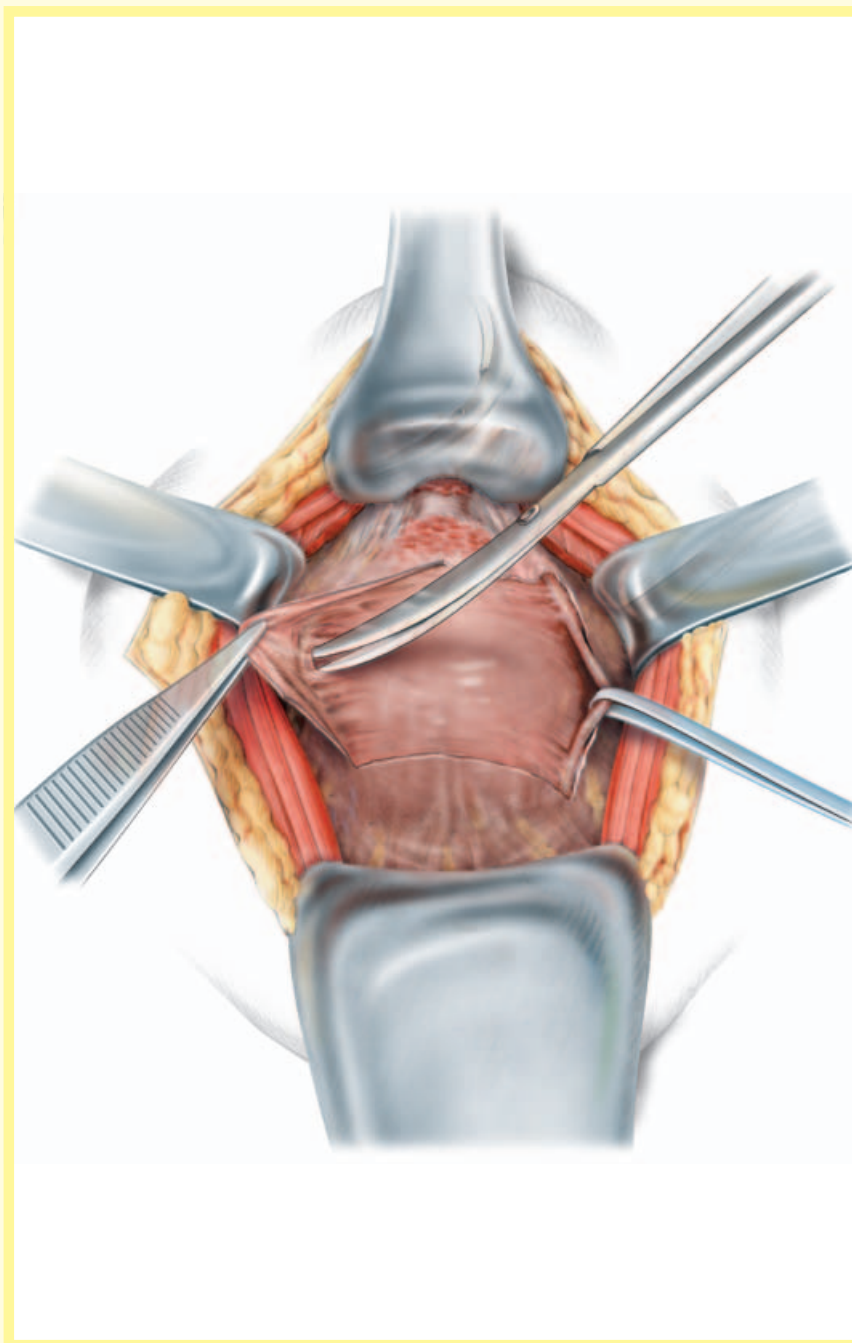
The rectourethralis muscle has been divided. The levator ani muscles on both sides are held laterally with retractors. The surgeon views the prostatic dorsal face with Denonvillier's fascia. The self retaining retractor may be installed at this time.

If *nerve-sparing prostatectomy* is attempted, Denonvilliers' fascia is incised in the midline with a knife, along the dotted line. At the level of the base of the prostate, Denonvilliers' fascia is then incised perpendicular, but taking care not to advance the incision too laterally towards the posterolateral course of the neurovascular bundles.

Figure 10

In *nerve-sparing prostatectomy*, the posterior layer of Denonvilliers' fascia can be dissected laterally off the prostate to include the neurovascular bundles. Small vessels tethering the neurovascular bundles to the prostatic gland can be controlled with the use of small clips.

