

Section

I

Prostate Surgery

1. Transurethral Resection of Prostate (TURP)
2. Holmium Laser Enucleation of Prostate (HoLEP)

Transurethral Resection of Prostate (TURP)

• Abhijit Patil • Arvind Ganpule • Arun Chawla • Pankaj N Maheshwari

Steps of Surgery

1. Position and OT setup
2. Endoscopic evaluation of the lower urinary tract
3. Resection of prostate
4. Evacuation of prostate chips
5. Catheterisation

INSTRUMENTATION

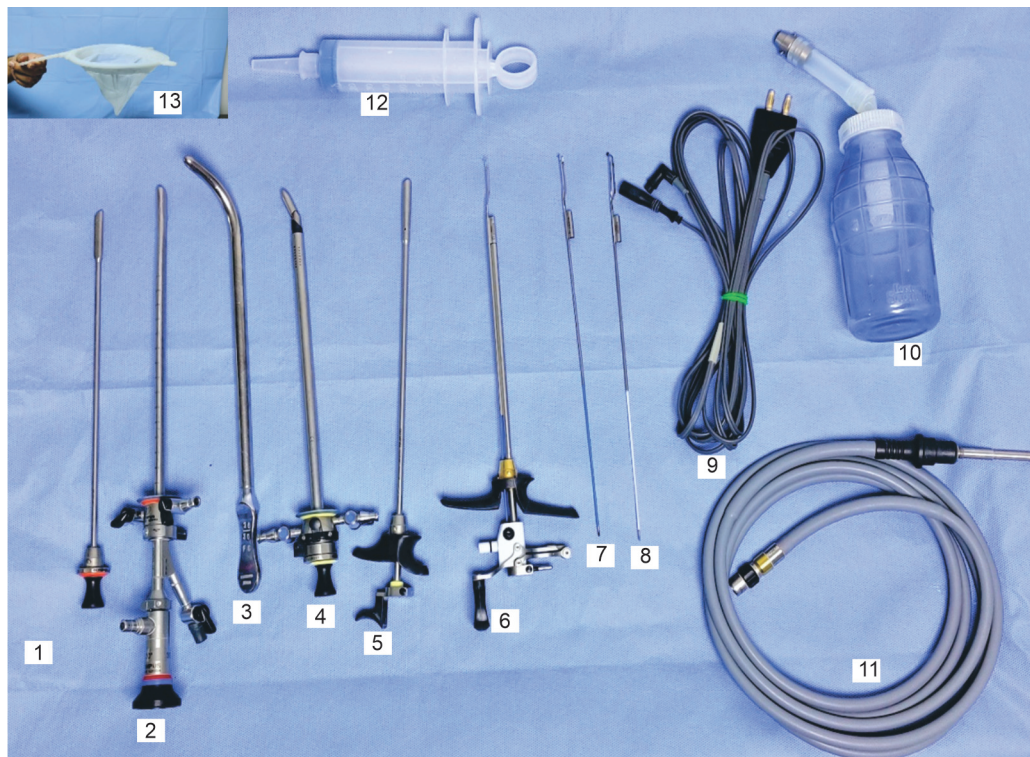


Figure 1.1 (1) Resectoscope obturator; (2) Cystoscope; (3) Clutton's metal urethral dilator; (4) Timberlake's resectoscope outer sheath with obturator; (5) Visual obturator for resectoscope; (6) Working element; (7) Loop; (8) Ball electrode; (9) High frequency electrocautery cable; (10) Disposable bladder evacuator; (11) Light cable; (12) Toomey syringe; and (13) Sieving net.

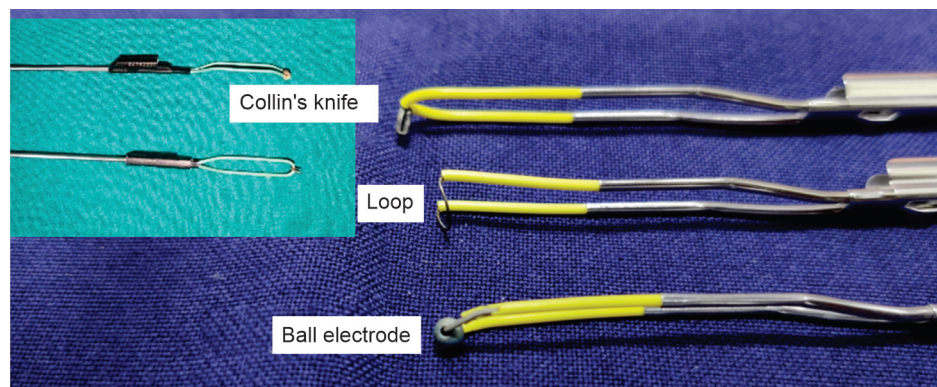


Figure 1.2 Configuration of tips of various electrodes used during TURP (Inset showing the Wolf, Tuttlingen, GmbH) Collin's knife and ball electrode. The main figure showing the attachments from Karl Storz, Tuttlingen, GmbH.

It is important to understand that the inflow and outflow channels should be connected to the appropriate channels (Fig. 1.3).

The inflow channel is depicted by arrow pointing towards the sheath.

The outflow channel is depicted by arrow pointing away from the sheath.

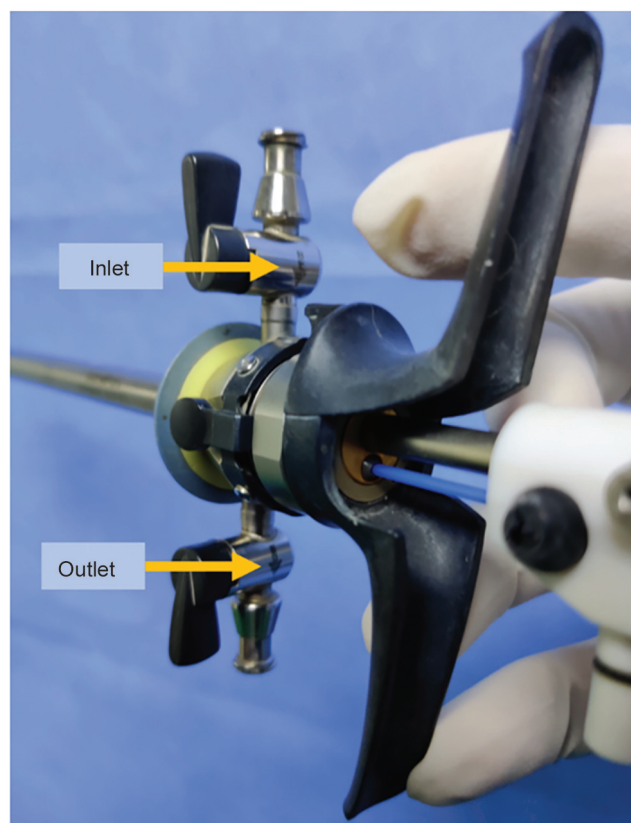
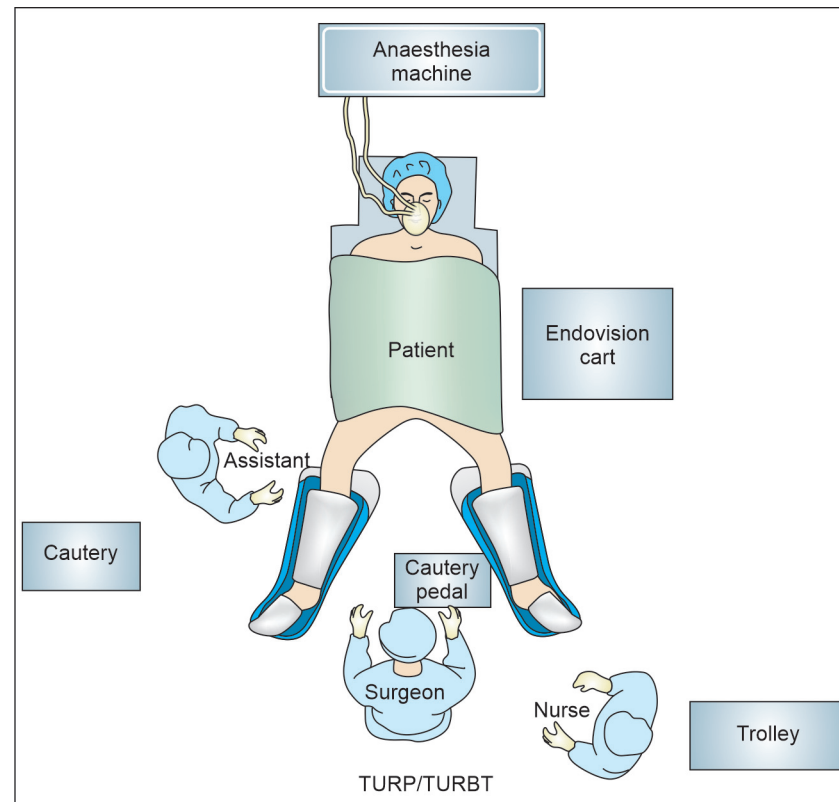


Figure 1.3

Note: If the wrong channel is used and connected, bladder will not remain distended during resection, as the flow through the outflow channel is slower than that through the inflow.

Step 1. Position and OT Setup**Figure 1.4**

The patient is positioned in lithotomy position as shown in Fig. 1.5.

Note both the legs are abducted at 60°. Care should be taken to cushion the pressure points and nerve compression points (e.g. lateral cutaneous nerve of thigh).

While draping it is important to segregate the anal opening from the operating field.

**Figure 1.5**

Step 2. Endoscopic Evaluation of the Lower Urinary Tract

The next step of TURP is endoscopic evaluation of the lower urinary tract with 0° lens for urethra and 30° lens for bladder evaluation. This is done with 21 Fr cystoscopic sheath (shown in Figs 1.6, 1.7A and B).

The typical grip of a cystoscope is grasping the cystoscope with the palm of the hand, the left hand should hold the camera. Grasping the camera with the left hand helps in rotating and orienting the camera. For instance, if the left lateral wall of the bladder is to be visualised, the left hand holds the camera and the cystoscope (30° lens) is rotated as shown in Fig. 11.3 in Chapter 11.

One tries to see the bladder neck from the verumontanum (Fig. 1.7A).

In this case, there are bilateral obstructing lateral lobes with elevated bladder neck (Fig. 1.7B).

Bilateral ureteric orifice should be visualised and distance between bladder neck and ureteric orifice should be noted.

