

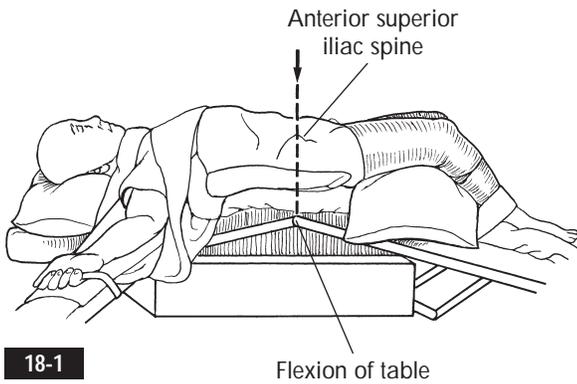
RADICAL RETROPUBIC PROSTATECTOMY

18

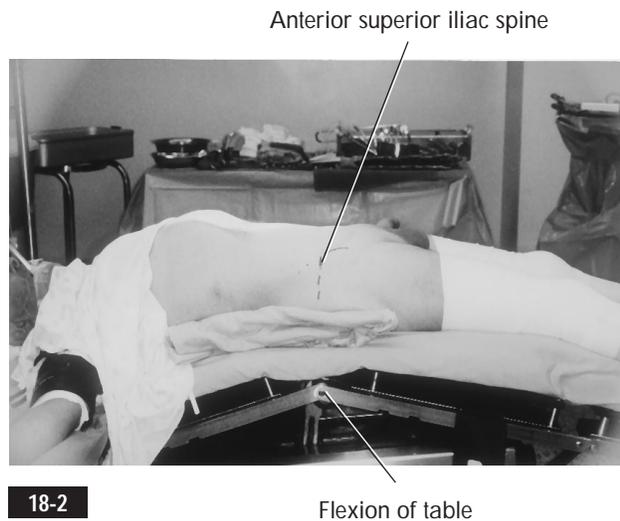
PATIENT POSITIONING

FIGS. 18-1, 18-2, AND 18-3. Flexion of the body with the break of the operating table in line with the anterior superior iliac spine of the pelvis will consistently provide maximal exposure of the pelvis.

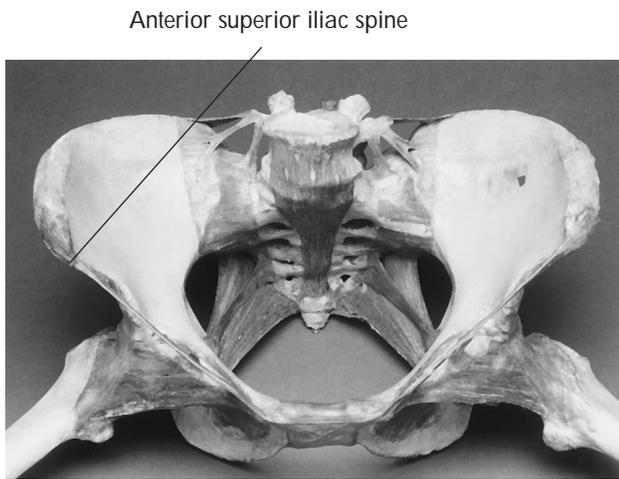
FIG. 18-4. In addition, abduction of the legs with flexion at the knees will facilitate the pelvic lymphadenectomy procedure.



18-1



18-2

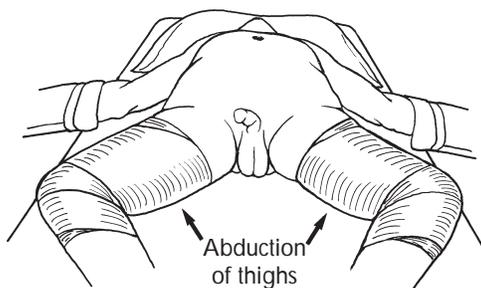


A

18-3



B



18-4

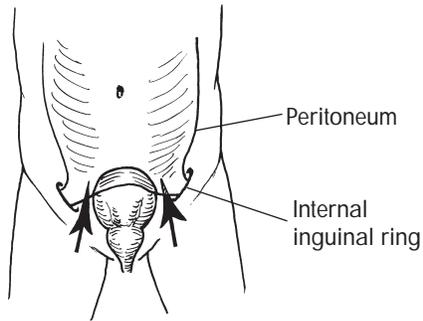
EXPOSURE OF RETROPUBIC AND RETROPERITONEAL SPACES

FIG. 18-5. Once the space of Retzius (retropubic space) is established, the surgeon can create the retroperitoneal pockets.

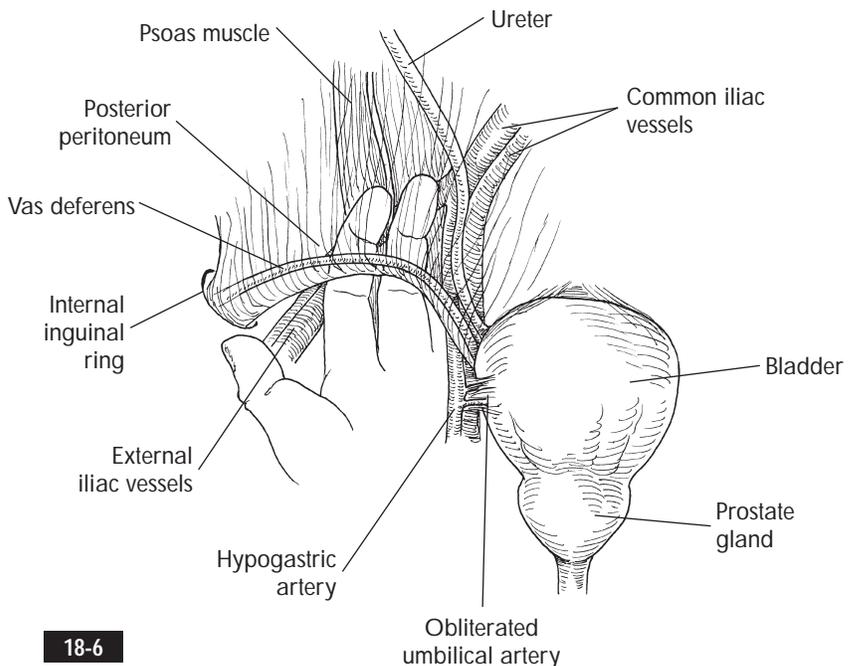
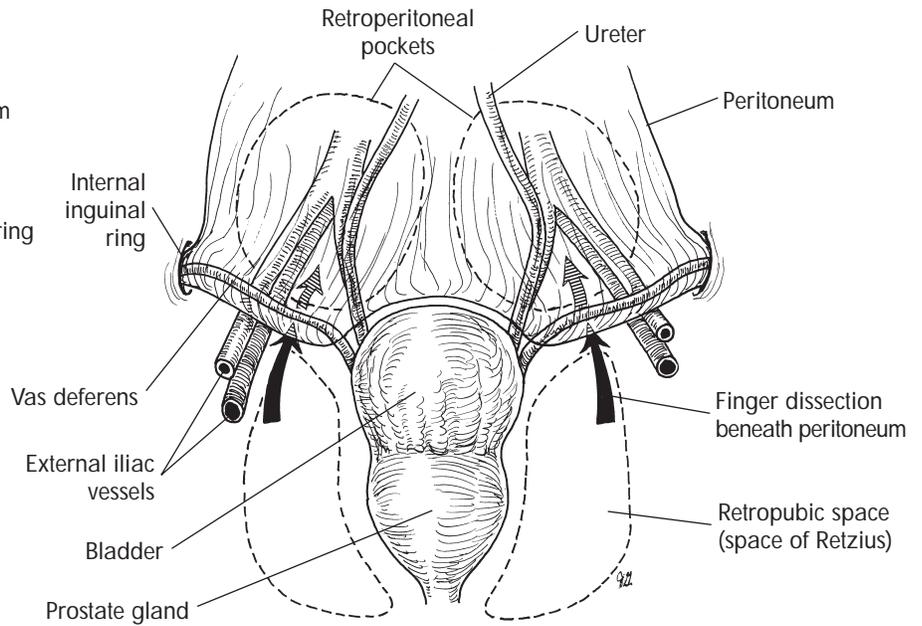
FIG. 18-6. With the hand palm side up and the index finger hugging the lateral wall of the pelvis slightly below the level of the iliac vein, the surgeon uses the index and middle fingers to gently tunnel behind the peritoneum and into the retroperitoneal space.

FIG. 18-7. This maneuver exposes the bifurcation of the iliac vessels, the lymph nodes most commonly involved in prostate cancer metastasis, the ureter medially, and the vas deferens coursing above and across the peritoneal shelf.