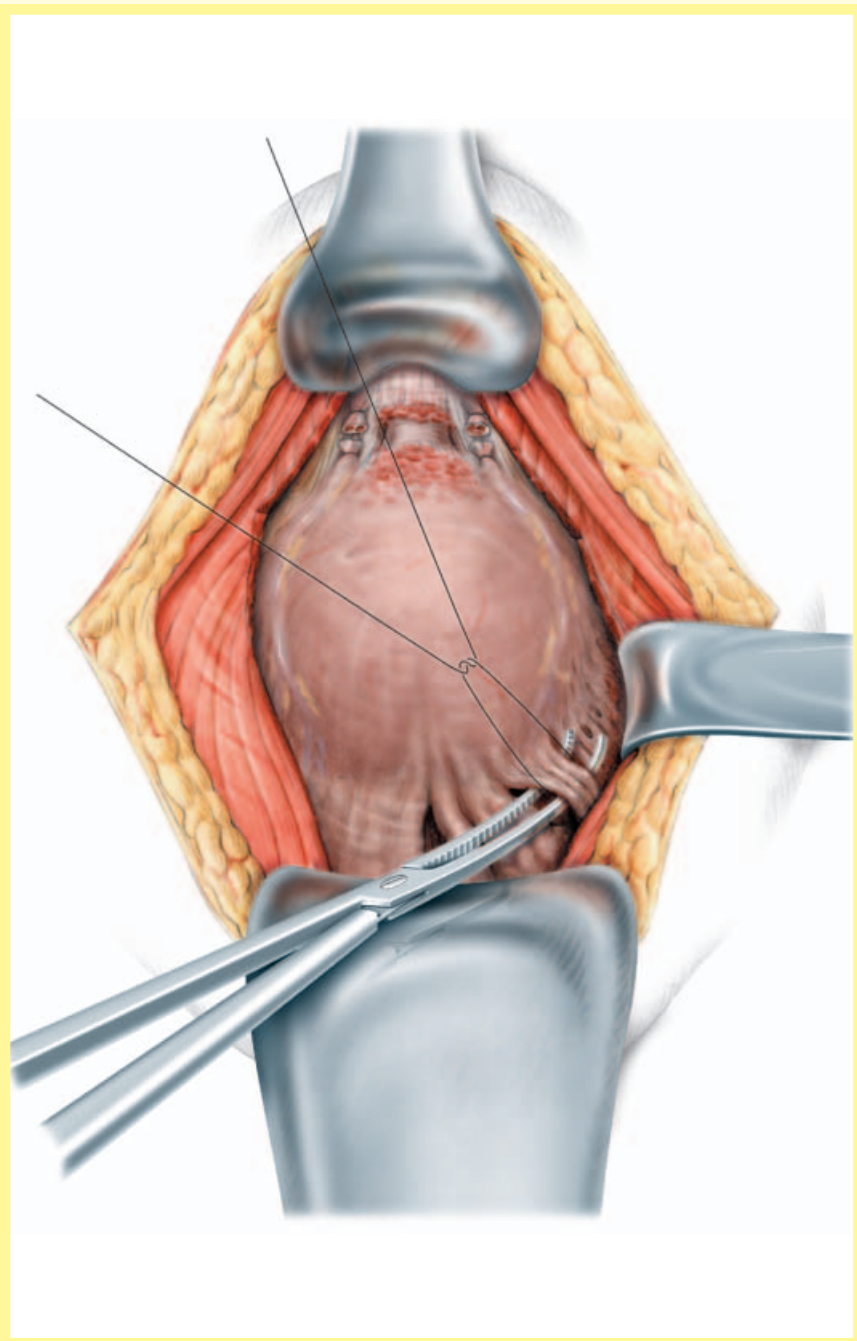


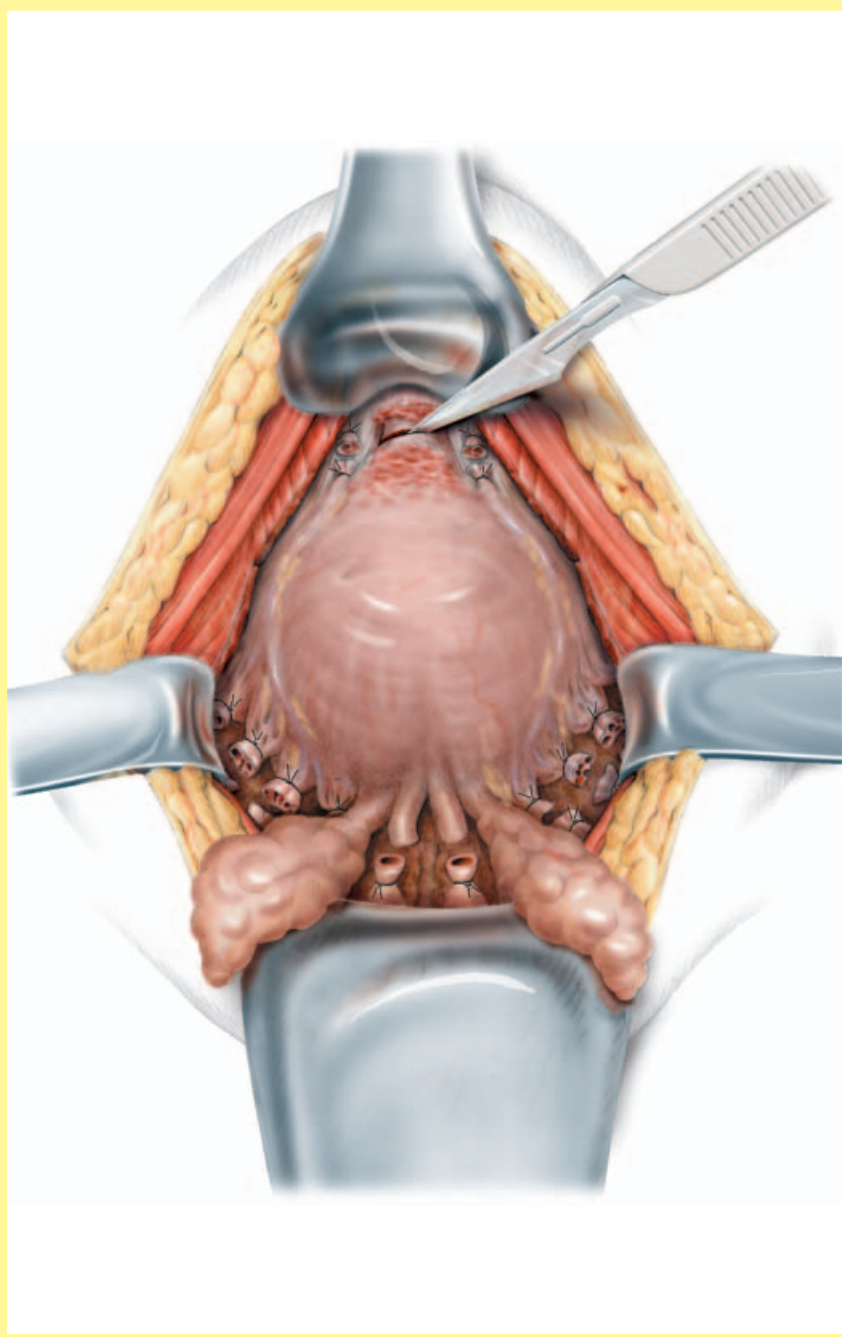
**Figure 11**

Dissection of the neurovascular bundles is continued cranially towards the apex and caudally to the seminal vesicles. Minimal manipulation of the neurovascular bundles will prevent stretching injury, grasping the fascial margin only. A vessel loop on the left side has been placed for better depiction of the illustration. Any form of traction on these delicate structures should be avoided. The neurovascular bundles must be completely dissected from the prostatic surface. Dissection is carried past the prostatic apex and a few millimetres past the prostatourethral junction, separating the neurovascular bundle from the urethral margin to avoid damage while placing the anastomotic sutures. Proximally, the neurovascular bundle has to be dissected off the tips of the seminal vesicles. Denonvillier's fascia covering the seminal vesicle tips should be stripped off from the seminal vesicles and left as a protecting shield on the neurovascular bundles.

Figure 12

The neurovascular bundles have been ligated and divided on both sides at the apex. Denonvilliers' posterior layer is covering the neurovascular bundles when nerve-sparing surgery is not indicated. The assistant exerts traction on the curved Lowsley retractor to elevate the prostate and define the neurovascular bundles at the level of the seminal vesicles. Using right-angle clamps these structures can be controlled. After sectioning the neurovascular bundles, the vas deferens and the seminal vesicles are identified and dissected free with blunt and sharp dissection on either side (not shown). The vas deferens is divided and ligated. Traction on the divided distal vas deferens in the contralateral direction will aid in identifying the corresponding seminal vesicle, which should be dissected carefully to avoid tearing. Atraumatic traction to the seminal vesicle may be applied by using a Babcock clamp. Once the seminal vesicle body has been readily dissected, the seminal vesicle artery can be controlled at its tip under vision. Caution should be taken in *nerve-sparing prostatectomy* to avoid damaging the nerve plexus by dissecting lateral to the tips of the seminal vesicles. Once the vas and seminal vesicle have been dissected free on either side, by pulling them in a contralateral and cranial direction, the prostatic pedicles will become evident and can be transected between right-angle clamps. Thereafter, by pulling both seminal vesicles and vas stumps cranially, retroprostatic dissection of the bladder neck can be carried on with curved scissors or using the harmonic scalpel (not shown). Dissection will begin in the midline and follow laterally on both sides to control remnant perivesical tissue with right-angle clamps or with the harmonic scalpel. Once dissection of the vesical neck has been completed, the seminal vesicles can be pushed back and dissection of the apex and urethra may begin.