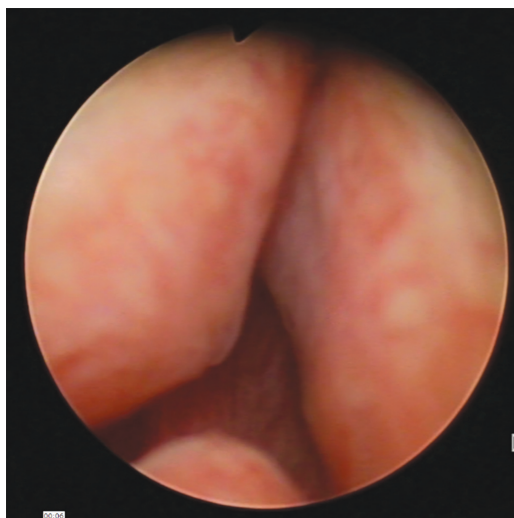


Figure 1.6 Cystoscopy before the procedure

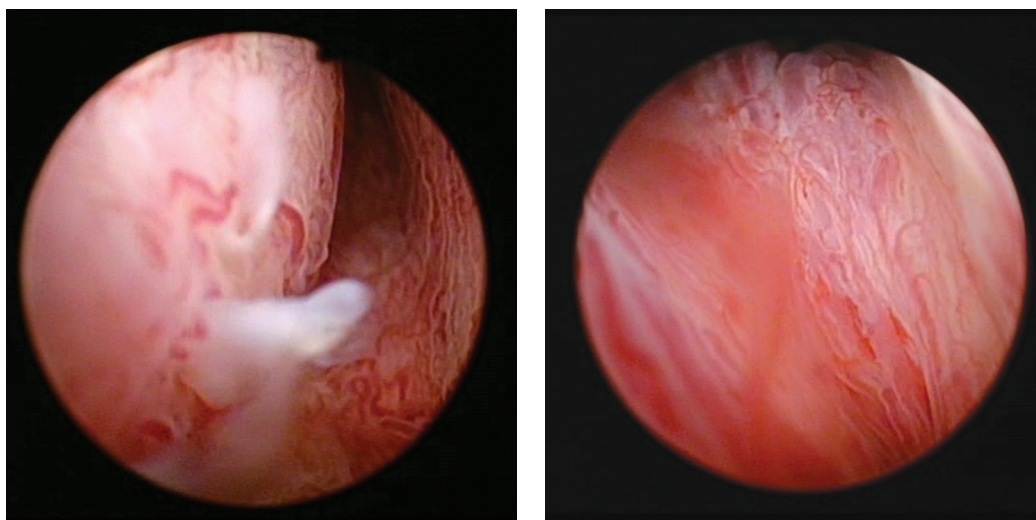


Figure 1.7A and B Visualisation of the bladder neck from the verumontanum. In this case, enlarged lateral lobes can be seen. However, the bladder neck cannot be seen from the verumontanum indicating obstruction.

Trabeculations should be noted (Fig. 1.8).

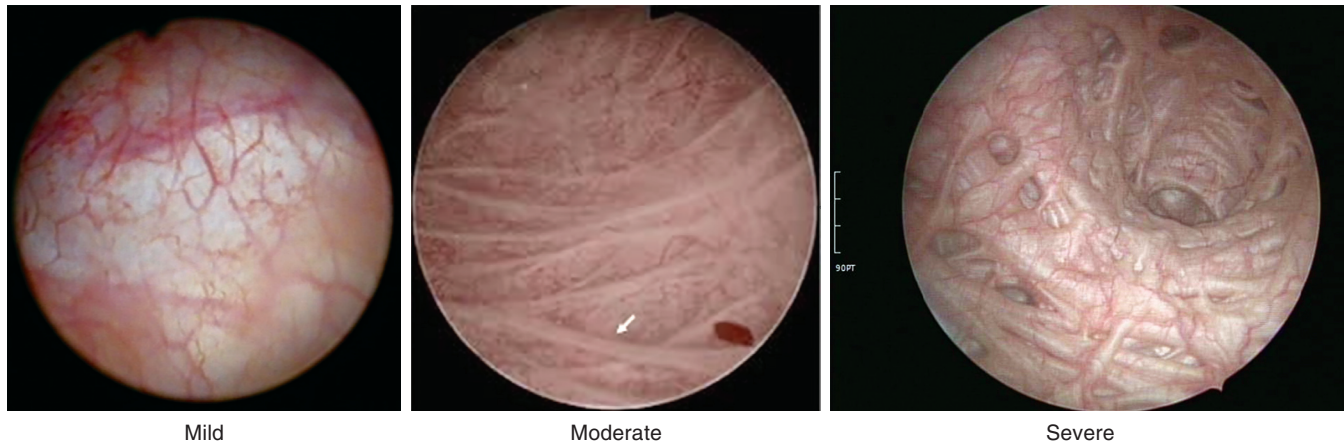


Figure 1.8 Trabeculations in the bladder should be noted

Step 3. Resection of Prostate

Calibration of the Urethra

The anterior urethra is dilated serially with urethral dilators till one size above the resectoscope sheath. There are different schools of thought regarding methods of dilatation which is a matter of surgeon training and preference.

The different approaches include:

1. Do not dilate. Use a small resectoscope 22 Fr.
2. Only dilate the meatus.
3. Use an OTIS urethrotome.
4. Use metallic urethral dilators (Fig. 1.10).

The Fig. 1.9 shows the calibration and dilatation of the meatus with a straight metal dilator.

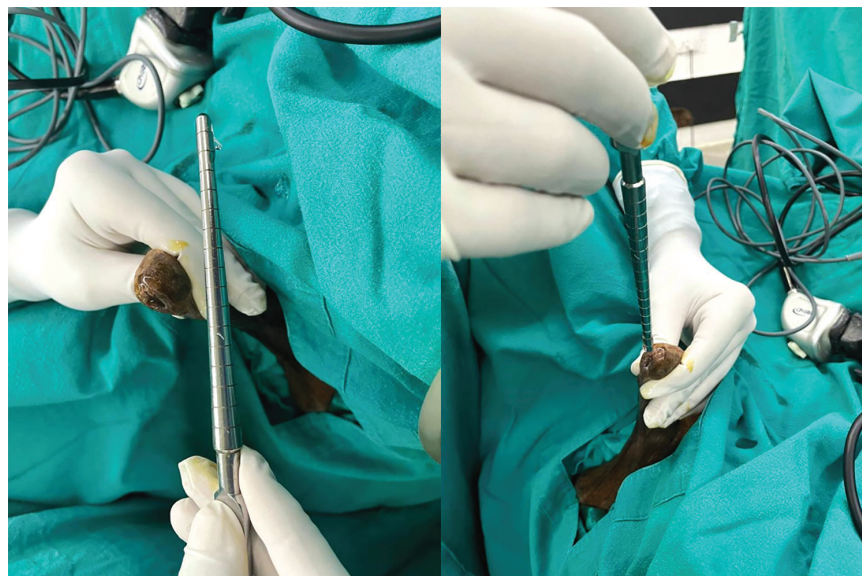


Figure 1.9

The movements of the dilator are sequentially demonstrated in the collage of photos shown in Fig. 1.10.

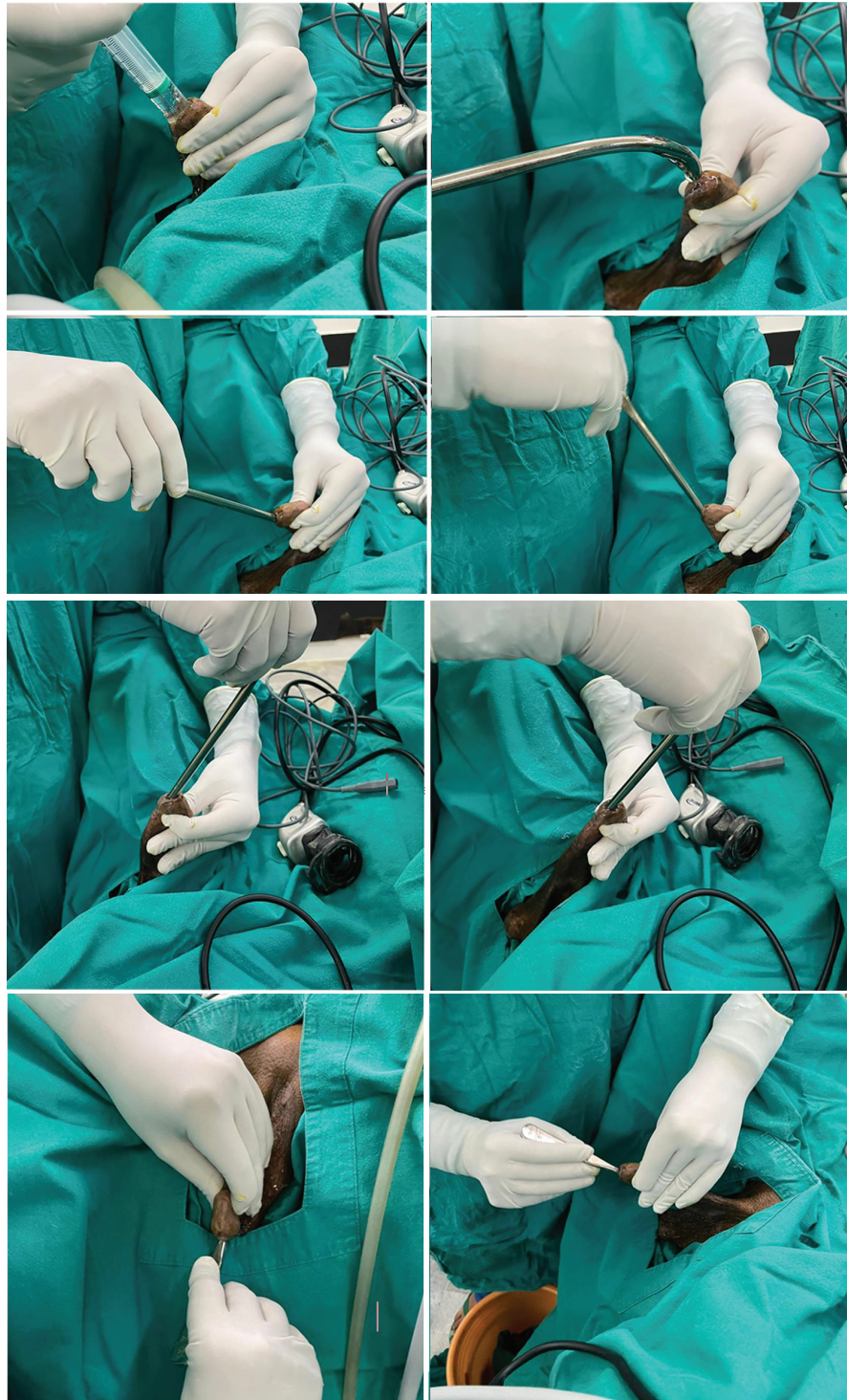


Figure 1.10

The resectoscope sheath can be then inserted using a visual obturator as shown in Fig. 1.11.

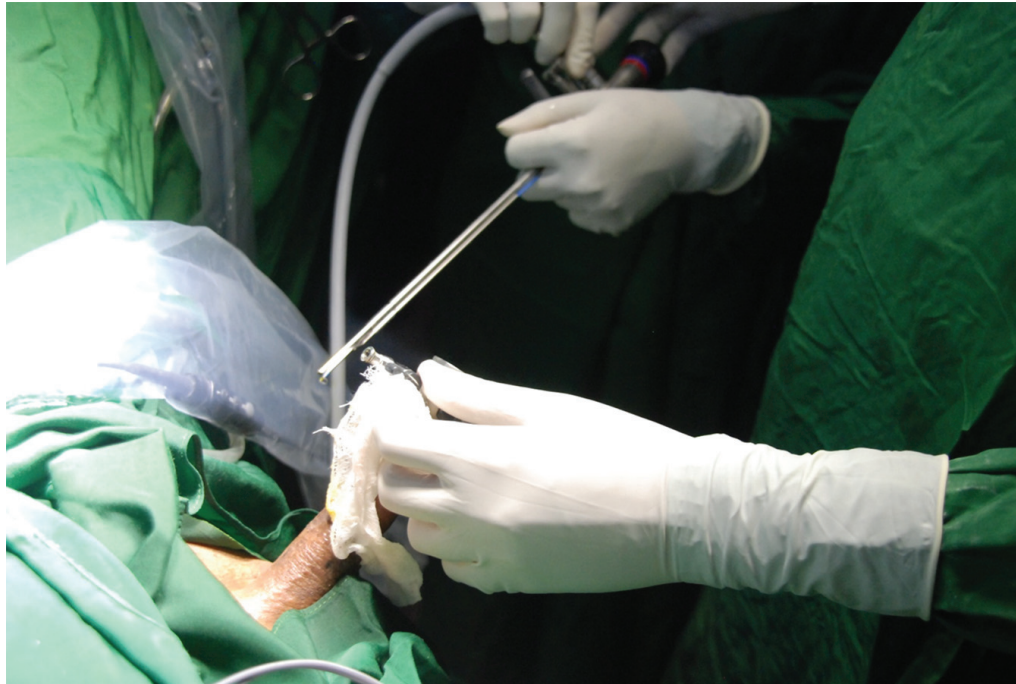


Figure 1.11

A standard 26 Fr resectoscope with working element with loop is inserted in the urethra. (Note position of left hand holding the camera head and the right hand holding the resectoscope in Fig. 1.12). Standard resectoscope—could be 24 or 26 Fr depending on the urethral caliber.