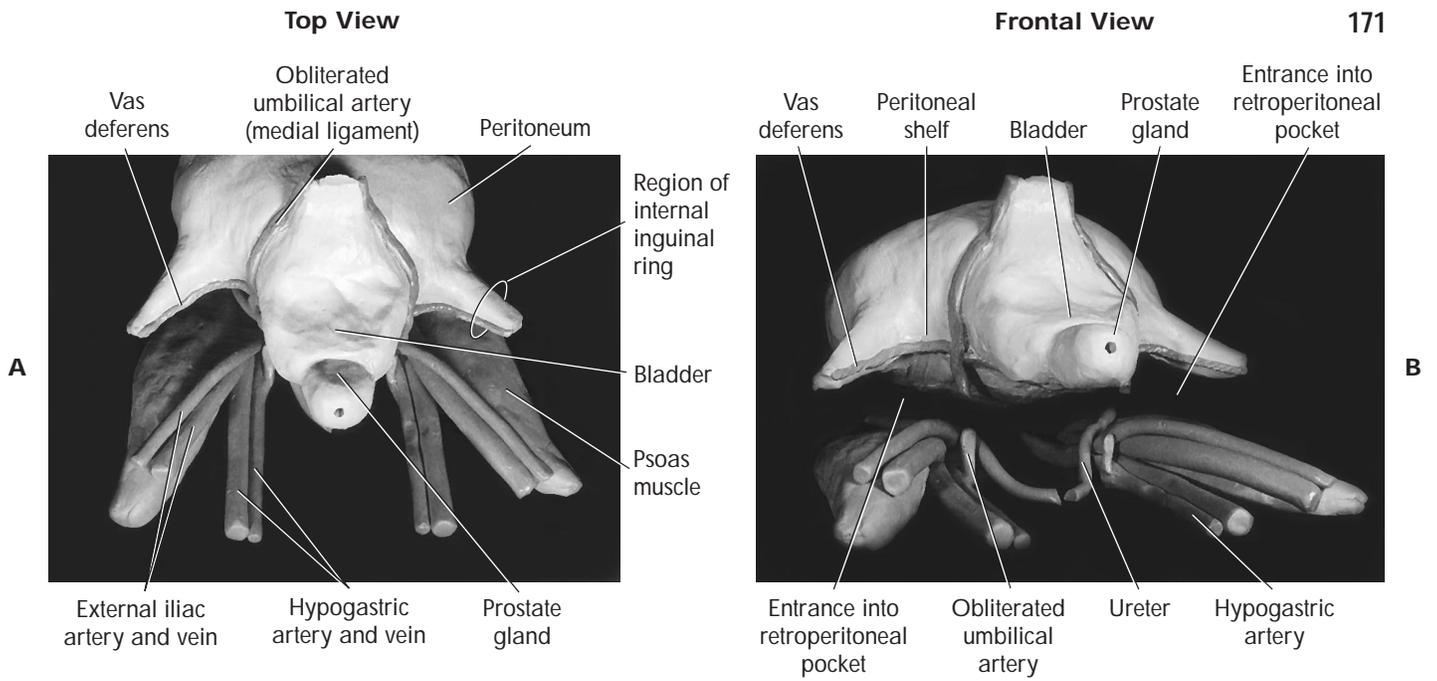
FIG. 18-8. Once the Balfour or Bookwalter retractor is in place, a narrow malleable blade can be positioned within these retroperitoneal pockets and fixed cephalad to the retractor.



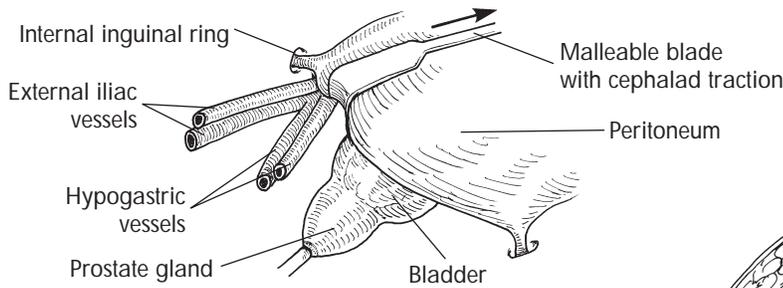
18-5



18-6



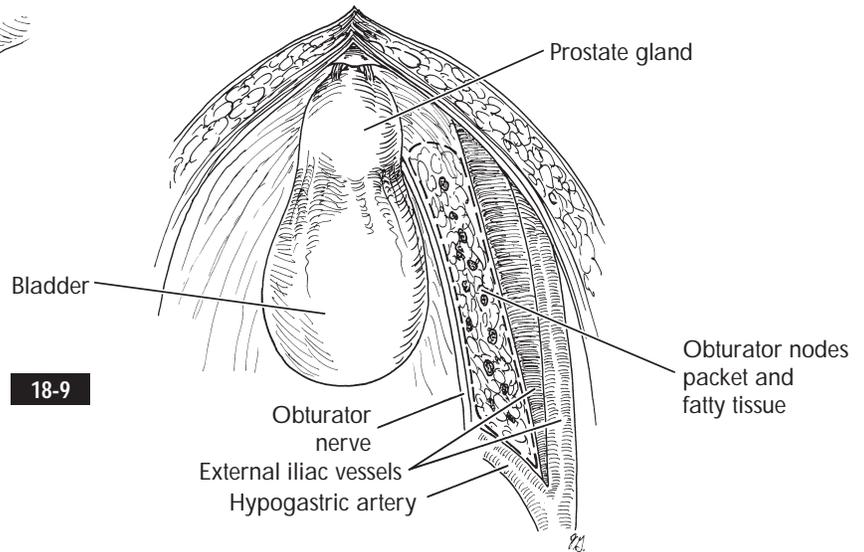
18-7



18-8

PELVIC LYMPH NODE DISSECTION

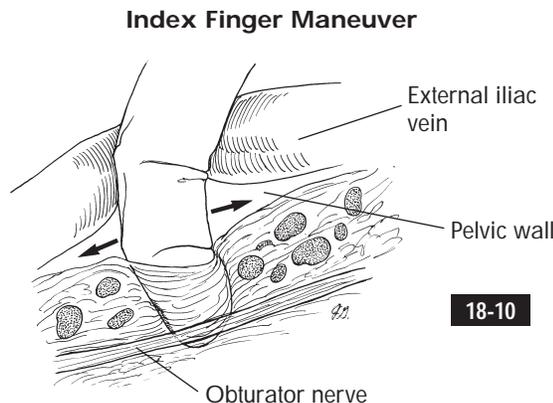
FIG. 18-9. By opening the space between the lowermost aspect of the iliac vein and the fatty tissues below, the surgeon uses Kitners (tonsil clamp with ball of gauze clamped at its tip) to push the iliac vein away from the fatty and lymphatic tissues until the pelvic wall is identified.



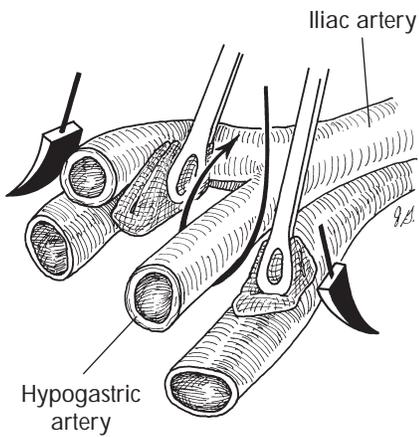
18-9

FIG. 18-10. With the middle and index fingers, the surgeon palpates for the pelvic wall and moves the index finger horizontally in a back-and-forth motion to free the obturator nodes packet. The surgeon can simultaneously palpate for the obturator nerve below and use gentle blunt dissection with the index finger and thumb to isolate it.

We have found these maneuvers to be time-saving for a rapid dissection.



18-10



18-11

TEMPORARY LIGATION OF HYPOGASTRIC ARTERY

FIG. 18-11. If there is a good pulse in the hypogastric artery, it should be ligated temporarily as a safety precaution. Hypogastric artery ligation does not prevent bleeding during the later dissection of the dorsal venous complex but will slow down the hemorrhage sufficiently for the surgeon to maneuver and control bleeding points.¹ After maximal cephalad retraction with the malleable blade in the retroperitoneal pocket, the surgeon can identify the iliac vessel bifurcation. By applying sponge sticks on either side of the hypogastric artery, the surgeon can safely place vessel loops twice around and ligate it. We do not use the bulldog clamps in these delicate, small spaces.

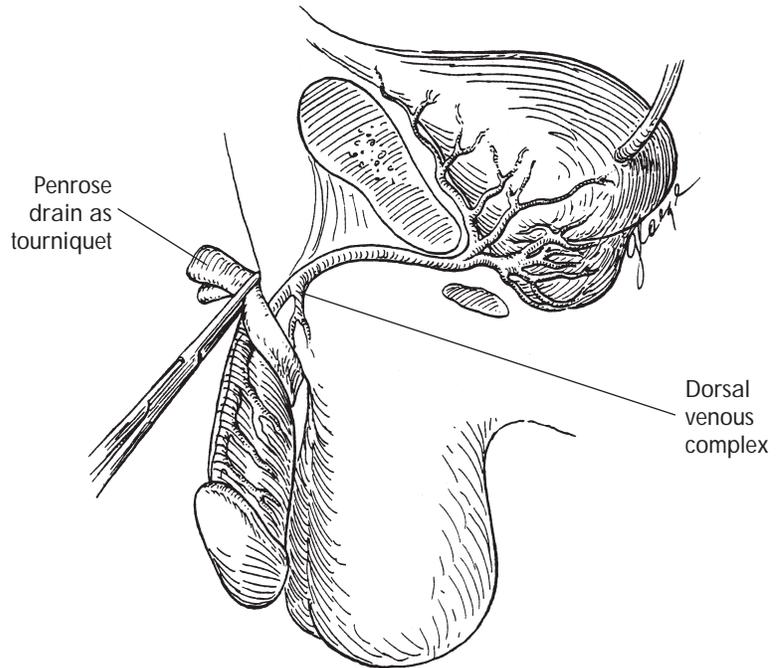
LIGATION AND DIVISION OF DORSAL VENOUS COMPLEX

FIG. 18-12. The placement of a 3/4-inch Penrose drain tightly clamped around the base of the penis will decrease the potential bleeding during division of the dorsal venous complex.²

FIGS. 18-13 AND 18-14. The Yu-Holtgrewe grooved blade (Greishaber Co., Chicago, Ill.) is placed over the bladder, and then the Foley balloon catheter (inflated to 30 ml) is retracted cephalad slowly and fixed to the Balfour or Bookwalter retractor.³

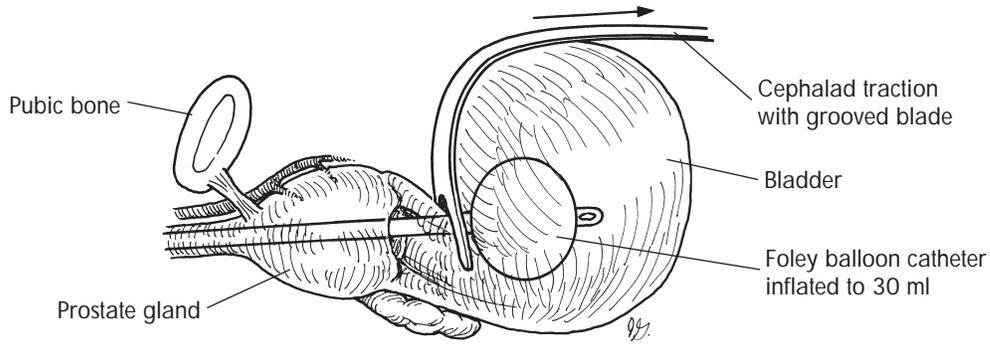
FIG. 18-15. The key maneuver of cephalad traction with the grooved blade and downward traction with a sponge stick exposes the puboprostatic ligaments.