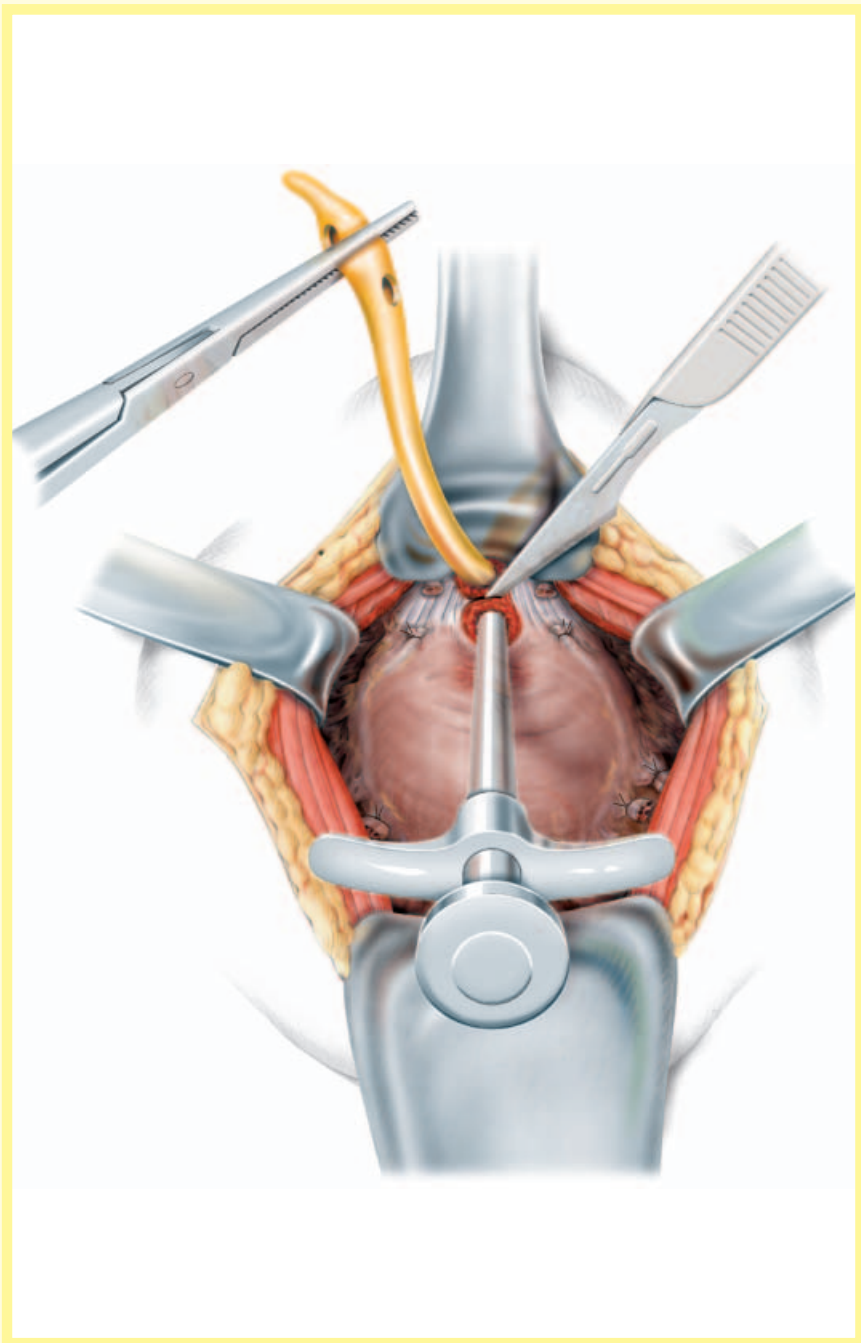


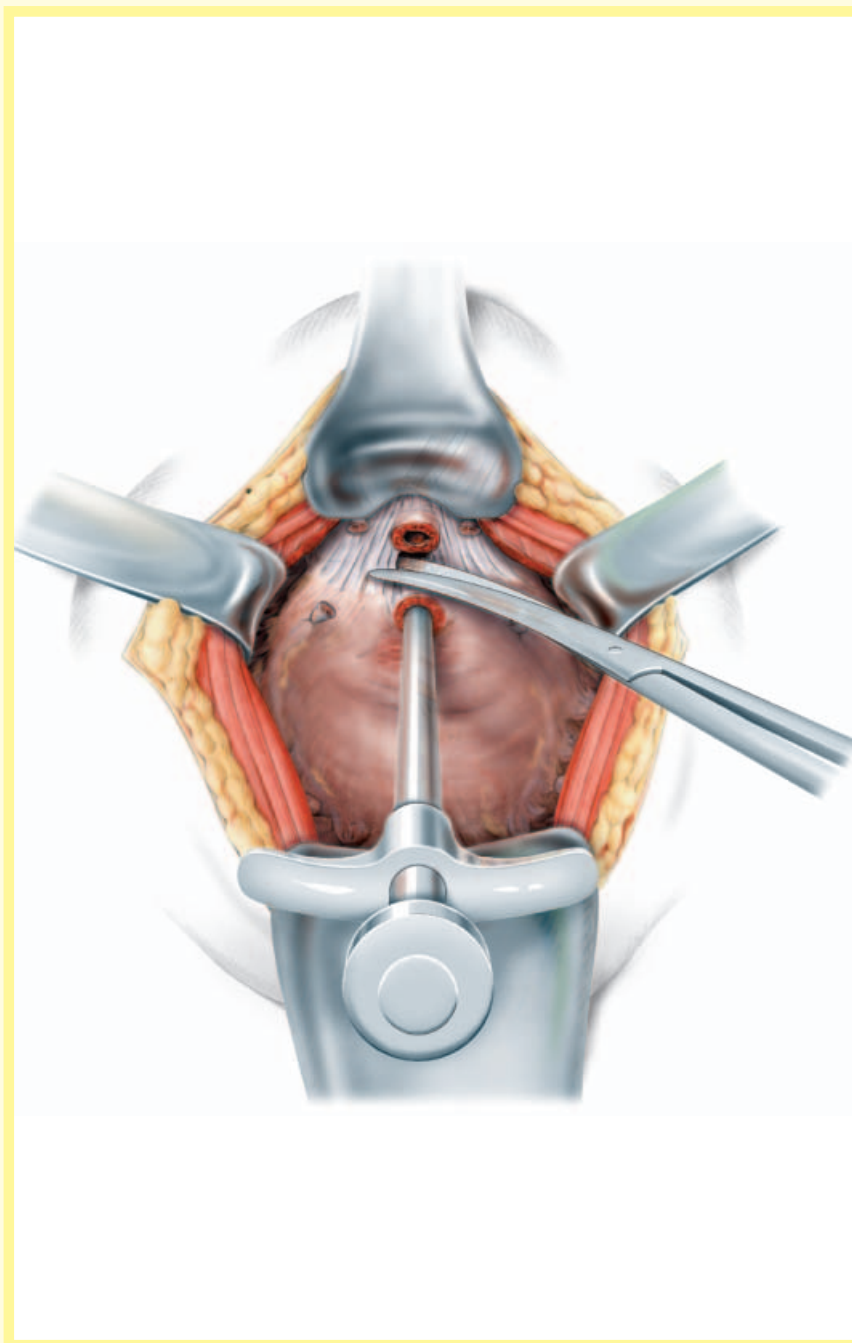
**Figure 13**

The seminal vesicles have been freed, and the vas deferens and the prostatic pedicles sectioned. The dorsal circumference of the urethra is mobilized by blunt dissection off the prostatic apex with a 'peanut' dissector and incised with a knife adapting to the apical shape of the prostate. To visualize a long urethral stump, the surgeon can push the prostatic apex with a strong forceps or a peanut clamp.

Figure 14

After sectioning the dorsal circumference of the urethra, the curved Lowsley retractor is replaced by a straight Lowsley retractor, which is used to push the prostate downwards. An endotracheal suction catheter is placed transurethrally, exteriorized through the incision and pulled upwards to improve visualization of the prostatourethral junction. Under tension the ventral circumference of the urethra can be sectioned with a knife or curved Satinsky scissors.

