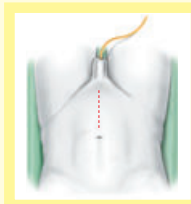


# Surgery Illustrated



## Surgical Atlas

### Radical retropubic prostatectomy: apical preparation and curtain dissection of the neurovascular bundle



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ILLUSTRATIONS by STEPHAN SPITZER, [www.spitzer-illustration.com](http://www.spitzer-illustration.com)



#### PATIENT SELECTION AND INDICATION

Radical prostatectomy should be reserved for men diagnosed with localized prostate cancer with a total PSA level of  $<15$  ng/mL who are likely to be cured and have a life-expectancy of  $\geq 10$  years. Surgery is deferred for  $\geq 2$  months after prostate biopsy and for 3 months after TURP. This delay enables inflammation or haematoma to resolve so that the anatomical relationships between the prostate and the surrounding tissue return to a near-normal state.

are assessed; in the afternoon patients are shaved and receive one colonic enema. On the day of surgery patients wear compression stockings.

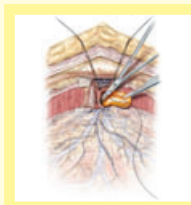
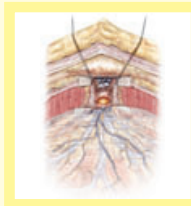


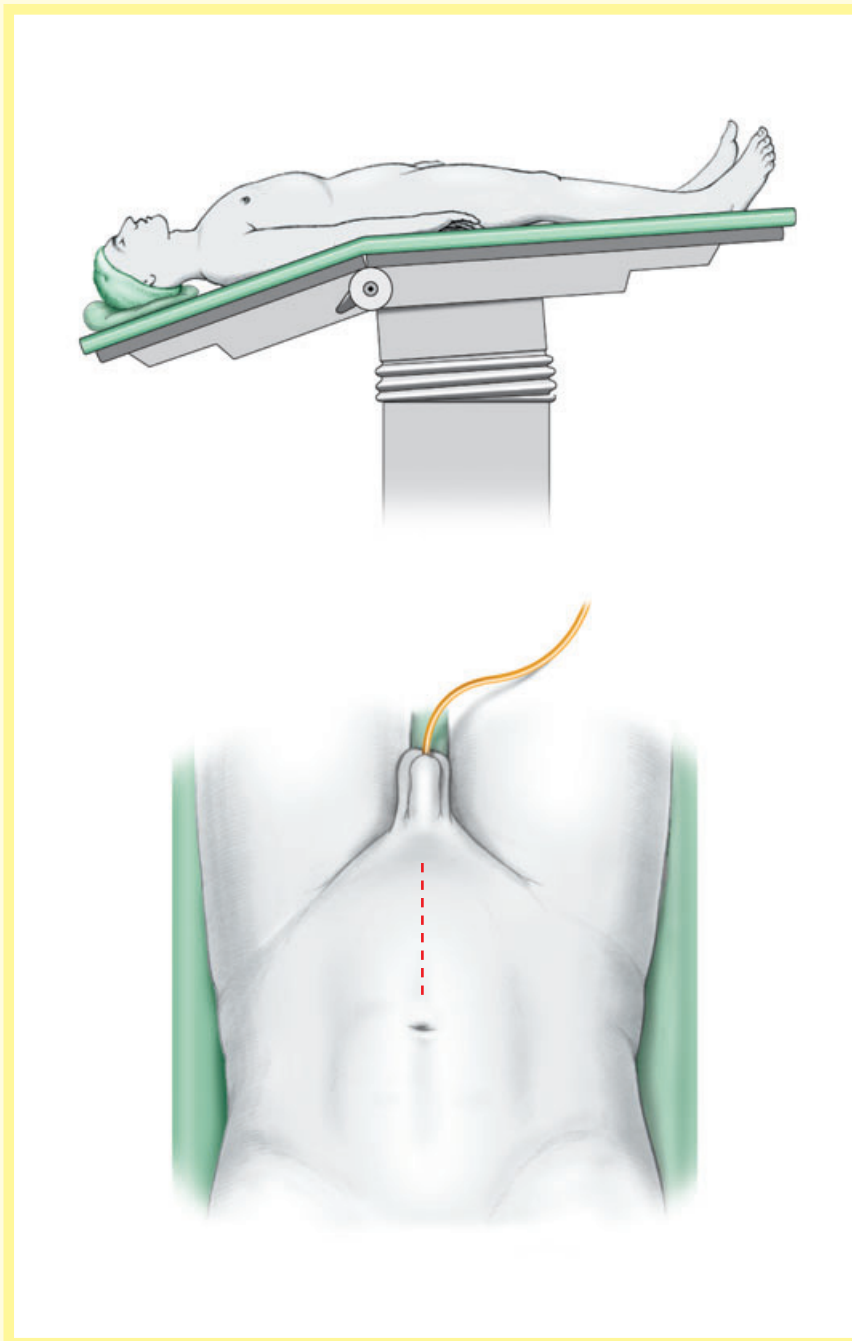
#### PATIENT PREPARATION

Patients are admitted to the hospital 1 day before surgery, and blood and urine samples

#### SPECIAL INSTRUMENTS

Radical retropubic prostatectomy requires few special instruments. A headlight and magnifying loupes are very useful for the procedure, especially for a sufficient nerve-sparing procedure. We use a standard Balfour retractor to provide cranial and posterior retraction on the peritoneum and bladder. A right-angle clamp (Scott McDougal), a coagulating forceps and small clips are the only special instruments that should be available.