With the removal of the fat around the puboprostatic ligaments and endopelvic fascia, the surgeon can clearly see the ligaments and lateral fascia.

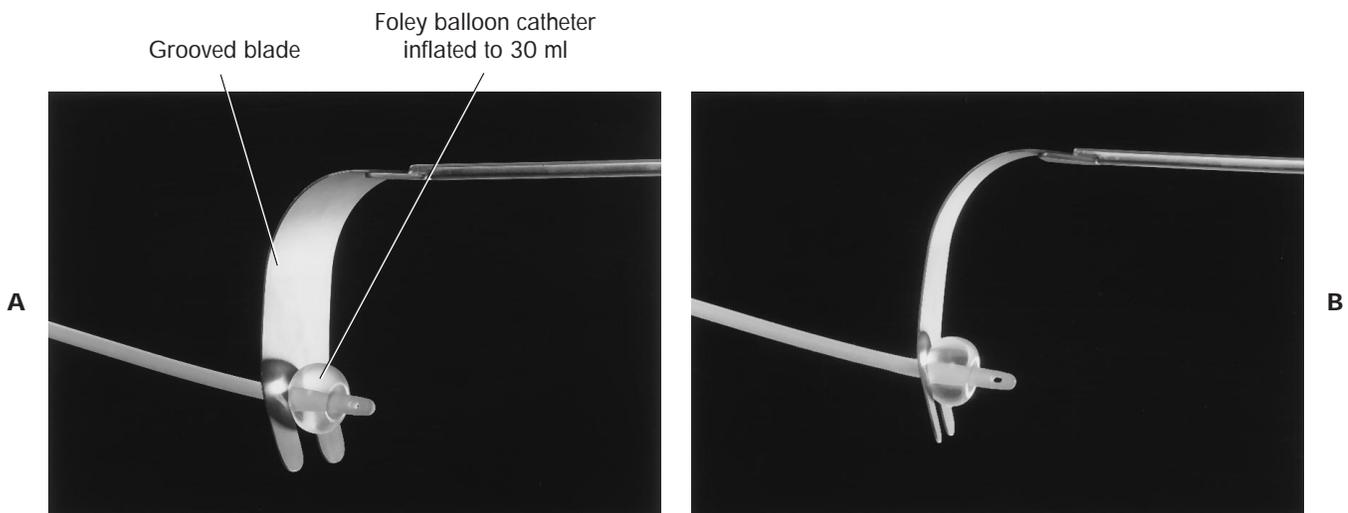


From Kaufman JJ, Katske FA: *Urology* 20:309, 1982.

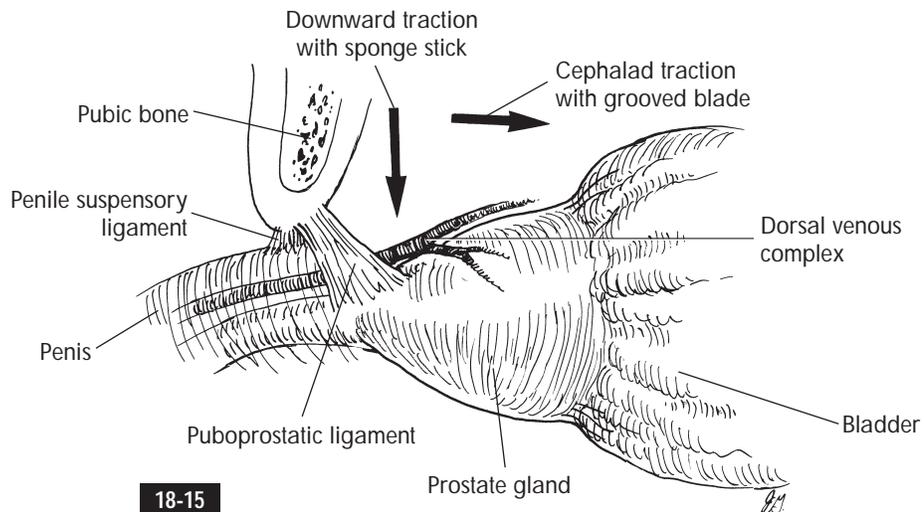
18-12



18-13



18-14



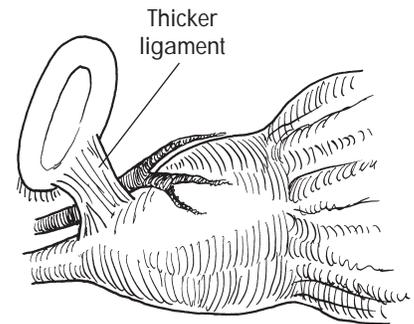
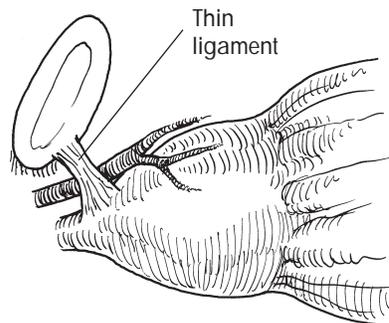
18-15

FIGS. 18-16 AND 18-17. The puboprostatic ligaments are not just fibrous, bandlike structures viewed from the space of Retzius but are thickened, pyramid-shaped structures that can vary in configuration (length and width) and in position to each other.⁴ If the ligaments are wide apart and long, small “nibbles” of the superficial bands with scissors and a subsequent “finger-fracturing” or “pinching” can be performed to loosen the prostatic apex. This maneuver should be performed after the endopelvic fascia is opened bilaterally.

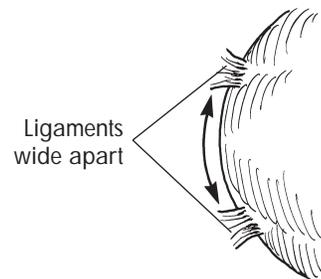
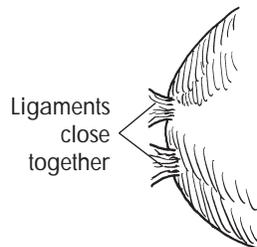
FIG. 18-18. The traditional approach is to divide the puboprostatic ligament separately from the dorsal venous complex (1). However, if the puboprostatic ligaments are close together, then these ligaments and the dorsal venous complex can be tied together as one unit and divided proximal to the ties away from the ligament insertions to the pubic bone^{5,6} (2 and 3). A 2 to 3 cm margin must be developed between the urethra and dorsal venous complex (4).

Variations in Configuration of Puboprostatic Ligaments

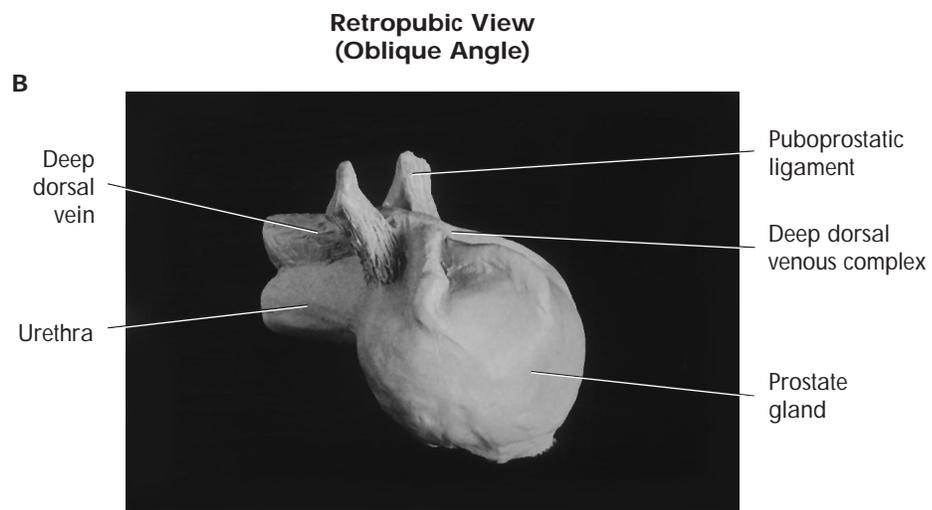
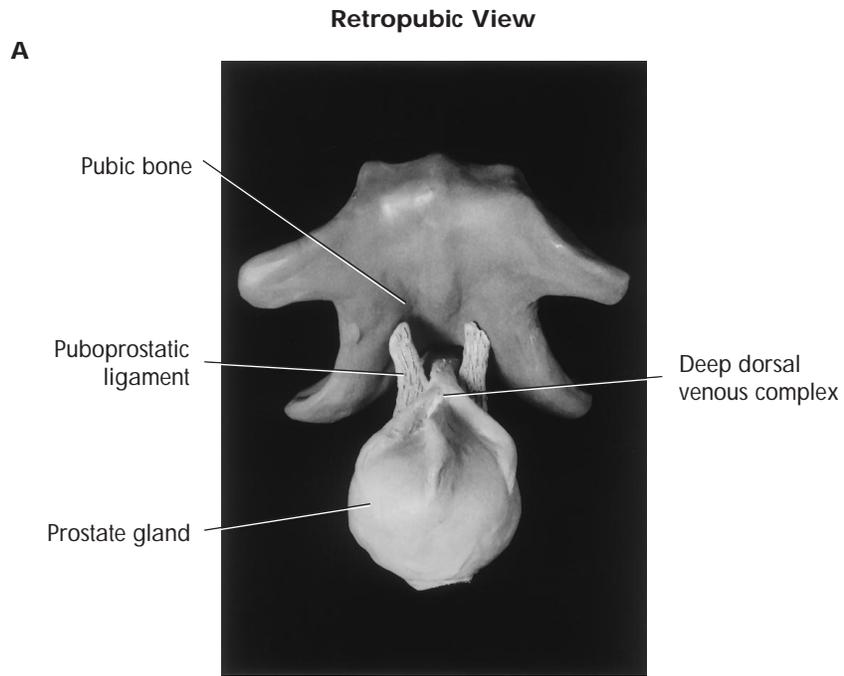
Lateral View



