

TRANSURETHRAL RESECTION OF THE PROSTATE GLAND

21

Prostatic sonographic studies of patients who have undergone a transurethral resection of the prostate gland reveal large volumes of residual prostate tissue surrounding the open channel. The objective of this operation is to create an open prostatic urethra with a resultant ovoid, funnel-shaped opening of the prostatic fossa.

The technology may change, but whether conventional electric cutting loops, laser beams, high-frequency electrovaporization, or newer modalities are used, the principles of this operation are the same.

Varying the strength of electric currents and laser beams can achieve two objectives: (1) to coagulate and denature tissues, which will result in tissue ischemia and hemostasis, and (2) to remove tissues by electric resection or vaporization by laser or high-frequency current.

In general, we will not perform transurethral resection in patients with an infected urinary tract. Even with preoperative administration of intravenous antibiotics, patients can suffer from urosepsis with severe blood pressure fluctuations postoperatively. It is better to treat the infection and then perform the elective surgery.

Diagnostic cystoscopy performed before the actual surgery provides the surgeon a chance to plan and adapt special variations of the operation, although some urologists have considered this to be an unnecessary step.

Before the resectoscope is in-

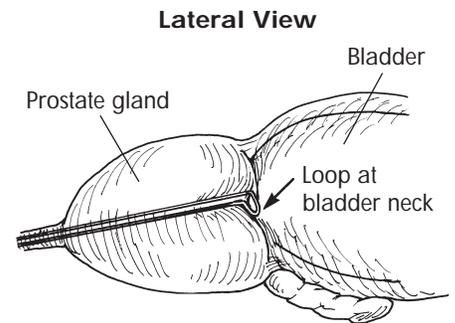
serted, urethral dilatation with Van Buren sounds will decrease the chance of iatrogenic stricture formation.

BLADDER NECK AND PROXIMAL PROSTATE RESECTION

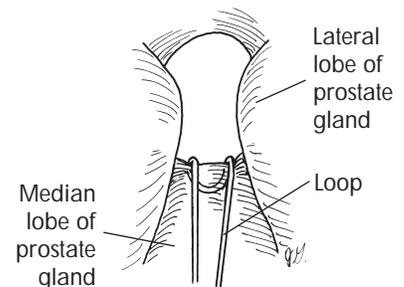
The surgeon should always identify the location of the ureteral orifices before any maneuvers are performed because their position may vary in relation to the bladder neck.

FIG. 21-1. One of the troublesome bleeding sites associated with this surgery is the raw edges of the bladder epithelium, which can be difficult to find at the end of the resection. To avoid this problem, the surgeon coagulates this area before beginning the resection by resting the loop against the proximal side of the bladder neck at the 5-, 6-, and 7-o'clock positions and then coagulating these areas for 2 to 3 seconds each. Then, without the position of the cutting loop at the bladder neck being changed, a cut is made into the proximal prostate gland through this cauterized bladder neck epithelium. It is not necessary or wise to cauterize the epithelium in the remaining circumference of the bladder neck because oozing from lateral or anterior vessels can easily be seen and controlled.

FIG. 21-2. Especially in young men with small, obstructive prostate glands, aggressive circumferential resection of the bladder neck often results in bladder neck contractures.

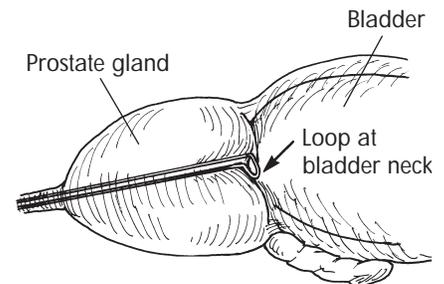


Frontal View



21-1

Lateral View



Frontal View

21-2

The surgeon should initiate these first three cuts at the 5-, 6-, and 7-o'clock positions with *straight*, full excursions of the cutting loop.

Even in the proximal resection of the prostate gland, the surgeon should always check for the location of the verumontanum, which is the *distal landmark* of the resection.

FIG. 21-3. We prefer to resect from the 7- to 11-o'clock positions and 5- to 1-o'clock positions (A) rather than use the Nesbit approach from the top¹ (B). The illustration shows the exact order of resection. It is best to resect the median lobe in two stages: one major part at the beginning of the procedure and the second trimming when the procedure is near completion.