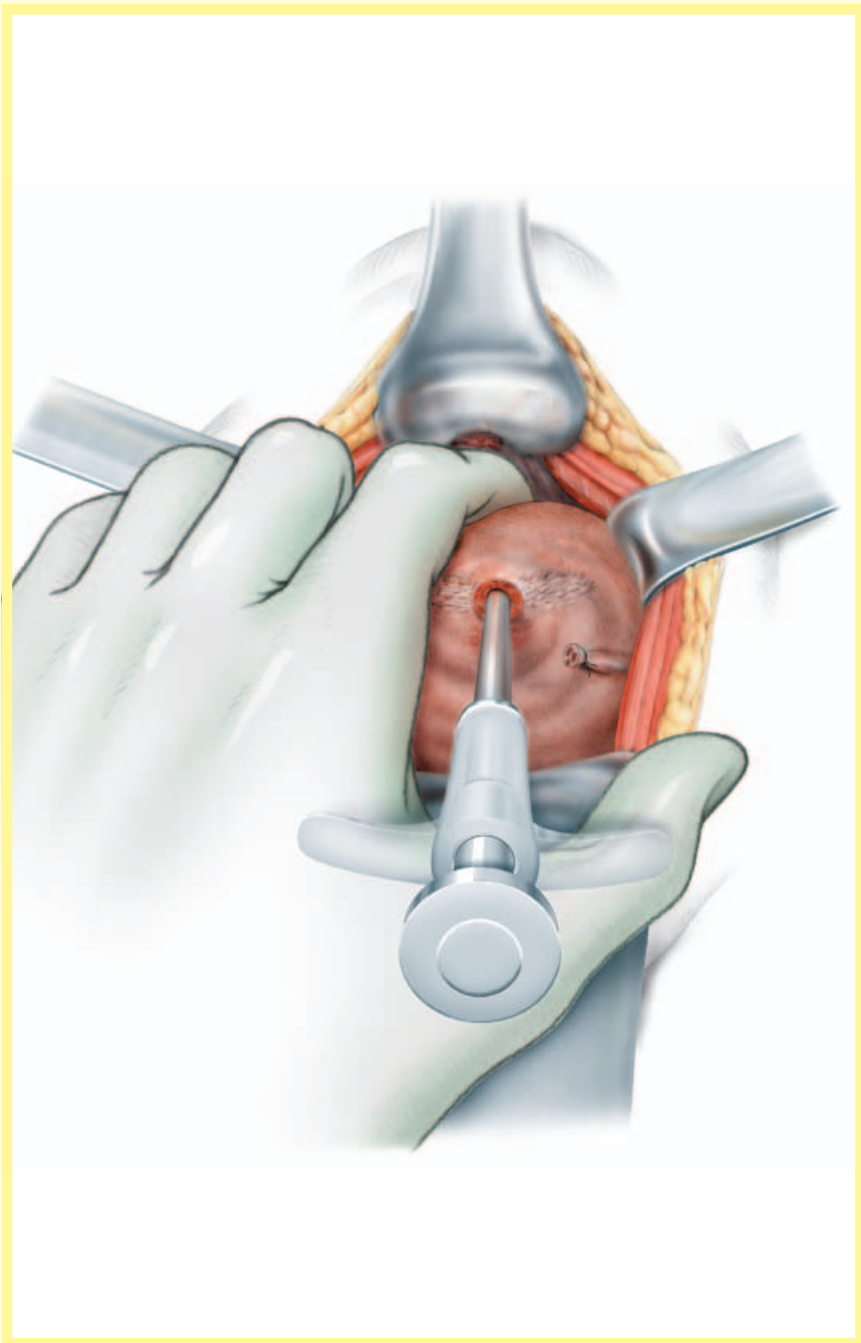


**Figure 15**

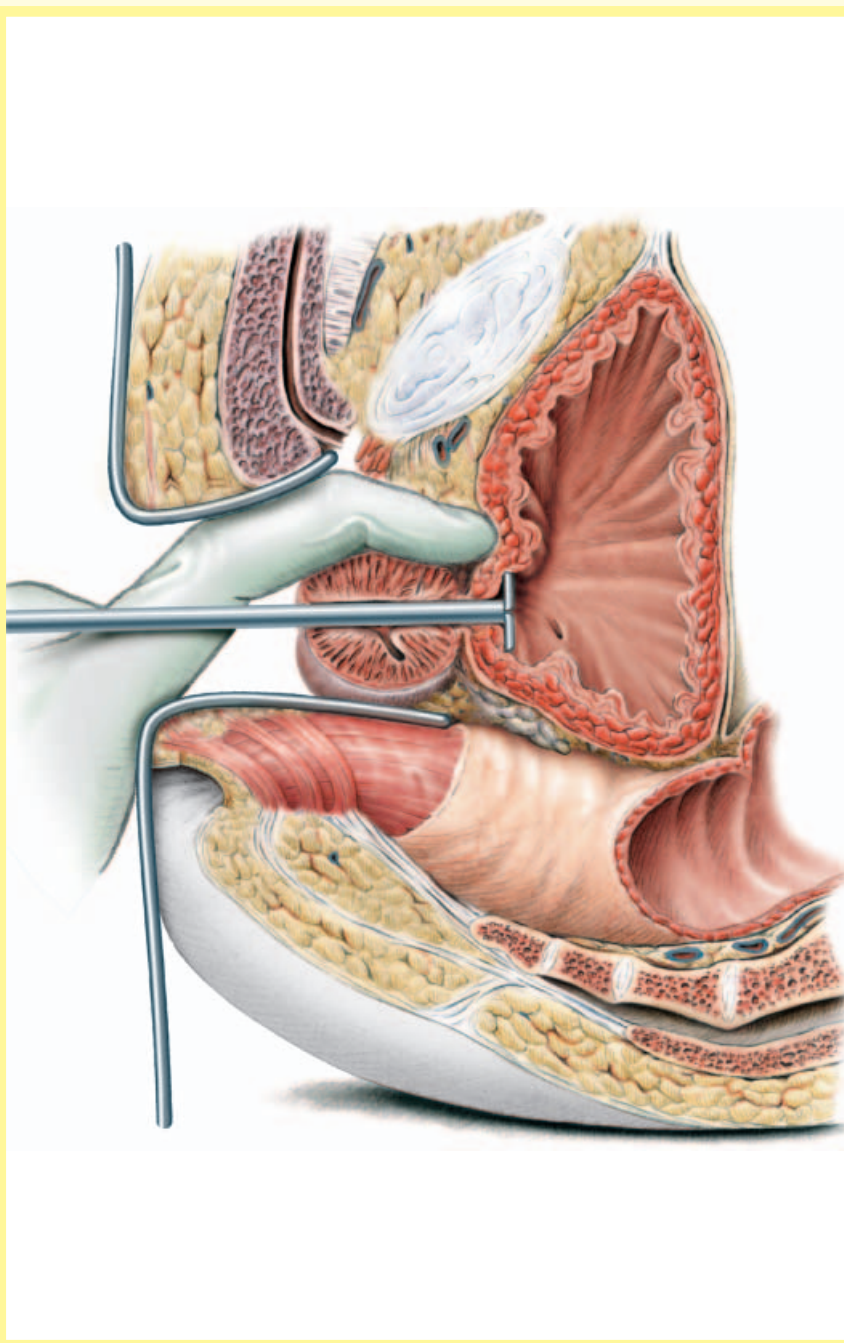
Once the urethra has been transected, the puboprosthetic ligaments are identified by blunt dissection of the midline with the finger or a peanut dissector, sweeping off the dorsal vein complex ventrally and working against the bladder neck dorsally, and divided. Identification of the bladder neck is helped by a 90° turn of the straight Lowsley retractor so that one of its blades can be palpated in the 12 o'clock position of the bladder neck.

Figures 16 and 17

The anterior prostatovesical junction can be identified by palpating the branch of the straight Lowsley retractor in the bladder. The prostate is dissected off the anterior bladder neck with curved scissors or the harmonic scalpel.

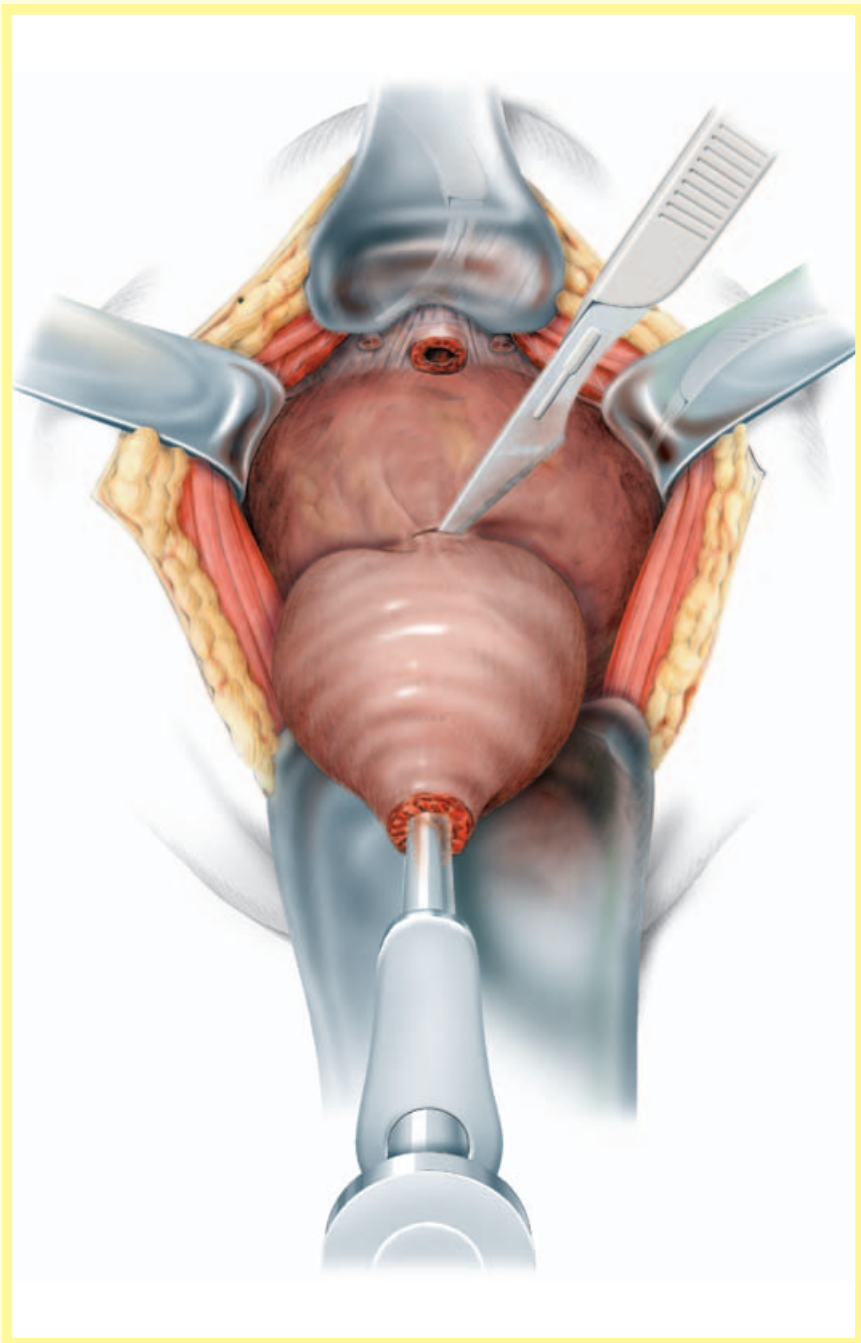


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Figures 18 and 19

Once the prostatovesical junction has been dissected free the bladder neck is incised. The straight Lowsley retractor is removed and an endotracheal suction catheter passed through the prostatic urethra for traction.



