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Surgery Illustrated – Surgical Atlas
Laparoscopic treatment of benign prostatic hyperplasia (BPH): overview of the current techniques

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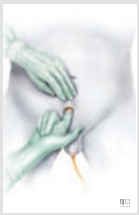

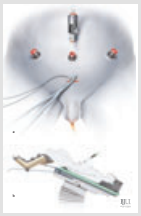
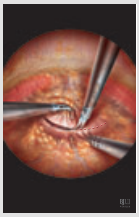
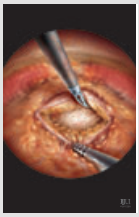

INTRODUCTION

BPH is one of the most common diseases in ageing men and can be associated with LUTS that affect health-related quality of life [1,2].

TURP has been the 'gold-standard' surgical treatment for BPH over the past 30 years. However, its role in treating large prostates is limited mainly due to intraoperative and postoperative morbidities such as bleeding (with need for transfusion), TUR syndrome, urethral strictures as well as frequent need for re-operation [3]. The operative morbidity of TURP increases when it is performed for prostatic adenomas >45 g, in procedures lasting >90 min, or in patients aged >80 years or with a history of acute urinary retention [4,5].

For large adenomas (>80 g), open transvesical (Frayer) or transcapsular retropubic (Millin) approaches obtain good and durable clinical results and lower re-operation rates than transurethral surgery [6–9]. However, it is still considered an invasive procedure. In a recent study of 902 patients who underwent open prostatectomy (OP) for prostates of mean (SD) size 96.3 (37.4) mL, the overall complication rate was 17.3% [mainly bleeding requiring transfusion (7.5%), urinary tract infection (5.1%) and surgical revision due to severe bleeding (3.7%)] and the overall mortality rate was 0.2% [10]. Moreover, the procedure alters the cosmesis, leaving a large abdominal scar.

Holmium laser enucleation of the prostate emerged as an effective alternative to OP in treating large adenomas with the additional advantages of reduced duration of catheterization and hospital stay. However,

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it is not devoid of complications and presents a steep learning curve that leads to limited acceptance in the urological community [3].

Recently, the GreenLight® PVTM potassium-titanyl-phosphate laser vaporization also showed promising results in treating large prostate adenomas. The technique seems to provide good functional outcomes, reduced time until catheter removal and reduced hospital stay together with excellent haemostatic properties. However, it does not offer the possibility for definitive histology and it has yet to be judged on a long-term basis to ascertain if this promising procedure can withstand the test of time [3].

In 2002 Mariano *et al.* [11] described the first laparoscopic prostatectomy for BPH. In 2005 Sotelo *et al.* [12] presented 17 cases of laparoscopic simple retropubic prostatectomy. After these initial presentations, laparoscopic simple prostatectomy has spread [13]. However, it is a challenging operation, even for a laparoscopic expert.

The laparoscopic approach can be extra- or intraperitoneal, following a transcapsular or transvesical route. Finger assistance may be used for a quicker enucleation of large adenomas.

The aim of the present study is to describe the surgical steps of the laparoscopic, extraperitoneal transcapsular adenomectomy (Millin). We also briefly describe the extraperitoneal transvesical approach and discuss the possible disadvantages of the intraperitoneal approach.

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Figure 1

Patient position, development of the extraperitoneal space and trocar placement.

A, The patient is placed in dorsal lithotomy position with legs only slightly raised to allow intraoperative DRE. **B**, A 22 F irrigation bladder catheter is introduced. A small 2–3 cm, suprapubic, transversal incision (that will be used at the end of the procedure for the removal of the adenoma and for a finger-assisted procedure, if necessary) is made and CO_2 is insufflated in the extraperitoneal space through a Veress needle (at 12 mmHg). The placement of the needle at this level avoids important vascular injuries.

