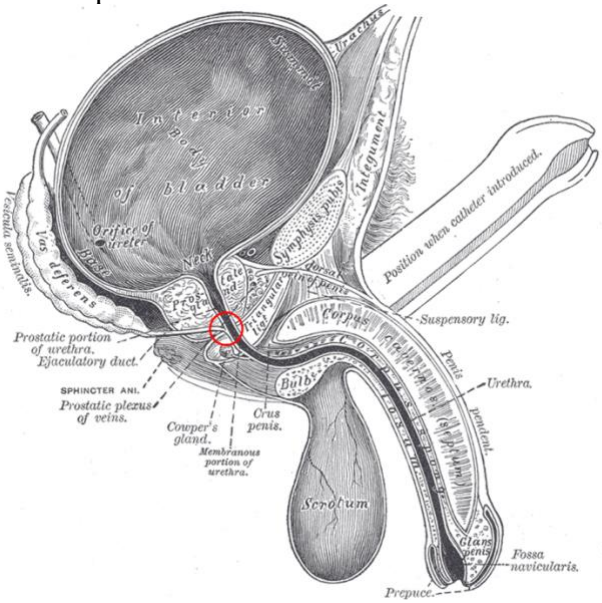
Transurethral Resection of Prostate

Nicholas Zurinaga, Gabrielle Yankelevich

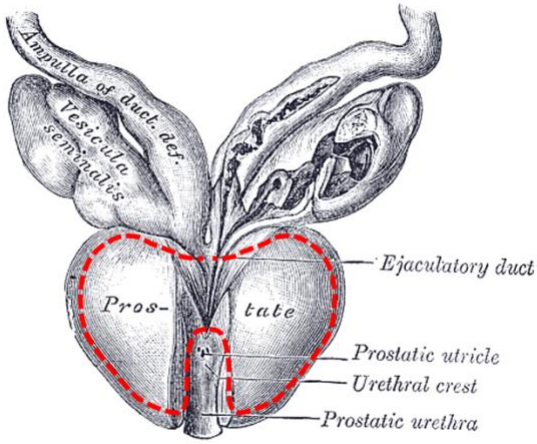
Introduction:

Transurethral resection of the prostate (TURP) is a procedure used to alleviate urinary outflow obstruction caused by benign prostatic hyperplasia. This is a commonly done urological procedure which involves the inserting of a resectoscope into the urethra and resecting the prostatic gland with the goal of increasing urinary flow, improving patient quality of life and reducing complication associated with urinary retention. Ideal candidates for this procedure are those with enlarged median lobes that have not responded well to medication. Though TURPs are less invasive than open surgery, they still carry the risks of infections, bleeds and transurethral resection syndrome.

Surgeons performing TURP should have in-depth knowledge of the male urinary tract. Complete visualization of the urethra and bladder should be conducted prior to any resecting. Key landmarks include the bladder neck and the verumontanum. These set the proximal and distal boundaries of resection due to their adjacency to the internal and external sphincters of the bladder.



Cross-section of the penis, bladder and prostate gland shows the verumontanum, the area where the ejaculatory ducts enter the prostatic urethra, within the Red circle. Resection should preserve this structure.



Trans-urethral resection of the prostate will include the two lateral lobes and the median lobe between the bladder neck and the verumontanum, as shown here. Source: Henry Vandyke Carter, Public domain, via Wikimedia Commons

Depending on resource availability both monopolar and bipolar resectoscopes can be used, however surgical considerations and irrigation fluid varies.

A resectoscope is utilized to complete a TURP, which is able to electrocoagulate and resect tissue. It consists of a sheath, lens, and working element (monopolar or bipolar electrode). Conventionally, TURP is performed using a monopolar resectoscope. The diathermy's current passes from the electrode through the patient's body to terminate at an electrode on the skin (grounding pad). Settings are the maximum allowed on the machine. The "cut" setting is used to resect the prostate and the "coagulate" setting is used to achieve hemostasis. Irrigation must be hypotonic conduction fluid, such as glycine, sorbitol, or 5% Dextrose solution. Due to risk of post-operative transurethral resection (TUR) syndrome, a serious complication due to excessive absorption of hypotonic irrigation causing hyponatremia which can lead seizures and death, bipolar resectoscopes are more commonly utilized. A bipolar working element uses both efferent and afferent currents, so an external electrode (grounding pad) is not necessary. Saline irrigation must be used for bipolar resections and the risk of TUR syndrome is much lower.

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Monopolar resectoscope and its attachments: camera (within plastic sheath), fiber-optic light cable (Gray), electrical cable (Black) and handpiece for manipulating the electrode.

A surgeon loading the resectoscope's electrode. It is imperative that you understand and can troubleshoot all components of the resectoscope, to allow the operation to progress smoothly and to prevent harm to the patient.