Figure 1.12

In TURP, it is a closed system resection where there is a chance of absorption of fluid. The height of the irrigation should be 60 cm. In situations where extra fluid absorption is contraindicated, a low pressure TURP is done.

For low-pressure TURP, SPC is placed per-operatively at a place two fingers above the pubic symphysis on a full bladder (Figs 1.13 and 1.14). Low pressure TURP is reserved for large prostates for which longer resection time is contemplated, for cardiac failure and renal failure patients where extra fluid absorption is contraindicated. Low pressure TURP can be done with Iglesias resectoscope—by continuous irrigation resectoscope.

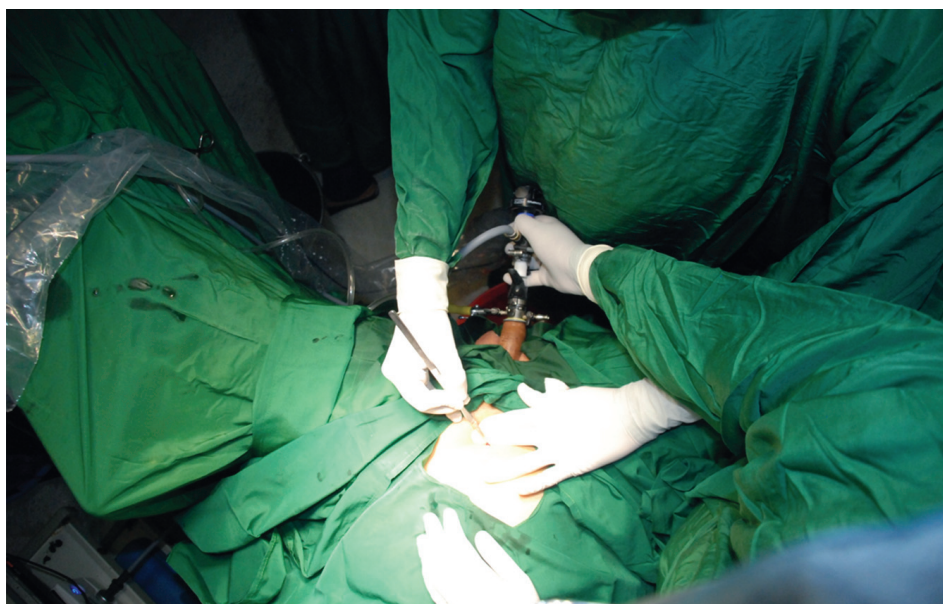


Figure 1.13



Figure 1.14

Reuter's cannula is inserted and connected to a tube. An assistant controls the outflow. There is also an attachment to the cannula which makes sure that the cannula remains in place (Fig. 1.15).

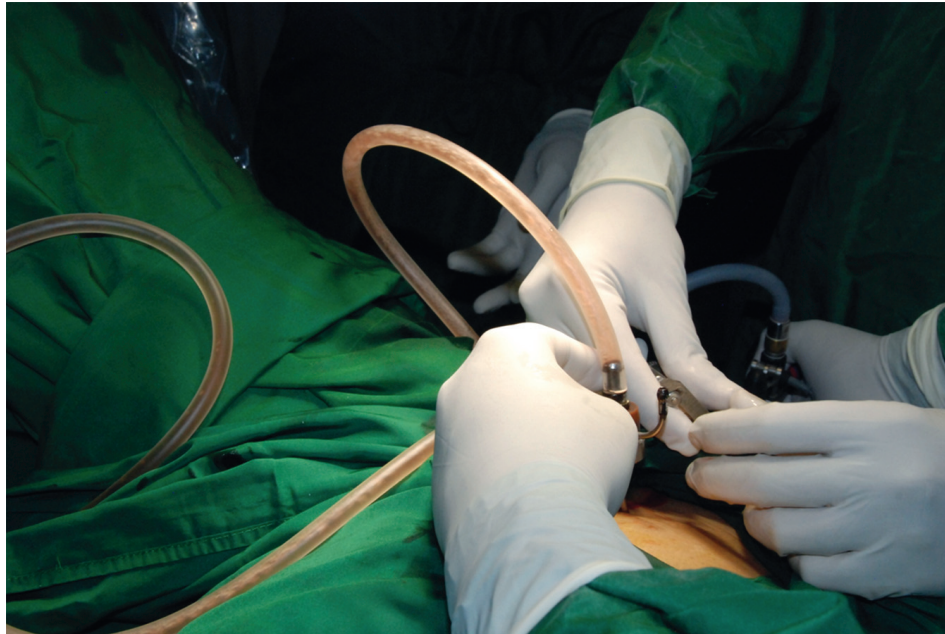


Figure 1.15

Figure 1.16 depicts the position of operating surgeon and the assistant. This is an illustration of proper setup with the operating surgeon sitting between the lithotomy position and assistant on the right side of the patient.



Figure 1.16

It is always a good idea to check the functioning of the electrosurgical unit before starting the resection of the prostate. This can be done by test coagulating on the prostate with the coagulation pedal activated.

Distance of prostate from ureteric orifice is noted before starting resection (Fig. 1.17).

The various techniques of resecting the prostate are:

1. **The Nesbit technique:** Here the resection starts from the roof (12 o'clock) and then proceeds sectorally to 3 and 9 o'clock on both sides followed by resection of the floor.
2. **The Barnes technique/Mauermayer technique:** Here resection starts at the floor (6 o'clock) followed by both the lobes (Fig. 1.18).

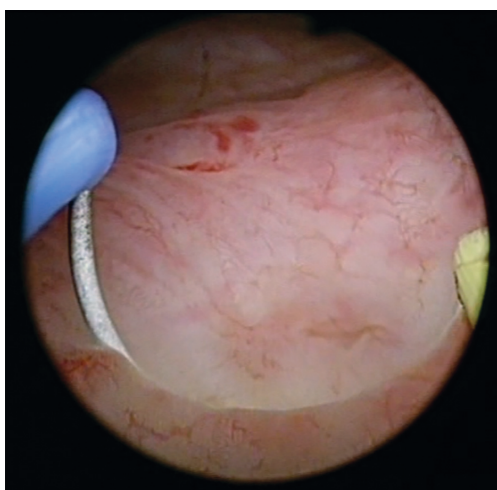


Figure 1.17 Visualization of ureteric orifice

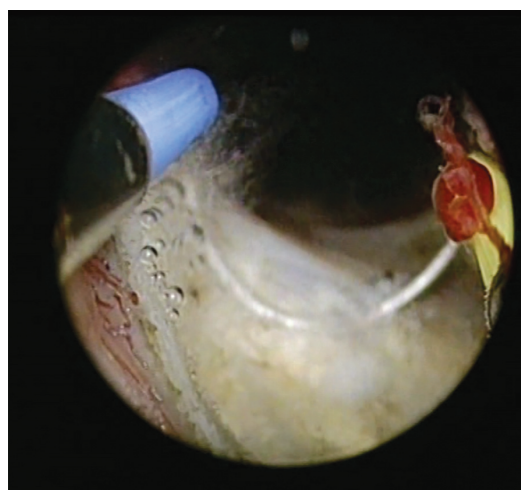


Figure 1.18 Beginning of resection

In low pressure TURP, if the bladder is collapsed, then the assistant can temporarily block the cannula leading to distension of bladder (Fig. 1.19). For resection of median lobe and at the beginning of resection, Reuter's cannula is blocked so as to visualize bladder neck properly in distended bladder.



Figure 1.19

Figure 1.20 shows how to orient and position the resectoscope to resect the prostatic lobes at 6 o'clock position (floor).

Figure 1.20 depicts a bipolar thumb-operated resectoscope. The various elements and parts are labelled.

The choice of the working element (thumb-operated or finger-operated) is a matter of surgeon's training and preference.

For seamless transurethral resection, the position of both the surgeon's hands should be ergonomic. As seen in Fig. 1.20, the left hand should always hold the camera to maintain reference position (in this case, the floor of the prostate).

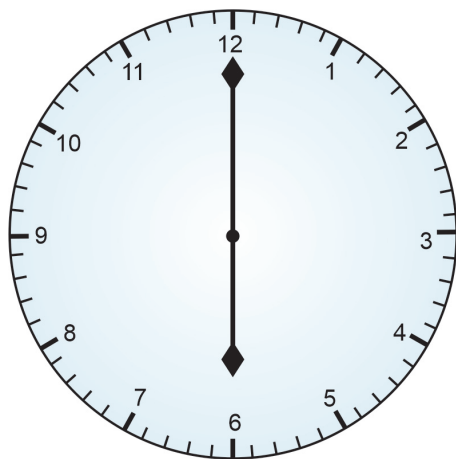
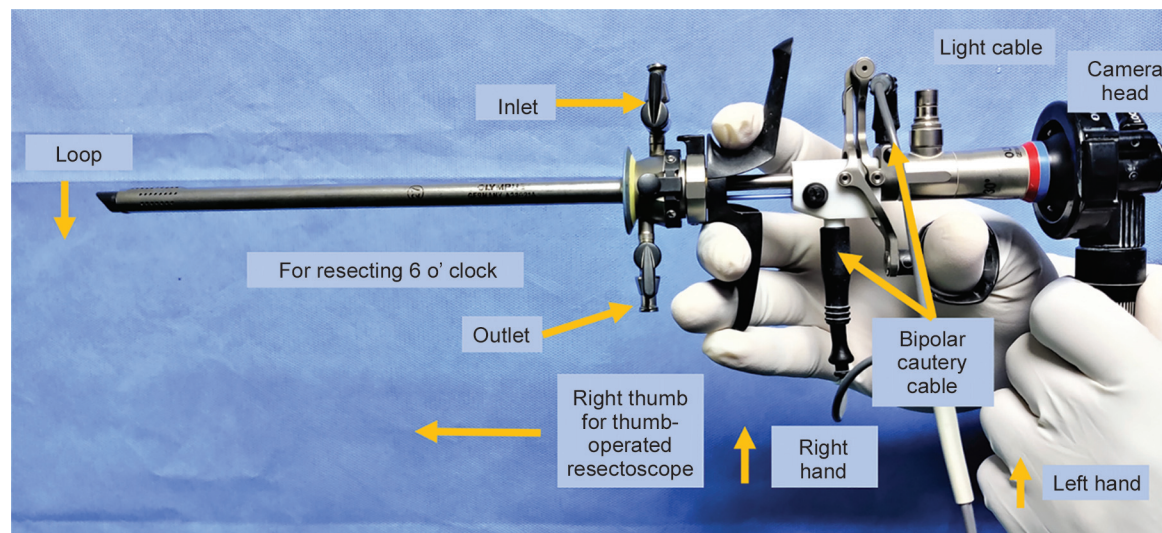


Figure 1.20

The camera head is held by operating surgeon with his left hand in a stable position and the working element is rotated according to the prostate resection (Fig. 1.21). To resect the left prostatic lobe, the working element is rotated on the opposite side without altering the camera position. This is of utmost importance for proper orientation of the gland.