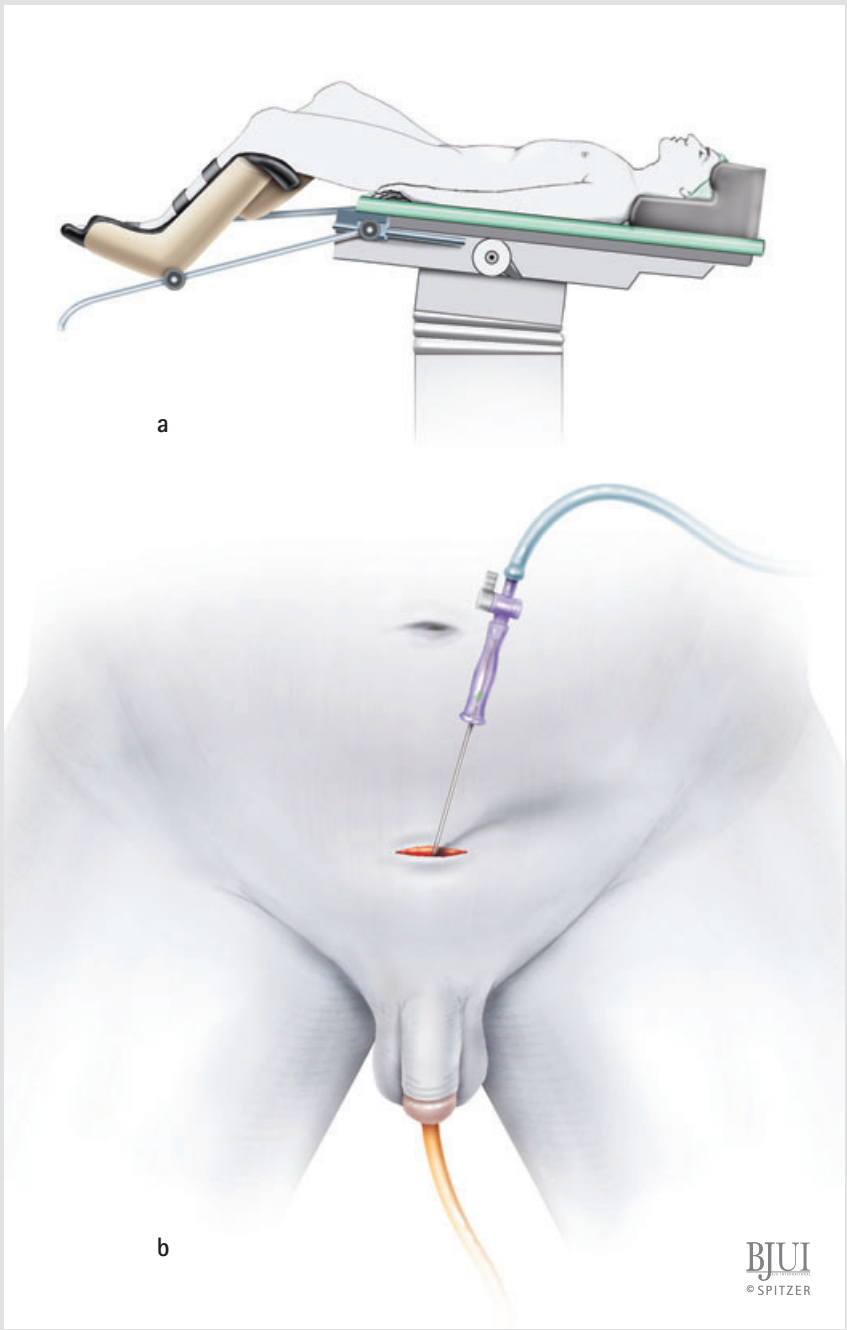

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Figure 2

A subsequent digital dissection of the preperitoneal space is performed: we start from the pubic symphysis and push the peritoneum cranially with the index finger of the left hand while the right hand pushes the abdomen in order to facilitate the detachment of the peritoneum (in Figure 2 this manoeuvre is performed by the assistant).