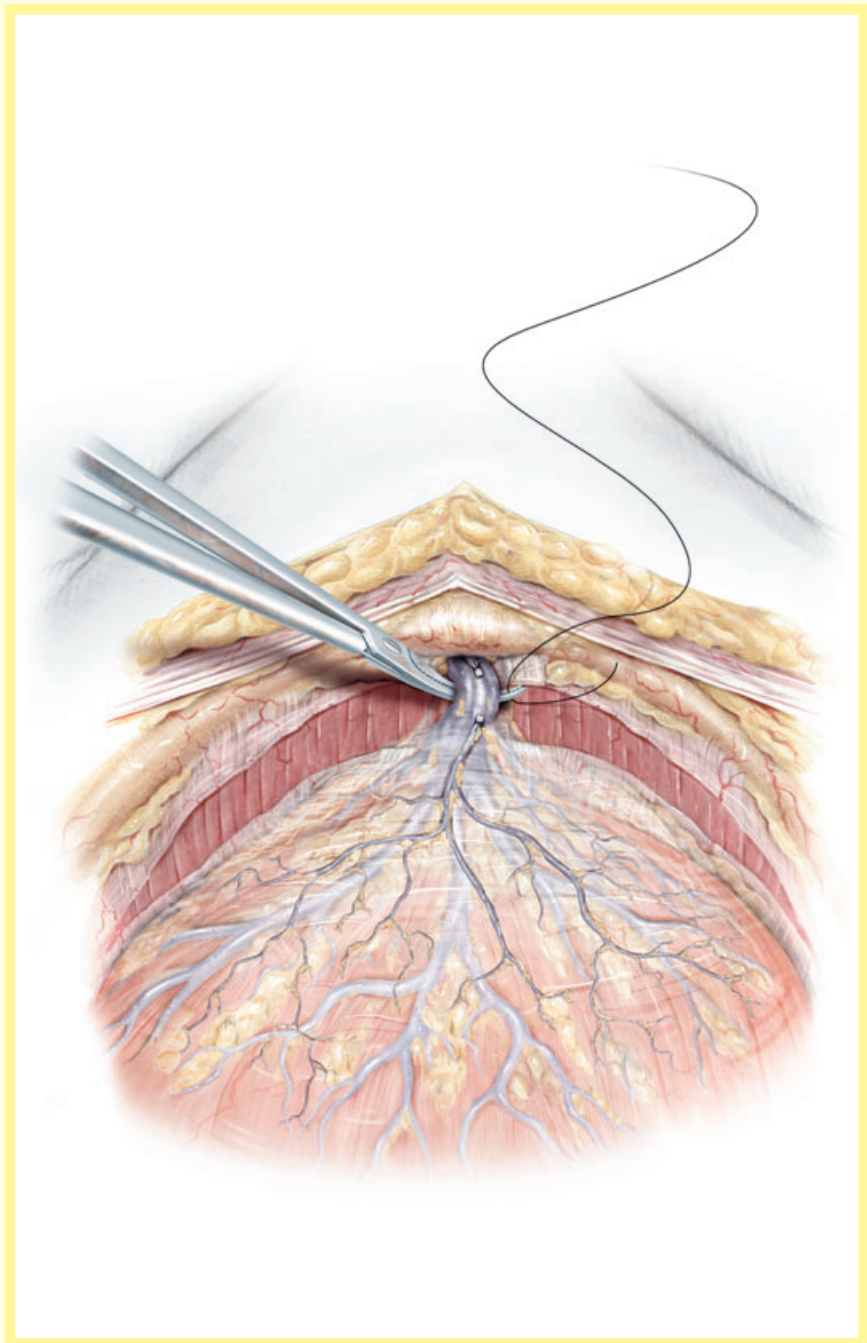
**Figure 1**

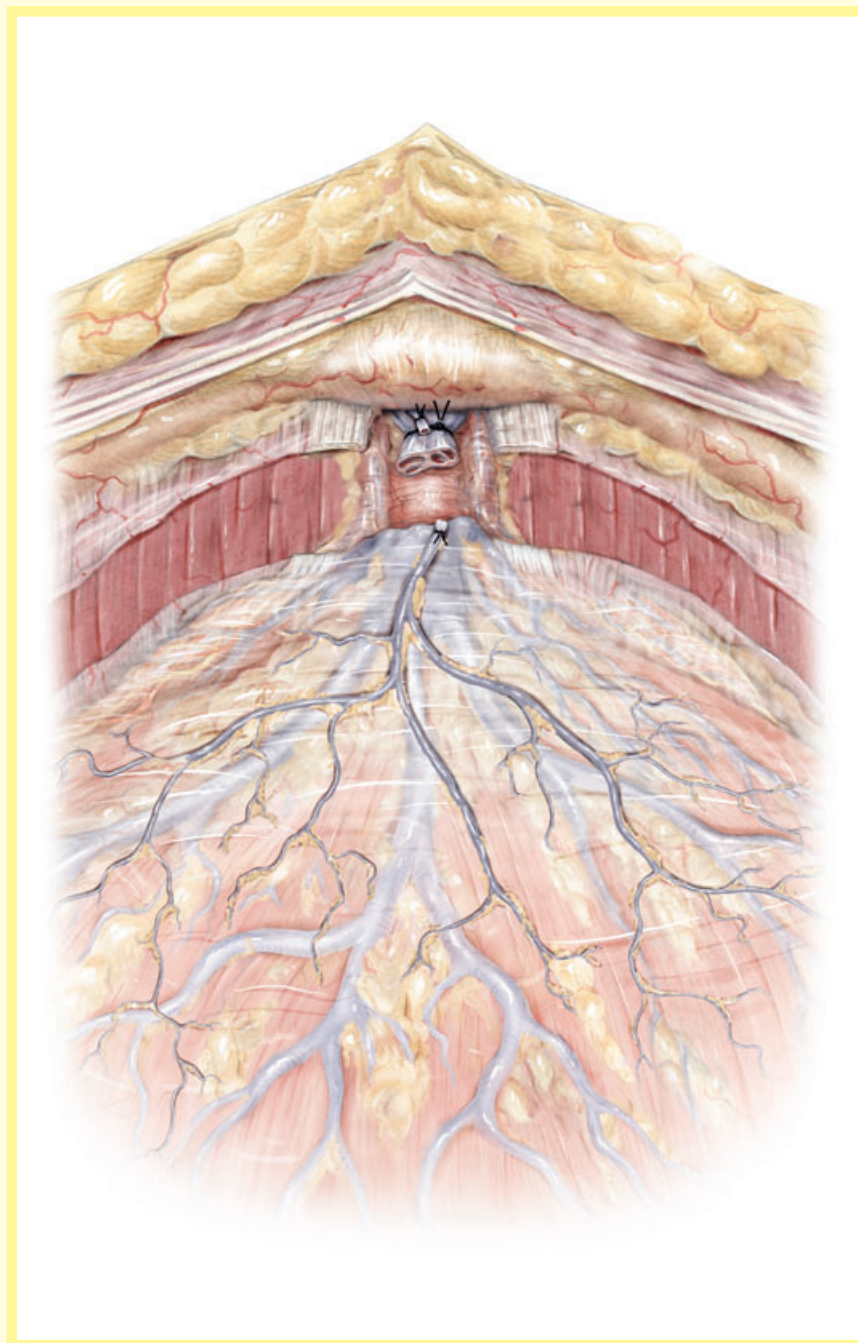
The patient is placed in a hyperextended supine position to increase the distance from the umbilicus to the symphysis, supplemented by a mild Trendelenburg position.