Figure 1.21

Figure 1.22 shows resection at 5 o'clock position.

This is the position of surgeon's hand while resecting the 5 o'clock prostatic lobe.



Figure 1.22

Figure 1.23 shows how to orient and position the resectoscope to resect the prostatic lobes at 12 o'clock (roof).

It should be noted that the left hand holds the camera in reference position. However, the resectoscope sheath is rotated 180° to resect the roof of the prostate.

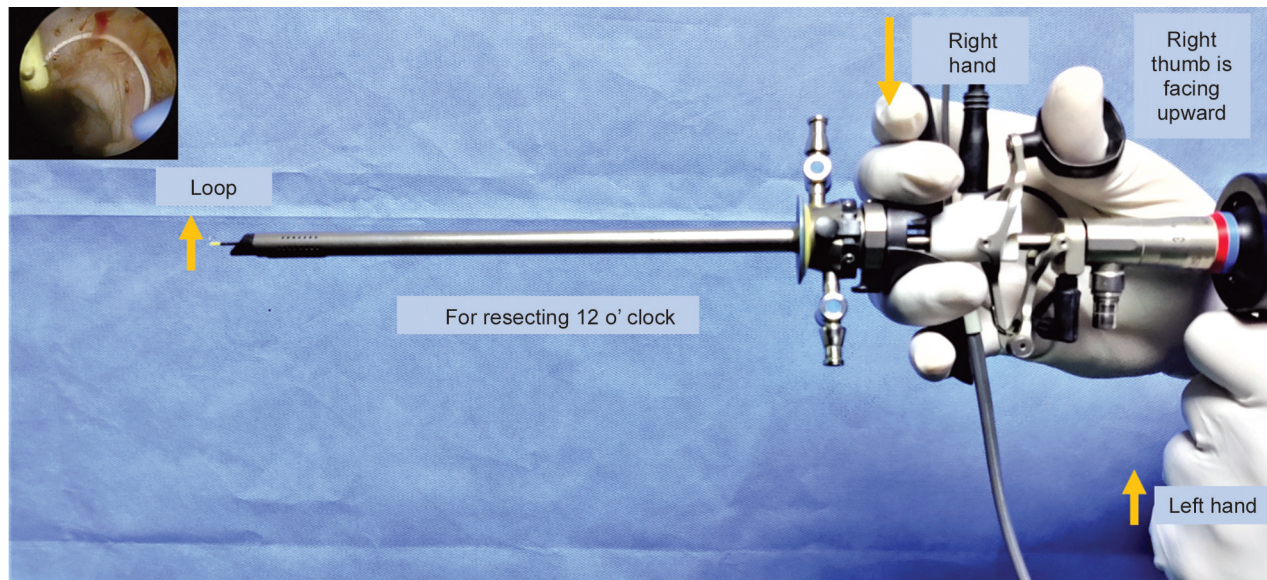


Figure 1.23

Figure 1.24 shows how to orient and position the resectoscope to resect the prostatic lobes at 2 o'clock (right lobe).

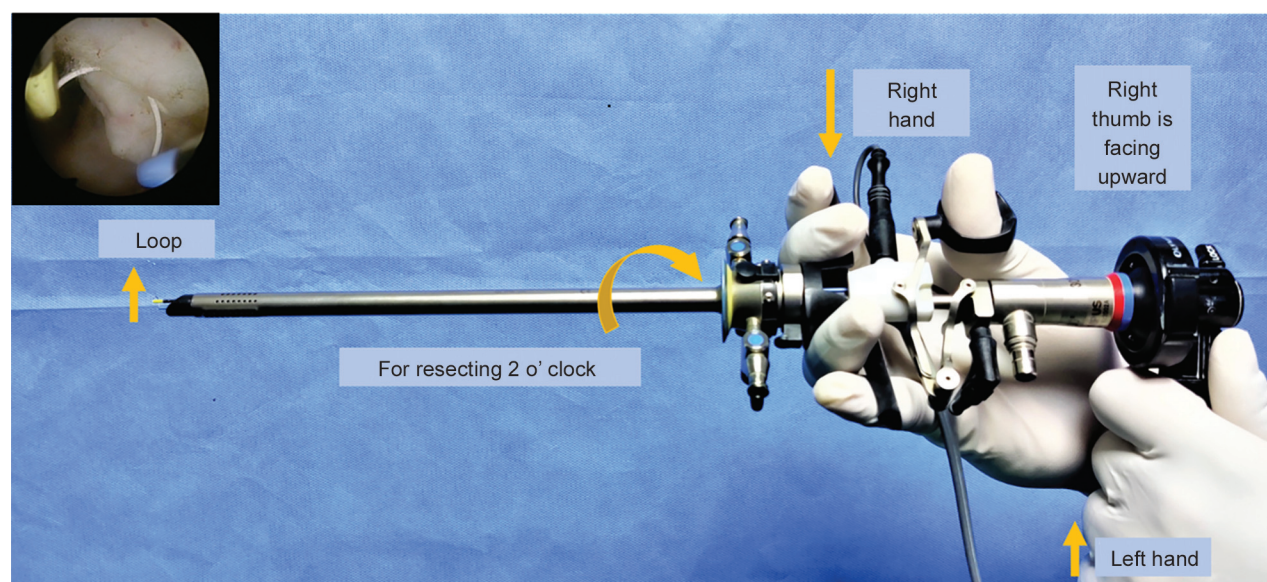


Figure 1.24

Figure 1.25 shows how to orient and position the resectoscope to resect the prostatic lobes at 11 o'clock (left lobe).

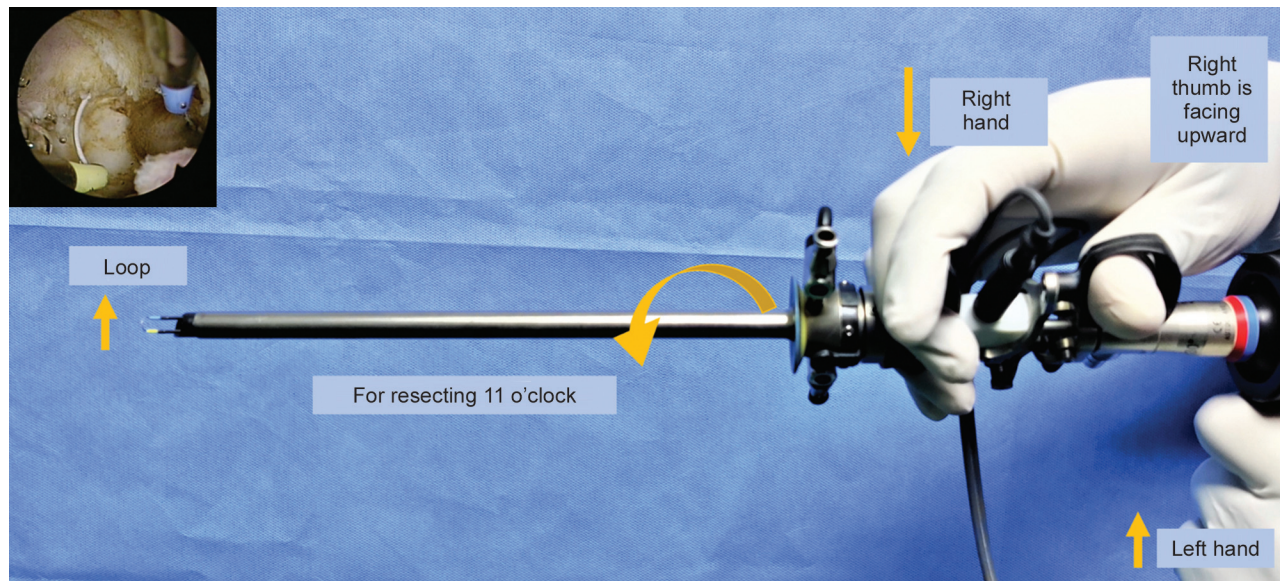


Figure 1.25

This is the bipolar electrosurgical unit machine with pedal as seen in Fig. 1.26. Yellow colour code is for cutting and blue colour is for coagulation.



Figure 1.26

Visualization of the capsule marks the end of resection in that part of the prostate (Fig. 1.27).

Due to overzealous resection beyond the capsule, one can see a threatened perforation on the floor of the prostate in Fig. 1.28.

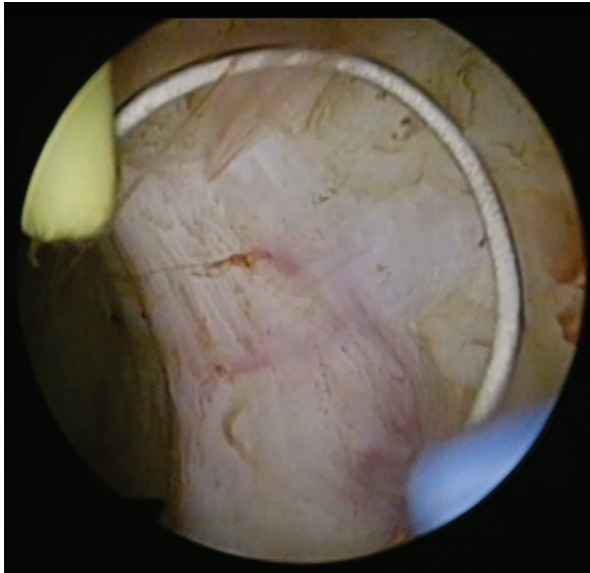


Figure 1.27



Figure 1.28 Capsular perforation

Transurethral Incision of Prostate—TUIP (For Smaller Glands)

The TUIP is done as follows (as shown in Fig. 1.29):

- Cutting current should always be used (monopolar 120, bipolar 270 pure cut).
- Landmarks: Ureteric orifice, bladder neck and verumontanum.
- Incision made from just distal of ureteric orifice to verumontanum.
- The depth of incision of the TUIP should cut the capsule and see the fat.

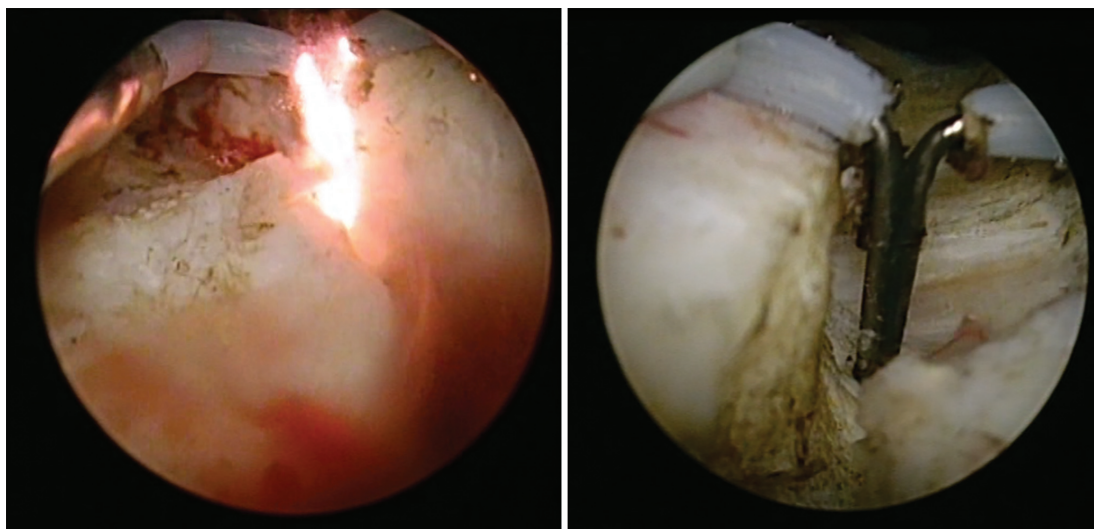


Figure 1.29 Technique of bladder neck incision

Step 4. Evacuation of Prostate Chips (during TURP)

The TURP chips in the bladder are evacuated by disposable bladder evacuator (Fig. 1.30), after filling the bladder adequately. The irrigation, outflow channel and the cannula should be blocked during this step. This step is repeated a number of times till returning fluid has no chip.