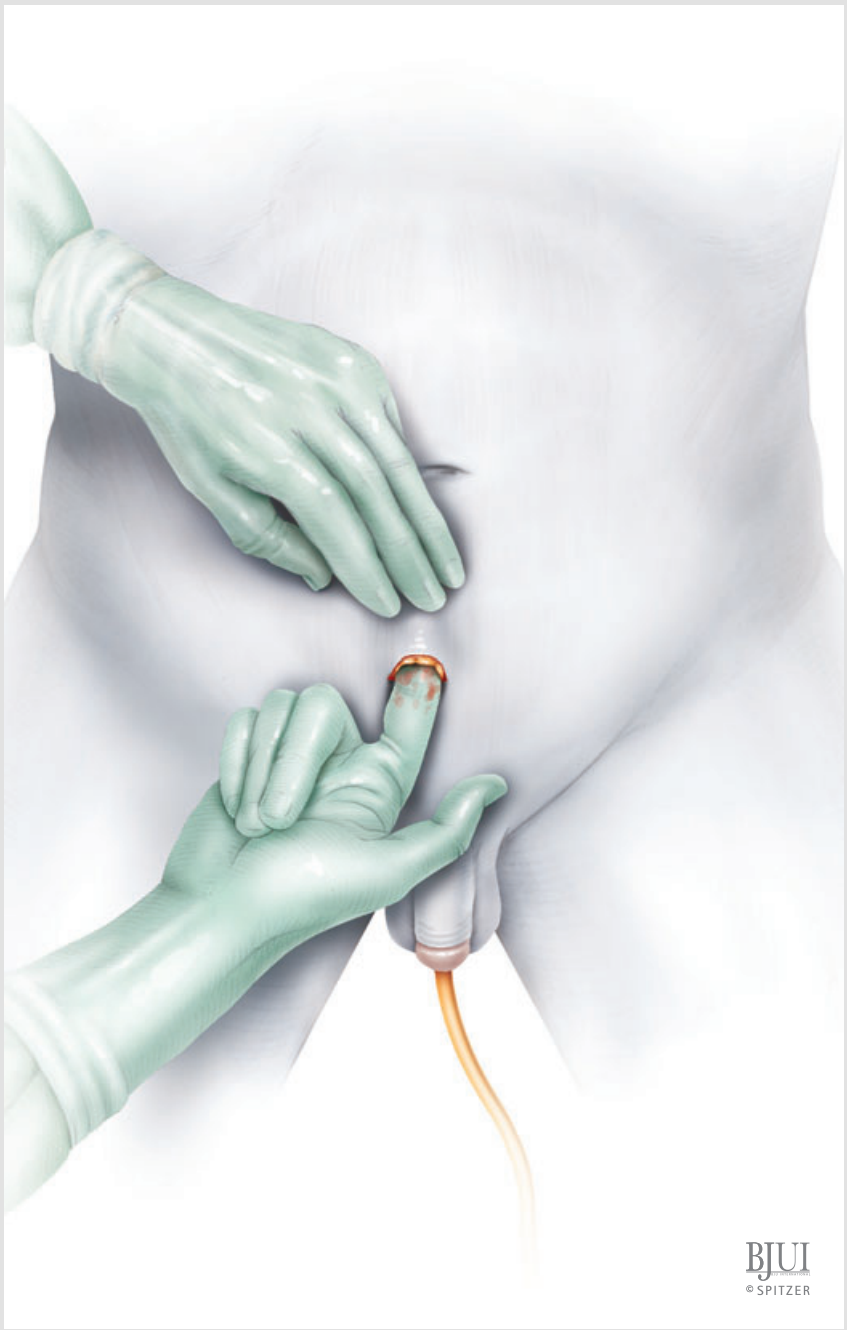

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Figure 3

Once the preperitoneal space is created, the trocars are inserted under digital guidance on the index finger of the left hand, which also lifts the anterior abdominal wall upwards.

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Figure 4

A, We use four trocars. The first 10-mm port is introduced in the Retzius space just below the umbilicus for laparoscopy. Two 5-mm ports are inserted between the umbilicus and anterior superior iliac spine on each side and another one in the midline between the pubic symphysis and the umbilicus.

Closed Veress technique, mini-laparotomy or direct insertion of the first trocar (based on the preferences and the experience of the surgeon) may be also used to gain access to the preperitoneal space. The fascial opening of the suprapubic incision is temporarily closed (we do not tie the suture but we keep the extremities together with a large Crile clamp) to avoid CO_2 leakage during the procedure.

B, Finally, the patient is placed in Trendelenburg position.