The skin incision is a lower abdominal midline incision and starts above the symphysis and extends upwards for some centimetres below the umbilicus. Antibiotic prophylaxis with amoxicillin is started during surgery, and subcutaneous prophylaxis for deep vein thrombosis on the evening of the same day.

**Figures 2 and 3**

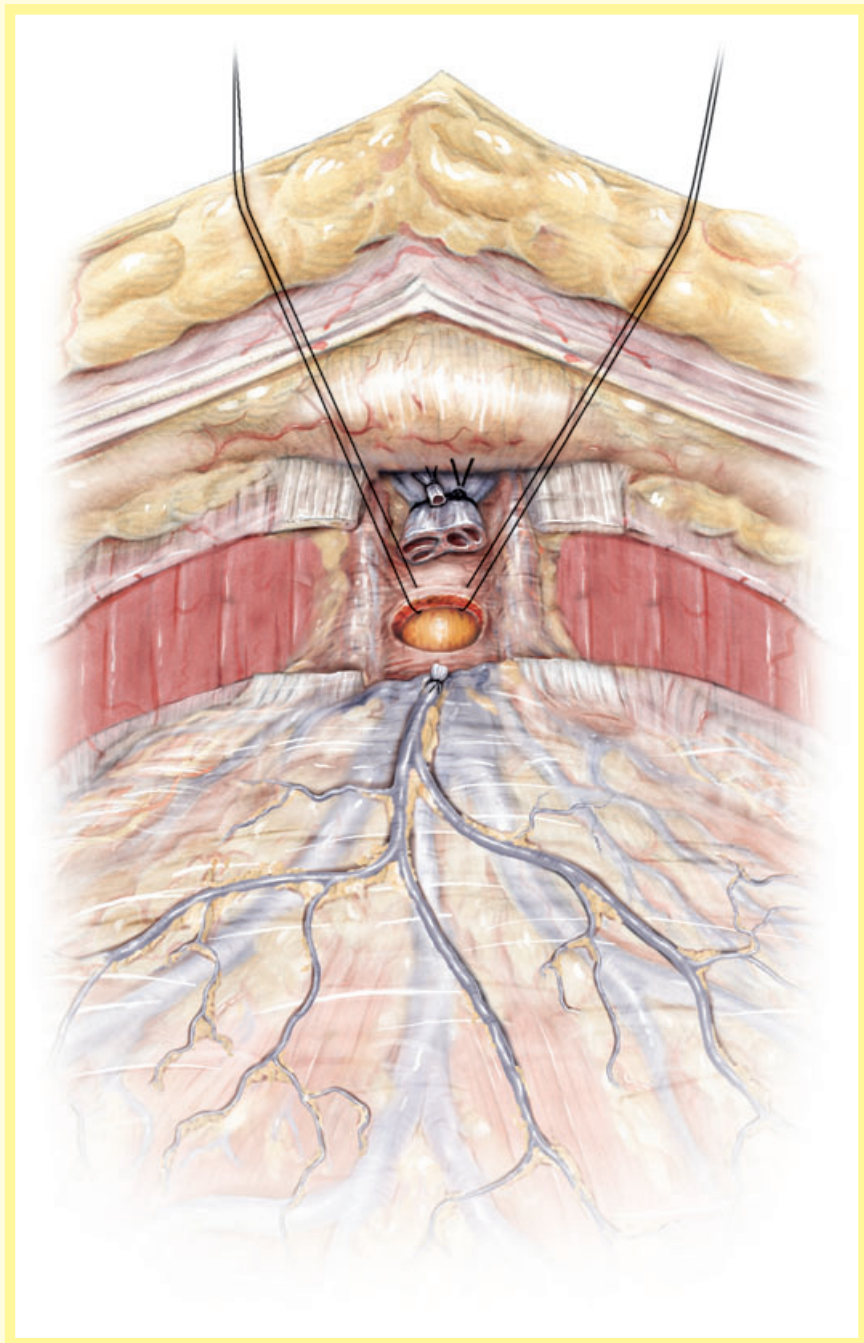
After incising the endopelvic fascia the anterior aspect of the prostate is dissected free of fatty tissue, and the superficial branch of the deep dorsal penile vein dissected. Then the puboprostatic ligaments are cut and the dorsal vein complex under-run and ligated.