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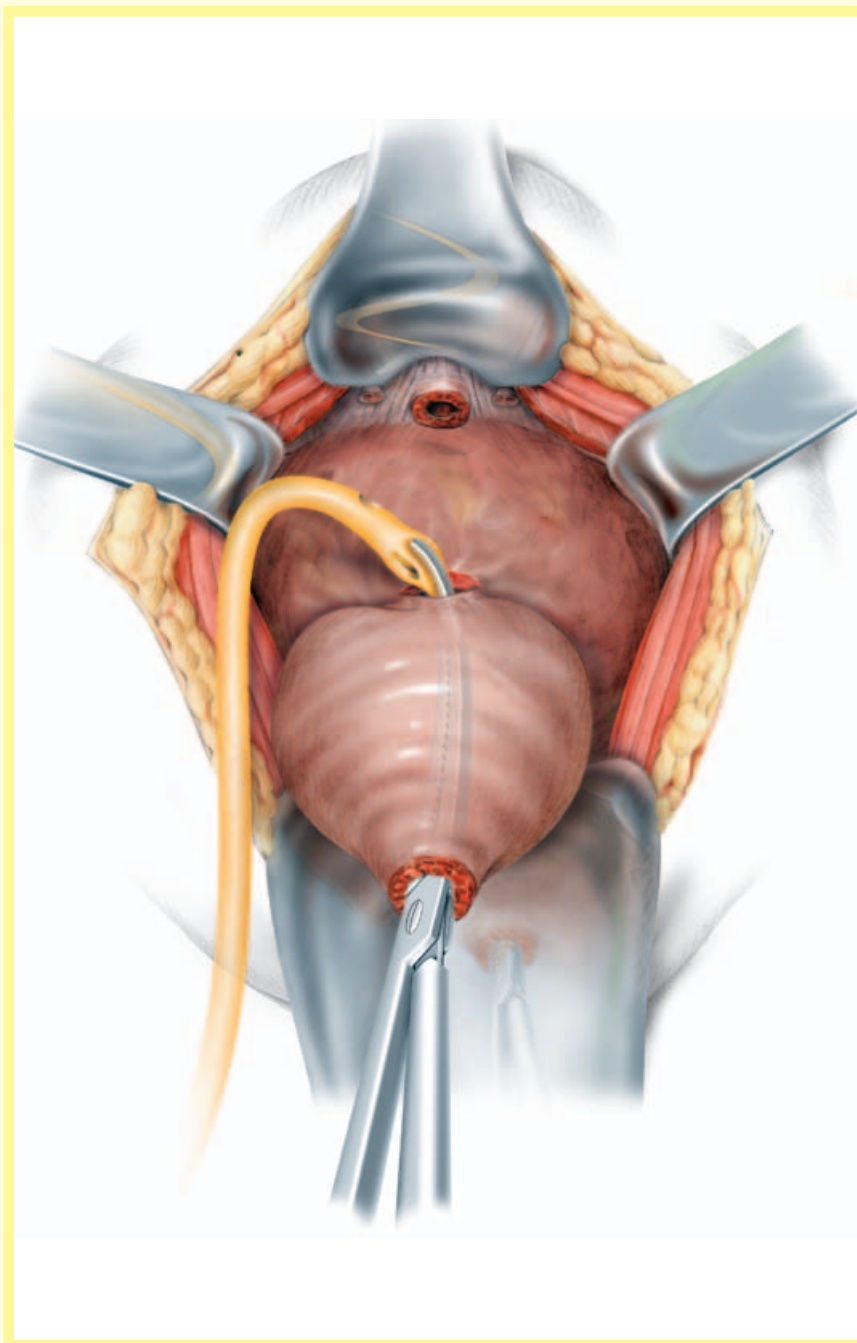
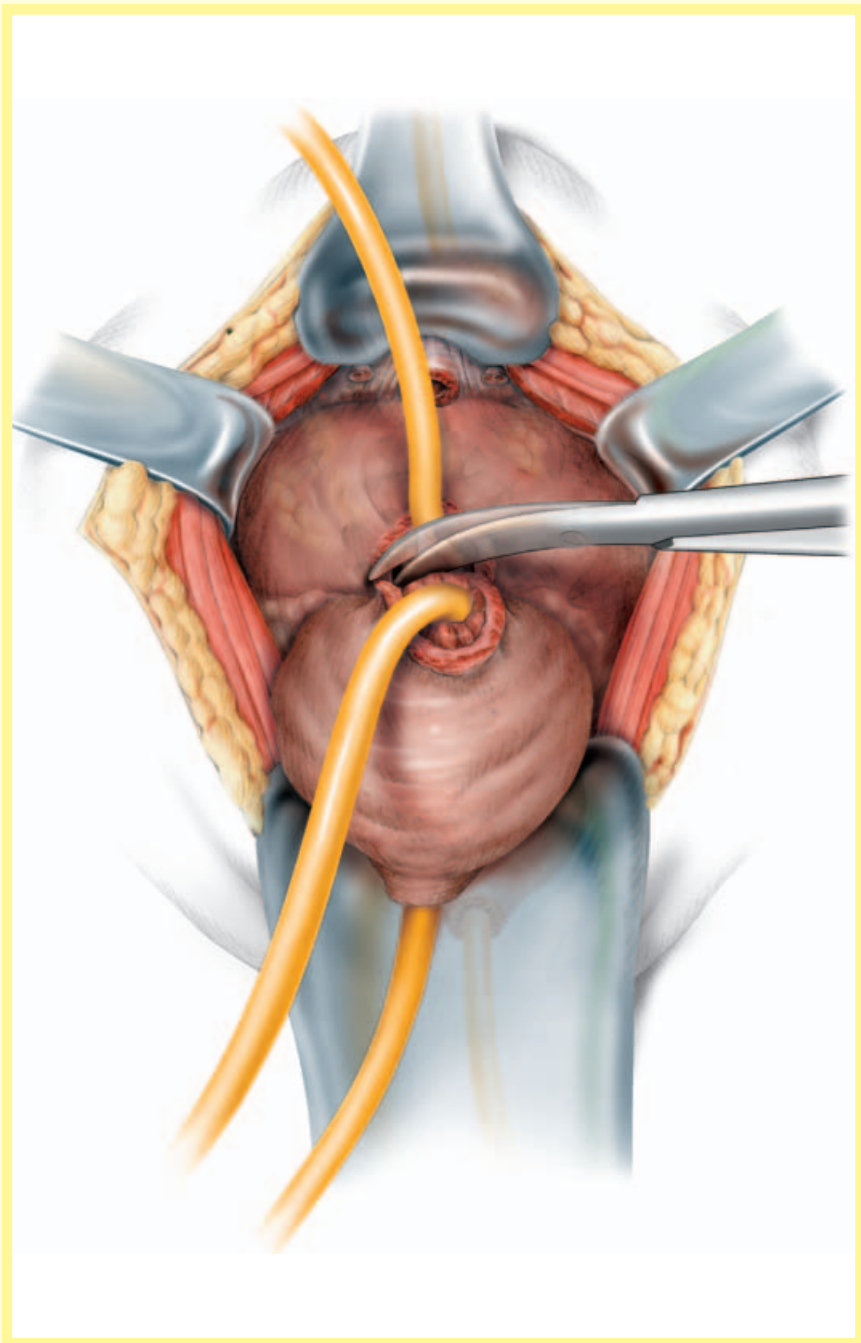
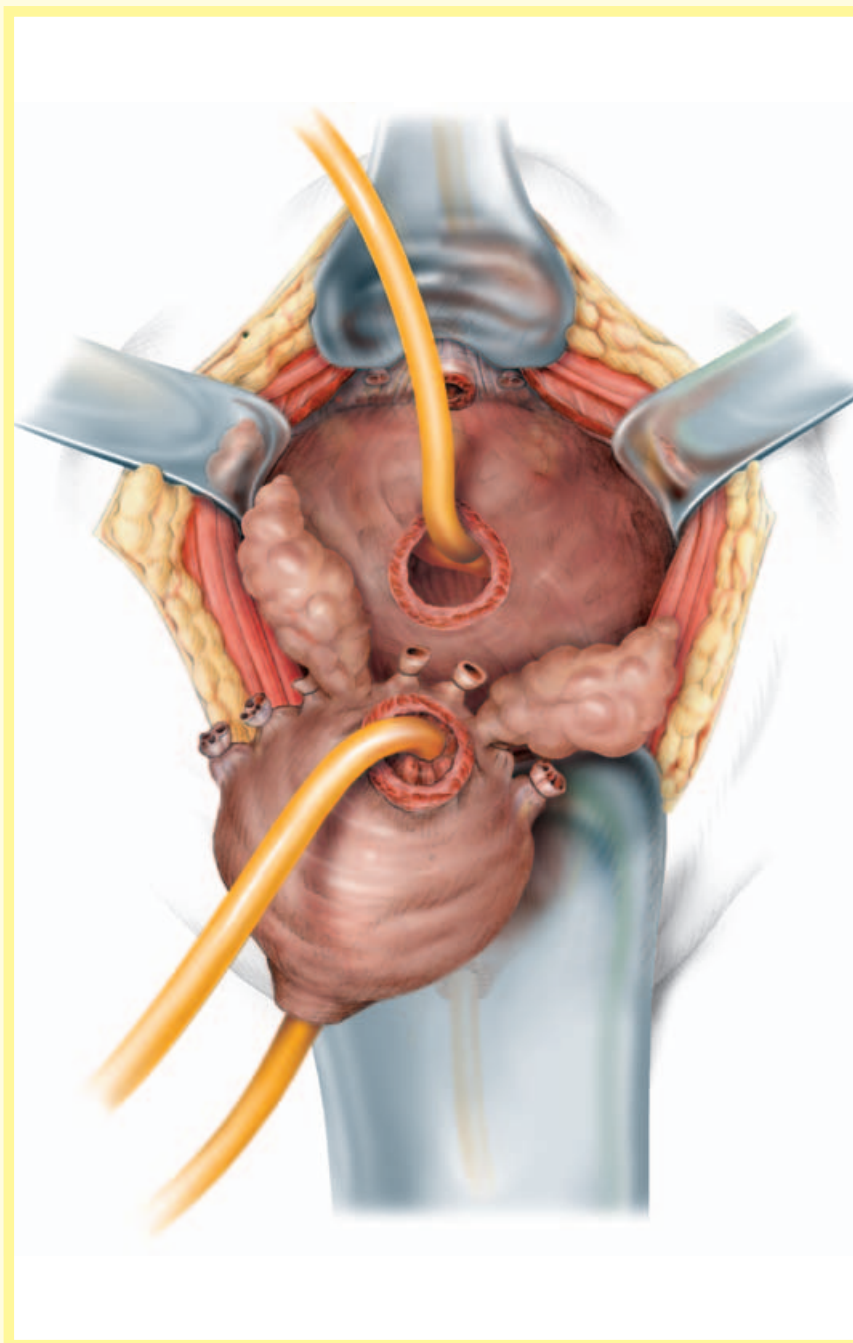


Figure 20

A bladder catheter is inserted through the bladder neck incision into the bladder and blocked with 20–30 mL and the remaining bladder neck circumference incised. At this point, bladder neck frozen-section biopsies can be excised.