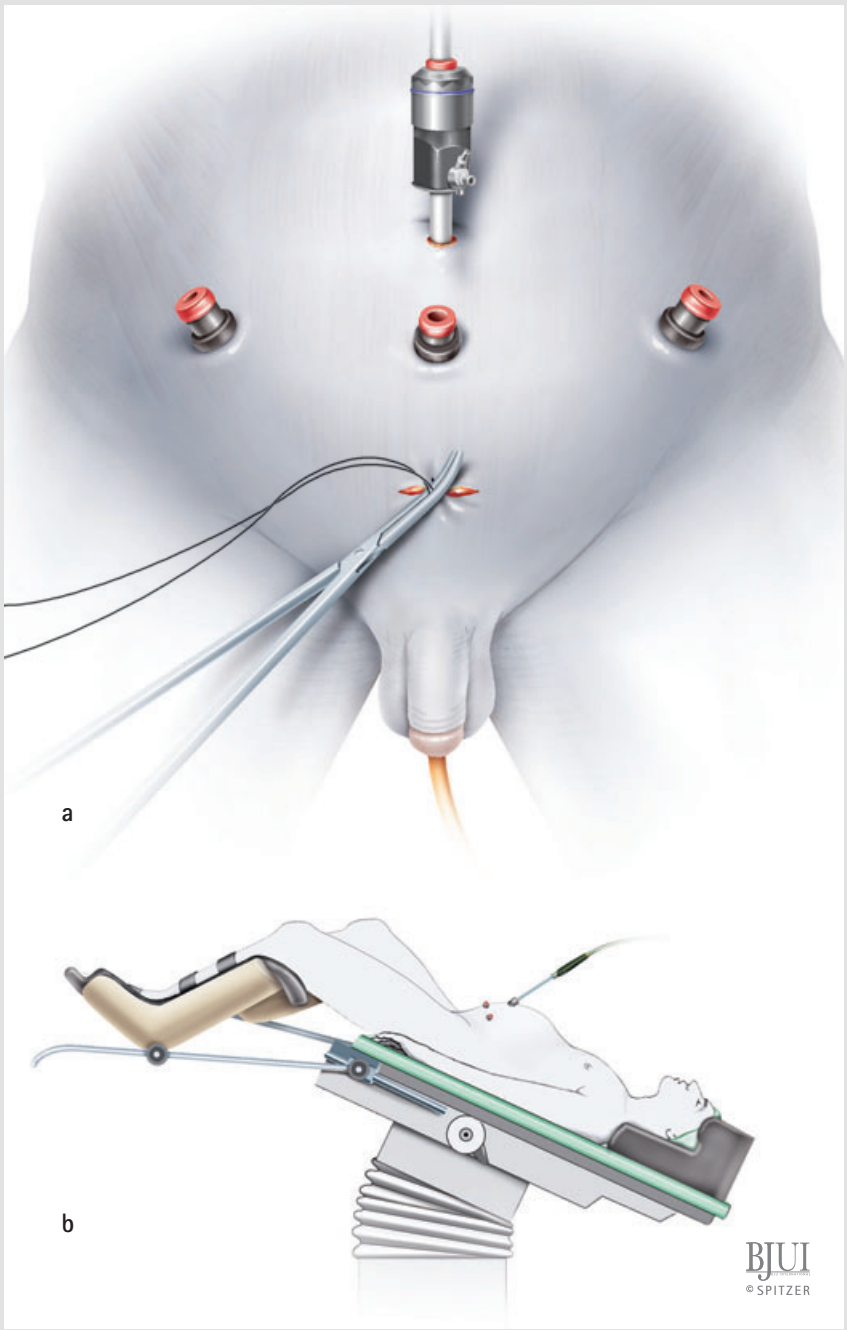

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Figure 5

Clearing of anterior preprostatic fat, coagulation of the superficial dorsal penile vein and opening of the prostatic capsule.

As previously described in the open counterpart [14], the preprostatic fat should be removed by aspirating/sweeping it away in an up and down direction. This prevents tearing of the veins, which would occur if the fat was removed side to side. Once the fat has been removed, the superficial dorsal vein of the penis can be easily evidenced, coagulated (by bipolar coagulation) on both sides of the future line of transversal capsular incision and transected far away from the puboprostatic ligaments (to avoid bleeds from the dorsal vascular plexus).

A 3–4 cm transverse incision of the prostatic capsule is made using scissors and electrocoagulation, 1 cm distal to the bladder neck. The catheter balloon aids in the identification of the bladder neck. The opening of the capsule should be proportional to the volume of the adenoma. During this time, gentle pressure should be applied with the tip of the suction device manoeuvred by the assistant to reduce bleeding from capsular vessels. Bipolar diathermy is usually enough to control these bleeds.