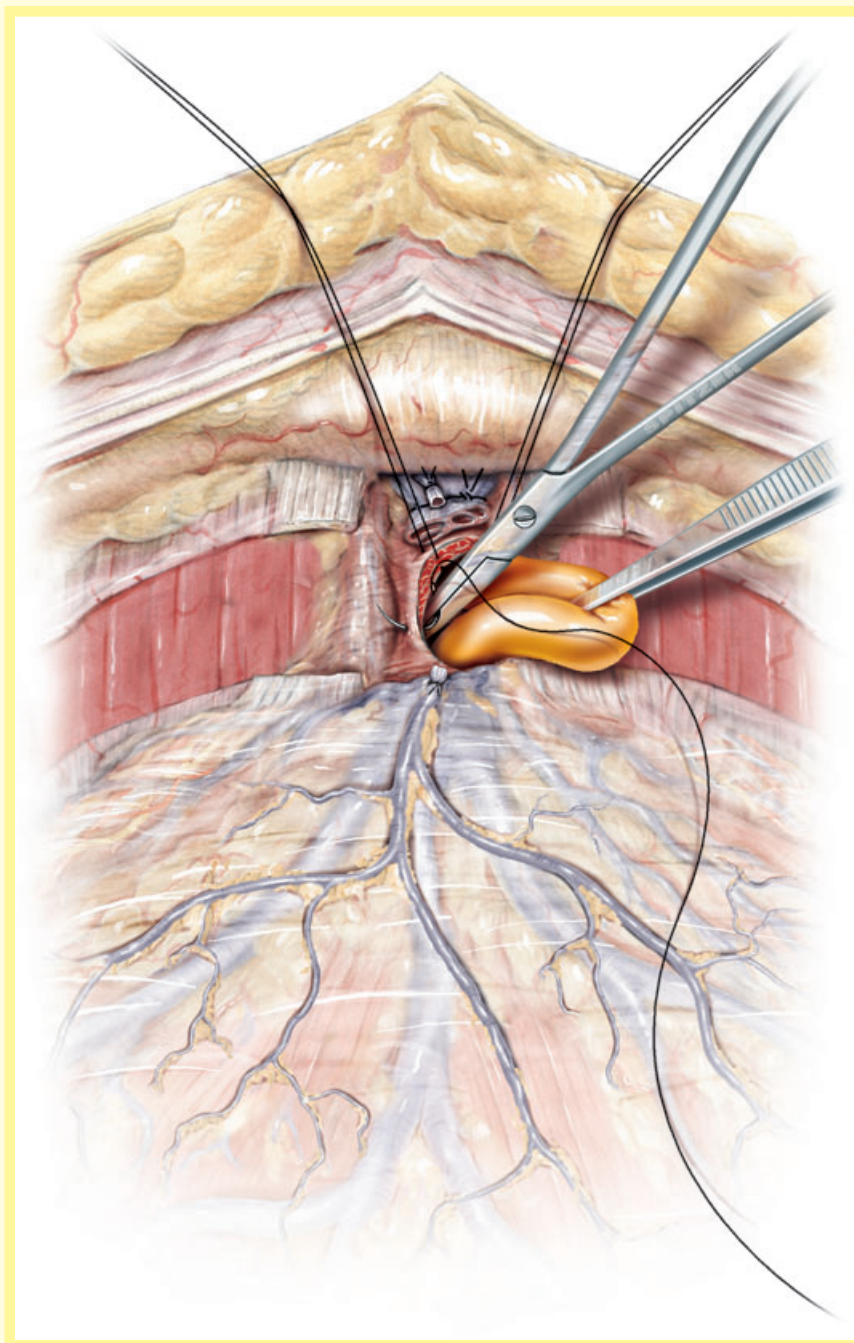




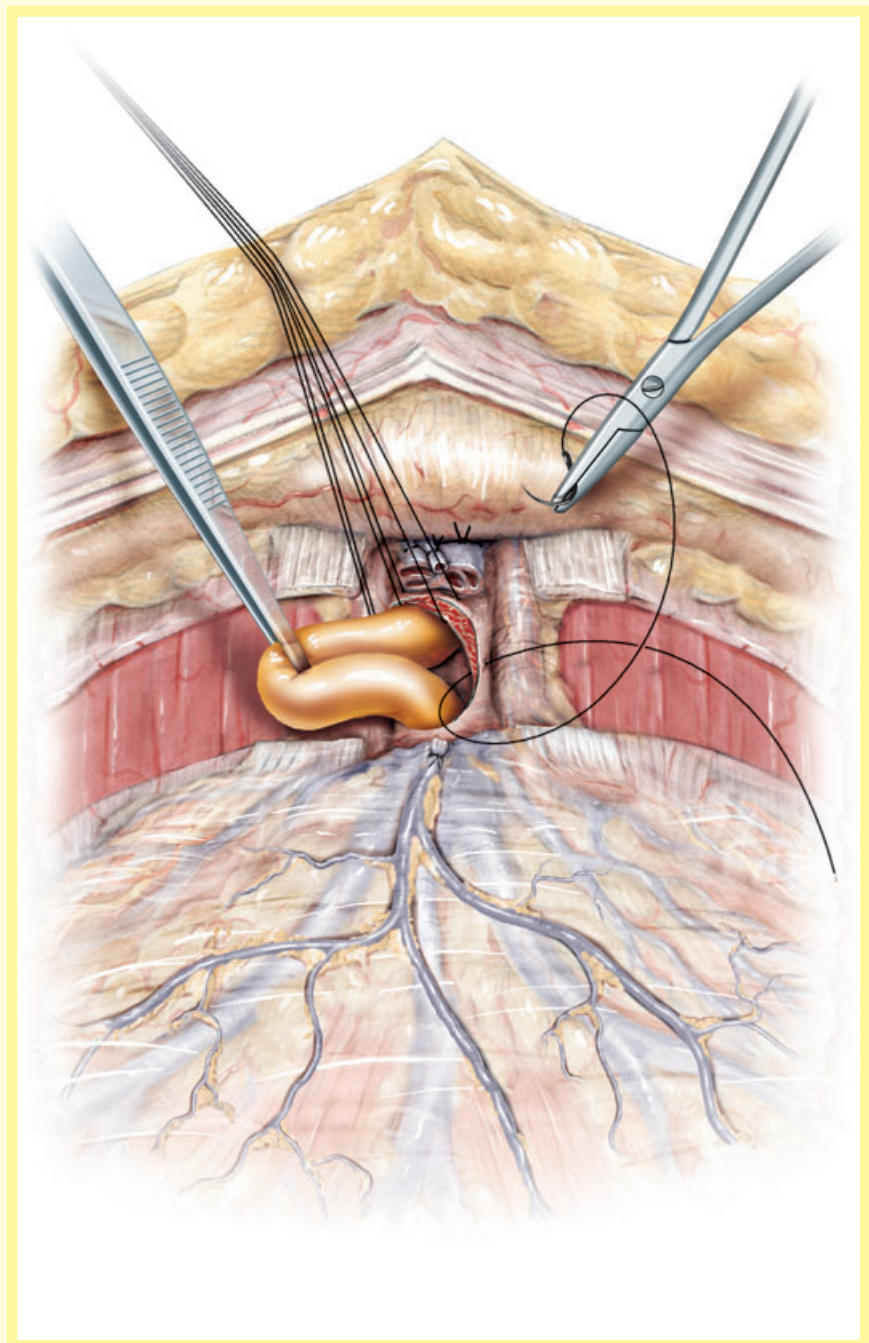
**Figure 4**

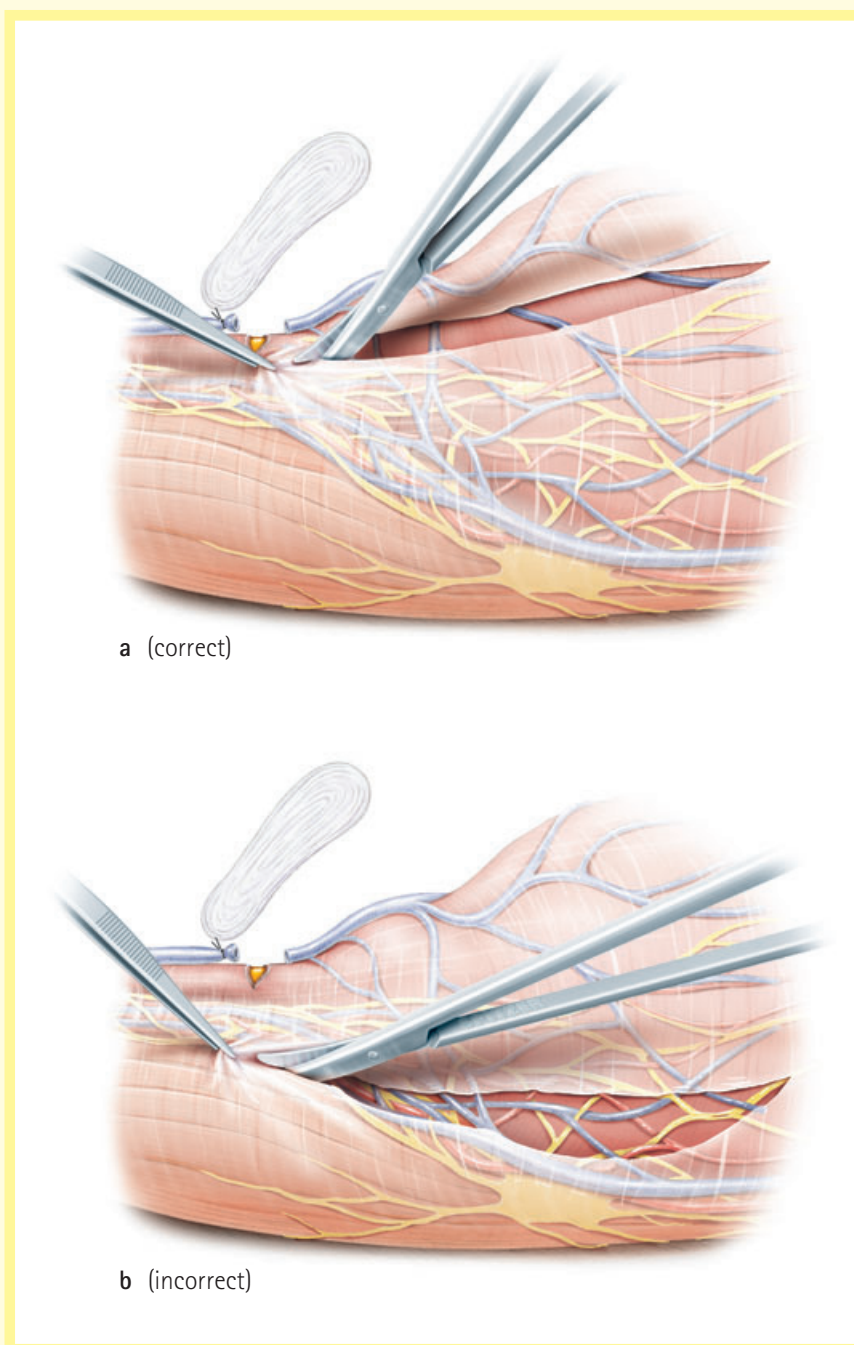
Subsequently, the anterior surface of the membranous urethra is incised  $\approx 2$  mm anterior to the apex of the prostate. The first anastomotic suture (poliglecaprone 2/0, double-armed UR-6 needle) is passed at the 1 o'clock position, taking care not to include the rhabdosphincter but only the urethra. The second anastomotic suture is passed in the same fashion at the 11 o'clock position.



**Figures 5 and 6**

By alternately pulling the catheter to the left and right with a forceps, the third and fourth anastomotic sutures are passed at 3 and 9 o'clock positions, respectively, also taking care not to include the rhabdosphincter or the neurovascular bundle in the suture.