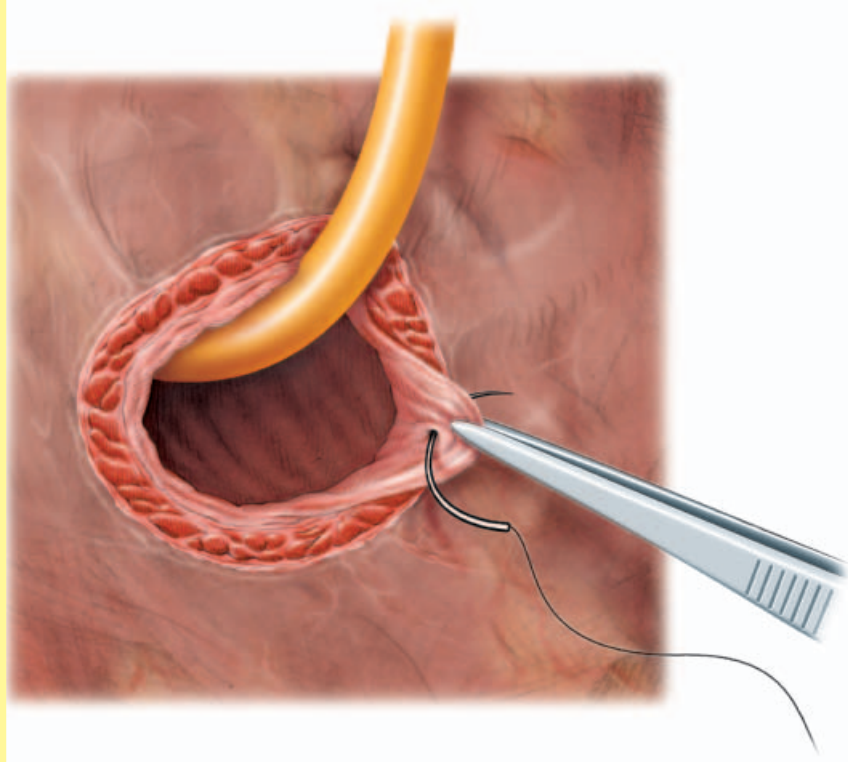


**Figure 21**

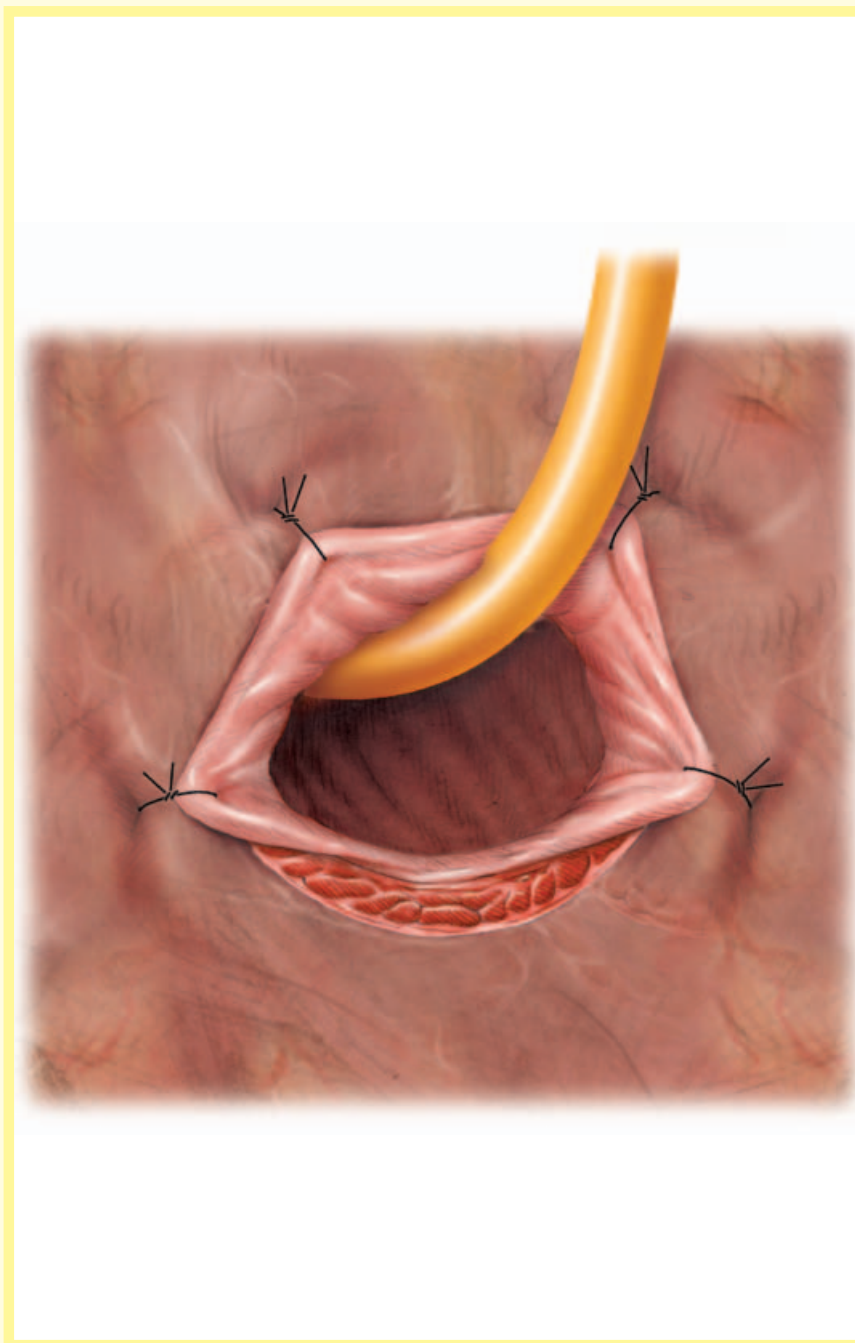
Before cutting the dorsal circumference of the bladder neck, the ureteric orifices can be identified and may even be intubated by stents, if a large prostate or a middle lobe have developed intravesically. After sectioning the remaining attachments of the prostate to the bladder, the specimen is removed.