Figures 1.30 to 1.32 depict how to use a disposable bladder evacuator for removal of prostate chips. Alternatively an Ellik's glass evacuator can be used.

The evacuator is first angled down so the chips at the base of the bladder start to float up (Fig. 1.31) and then by angling the evacuator down so the chips can come out due to the negative suction effect generated by it (Fig. 1.32).

The returning fluid is also cleared which means there is adequate haemostasis.

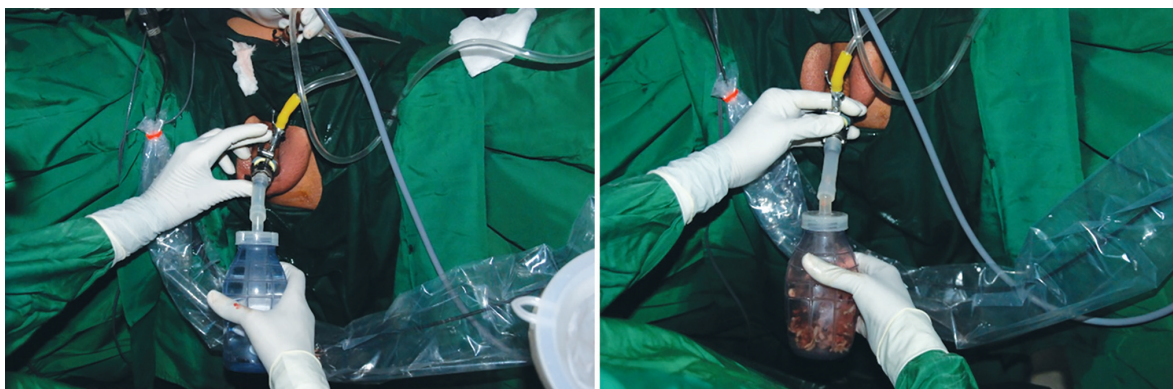


Figure 1.30

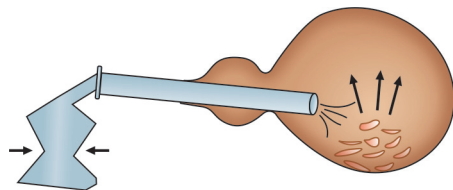


Figure 1.31

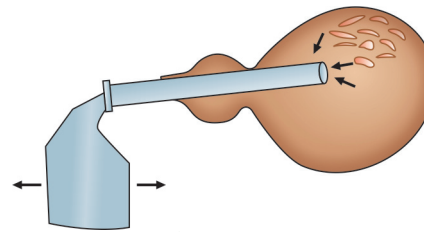


Figure 1.32

Figure 1.33 shows the Waddle's test—performed after TURP to assess adequacy of prostatic resection for outflow channel. Bladder is filled first and then urinary stream is assessed for adequacy of resection.



Figure 1.33

After completion of TURP, a three-way catheter is placed. In these pictures, low pressure TURP was done. A two-way catheter is placed per urethrally, and a 14 Fr suprapubic catheter is placed for irrigation (Fig. 1.34).

The asepto syringe has two purposes (Fig. 1.35):

1. To check for colour of efflux
2. To evacuate any residual chips (Fig. 1.35).

Any left-over prostatic chip in the bladder may lead to postoperative blockage of catheter.



Figure 1.34



Figure 1.35

The final TURP prostatic chips would be sent for histopathology (Fig. 1.36).

Their weight should be measured, so that we have rough idea about the amount of prostate resected.

Step 5. Catheterisation

This is the final picture in case of a low pressure TURP (Figs 1.37 and 1.38). The suprapubic catheter is dressed on the abdomen. The penis is covered with a pad. The per-urethral catheter is given traction to a thigh as shown in Figs 1.37 and 1.38 (2-way in this case as shown in the figure as it was a low pressure TURP). This ensures pressure haemostasis in the prostatic fossa.



Figure 1.36



Figure 1.37



Figure 1.38



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TURP: Step by Step

As an alternate, the traction can be applied to the abdomen as shown in Fig. 1.39.

Note: There are two schools of thought regarding application of traction, whereby some resectionists do not prefer to use traction after surgery.

Different schools of thought for traction application are:

- No traction
- Light traction
- Heavy traction (only to be used in case of bleeding during procedure).

When no traction is applied the catheter must be fixed so that catheter is free from movements (Fig. 1.40).



Figure 1.39



Figure 1.40

#TIP 1

Steps in Assembling TURP Apparatus

1. Insert the telescope in visual obturator.
2. Insert the inner Iglesias sheath into the outer Iglesias sheath.
3. Insert visual obturator in inner Iglesias sheath.
4. After entering the bladder, visual obturator is removed. Loop is attached to working element.
5. The working element is inserted into inner Iglesias sheath.

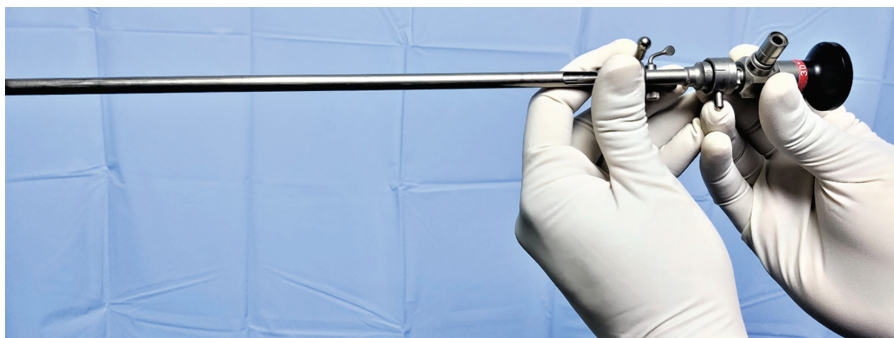


Figure 1.41



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Instrumentation in TURP

In step 1, the 30° scope is inserted in the visual obturator. While doing so, point A, B and C should be aligned in the same line as shown in Fig. 1.42. Both of them are locked by rotating the knob “B” clockwise (as shown in Fig. 1.43).

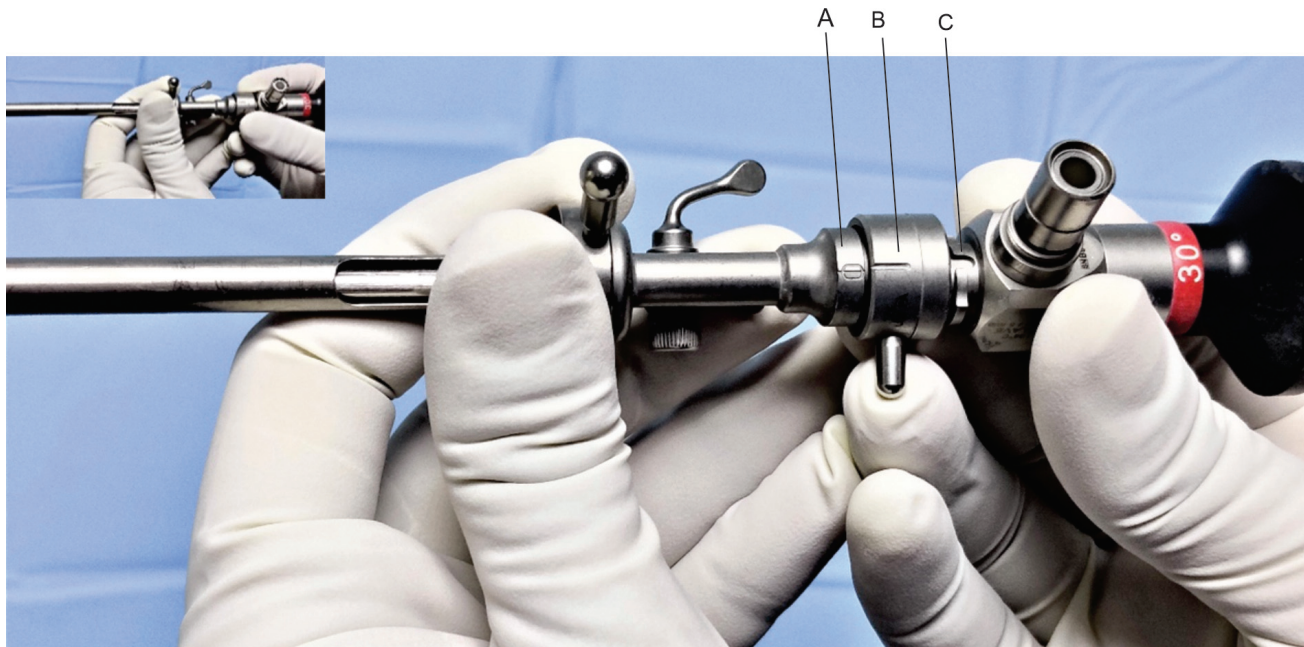


Figure 1.42

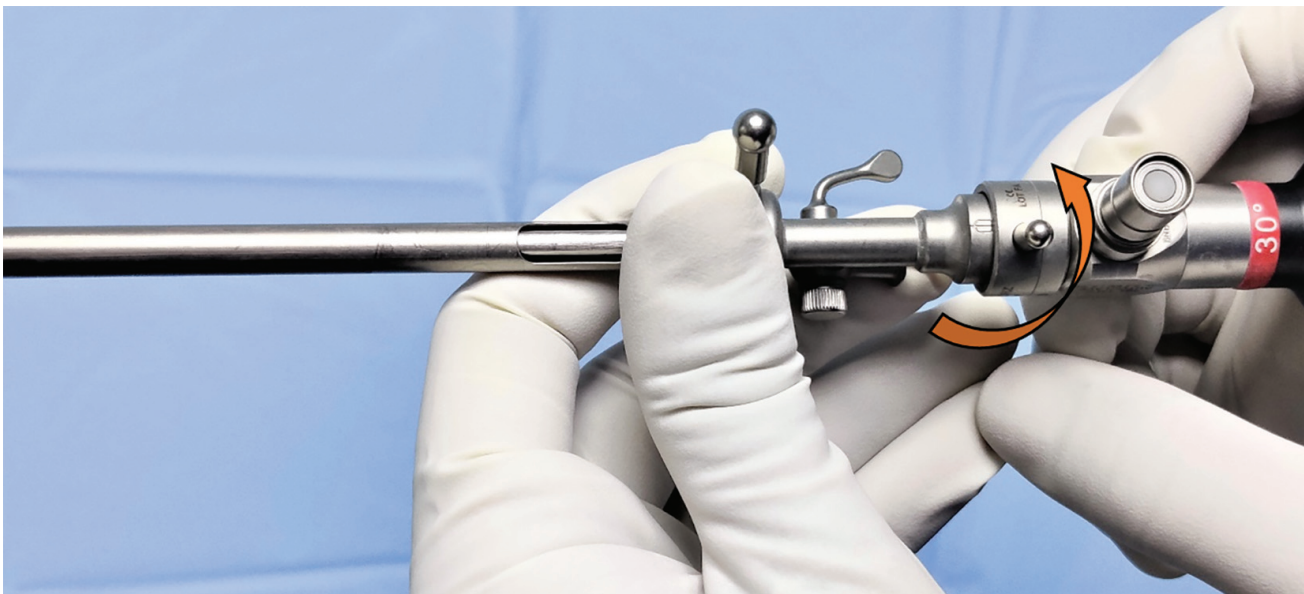


Figure 1.43

In step 2, inner sheath is inserted in the outer Iglesias sheath. Here again, all the three points A, B and C should be aligned in the same line. The components are locked by rotating the knob "B" in clockwise manner (as shown in Figs 1.44 and 1.45).