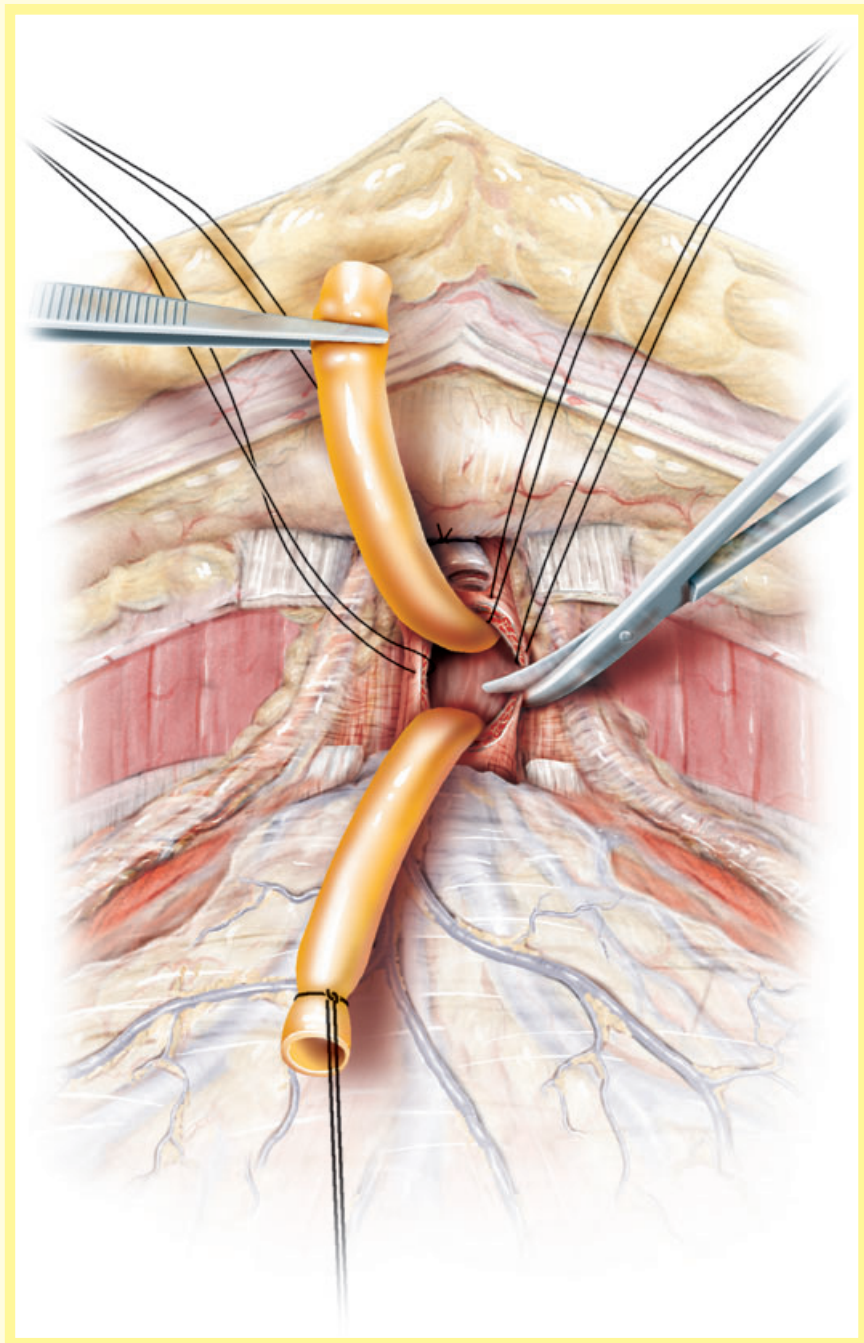


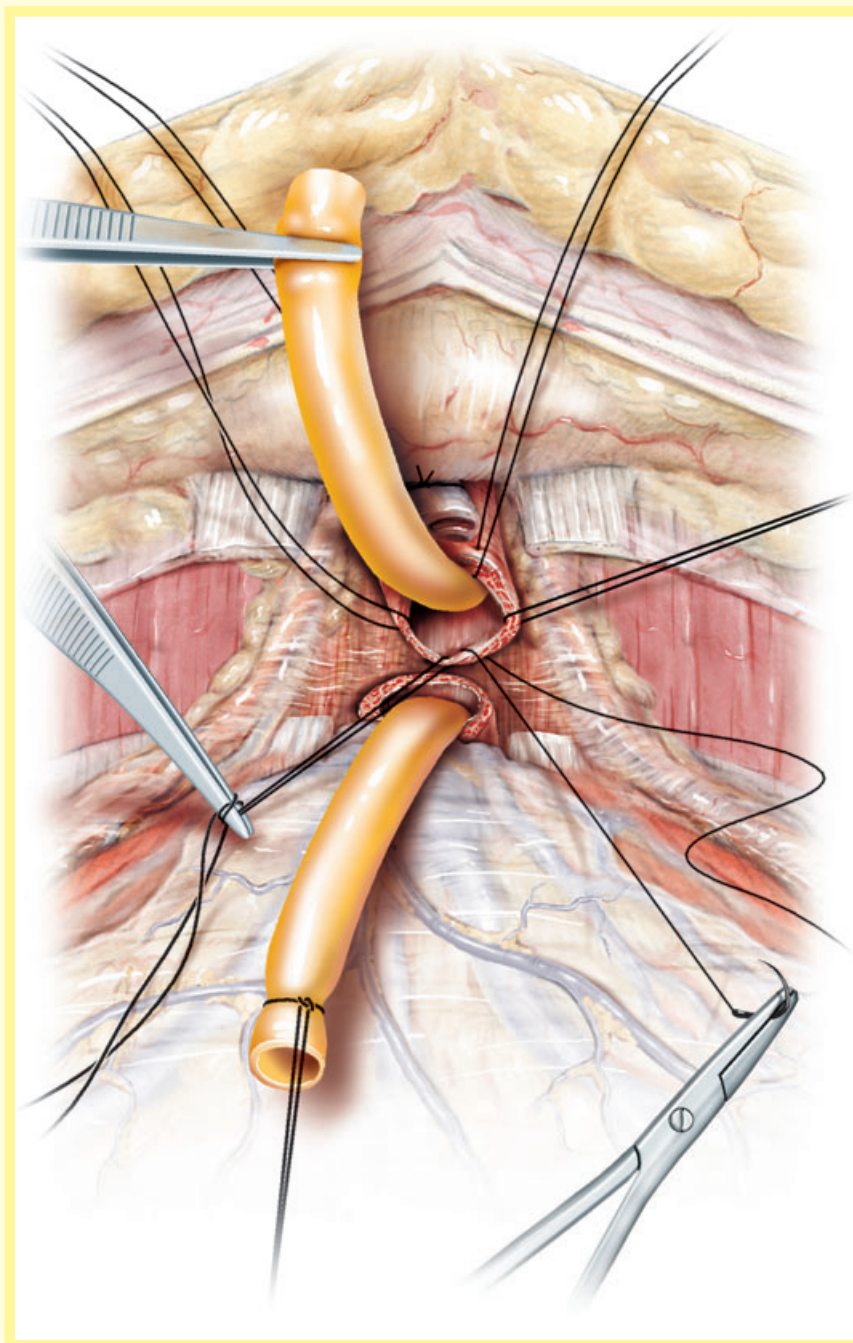
**Figure 7**

The nerve-sparing approach is then attempted; the prostate is first pushed to the left or to the right below the bladder neck so that the lateral pelvic fascia can be incised. Using magnifying lenses, dissection of the neurovascular bundles starts very far anteriorly to preserve all the nerve fibres that are spread out concavely as described ('bob run' or 'curtain' shape) along the surface of the lobes of the prostate (Fig. 7a). With this type of preparation the vast majority of cavernosal nerves forming the neurovascular bundles can be preserved. The neurovascular bundles are teased away to the distal third of the prostate.