Figures 22–24

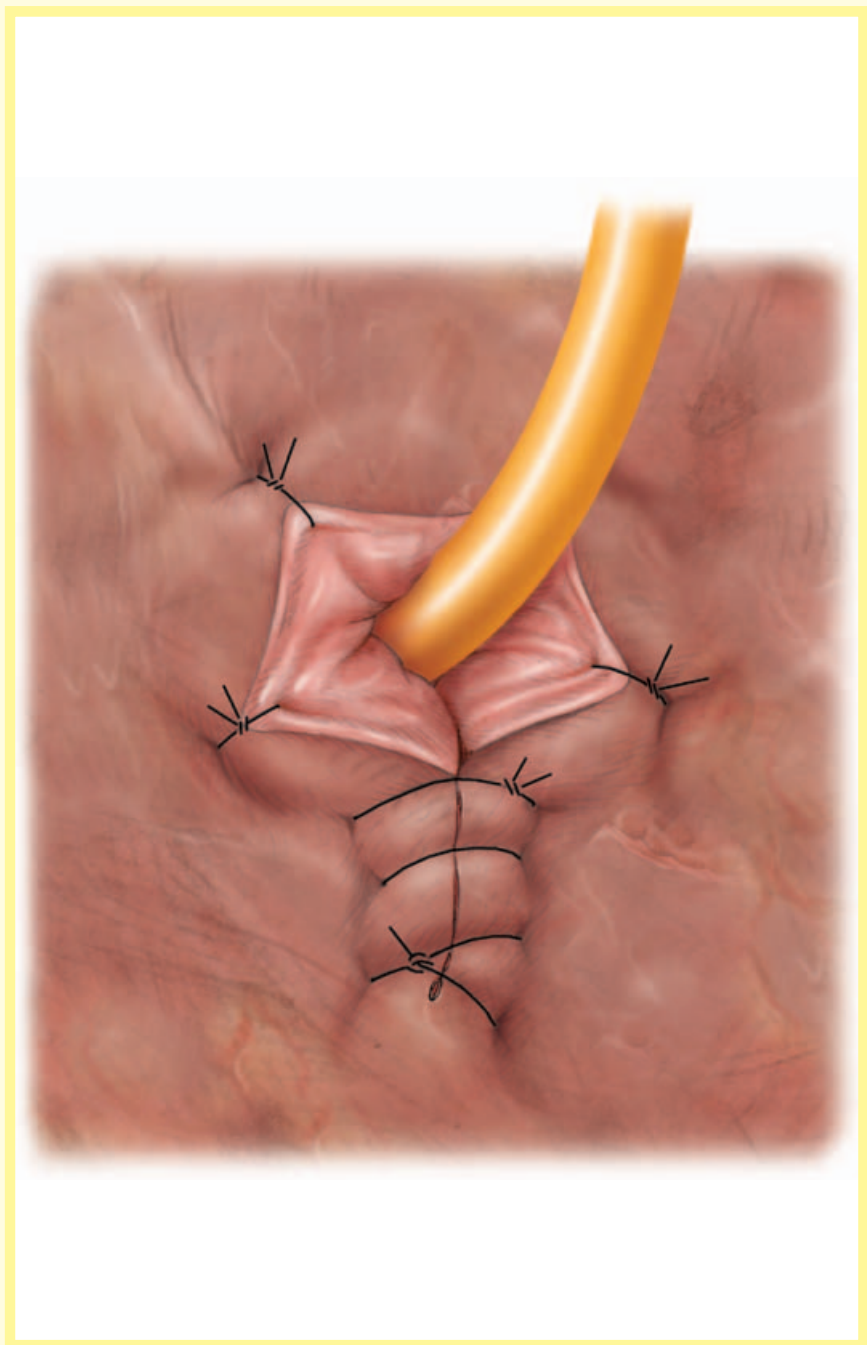
The bladder neck mucosa may be fully everted to ensure exact mucosal apposition with the urethra (4/0 monofilament tie), but often this is unnecessary because of the excellent visualization of the bladder neck during anastomosis with the urethra. The bladder neck is reconstructed in a 'tennis racket' fashion to tailor an opening of 22–24 F.

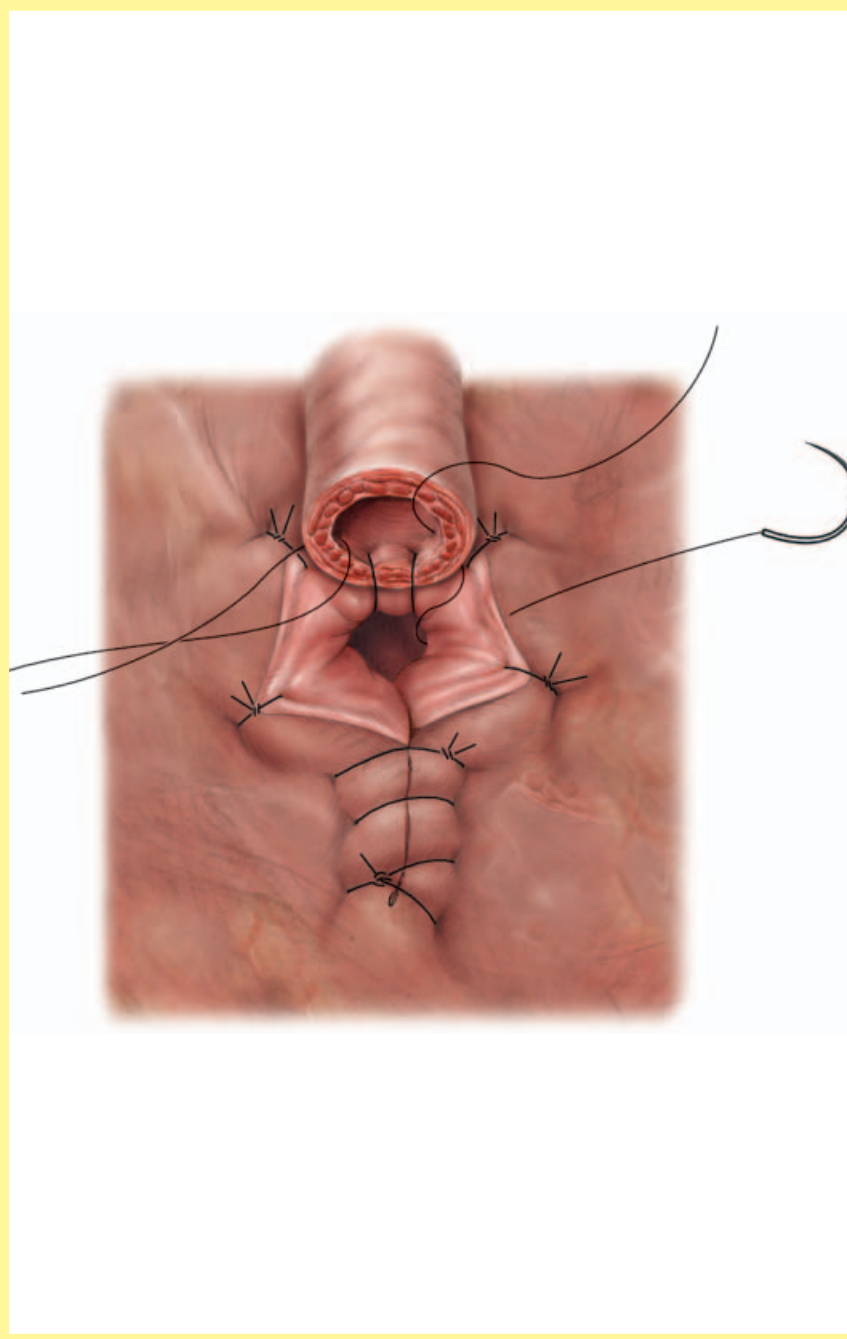


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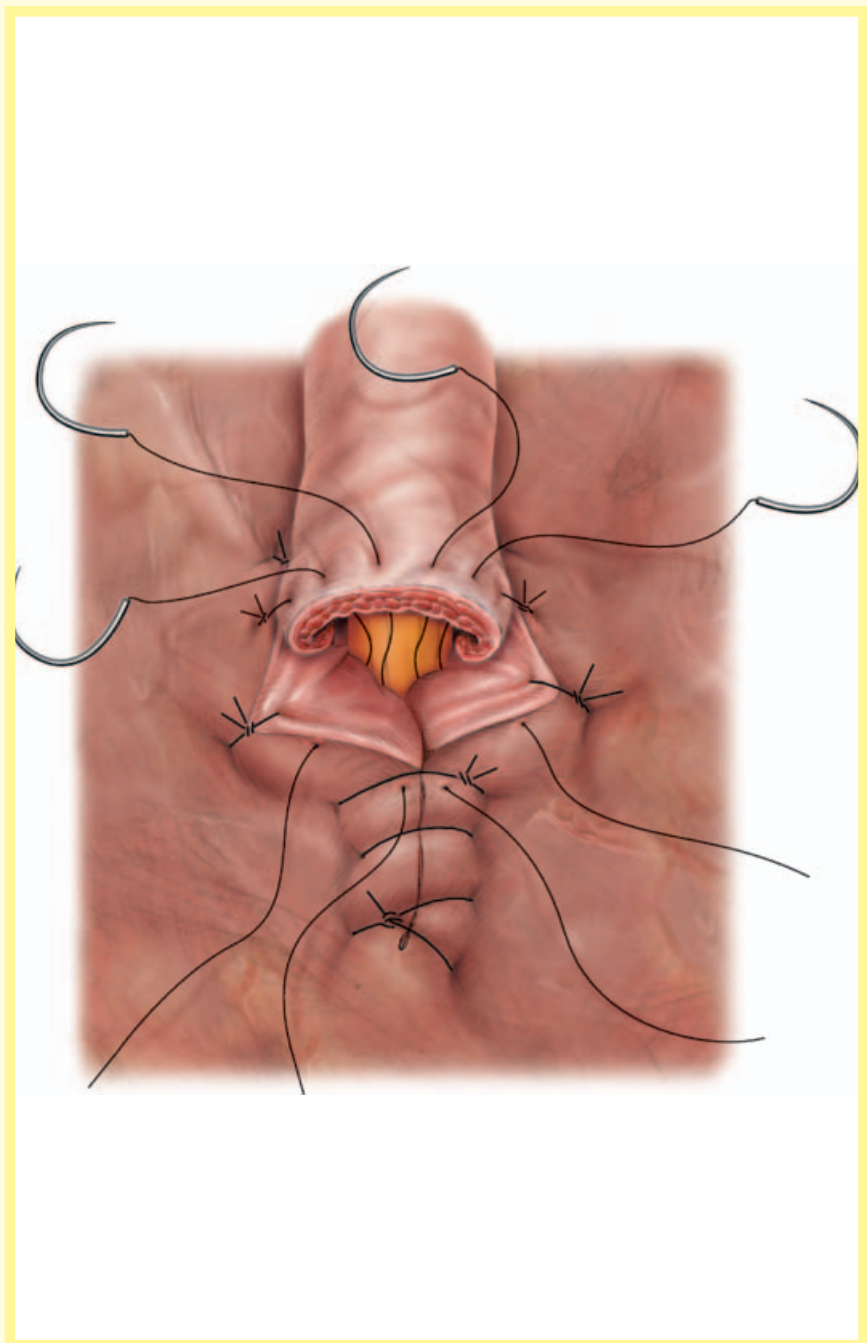
RADICAL PERINEAL PROSTATECTOMY