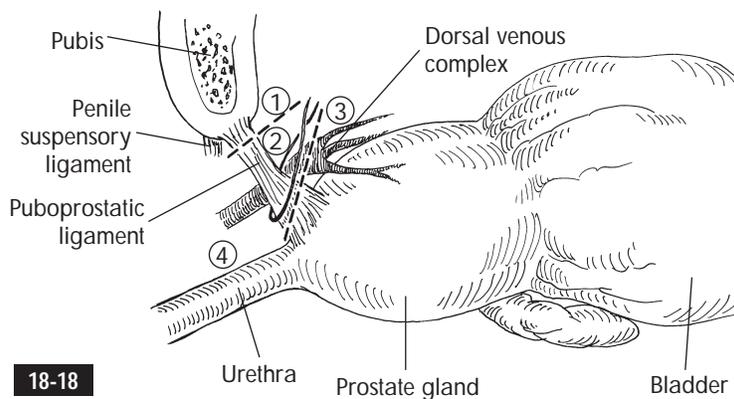
Superior View



18-16



18-17



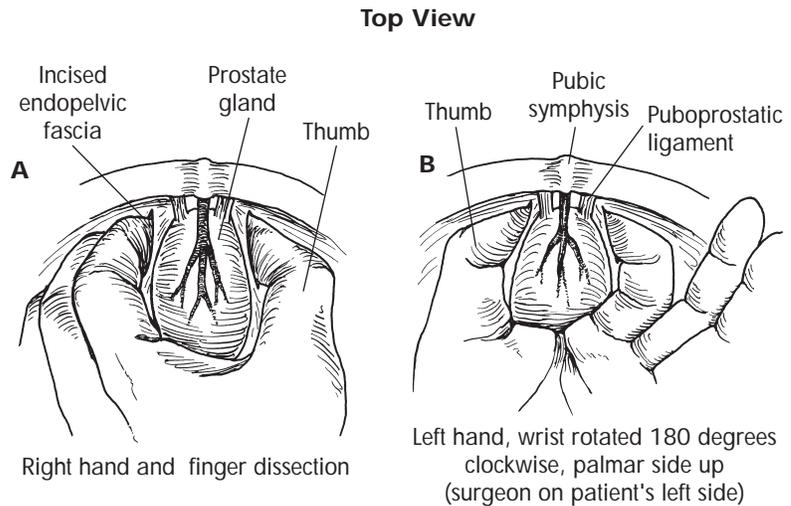
18-18

FIGS. 18-19, 18-20, AND 18-21. The surgeon can tunnel the index finger and thumb within the endopelvic fascia and “finger-pinch” a plane between the dorsal venous complex and the urethra (Figs. 18-19, A, and 18-20). The dorsal venous complex, a combination of fatty, fibrous tissues and venous channels, is about 2 cm in diameter.

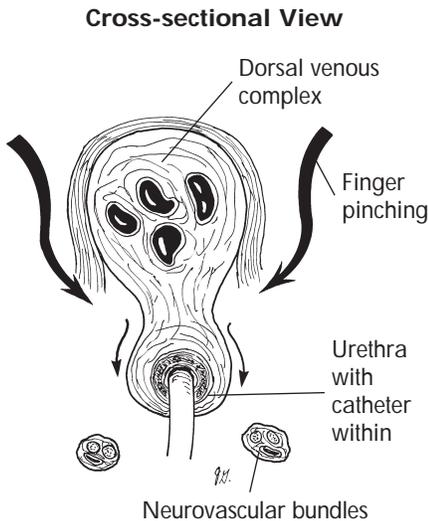
At the patient’s left side, a simple maneuver is for the surgeon to insert the left hand, rotated 180

degrees clockwise at the wrist with the palm up (Fig. 18-19, B), and then, using the left thumb and index finger, feel the dorsal venous complex and the urethra with the Foley catheter within.^{5,6}

FIG. 18-22. Since the diameter of the dorsal venous complex varies, the surgeon may opt to use right-angle clamps, which are available with different lengths of the angled nose.

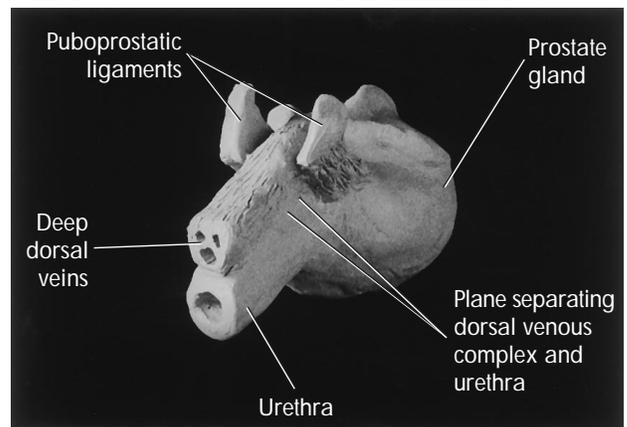


18-19



18-20

View from Anterior Side (Penile Base) Without Pubic Bone

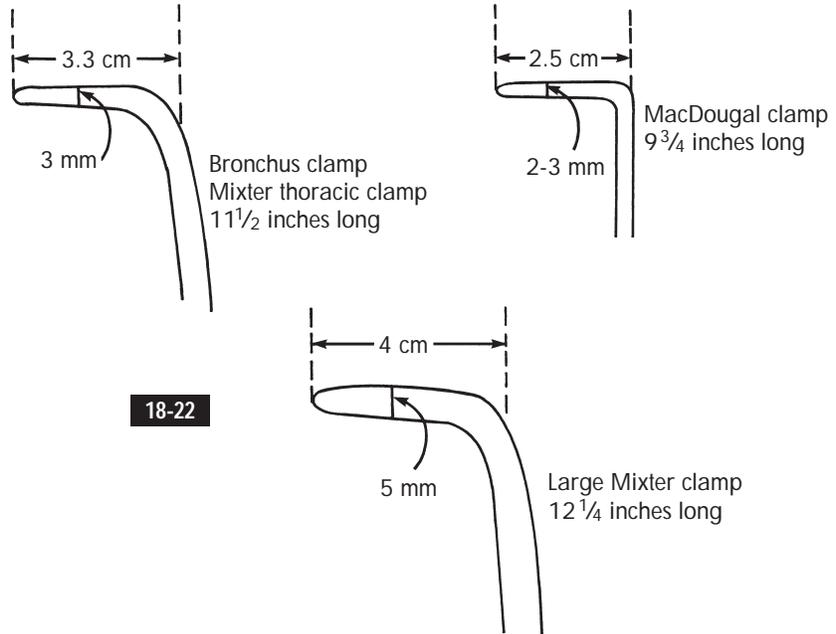


18-21

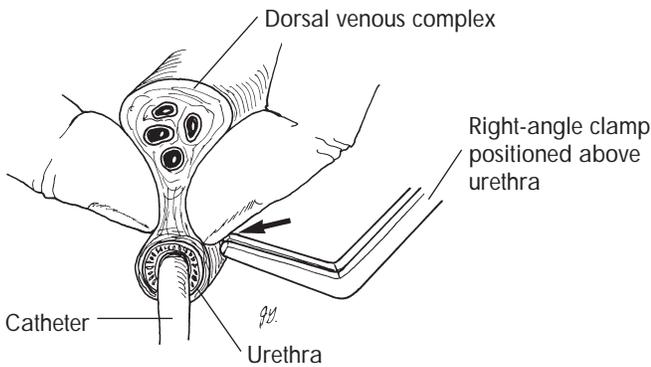
FIGS. 18-23 AND 18-24. The surgeon guides the right-angle clamp down and adjacent to the index finger for the blind placement of the clamp in the plane between the dorsal venous complex and urethra. The surgeon then uses the index finger or middle finger to feel the clamp from the other side to determine the correct site for the actual puncture.

FIG. 18-25. Because venous bleeding often obliterates the tip of the right-angle clamp, a suction tip placed against the right-angle clamp tip will clear the operative field and facilitate placement of the ties.