Resecting down to the circular fibers in the major central portion of the prostate gland increases the surgeon's risk of cutting into venous sinuses and even capsular walls but will not increase the likelihood of improved voiding results postoperatively. Sculpting a smooth, funneled cavity with no bulging adenoma seen coming into the cavity should be the goal. Once this is accomplished, the resection has gone deep enough.

The proximal anterior aspect of the prostate gland from the 11- to

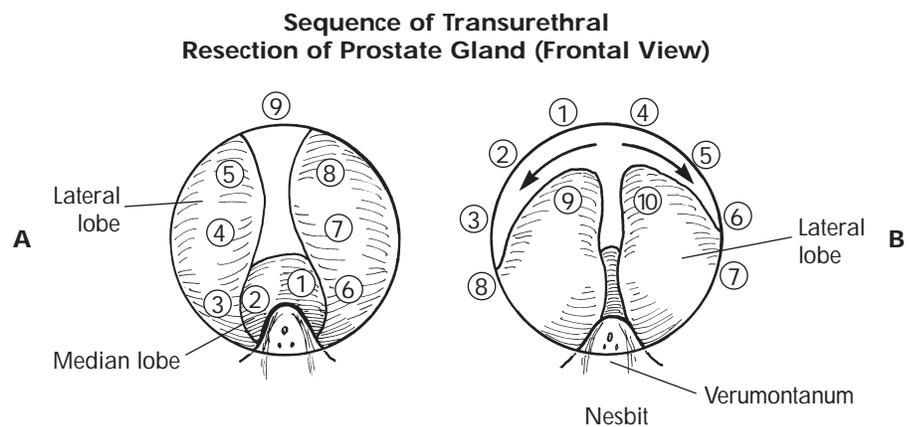
1-o'clock positions is usually thin. The surgeon should remember that it is also at the distal anterior prostate region where continence may be affected by the resection.

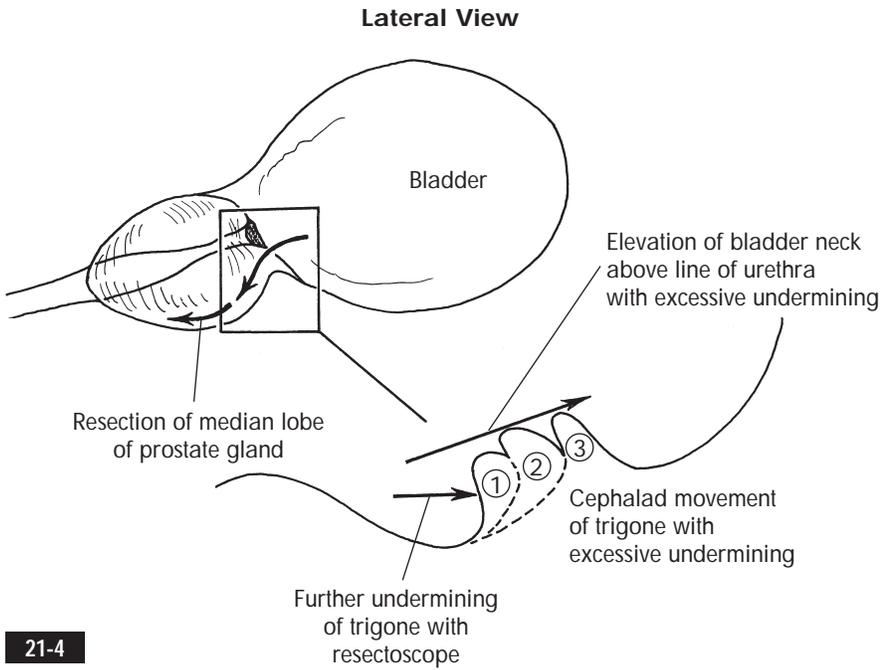
FIG. 21-4. While resecting a large median lobe, inexperienced surgeons invariably overcut or excessively "scoop" too early in the operation. This action results in elevation of the bladder neck with undermining of the trigone region. Once the trigone has been undermined by the excessive resection, the bladder neck at the 6-o'clock position moves further and further cephalad (1, 2, 3) as the surgeon continues the procedure. By the end of the surgery, the bladder neck not only has moved cephalad but also is elevated above the line of the urethra. Reinsertion of the scope and the Foley catheter is difficult.