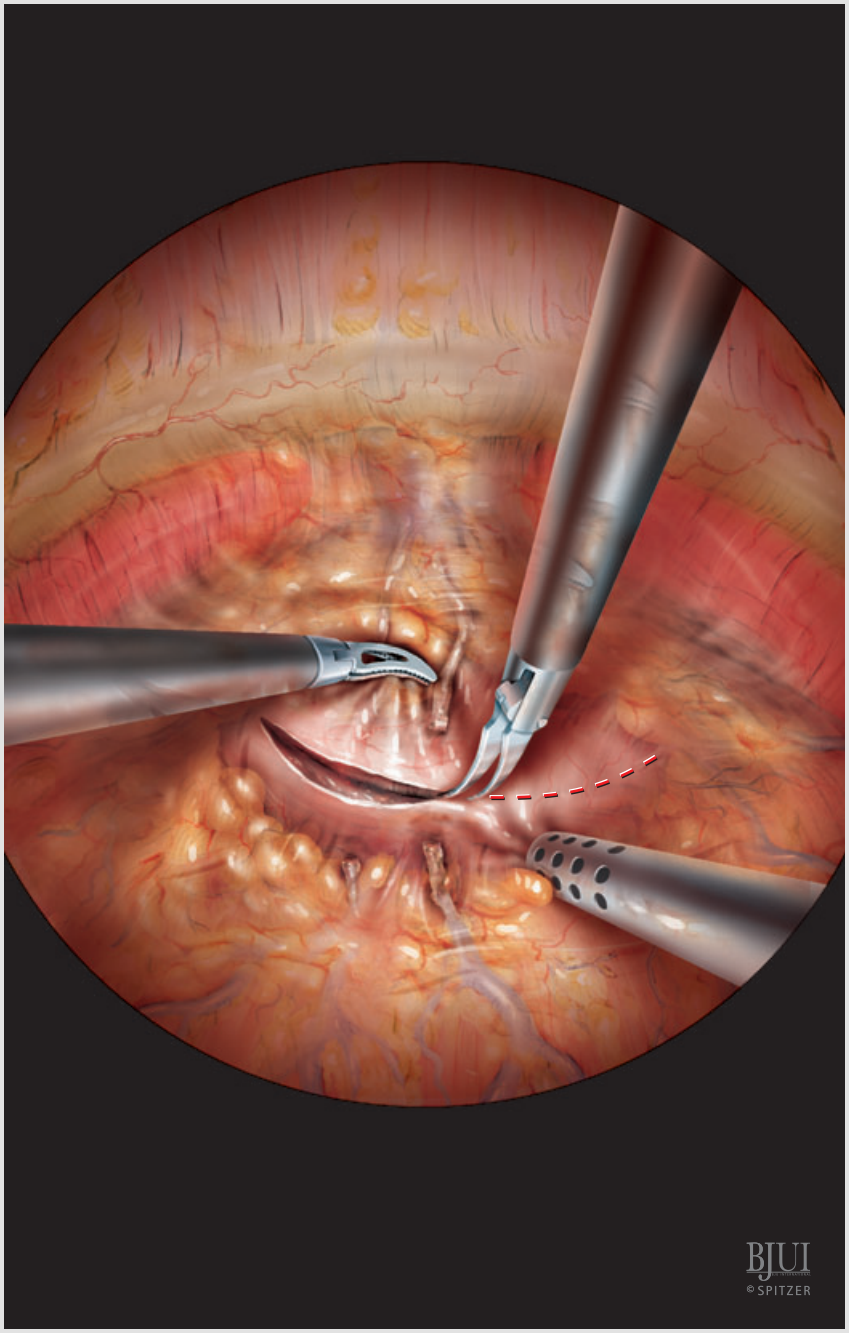

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Figure 6

The capsular incision proceeds in depth until the whitish tissue of the adenoma becomes visible.