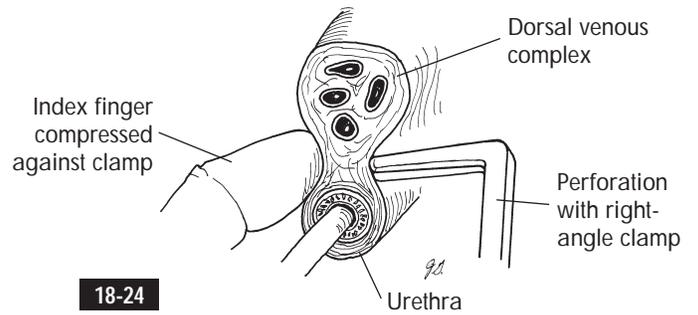
Variations in Right-Angle Clamps



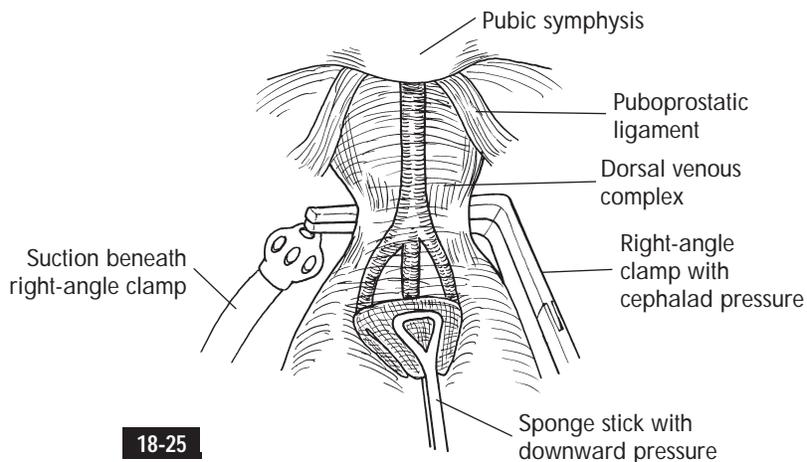
18-22



18-23

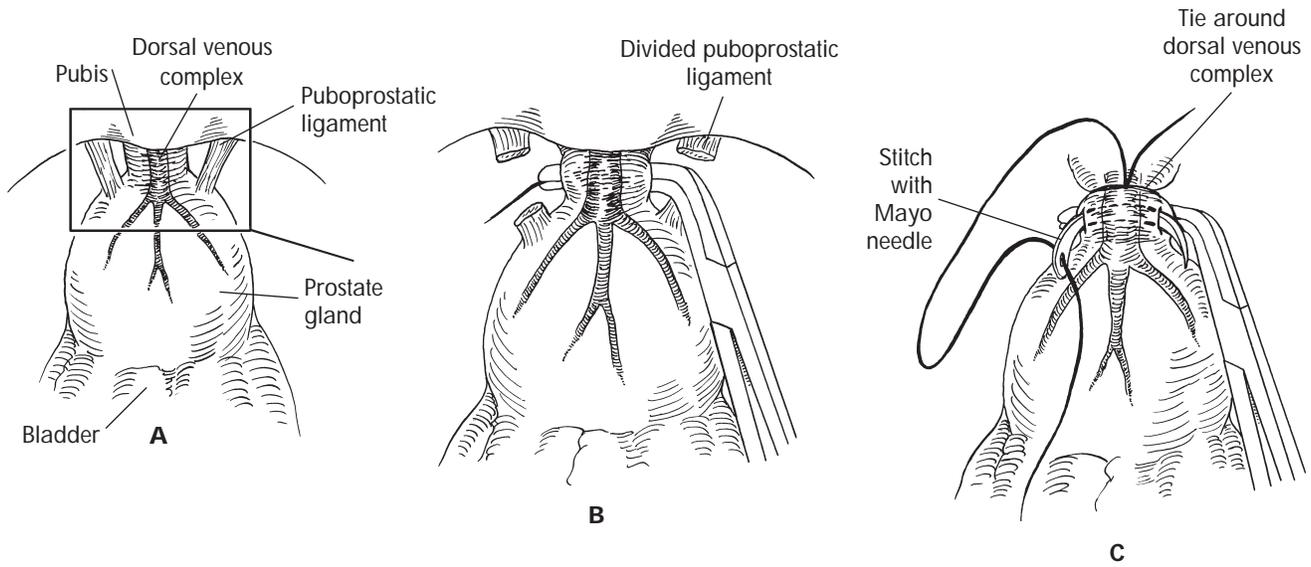


18-24



18-25

Dorsal Vein Ligation and Stitch Exclusive of Puboprostatic Ligaments



Dorsal Vein Ligation Inclusive of Puboprostatic Ligaments

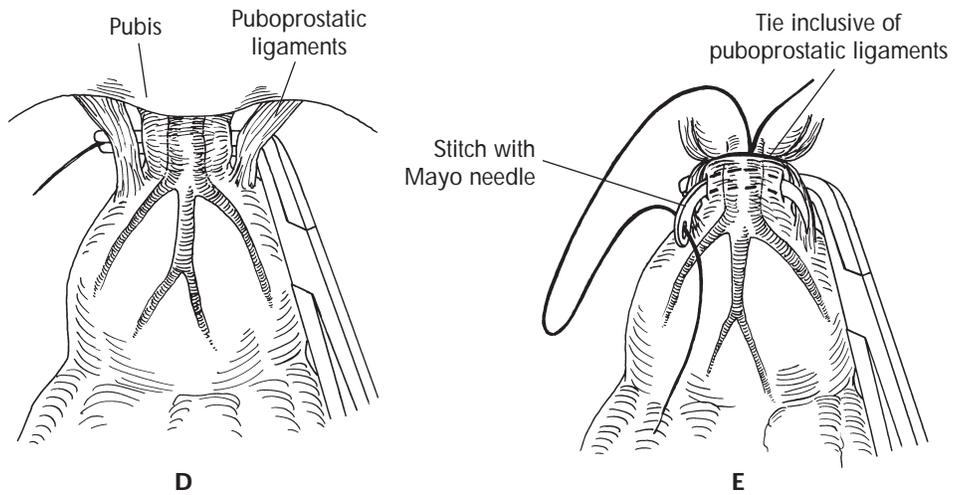


FIG. 18-26. A free margin 2 to 3 cm long between the dorsal venous complex and the urethra is established (A and B). A long tie (1-0 Vicryl) is passed around the dorsal venous complex and tied. With a right-angle clamp placed below the ligated dorsal venous complex (exclusive of the divided puboprostatic ligaments [B] or inclusive of the intact puboprostatic ligaments [D]), the surgeon can thread one free end of the Vicryl tie through a No. 3 Mayo needle and place a back-handed figure-of-eight stitch through the dorsal venous complex (C and E). This maneuver will prevent tie slippage and can be repeated as many times as needed before the dorsal venous complex is divided proximal to the ties.

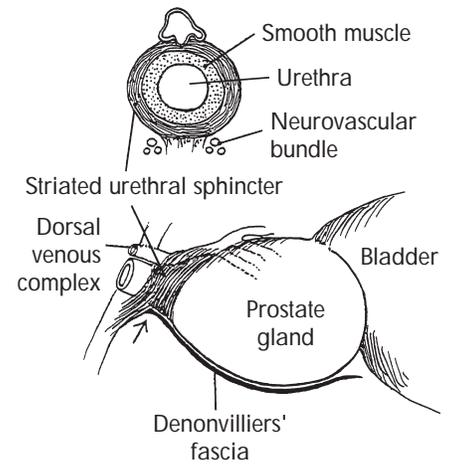
After tying the dorsal venous complex but before dividing it, the surgeon uses an index finger and thumb to gently feel the urethra and establish a plane around it. With the index finger and thumb encircling the urethra from the 12-o'clock position to the 6-o'clock position, the surgeon avoids the neurovascular bundles, which are

inferior to the urethra on both sides.

FIG. 18-27. Although the surgeon's goal is to isolate the urethra, we believe any urethral mobilization and isolation with a right-angle clamp or finger-pinching will incorporate some but not all of the striated urethral sphincter (rectourethralis muscle).⁷

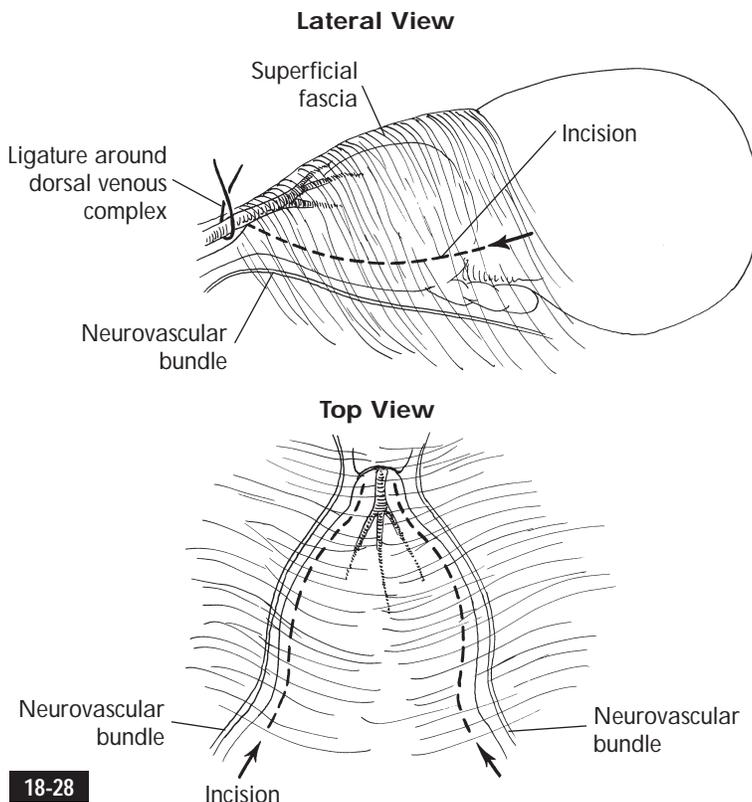
An umbilical tape is passed around the urethra and placed on traction.

FIGS. 18-28 AND 18-29. The superficial fascia covering the anterior region of the prostate gland can be divided before or after the division of the dorsal venous complex and urethra. We prefer to divide it bilaterally immediately after the ligation of the dorsal vein when the anterior prostate anatomy is not yet distorted or bloody. This thin fascia can be divided from the bladder to the apical region of the prostate gland or in reverse, depending on the surgeon's preference. This maneuver allows the surgeon to tease the neurovascular bundles from both sides of the prostate gland if a nerve-sparing procedure is desired.