The use of a guidewire with the Foley catheter often is required in catheter insertion into an undermined bladder. To facilitate insertion, the guided Foley catheter should "hug" the anterior urethra.

DISTAL PROSTATE RESECTION

FIG. 21-5. The verumontanum is always distal to the resection. The preservation of this landmark facilitates the various maneuvers for the distal resection.





The surgeon first visualizes the verumontanum distally and then moves the resectoscope proximally or forward toward the bladder until the surgeon is no longer able to see this landmark; this is the correct distal margin of resection. In addition, this maneuver actually pushes the distal apical tissue to a more proximal position in relation to the verumontanum. Consequently, potential sphincter injury is avoided during the resection of this tissue.

The surgeon resects the lateral distal prostatic tissues (6- to 3-o'clock and 6- to 9-o'clock positions).

Some surgeons insert the index finger into the rectum through an O'Connor sheath during the resection of the floor of the prostate gland (5- to 7-o'clock positions), but we have not used this extra aid, believing it leads to undermining.

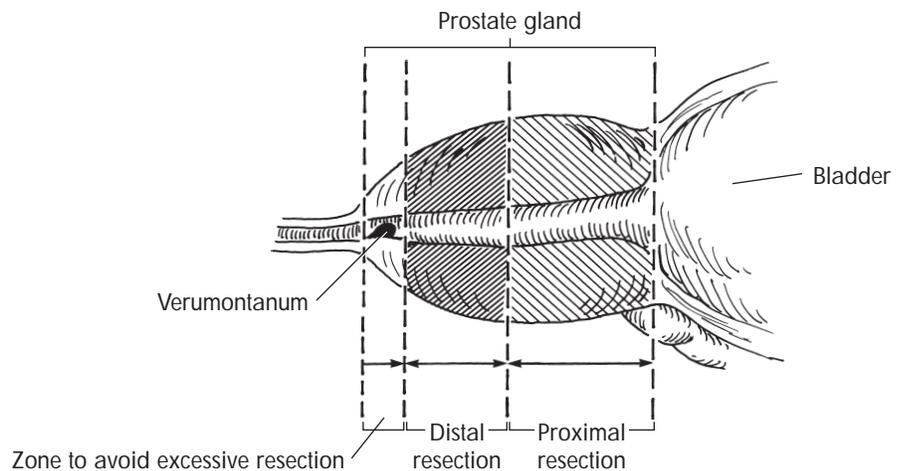
The anterior distal aspect of the prostate gland should be resected carefully in small "nibbles." There is little prostate tissue in this region, and excessive resection may lead to permanent incontinence.

The surgeon should visualize

the verumontanum, move proximally, and then rotate the resectoscope 180 degrees for the anterior resection. The resection must not extend past the region of the verumontanum.

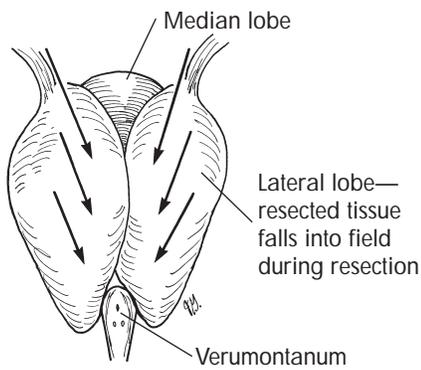
If the patient is in a Trendelenburg position, the surgeon must correct the orientation of the resectoscope to avoid a long anterior cut, which may end up more distal than the verumontanum.

Stages of Transurethral Resection of Prostate Gland



21-5

Resection in Straight Line Rather Than "Scooping" Motion



21-6

RESECTION TECHNIQUES

The size and shape of the prostatic "chips" reveal the experience and skill of the surgeon.

FIG. 21-6. Each cut should be smooth and straight with full excursion of the cutting loop.

The cutting current is engaged until the loop retracts inside the resectoscope.

Segments of resected prostate tissue are sometimes too large to fit through the resectoscope sheath. This usually means the surgeon has "scooped" during the cut. It should be avoided. Faced with very large fragments, the surgeon may have to recut the fragments and/or remove them with grasping instruments with or without removing the resectoscope sheath.

FIG. 21-7. The surgeon should avoid the temptation to "scoop" the prostatic tissue and should cut with *straight excursion* of the cutting loop because then the resected tissues will automatically fall into the resection field. Scooping cuts result in undermining of

the trigonal region and cut into vascular sinuses and prostatic capsules unnecessarily.