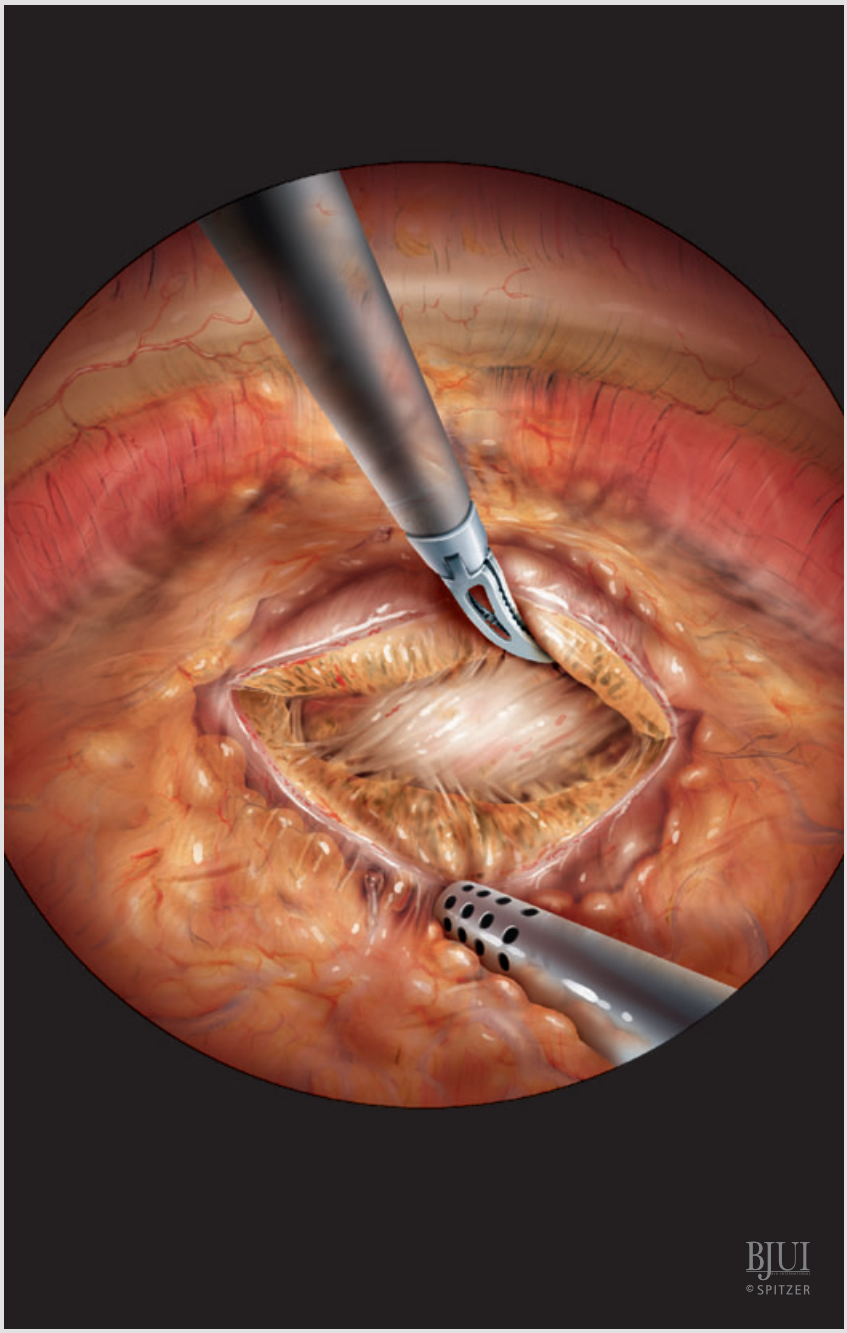

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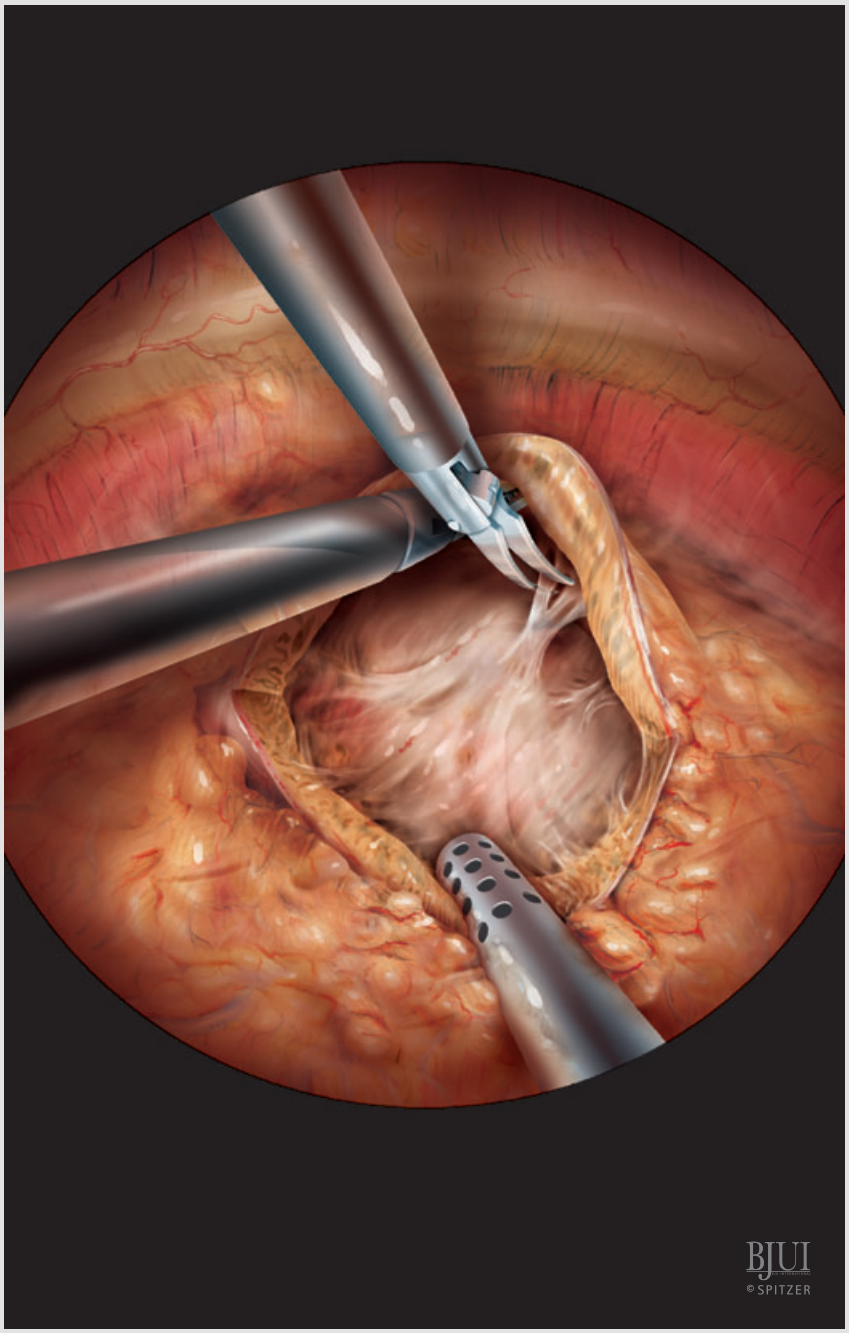
Figure 7

Dissection of the adenoma and incision of the distal urethra.