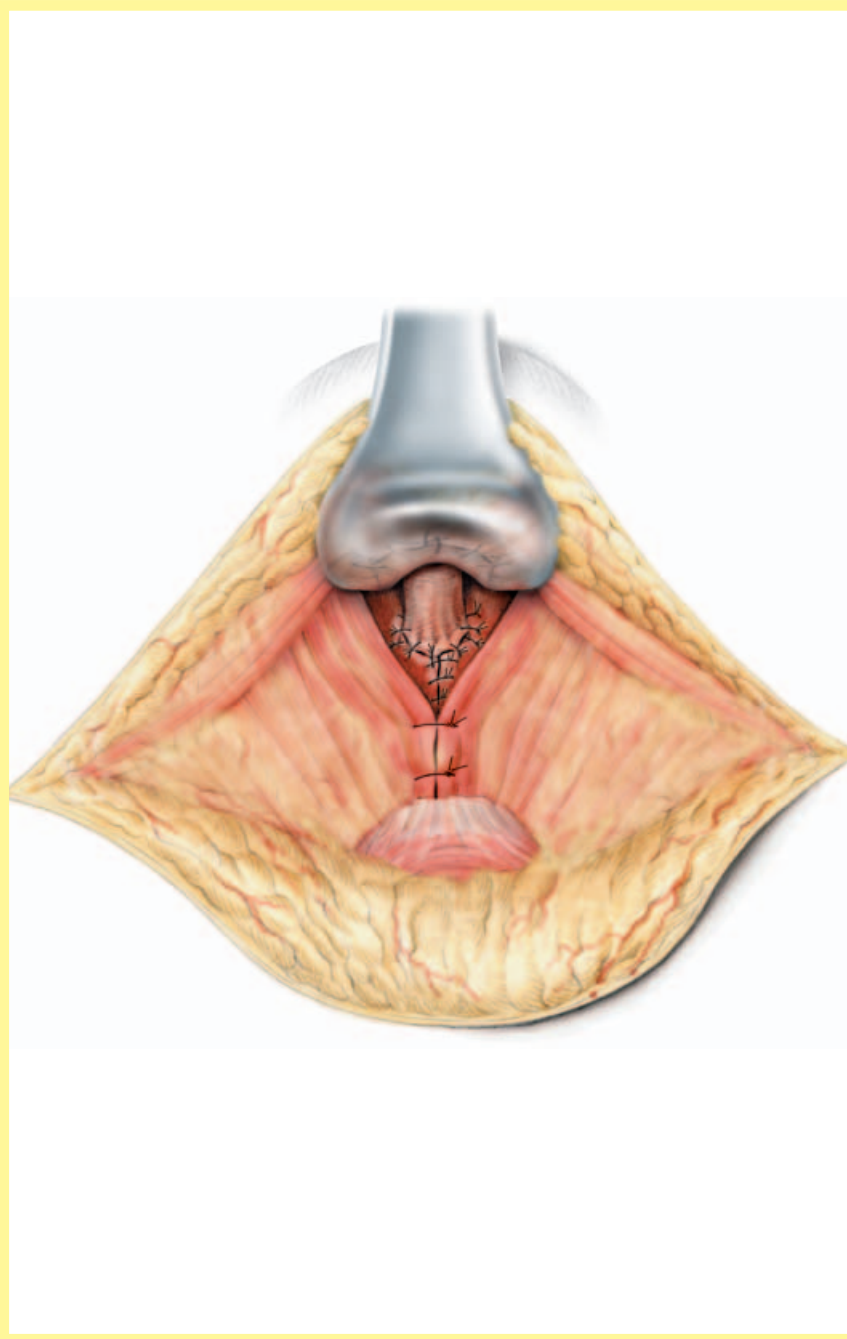


**Figures 25 and 26**

We use eight anastomotic sutures (4/0 double armed Monosyn) for anastomosing the urethra to the reconstructed bladder neck. The ventral urethrovesical circumference is reconstructed by placing four separate sutures in sequence at the 10, 11, 1, and 2 o'clock positions. Be certain to take only the urethral wall and full bladder wall with the suture. After transurethral insertion of a silicone Foley catheter (20 F) and intravesical positioning, the ventral dorsal circumference is completed by placing sutures in sequence at the 4, 8, 5 and 7 o'clock positions. All sutures are tied immediately except for the 5 and 7 o'clock sutures; these can be anchored at the remnant tissue of the rectourethralis. After completing the anastomosis, water-tightness can be controlled by filling the bladder with 200–300 mL of saline, and the bladder catheter balloon is inflated with 30 mL of fluid.

RADICAL PERINEAL PROSTATECTOMY



**Figure 27**

After visual and digital inspection of the integrity of the rectum and placing a drain, the pelvic floor is reconstructed by readapting the levator ani muscles in the midline.

TROUBLE-SHOOTING

- We recommend a preoperative retrograde urethrogram or cysto-urethroscopy to exclude concomitant urethral stricture. If the curved Lowsley retractor cannot be introduced, returning the legs to a more stretched position at the hips will reduce the sharp entry angle into the bladder. Transrectal digital guidance may also be of help. If the retractor can still not be introduced and urethroscopy excludes urethral stricture, we perform the procedure only with a transurethral bladder catheter in place. A concomitant urethral stricture can be managed with cold-knife urethrotomy before perineal prostatectomy in a single session.
- If the bladder neck was sectioned close to the ureteric orifices we recommend temporarily placing ureteric stents, which can be removed on 10 days after surgery.
- Bleeding from Santorini's plexus is rarely encountered and can be controlled with clips or with a figure-of-eight 3/0 absorbable sutures on a 5/8 circle needle.
- If there is a rectal lesion use a transverse two-layer inverting suture. A rectal tube should be placed under manual guidance for anal dilatation. Intraoperative application of 500 mg metronidazole should be continued twice daily for 5 days. The rectal tube remains until the first bowel movement. Parenteral feeding should continue for 5 days.

SURGICAL TRICKS

- The self-retaining Bookwalter retractor obviates the need for a second assistant.
- Improve visualization of the operative field by tilting the table in a Trendelenburg or anti-Trendelenburg position as needed.
- Use long instruments with small working tips.
- Apply traction to the skin flap tag suture to improve identification of the different layers. Transanal digital guidance may help to identify the position of the rectal wall with respect to the prostatic apex.
- Always place a moist sponge between the rectum and the caudal retractor blade to avoid injury to the rectum.
- Perineal nerve-sparing prostatectomy is not recommended for large prostates because the prostate has to be removed between the neurovascular bundles, and this may cause damage by pressure or traction.
- The vas deferens should be isolated 1–2 cm towards the retrovesical space, otherwise the ligature will bunch the periductal tissue, including the tissue surrounding the seminal vesicles, and later dissection of the seminal vesicles may become difficult.
- To dissect the seminal vesicles use a Babcock clamp to grasp them. This atraumatic clamp will not traumatize them as easily as would an Allis clamp. Dissection is easier with intact seminal vesicles.
- A Duval clamp or atraumatic lung clamp

can be used to grasp both seminal vesicles and vasa together, and pull them in a cranial direction to dissect the retroprostatic bladder neck.

- If the bladder neck has been reconstructed in a tennis racket fashion, leave the end of the suture at the neobladder neck long, to be able to pull on it in cephalad while tying the dorsal circumference anastomotic sutures, thus releasing tension on the sutures.
- 5/8 double armed needles improve manoeuvrability and allow for an inside-to-outside suture with no need for a French-eye needle.

POSTOPERATIVE CARE

Intravenous antibiotics with a cephalosporin is continued until the patient is taking oral nutrition. The patient receives nothing by mouth on the day of surgery and receives liquids on the first day afterward. A laxative is administered on the first night after surgery, a regular diet is initiated on the second day, and the patient ambulates on the first day. The analgesic requirement is usually adequately covered with intravenous metamizol.

The drain is removed 1–2 days after surgery, a control cystogram taken after 7 days and the catheter removed on the same day if no extravasation is evident. Pelvic floor training is initiated at 3–4 days after surgery.