Detail of the resectoscope's electrode, at full extension advancing beyond the lens of the scope.

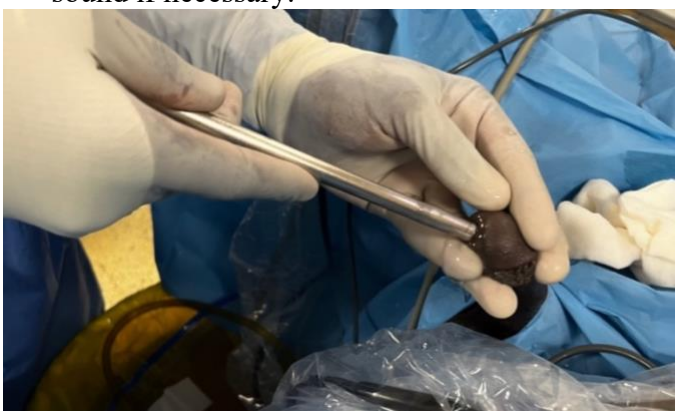
American Urological Guidelines recommend imaging study or cystoscopy of the prostate be included in preoperative work up to assess size of prostate. Additional urodynamic studies are also routinely performed to measure bladder function.

Trans-urethral resection of the prostate is performed in the following steps:

- Cystoscopy and assessment of the bladder, prostate and urethra
- Resection of the median lobe
- Resection of one lateral lobe
- Resection of the other lateral lobe
- Hemostasis
- Insertion of a catheter for continuous bladder irrigation.

Steps:

1. Under general anesthesia (or spinal anesthesia), place the patient in the dorsal lithotomy position.
2. Prepare and drape the genitals with betadine or chlorhexidine
3. Insert the resectoscope with a blind or visual obturator. Dilate the urethra using a urethral sound if necessary.



A urethral dilator with a curved tip being used to dilate only the urethral meatus to allow the resectoscope sheath to pass.

Resectoscope sheath with a blind obturator, attached to the irrigation tubing.

Transurethral Resection of Prostate

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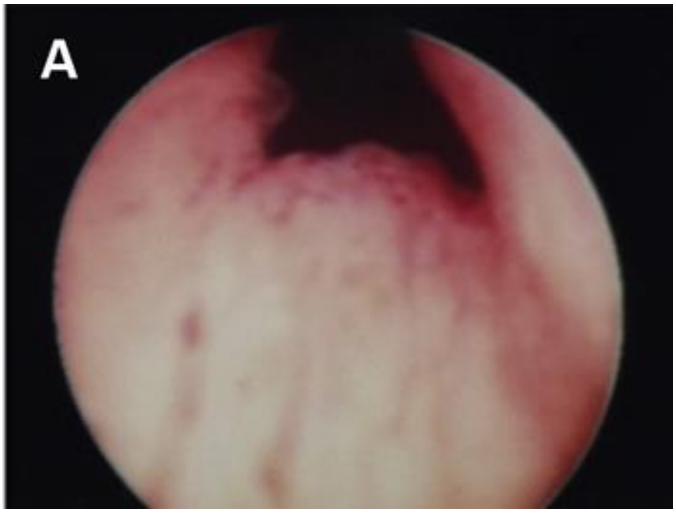
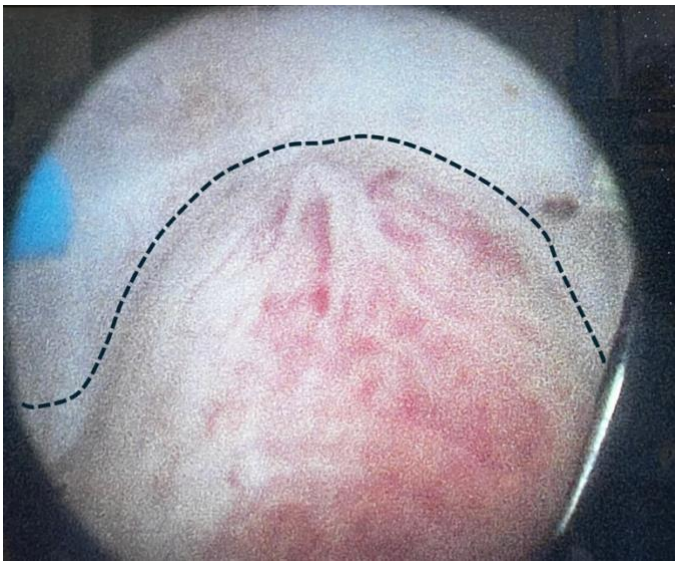
Insert the sheath and obturator into the urethral meatus, maintaining traction on the penis to keep the urethra straight. Keep your thumb on the obturator so there is no chance it will be dislodged, to prevent the unprotected edges of the sheath from damaging the urethral mucosa.