**Figure 8**

The posterior surface of the urethra and the underlying perineal body are then dissected. As most of the cavernosal nerves are situated dorsolateral to the membranous urethra at no time is the urethra under-run with a clamp. Subsequently, the apex of the prostate is dissected from the neurovascular bundle and the rectal fascia. After cutting half of the posterior surface of the urethra a traction suture is placed at the 6 o'clock position.

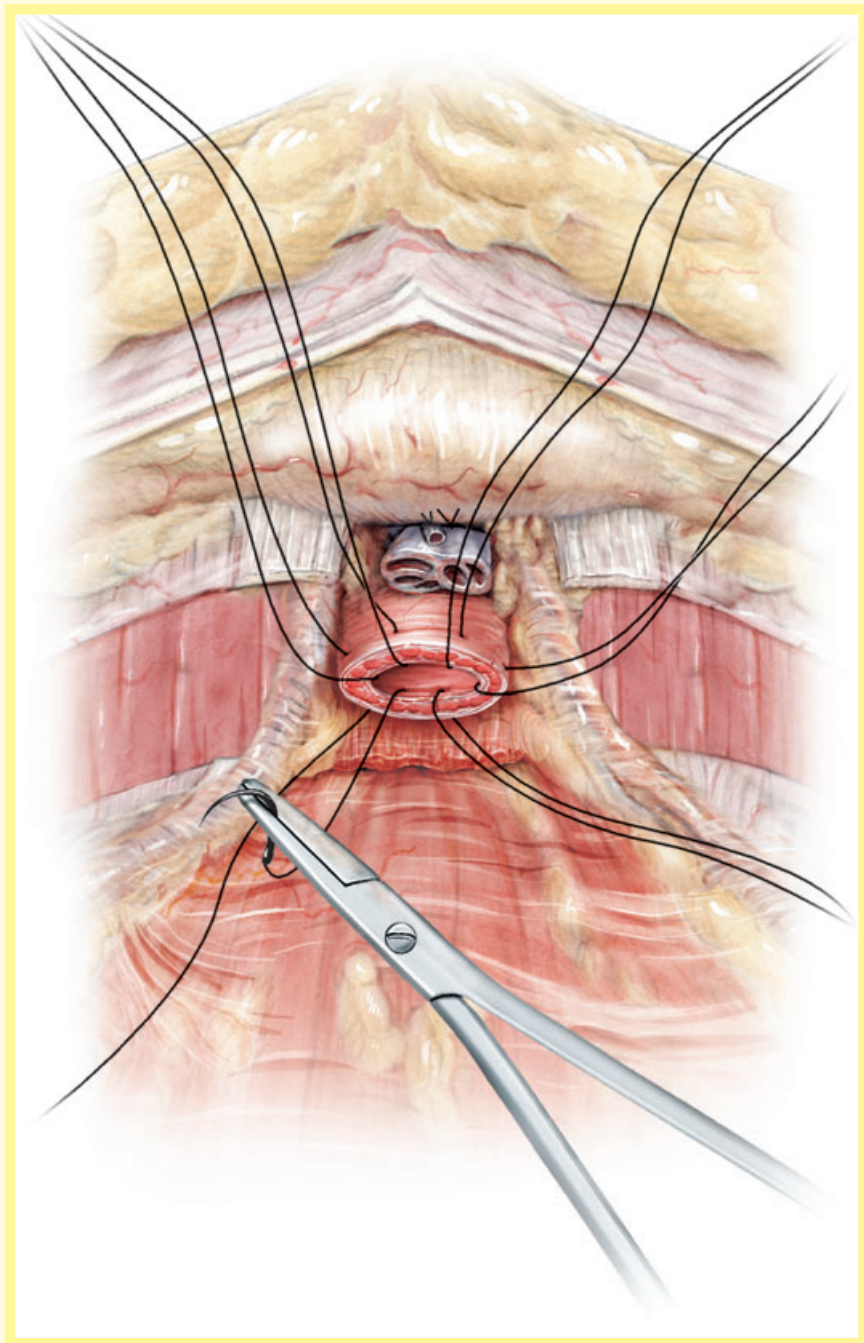


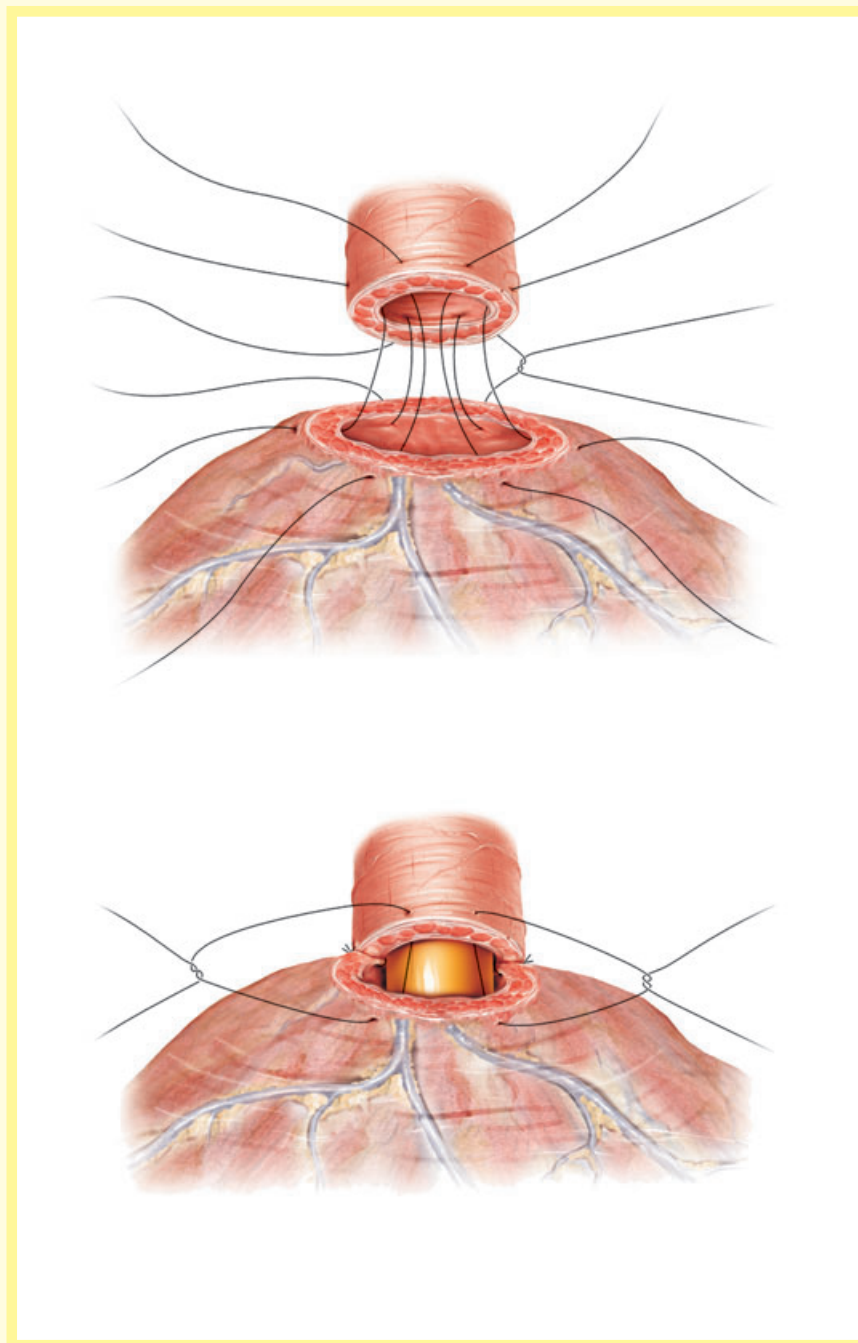
**Figure 9**

Pulling on this traction suture facilitates placing the fifth anastomotic suture line at the 5 o'clock position and medial to the neurovascular bundle. The sixth anastomotic suture line is passed in a similar fashion at the 7 o'clock position.

**Figures 10 and 11**

After removing the surgical specimen on both sides of the rectum the neurovascular bundles are visible; the previously placed urethral sutures are passed through the vesical neck at the corresponding positions and tied over a 20 F urethral catheter to complete the vesico-urethral anastomosis.





## ANATOMICAL CONSIDERATIONS OF THE CAVERNOSAL NERVES

According to anatomical studies in 29 male fetuses, at our institution, the original course of the cavernosal nerves could be detected during the early stages of fetal development, as the prostate does not start to develop before fetal week 13. Because there is no prostate and the nervous structures are relatively thick, the cavernosal nerves were visible running downward lateral and dorsal to the prostatic and the membranous urethra, and the omega-shaped rhabdosphincter, which covered the ventrolateral aspects of the prostatic and membranous urethra between the bulb of the penis and the bladder neck.

After 13 weeks of gestation the prostate begins to develop. Because of the growth and increasing volume of the prostate, the course of the cavernosal nerves begins to change. By contrast, the prostate increasingly displaces the cavernosal nerves dorsolaterally. In this region the nerve fibres and vessels are increasingly dispersed along the convex surface of the prostatic capsule. Therefore, the cavernosal nerves running in the neurovascular bundles increasingly assume a shape that can best be compared to the concave 'steep turn of a bob-sleigh run' or a concave 'curtain' covering both prostatic lobes. At the apex of the prostate the nerve fibres of the neurovascular bundles converge again, like the exit of a steep turn of a bob-