If the tissues are oozing with blood, the surgeon should use a blend of cutting and coagulating currents to establish hemostasis while resecting tissues.

The thickness of the adenoma varies with each patient. Instead of relying on index finger palpation through an O'Connell sheath for arbitrary thickness of the remaining prostate wall, it is preferable to stop the resection when either no more bulging adenoma is seen when viewed from the verumontanum or when no more "mashed potatoes" (Miller's term) are seen during a cut. In either case, cutting deeper means entering the "circular fibers," which carries a great risk of troublesome bleeding. It does not make for easier voiding by the patient and it does waste time.

HEMOSTASIS

If a venous sinus is open, the surgeon must press the loop against the sinus and obliterate the opening before applying the electric current.

The surgeon should coagulate the tissue to obtain hemostasis while resecting prostatic tissues and not wait until the end of the operation to perform coagulation.

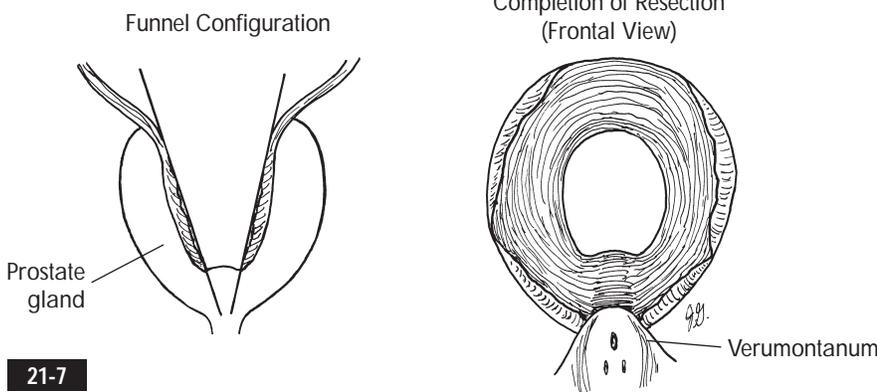
At the end of the surgery, the surgeon should establish a *systematic approach* to check for hemostasis, working from the bladder neck to the distal prostatic fossa.

It is best to check the anterior and lateral prostatic fossa first and leave the prostatic floor for last since the clots collect in this area.

Foley catheter tamponade of the prostatic fossa by traction of the catheter should remain a last resort to establish hemostasis.

Hemostasis should be complete at the end of the procedure, and all chips should be out of the bladder.

Transurethral Resection



21-7

USE OF PERINEAL URETHROTOMY FOR TRANSURETHRAL RESECTION

FIG. 21-8. In situations in which the patient has had either a semi-rigid or even an inflatable penile prosthesis inserted, the rigidity of the proximal prosthesis or rear-tip extenders of the inflatable prosthesis pressing against the bulbous urethra prevents easy access and maneuverability of the resectoscope.

In this situation, a perineal urethrotomy facilitates access of the resectoscope into the prostatic fossa and bladder without lateral compression from the prosthesis.¹

FIG. 21-9. After placing a 24 Fr Van Buren sound (with or without a groove) in the urethra, the surgeon incises the perineal skin (A and B) and continues the incision through the bulbospongiosus muscle and the corpus spongiosum into the urethra (C).

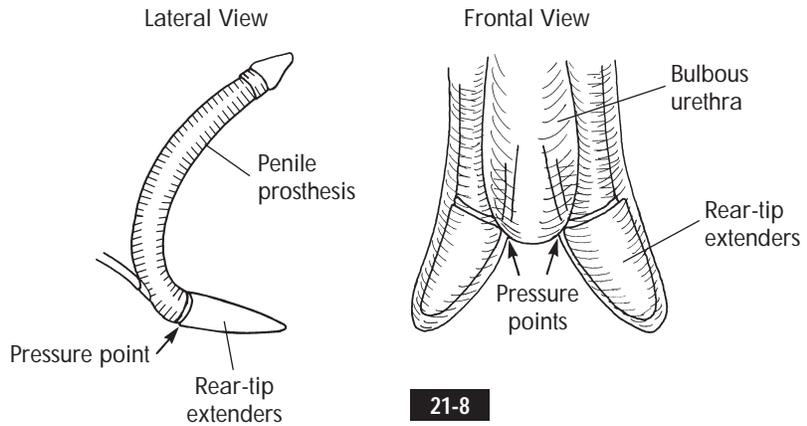
When the cut urethral edges expose the Van Buren sound within, the surgeon places full-thickness stitches from the urethral edges to the perineal skin on both sides (D).