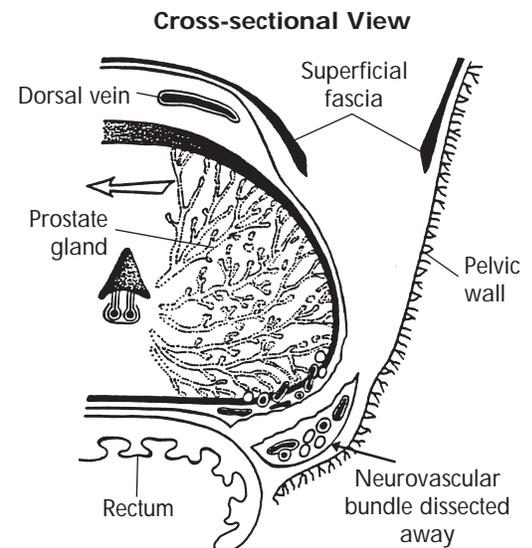


From Myers RP, Goellner JR, Cahill DR: *J Urol* 138:543, 1987.

18-27

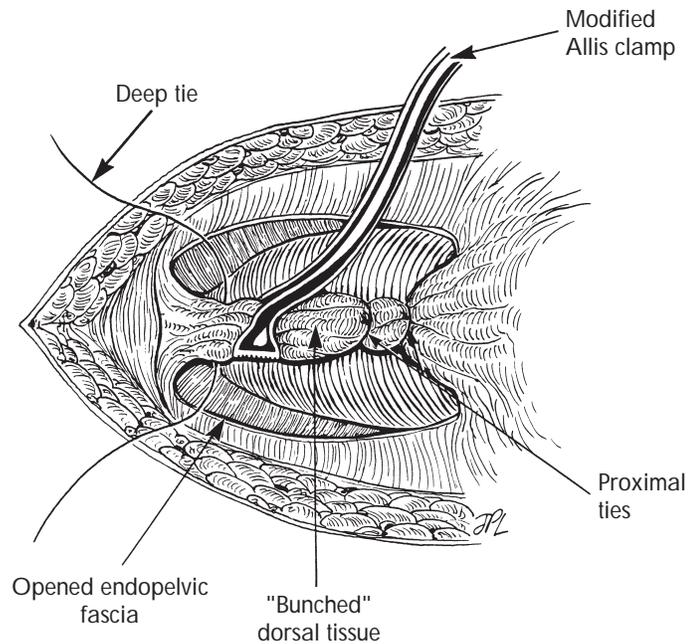


18-28



Courtesy Dr. T. Stamey.

18-29



From Myers RP: *J Urol* 142:1282, 1989.

18-30

FIG. 18-30. If there are prominent venous channels more proximally (plexus of Santorini), the “bunching” stitch⁸ can prevent back-bleeding when the dorsal venous complex is divided. These bunching stitches will incorporate the superficial fascia with the ligated venous structures, thus exposing the lateral region of the prostate gland on each side.

The division of the dorsal venous complex should be angled to parallel the prostatic apex to avoid cutting into the apical region of the prostate gland⁹ (see Fig. 18-18).

URETHRAL DIVISION

FIG. 18-31. While the assistant lifts the urethra with the right-angle clamp and applies downward pressure with the sponge stick on the prostatic apex, the surgeon divides the urethra accurately while applying suction. The catheter is pulled up and divided, and its proximal end is clamped.

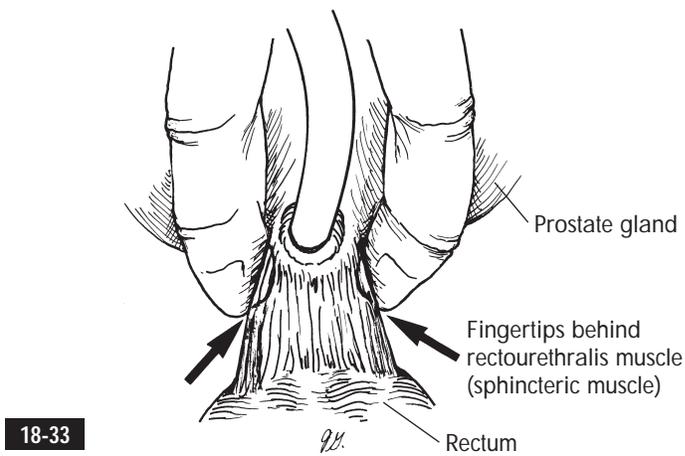
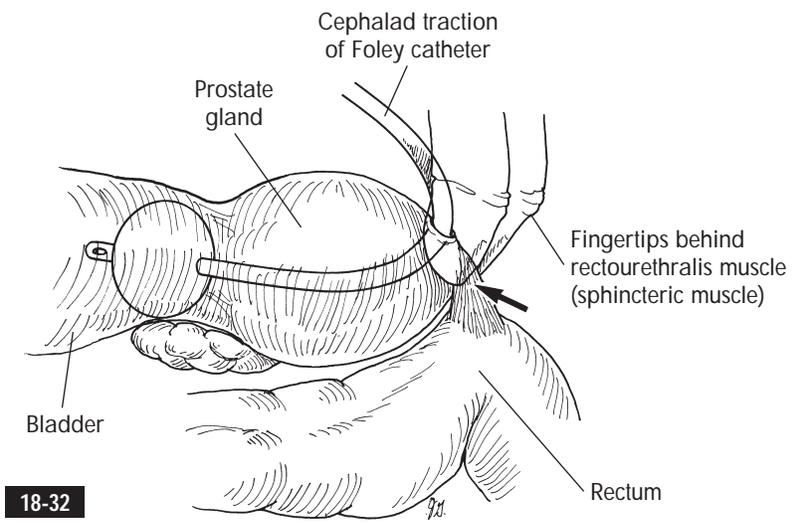
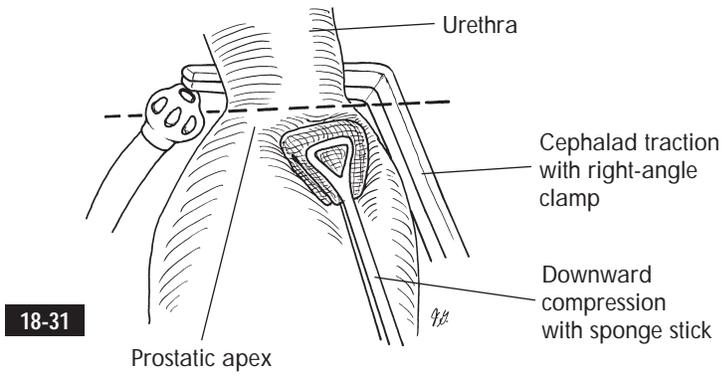
The grooved blade holding the Foley balloon catheter and blad-

der cephalad is removed, the balloon is held snug against the prostate gland, and the catheter is retracted cephalad.

The patient, who was in a reverse Trendelenburg position for the dorsal vein division, is then placed in the Trendelenburg position for the best exposure for proximal dissection.

FIGS. 18-32 AND 18-33. With the left index and middle fingertips slightly behind and compressing either side of the residual striated urethral sphincteric muscle (rectourethralis muscle) over the prostatic apex, the surgeon uses scissors first to spread parallel to the muscle fibers and fibrous tissues and then to cut these separated fibers close to the prostate side. The left fingertips are used as a guide to determine the depth of these cuts and to protect the rectum.

Once the striated urethral sphincteric muscle (rectourethralis muscle) is divided, it is easy to establish a plane between the prostate gland and the rectum.



PROXIMAL PROSTATE AND SEMINAL VESICLE DISSECTION

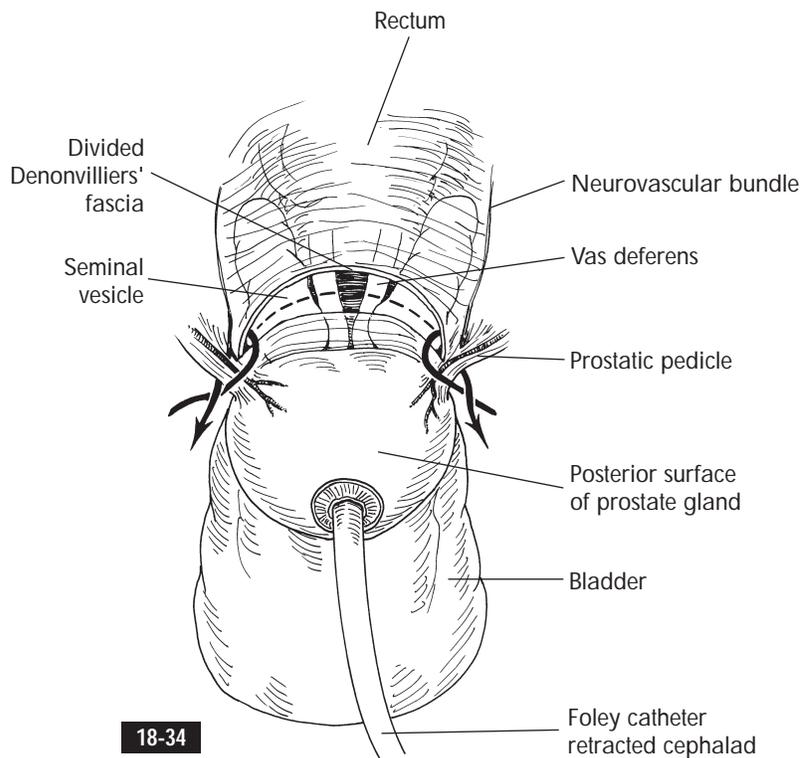
A key maneuver in this dissection is to use a sponge stick to push down on the rectum while pulling the prostate gland cephalad. Care should be exercised to avoid excessive cephalad retraction of the prostate gland to protect the neurovascular bundles on both sides.

FIG. 18-34. The surgeon incises the Denonvilliers' fascia to expose the seminal vesicles and vasa deferentia proximal to the prostate gland.