Insert the sheath and obturator gently and stop if there is any resistance. Exchange the obturator for the resctoscope and visualize the urethra. Sometimes patients with bladder outlet obstruction have unexpected urethral strictures concurrent with, or instead of, prostate hypertrophy. Short strictures can be treated with Direct Visual Internal Urethrotomy, described elsewhere in this Manual.

4. Replace the obturator with a working element with a loop (bipolar or monopolar).
5. Begin resecting with the median lobe in long strokes starting at the neck and cutting towards the verumontanum.



Before beginning resection, visualize all of the prostate. Here, the median lobe is in the center of the picture with the two lateral lobes on each side and the bladder, visible as a dark open space, beyond the median lobe.
Source: https://doi.org/10.1016/j.ajur.2017.03.003



The verumontanum contains the ejaculatory ducts and lies in the prostatic urethra in the posterior midline just distal to the median lobe. You should resect the median lobe just up to the verumontanum, as shown by the dotted line. It is acceptable to resect the lateral lobes just to the right and left of it, as shown by the dotted line.

Transurethral Resection of Prostate

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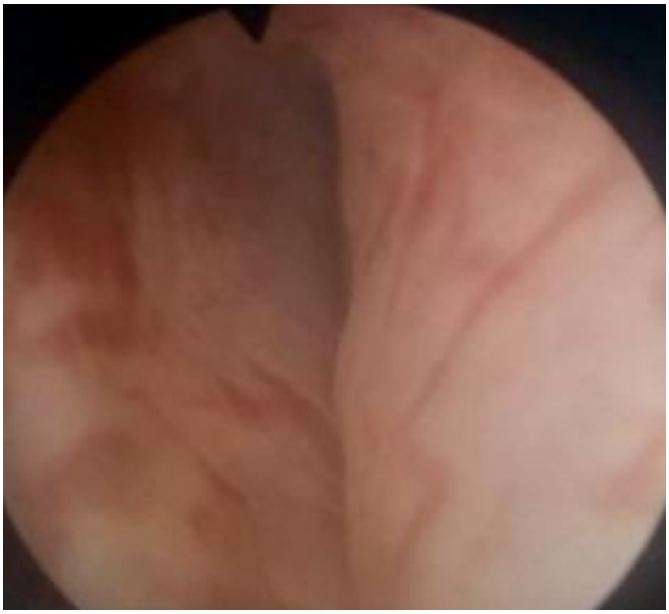
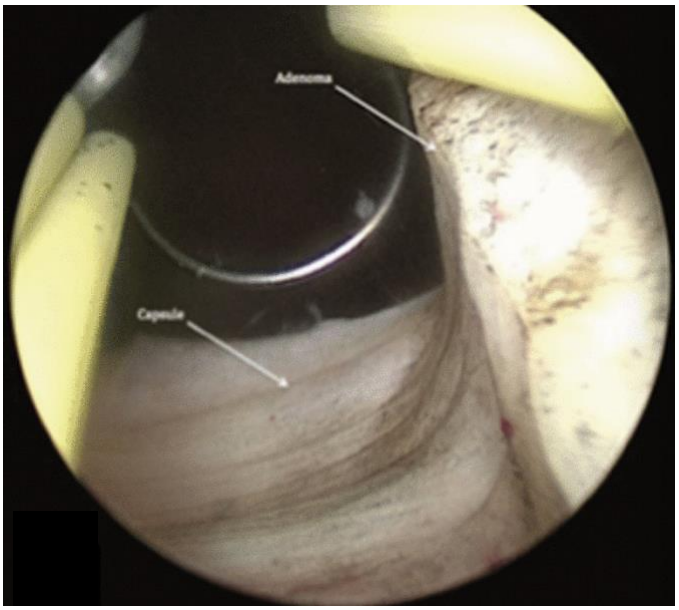
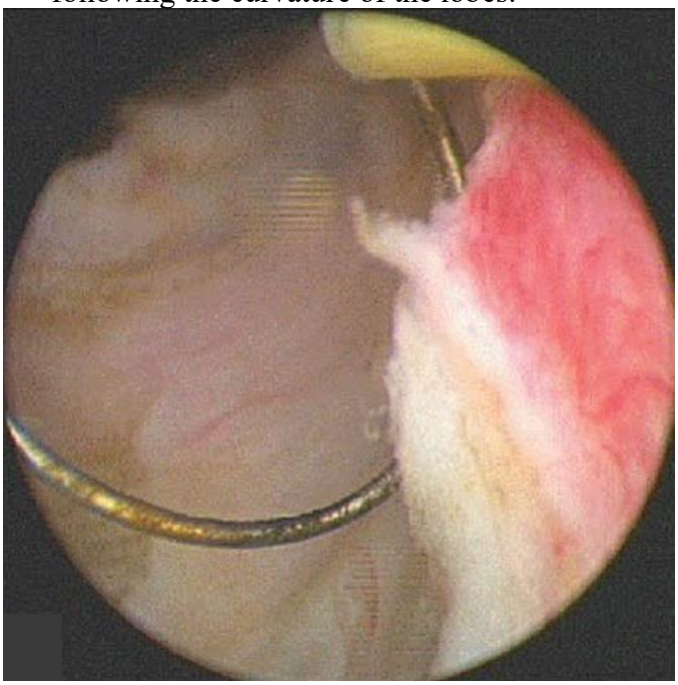