The incision should be at least 3 cm in length. Three stitches on each side are required to keep the urethral edges fixed to the perineal skin.

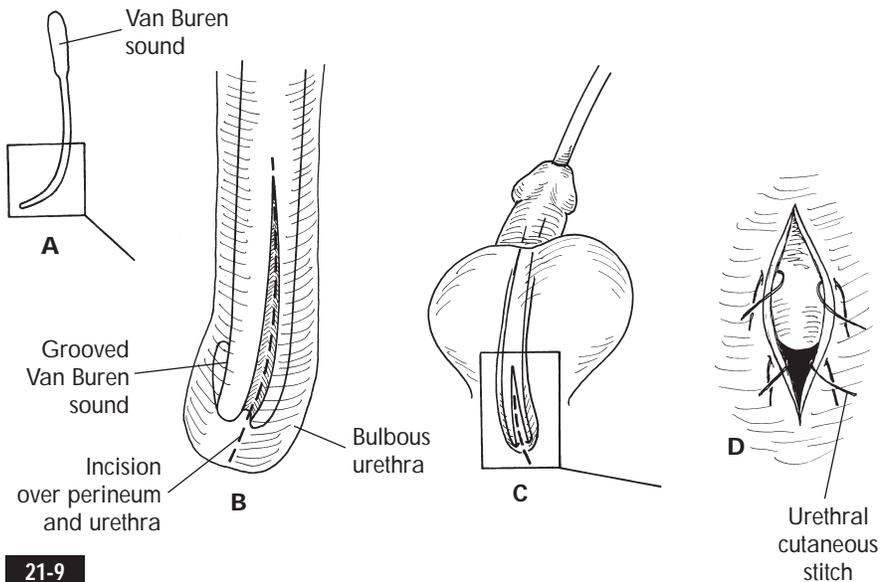
The resectoscope is inserted through the urethrotomy for the resection.

At the end of the operation the Foley catheter is inserted through the penile urethra into the bladder, and the perineal wound is reapproximated with figure-of-eight stitches (2-0 chromic) from urethra to skin to compress the bleeding corpus spongiosum tissues.

Pressure Point of Prosthesis at Bulbous Urethra



21-8



21-9

KEY POINTS

- The urethra is dilated with Van Buren sounds before inserting the resectoscope.
- The bladder neck epithelium is coagulated at the 5-, 6-, and 7-o'clock positions and then the proximal prostatic tissue is resected through the cauterized epithelium.
- The rest of the bladder neck muscles are preserved and the lateral prostatic lobes are resected from the 7- to 11-o'clock positions and 5- to 1-o'clock positions.
- The anterior lobe, especially the distal region, is carefully resected.
- The verumontanum is visualized and then the resectoscope is moved proximally toward the bladder past the verumontanum and the lateral tissues are resected.
- Small nibbles of the anterior distal aspect of the prostate gland are resected.
- A systematic check to verify hemostasis is conducted.
- The resection should not take longer than 1 hour.

POTENTIAL PROBLEMS

- *Venous sinus opened*: Press loop against the sinus to obstruct it and then coagulate
- *Capsular tear*: Continue the operation
- *Unidentifiable bleeding site*: Check the proximal bladder epithelial edges for bleeding
- *Prostatic chips too large for resectoscope sheath*: Press loop against chip, coagulate, and remove resecting loop with adherent chip
- *Hyperabsorption syndrome (hypertension, restlessness, nausea)*: Provide furosemide (Lasix) diuresis and hypertonic saline replacement²
- *Trigone is undermined and attempted catheterization of bladder is unsuccessful*: Use a guidewire with the Foley catheter and pass it into the urethra so that it hugs the anterior urethral wall
- *Medical condition unstable*: Perform coagulation to achieve hemostasis and insert Foley catheter → postpone the resection

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- 2 Holtgrewe HL: Transurethral prostatectomy, *Urol Clin North Am* 22:357, 1995.

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- Mebust WK, et al: Transurethral prostatectomy: immediate and postoperative complications: a cooperative study of 13 participating institutions evaluating 3885 patients, *J Urol* 141:243-247, 1989.