The seminal vesicles and the vasa deferentia are exposed; we prefer to divide both vasa deferentia and seminal vesicles at this

point without further dissection, thereby not taking the tips of the seminal vesicles with the prostate specimen.¹⁰ If the surgeon chooses to dissect the seminal vesicles and vasa deferentia entirely, blunt and sharp dissection can still be used at this point to separate a plane between the Denonvilliers' fascia and the vasa deferentia and seminal vesicles. This maneuver facilitates the later dissection of the vasa deferentia and seminal vesicles after the bladder neck is divided.

The surgeon can use a right-angle clamp to tunnel inside the open Denonvilliers' fascia and lateral to the seminal vesicles for prostatic pedicle ligation.



BLADDER NECK RECONSTRUCTION

The usual approach for bladder neck dissection is first to establish a plane between the anterior prostate gland and the bladder.

Once the urethra is opened, the catheter is removed from the bladder and retracted on the prostate side as the bladder is dissected free from the seminal vesicles.

FIG. 18-35. After the prostate gland, vasa deferentia, and seminal vesicles are removed, the surgeon can evert the bladder's epithelial surface and perform a "tennis racquet" reconstruction. The tennis racquet configuration moves the bladder neck cephalad away from the ureters, protecting them from accidental stitch injury.

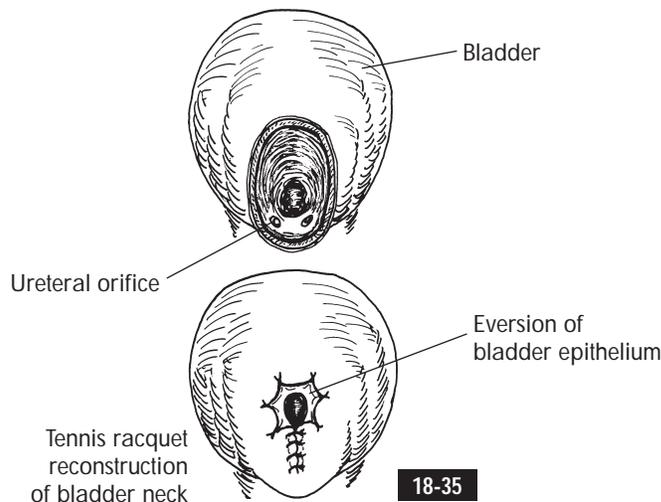
BLADDER NECK AND PARTIAL PROSTATIC URETHRAL PRESERVATION

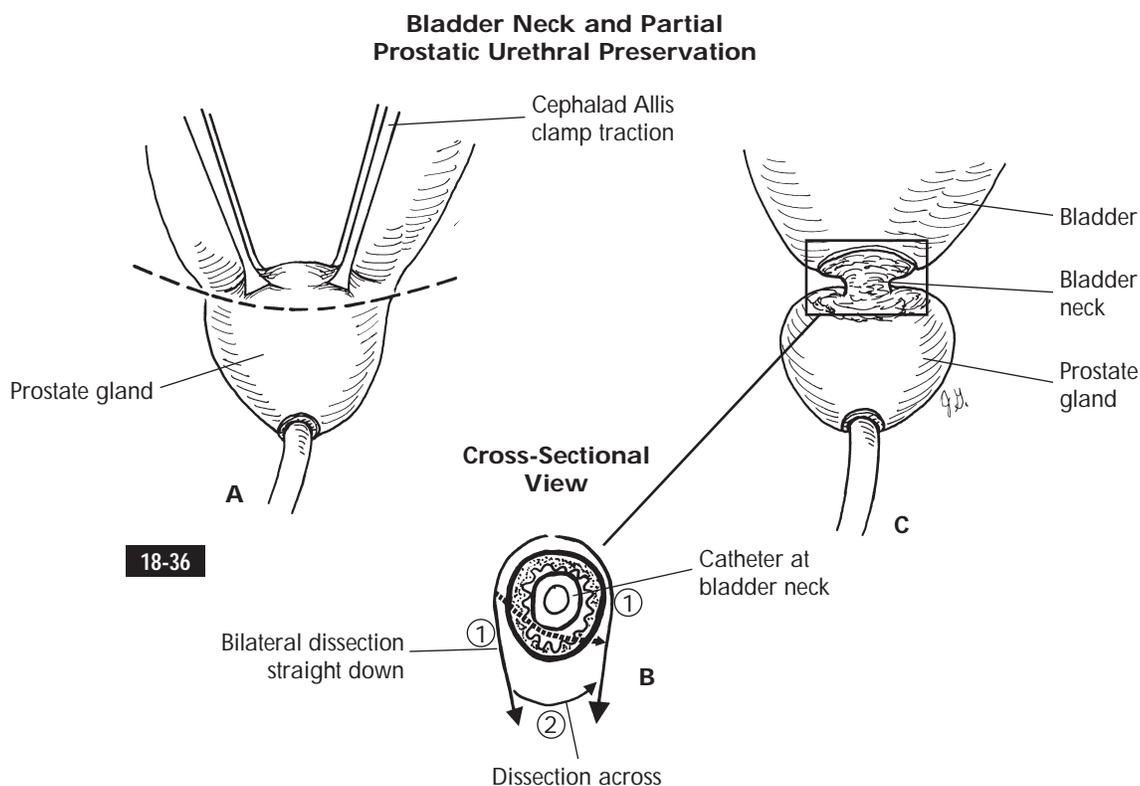
For low-stage cancer disease involving peripheral lesions, we prefer to perform bladder neck and partial prostatic urethral preservation because this approach offers earlier postoperative continence recovery and is associated with a lower frequency of severe stricture formation.^{5, 11-14}

It is well known that prostatic glands can drain directly into the bladder neck and even as far as the trigone region.¹⁵ However, isolated adenocarcinoma of the prostate gland involving these glandular tissues is rare.

The frequency of isolated adenocarcinoma in the transition zone of the prostate gland at the bladder neck region is approximately 3% to 6%.^{11,16} However, the frequency of cancer involvement of the prostatic apex region is much higher. More commonly, cancer involvement of the region near the prostatic urethra and bladder neck is secondary to extension of larger cancers with multifocal involvement.¹²

We believe that with careful selection of patients with low-stage peripheral disease, bladder neck and partial prostatic urethral preservation can be performed safely without the risk of leaving cancer behind.¹⁷ Routine biopsy of the prostatic cuff and bladder neck has rarely shown adenocarcinoma. If it is positive for cancer, we have resected the bladder neck as described previously.





FIGS. 18-36 AND 18-37. Using Allis clamps to apply countertraction between the prostate gland and bladder, the surgeon isolates the anterior urethra (Fig. 18-36, A, and Fig. 18-37, A). If a bunching stitch has previously been placed to avoid venous backflow, it must first be removed.⁸

Using both blunt and sharp dissection, the surgeon now dissects straight down each side of the urethral margin instead of encircling the urethra immediately (1 in Fig. 18-36, B). Invariably, the posterior bladder neck will be torn or lacerated if the surgeon attempts to dissect around the urethra prematurely (*dashed line* in Fig. 18-36, B; see Fig. 18-38, C).

Once certain that the bilateral dissection extends below the posterior bladder neck, the surgeon may use a right-angle clamp to gently encircle the urethra and work back upward (2 in Fig. 18-36, B).

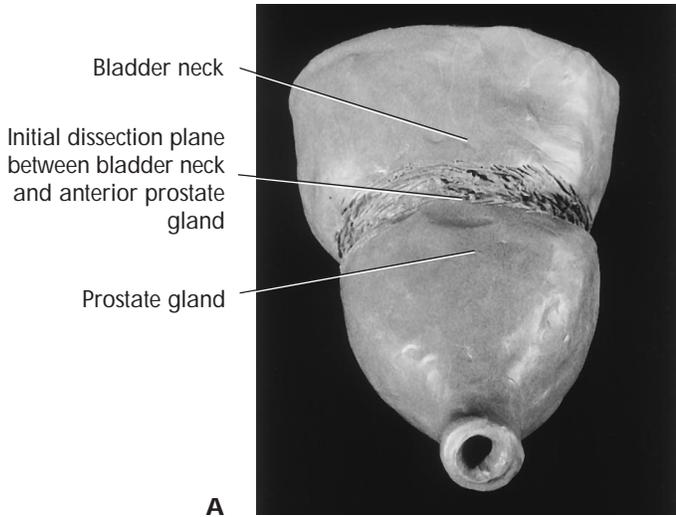
A groove is thus created between the bladder neck and the prostate gland (Fig. 18-36, C, and Fig. 18-37, B and C).

FIG. 18-38. Using umbilical tape around the bladder neck and removing the Allis clamp on the bladder side, the surgeon continues the distal urethral dissection by blunt dissection with the Kitners. A vein retractor is placed within the groove of the proximal prostate gland to help to retract it distally (A).

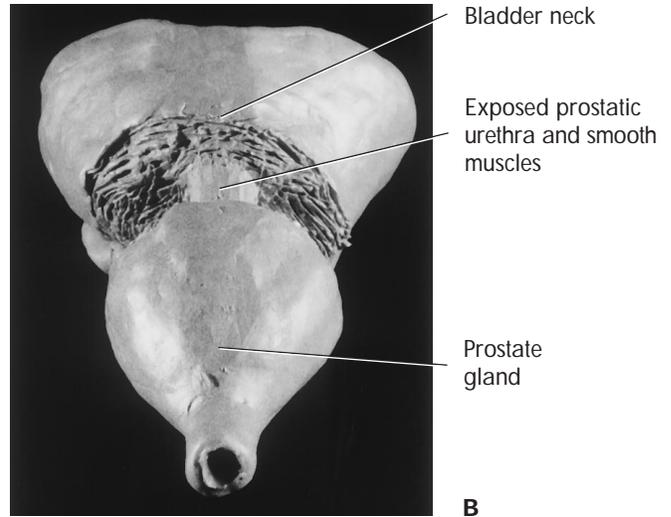
Finger palpation and “pinching” help to define a cuff of prostatic urethra free from the prostate gland. If a patient has a large median lobe, the surgeon will have difficulty in defining a plane between the posterior prostatic urethra and the median lobe.