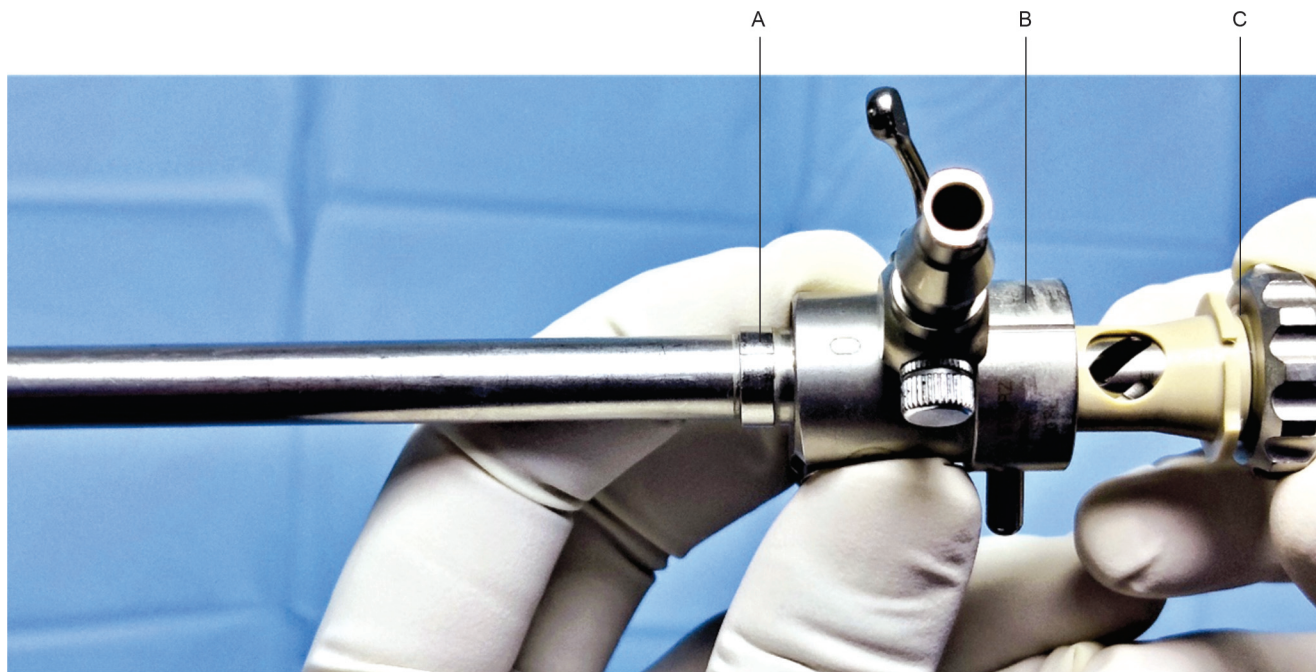


Figure 1.44



Figure 1.45

In step 3, the visual obturator is inserted in the inner Iglesias sheath.

In this step, points A, B and C must be aligned, to enable the telescope to snugly fit into the Iglesias sheath (as shown in Fig. 1.46). The visual obturator is fixed to the inner Iglesias sheath by rotating the knob "B" in clockwise manner (as shown in Fig. 1.47 and the final picture in Fig. 1.48).

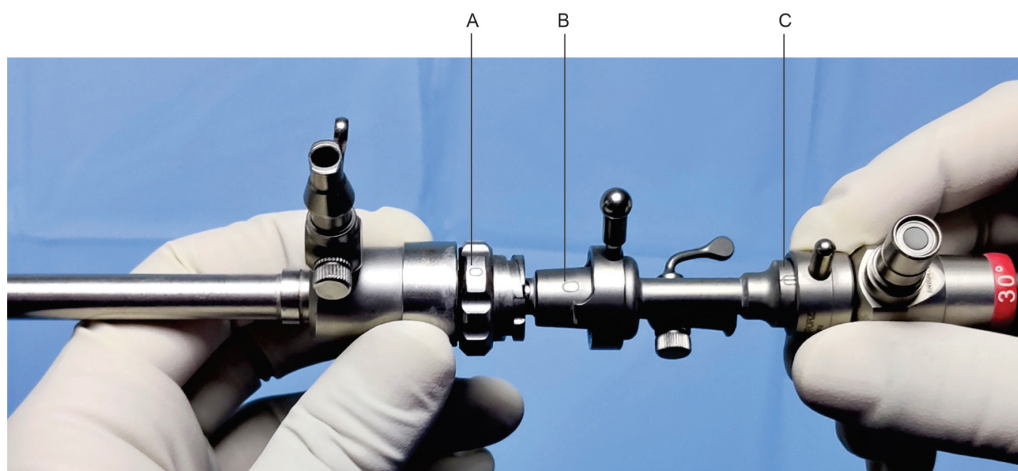


Figure 1.46



Figure 1.47



Figure 1.48

In steps 4 and 5, the visual obturator is removed, and it is replaced with working element (Figs 1.49 and 1.50). A loop electrode is attached to the working element by passing the two unequal stems in the two holes in the working element (Fig. 1.51).

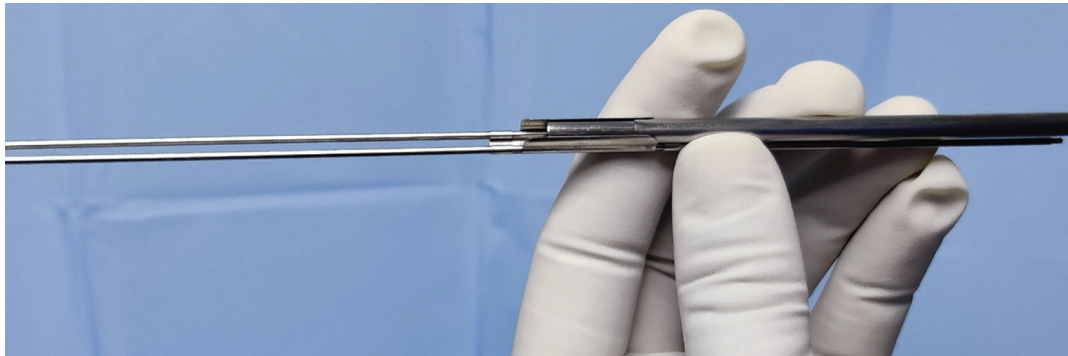


Figure 1.49



Figure 1.50



Figure 1.51

The point A of the outer Iglesias sheath is aligned with the point B of the working element (as shown in Fig. 1.52).

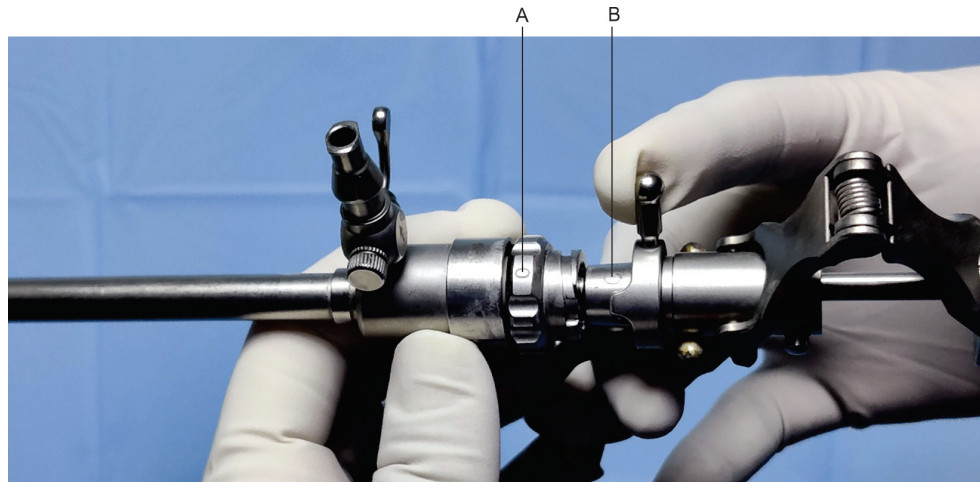


Figure 1.52

These two components are locked by rotating the knob "B" in clockwise manner (as shown in Fig. 1.53).



Figure 1.53

The final assembly for TURP/ TURBT (Fig. 1.54).



Figure 1.54

The cable is attached to the groove (upward arrow) in the working element (Fig. 1.55).

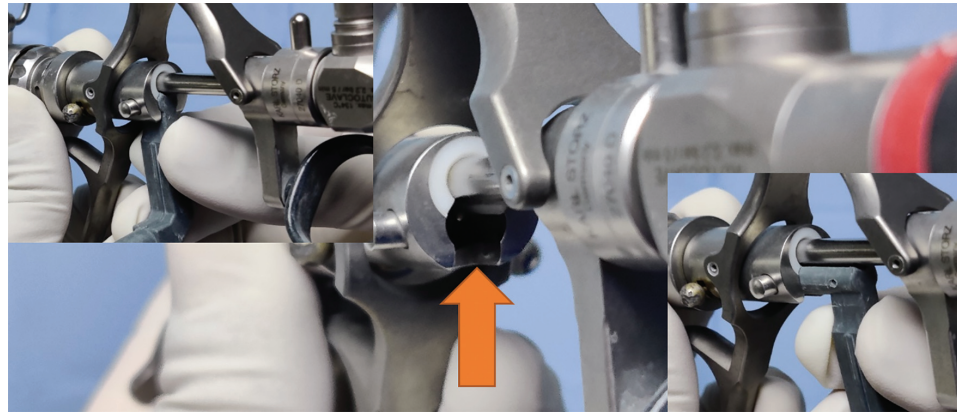


Figure 1.55

This is the complete TURP assembly with a finger-operated working element (Fig. 1.56).



Figure 1.56

The disposable bladder evacuator is attached to the outer Iglesias sheath for evacuation of prostatic chips (Fig. 1.57).