With the use of monopolar scissors and the suction-irrigation cannula, the plane between the prostatic adenoma and the capsule is developed. After developing the anterior plane, the dissection moves laterally and then posteriorly. Adhesions between the adenoma and the capsule must be cut with monopolar scissors under direct vision. Excessive traction to the adenoma should be avoided to prevent lesions to the membranous urethra/urethral sphincter.



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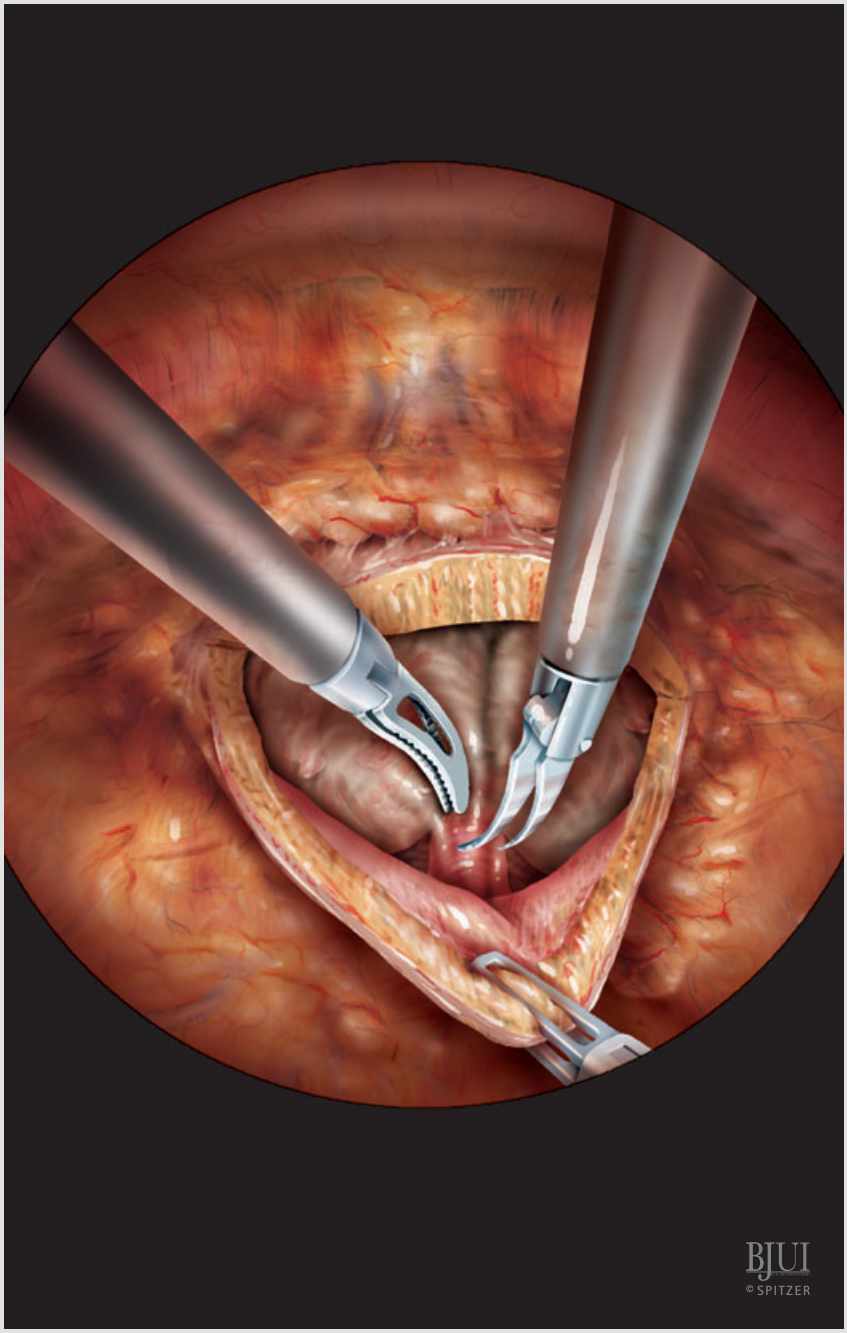
Figures 8 and 9

The bladder neck and the urethra are transected under direct vision (Figures 8 and 9, respectively) and the adenoma is removed and placed in the left lateral iliac space.