The Foley catheter is removed and then the urethra is cut as distally as possible, leaving a 2 cm cuff attached to the bladder neck (B).

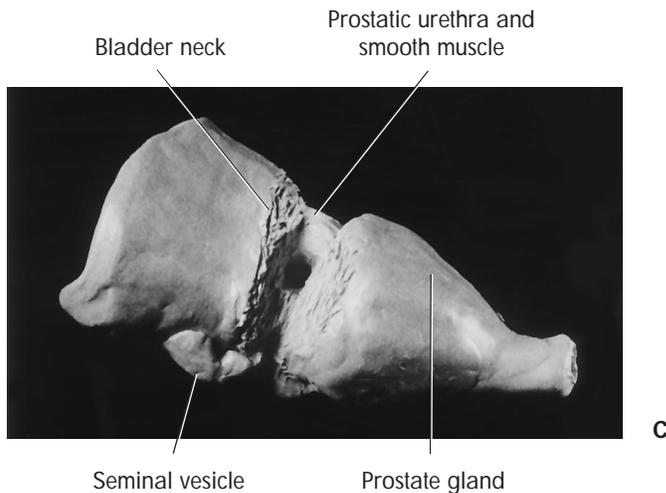
Frontal View



Frontal View



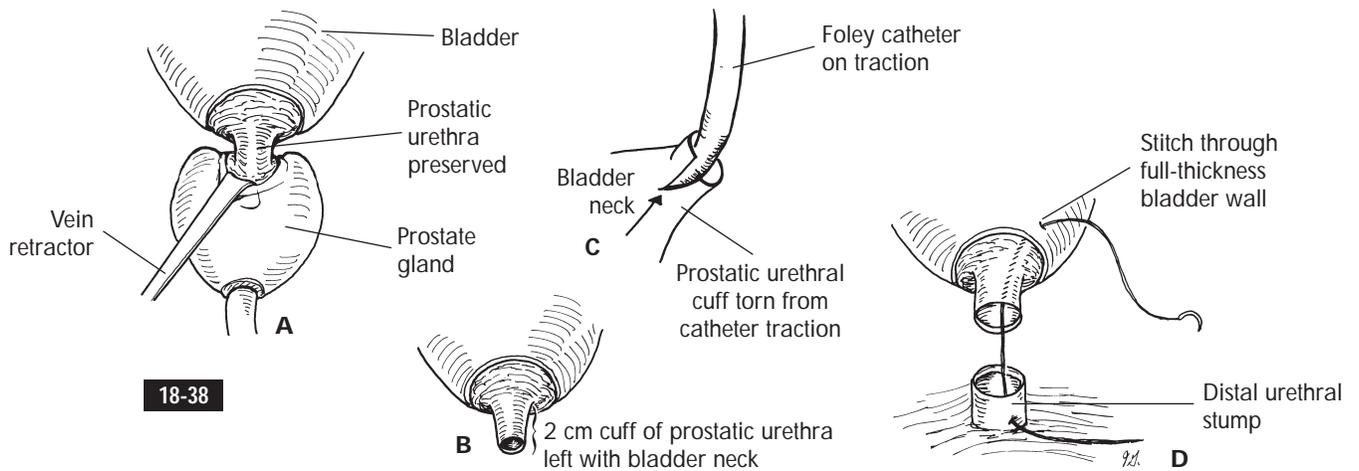
Lateral View



If the cuff were divided anteriorly with the catheter within and the catheter were retracted cephalad, there would be the potential for tearing this smooth muscle cuff (C).

For urethral reanastomosis, the epithelium is not everted but deep suture bites of the full-thickness bladder wall are taken to create the anastomosis (D). Anastomosing only the distal urethra to the cuff of the prostatic urethra is insufficient and the repair will tear out.

18-37



18-38

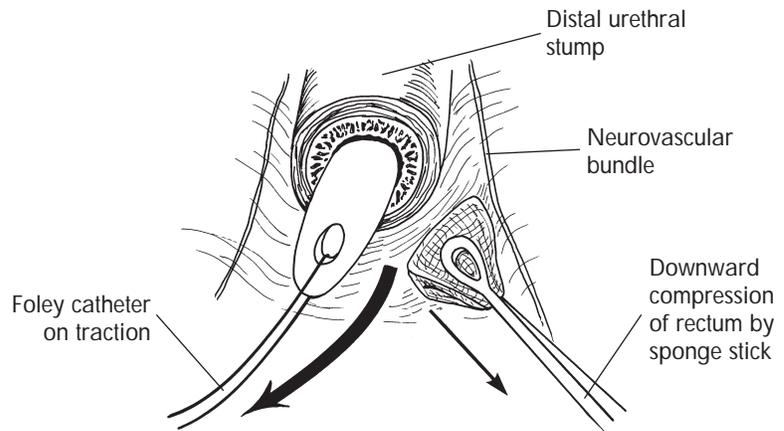
DISTAL URETHRAL-BLADDER NECK ANASTOMOSIS

FIG. 18-39. Whether using a Foley catheter (22 Fr with a 30 ml balloon filled with 5 ml) or a Greenwald sound to aid in urethral stitch placement, the surgeon places four to six stitches while the assistant uses a sponge stick to depress the rectum out of harm's way. Although the surgeon can take wide suture bites in the anterior urethra (sometimes including the levator ani muscle), more conservative suture bites should be placed in the posterior urethra to avoid the lateral neurovascular bundles.

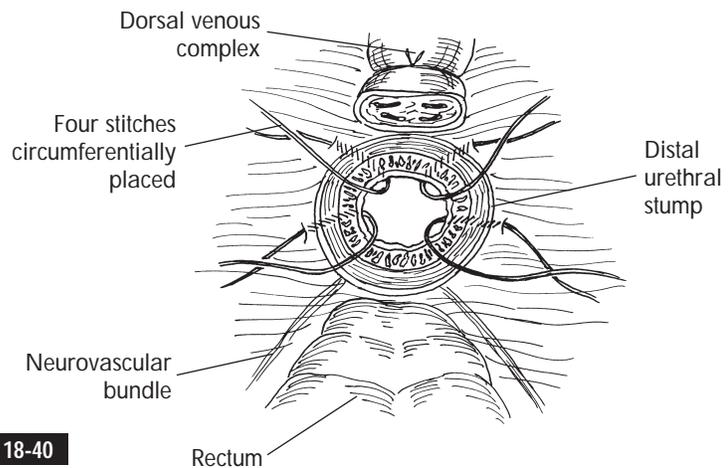
We have found a No. 3 Mayo needle bent into a U configuration helpful in placing deep but not wide bites.

FIG. 18-40. With a threaded Mayo needle, the surgeon passes the four urethral sutures through the respective four positions in the bladder to complete the anastomosis.

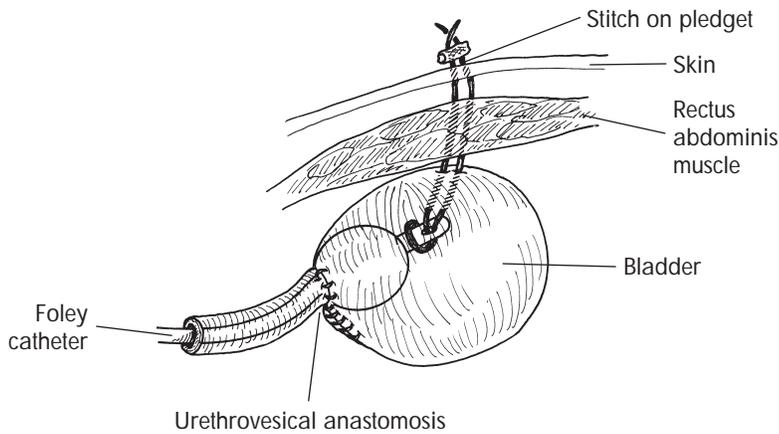
FIG. 18-41. A Foley catheter attached to a stitch (0 Prolene) brought out through the bladder and the skin is a safety measure that prevents accidental catheter slippage.



18-39



18-40



18-41

KEY POINTS

- A malleable blade retractor is positioned within the retroperitoneal pockets for pelvic lymphadenectomy, and the hypogastric artery is temporarily ligated with vessel loops.
- The bladder is retracted cephalad with a grooved blade retractor fixed to the Balfour or Bookwalter retractor, and downward compression is applied to the prostate gland with a sponge stick.
- The dorsal venous complex is ligated and divided.
- The urethra is isolated, avoiding the neurovascular bundles.
- The superficial fascia is divided with a nerve-sparing procedure or a wide excision is performed after urethral division.
- The rectourethralis muscle (striated urethral sphincteric muscle) is divided.
- Denonvilliers' fascia is opened, freeing the seminal vesicles and vasa deferentia posteriorly.
- The prostatic pedicles are divided.
- Two alternatives exist for bladder neck dissection: a wide bladder neck dissection with a tennis racket reconstruction or a bladder neck and partial prostatic urethral preservation.
- The prostate gland, seminal vesicles, and vasa deferentia are removed.
- Urethral-bladder neck anastomosis is performed.

P O T E N T I A L P R O B L E M S

- *Rupture of hypogastric vein:* Perform suture ligation → ligate entire vessel
- *Excessive bleeding from dorsal venous complex:* Perform a figure-of-eight stitch on the dorsal venous complex → apply a Foley catheter tamponade (balloon filled with 40 ml of saline solution)
- *Rectal injury:* Perform two-layer primary repair of injury → perform colostomy for a severe laceration
- *Ureteral injury in bladder neck dissection:* Repair vesical tear and place stent in ureter if needed
- *Torn distal urethra from stitch placement:* Replace new stitch and include lateral levator ani muscle in the anterior two stitches

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SUGGESTED READINGS

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