Figure 1.57

Holmium Laser Enucleation of Prostate (HoLEP)

• Tanuj Paul Bhatia

Steps of Surgery

1. Enucleation
2. Morcellation

INSTRUMENTS

Instruments for Enucleation

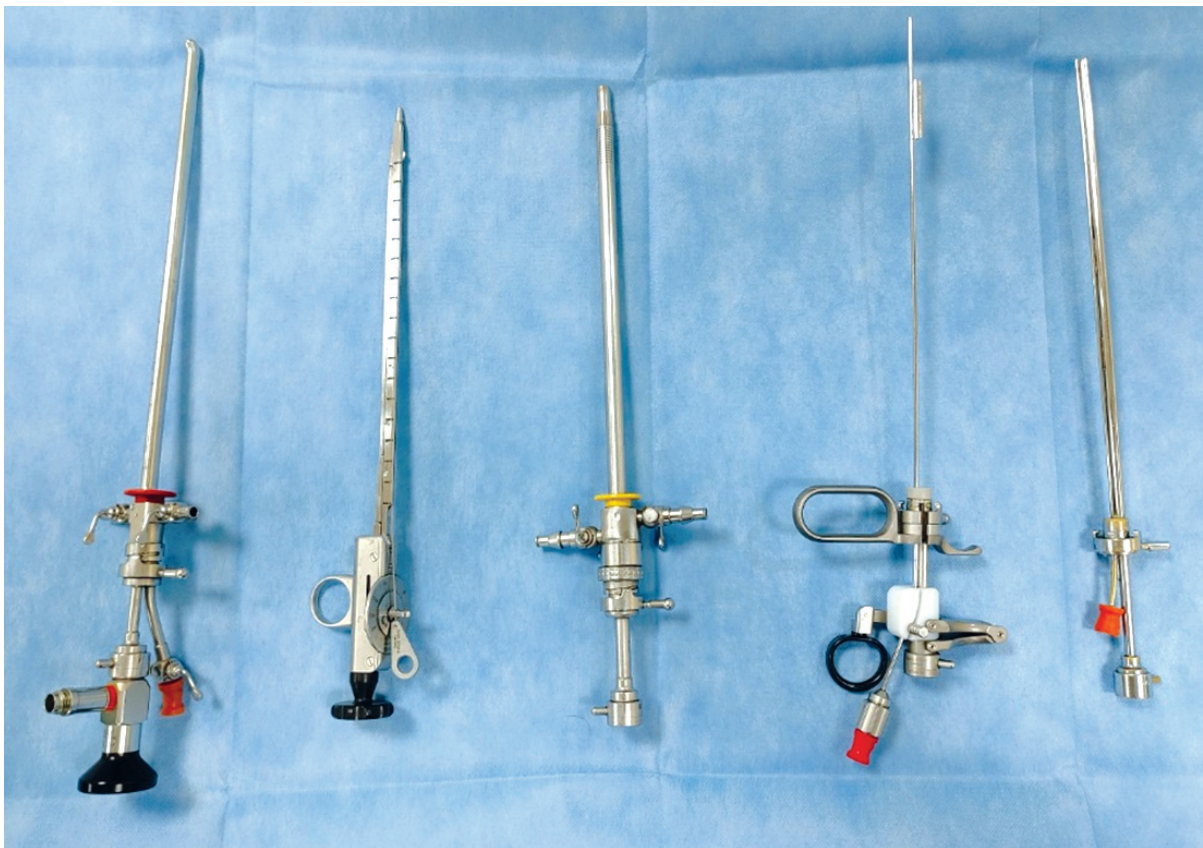


Figure 2.1 Cystoscope, Otis urethrotome, 26F resectoscope, LASER working element, LASER bridge (left to right).

Instruments for Morcellation

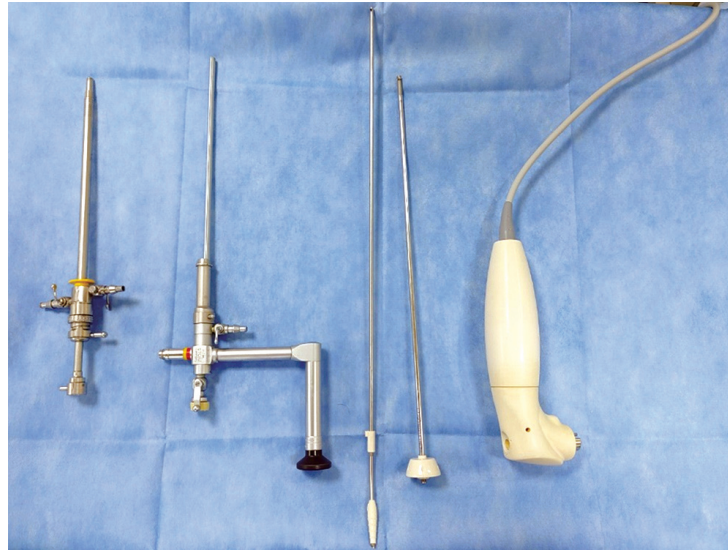


Figure 2.2 26F resectoscope, morcelloscope, morcellator blade, morcellator handle (left to right).

Position

Figure 2.3 shows patient in lithotomy position, monitor at head end of table, in straight line of sight.

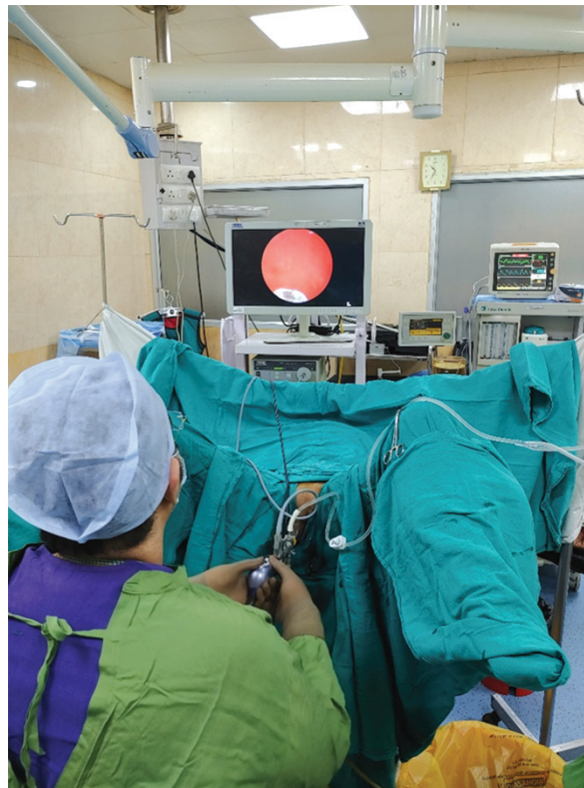


Figure 2.3

Initial Steps

Figure 2.4 depicts the importance of lubrication prior to urethral instrumentation. Figure 2.5 shows cystourethroscopy to assess the lower urinary tract.



Figure 2.4



Figure 2.5

Figure 2.6 shows Otis urethrotomy/urethral dilatation. Procedure is done using normal saline at a height of 60 cm.



Figure 2.6

Figures 2.7 and 2.8 show passage and assembly of resectoscope and LASER working element. Snuggly fitting washer prevents leakage of saline.



Figure 2.7



Figure 2.8



Figure 2.9 High power settings for enucleation

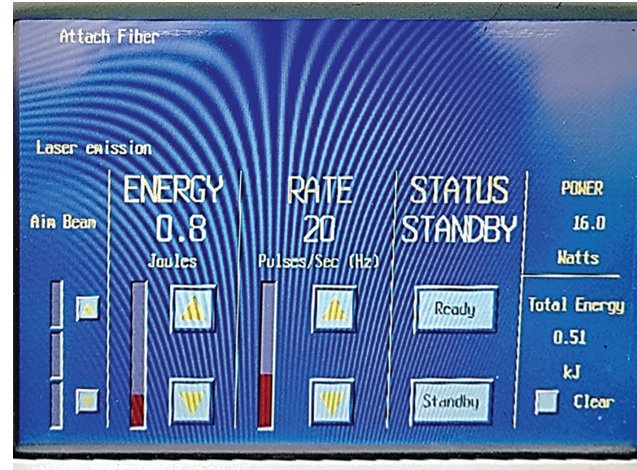


Figure 2.10 Low power settings for haemostasis

Methods of Enucleation

1. 3-lobe technique
2. 2-lobe technique
3. En bloc enucleation

Steps of Enucleation (3-Lobe Technique)

3-lobe technique is the most commonly practiced technique for enucleation. Following are the steps of this technique of enucleation.



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HoLEP: Step by Step



1. As shown in Fig. 2.11, LASER incision is made at 5 o'clock position beginning from bladder neck, extending till verumontanum. Incision is deepened till the capsule.
2. Similar incision is made at 7 o'clock position from bladder neck till verumontanum (Fig. 2.12).

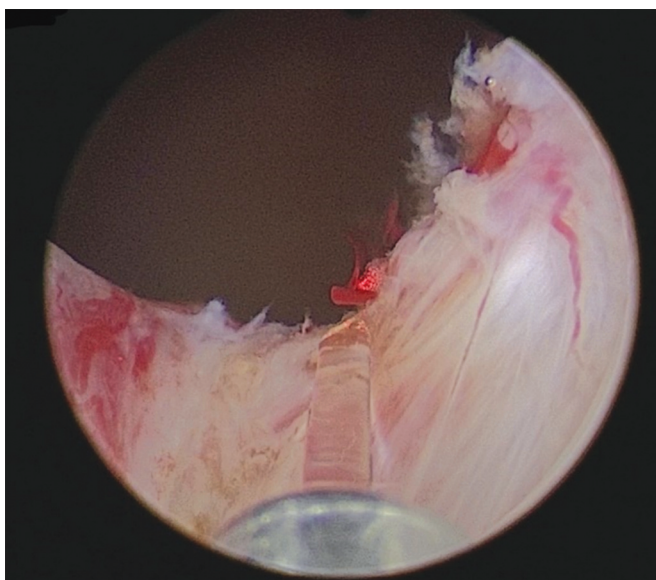


Figure 2.11 5 o'clock bladder neck incision

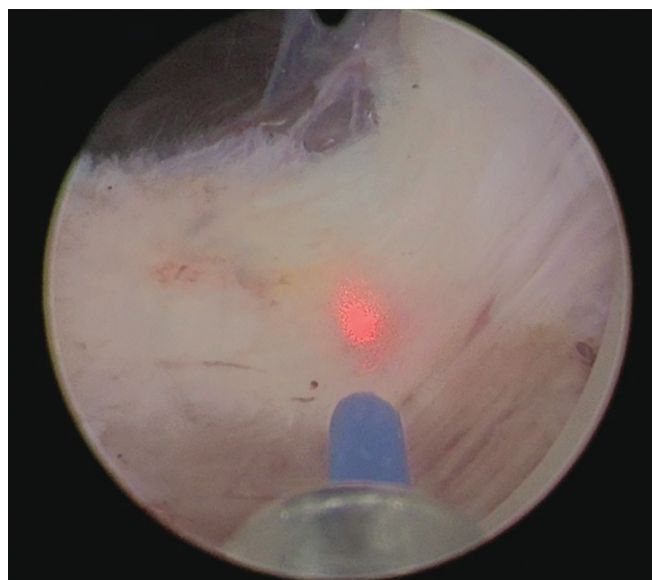


Figure 2.12 7 o'clock bladder neck incision

3. Enucleation of median lobe begins in front of verumontanum by connecting the previously placed bladder neck incisions in front of verumontanum (Figs 2.13 and 2.14).
4. As this incision is deepened, shiny capsule can be differentiated from fluffy adenoma, vertically stretched capsular fibres are divided.