sleigh run, and lie adjacent to the membranous urethra. According to these anatomical findings, the modified apical preparation and the dissection of the neurovascular bundle is described and illustrated.

## POSTOPERATIVE MANAGEMENT

Drains are routinely removed 3 days after surgery; the diet is advanced as tolerated, with normal intake by 3 days in most patients. Antibiotic prophylaxis with amoxicillin continues after surgery until the catheter is removed. On the 10th day gravity cystography is used under fluoroscopic control. The bladder is filled with 150–250 mL of a contrast agent until the patient experiences a sense of fullness and slight discomfort. The urinary catheter is removed if there is no extravasation. During gravity cystography all patients are instructed how to exercise the rhabdosphincter. It is essential that patients can see the elevation of the anastomotic site while contracting the rhabdosphincter, and therefore understand and participate cognitively in these exercises. At 11 days patients are discharged from the hospital.

## SURGEON TO SURGEON

Every surgeon has their way of improving the results of radical prostatectomy in

terms of continence and potency rates. We consider the use of magnifying loupes and a correctly positioned headlight to be very important, as they aid in identifying the neurovascular bundles and external striated sphincter. By using these two devices a bloodless operating field is more likely. This enables the surgeon to meticulously dissect the prostatic apex and preserve the complex of the rhabdosphincter and the distal part of the neurovascular bundles containing the cavernosal nerves, as well as the branches of the pudendal nerve. The integrity of the rhabdosphincter tendon and pudendal nerve supply is important for preserving continence. Thus, manipulating the urethra should be minimized so that all periurethral tissue distal to the apex remains intact.

Radical retropubic prostatectomy by an experienced surgeon is safe, with fewer complications during and afterward; the duration is usually <2.5 h. With proper patient selection, positive surgical margins are <10%, with pathologically organ-confined prostate cancers in 85–90%. In experienced centres, continence rates reach 95% and potency rates ≥80% after surgery.

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