At the level of the verumontanum, you will likely see the distal-most extent of the lateral lobes. Seen here, they are "kissing," causing obstruction.



Resect the median lobe, from the bladder to the verumontanum, going deeper until you see the lines of the prostate capsule. Going deeper than this level enters the periprostatic venous plexus, resulting in bleeding that can be hard to control.
Source: https://doi.org/10.1186/s12894-021-00895-4

6. With continuous bladder irrigation running, maintain at least 100mL or more of irrigant in the bladder during resection to flush out resected chips and prop up the urothelial walls. Evacuate the fluid when the view is not clear, indicating that the bladder is full and no more irrigation can run in.
7. Once median lobe is completely resected, move to the lateral and posterior lobes and resect following the curvature of the lobes.



Hold the camera straight as you rotate the resectoscope to the right and left, allowing you to preserve your orientation. Resect the lateral lobes down to the capsule, as shown here.
Source: https://doi.org/10.4103/0970-1591.126907

8. The last region to be resected should be the anterior prostate due to rich blood supply
9. Once resecting is completed, remove the prostate chips with the scope, Ellik evacuator, or Tumey syringe.
10. Stop the irrigant flow and inspect for spots of hemorrhage and residual tissue. Resect and cauterize accordingly.

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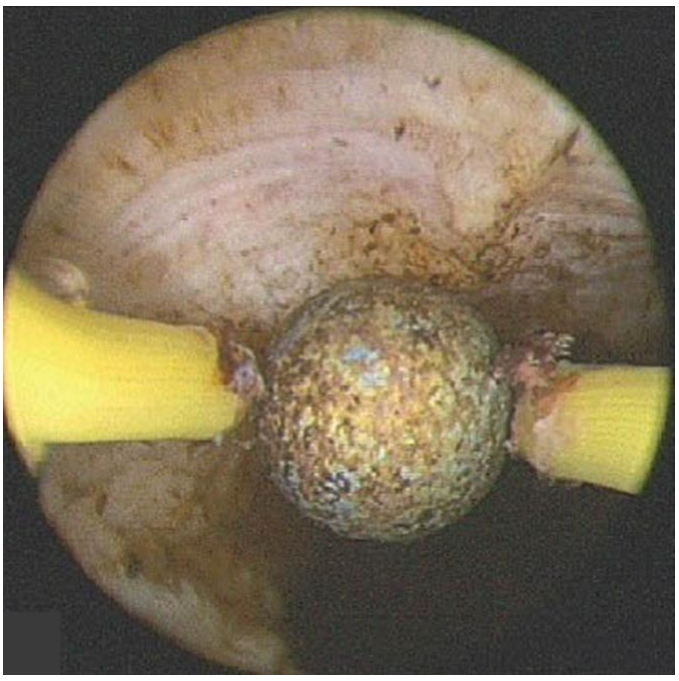

Use the "Roller ball" to cauterize the resected bed of the prostate using the "coagulate" setting on the diathermy.
Source: https://doi.org/10.4103/0970-1591.126907

11. Upon conclusion of the TURP a three-way catheter should be placed for continuous irrigation overnight to prevent clot formation. Catheter may be placed on traction if there is a risk of bleeding. Irrigation overnight should be saline.
12. Dependent on outcome of voiding trial patients can be discharged on post operative day 1 with or without a catheter.

Pitfalls

- A drawback of TURP is bleeding. Perioperative hemorrhaging is to be expected and is cauterized, however excessive hemorrhaging from a highly vascular prostatic gland during the procedure can cloud the image and prolong procedural time. Urethral catheters can be set at traction to apply pressure to hemorrhagic sites post-operatively.
- TUR Syndrome, consisting of hyponatremia which can lead to seizures, coma, and death, is a rare, but serious complication from excessive absorption of hypotonic fluid.
- Retrograde Ejaculation is commonly seen postoperatively and occurs with semen ejaculated into the bladders. Fertility concerns and considerations should be discussed with patients prior to TURP procedure.

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