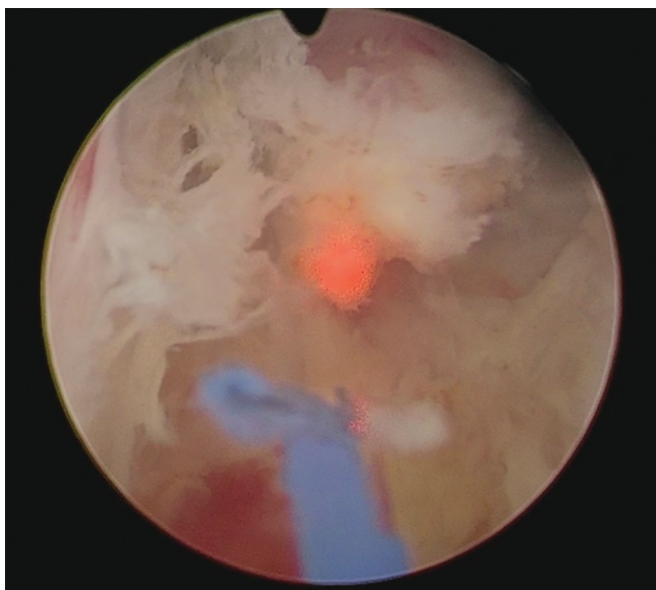


Figure 2.13 Connection of 5 and 7 o'clock incisions in front of verumontanum

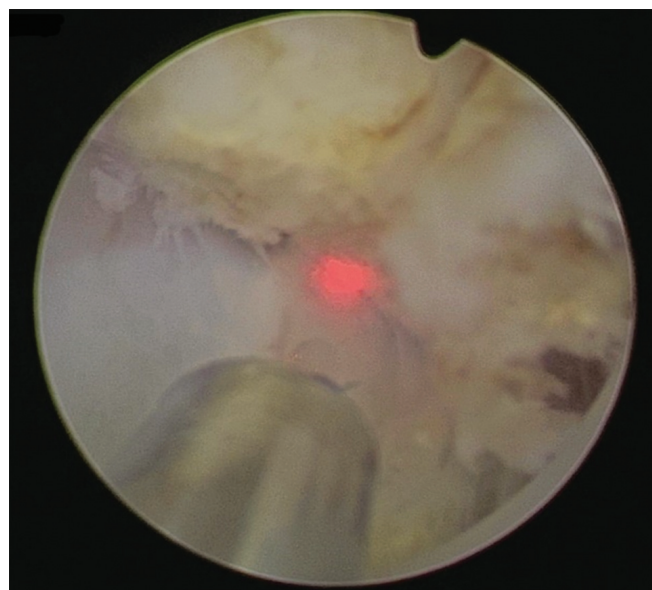


Figure 2.14 Connection of bladder neck incisions to lift the median lobe

5. Close to bladder neck, vertically stretched fibres are divided, sending the median lobe floating into bladder (Fig. 2.15).
6. The scope is turned 180° and anterior incision is made from bladder neck to around 1 cm proximal to the sphincter. Distal limit for this incision can be marked beforehand as shown in Fig. 2.16.

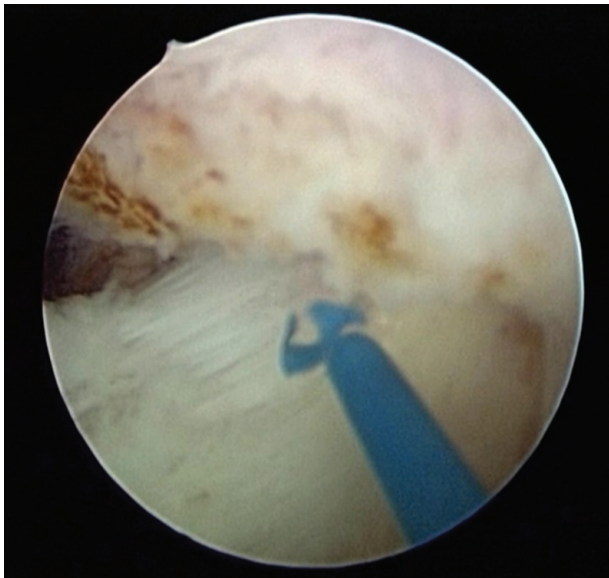


Figure 2.15 Median lobe dissection near bladder neck

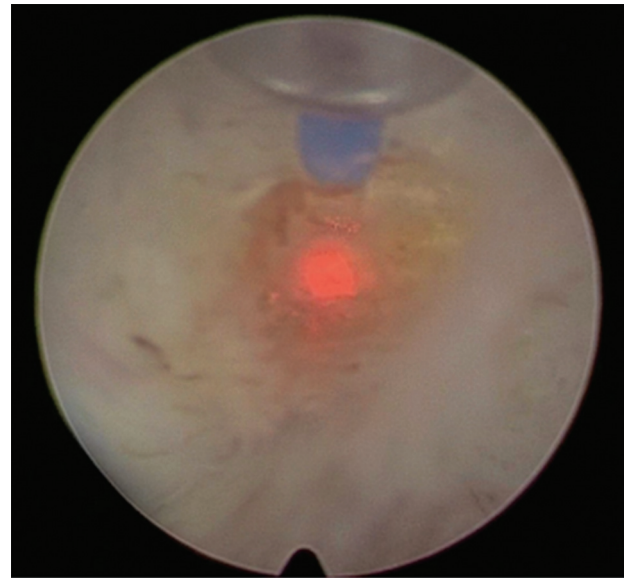


Figure 2.16 12 o'clock incision from bladder neck till sphincter

7. An incision is made all around on apical mucosa, thereby separating it from the external sphincter. This helps in decreasing the stretch on sphincter, thereby decreasing chances of stress incontinence as seen in Fig. 2.17.

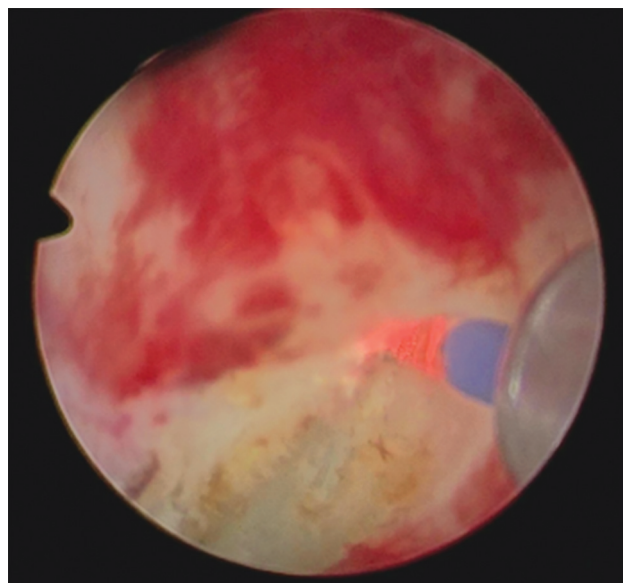


Figure 2.17 Apical mucosal release incisions separate sphincter from adenoma

8. Apical release incision is deepened till capsule thereby connecting the 5 and 12 o'clock incisions on left side (Fig. 2.18) and 7 and 12 o'clock incisions on right side as shown in Fig. 2.19. One proceeds from a defined area to an undefined area bit by bit staying towards adenoma and sighting the capsule all the time. Enucleation is continued in a retrograde manner as lateral lobes are lifted off the capsule and finally sent floating into the bladder.

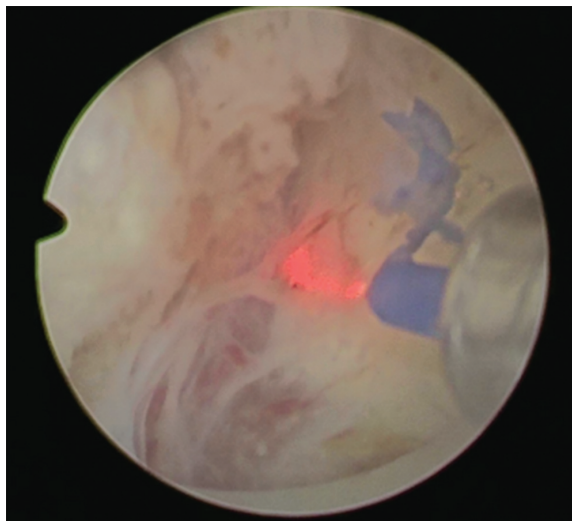


Figure 2.18 Left lateral lobe enucleation connecting the 5 and 12 o'clock incisions

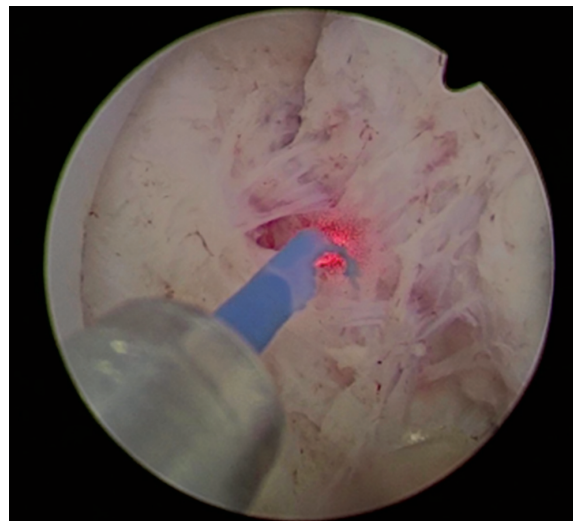


Figure 2.19 Right lateral lobe enucleation connecting the 7 and 12 o'clock incisions

9. After enucleation is complete, haemostasis is confirmed and floating adenomas are morcellated out. Outer sheath is kept *in situ*, as morcelloscope is passed through it. Bladder is kept distended for safe morcellation. Figures 2.20 and 2.21 show morcellation: Inlet is kept opened, outlet is kept closed. A hand is kept suprapubically to make sure bladder is full, to prevent inadvertent bladder injury.



Figure 2.20

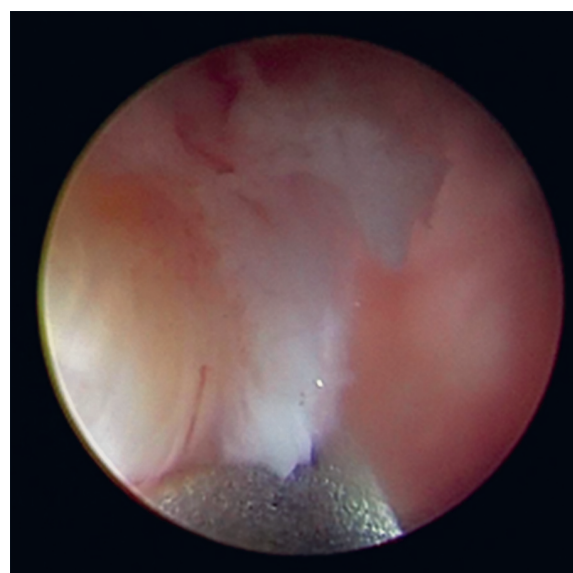


Figure 2.21

Morcellated Tissue



Figure 2.22 Morcellated tissue

Clear Urine: Irrigation only, if Required

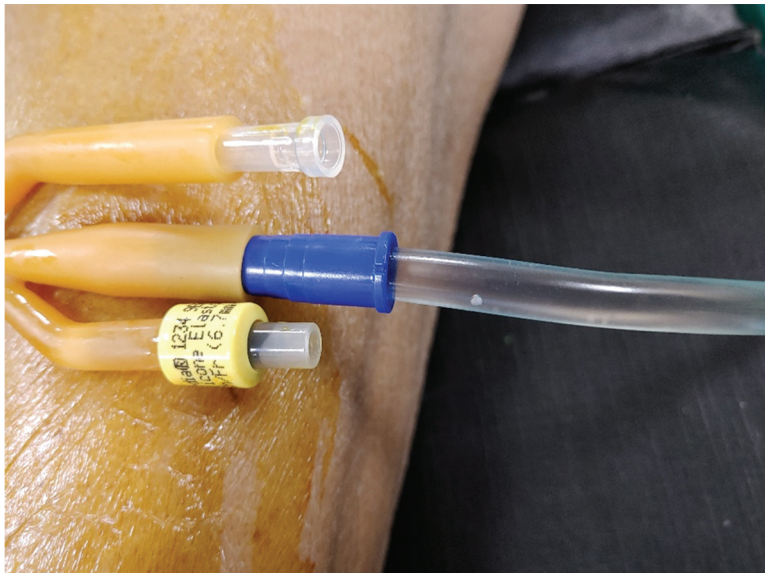


Figure 2.23 Clear urine post HoLEP



Figure 2.24 Morcellated tissue