The prostate fossa is inspected for any remaining nodules of adenoma. Bleeding points are controlled with bipolar coagulation for small vessels and sutures for larger capsular arteries.



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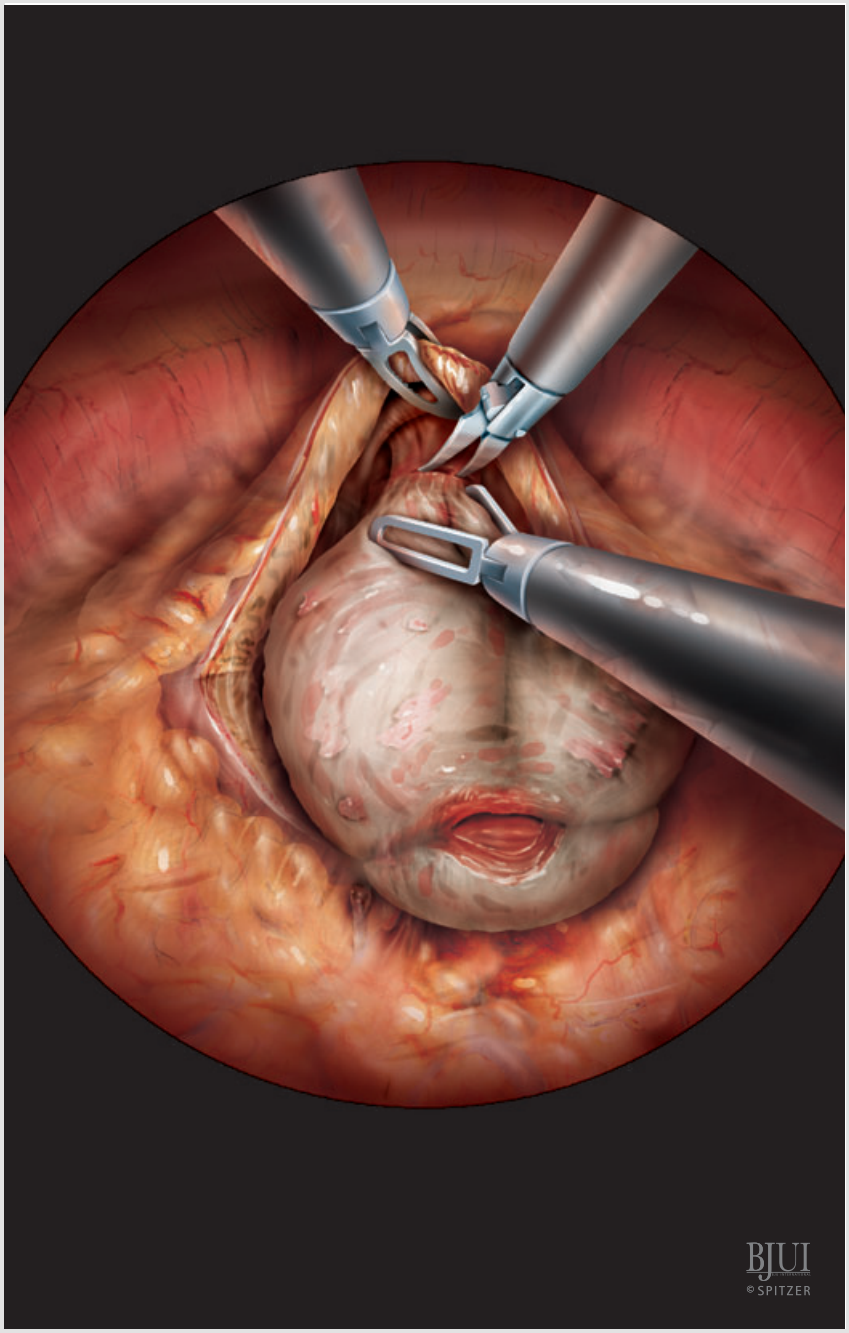

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Figure 10

Trigonisation.

Deep re-trigonisation is carried out by a running or interrupted suture of 3-0 polyglecaprone to create a wide open bladder neck. A U-suture passing from the posterior prostatic capsule to the sacral lip of the bladder neck and again to the posterior capsule could be also used. Trigonisation facilitates the re-epithelisation of the prostate cavity and may also help with haemostasis; however, it is a difficult surgical step and it is not always necessary. A 22 F irrigation catheter is then introduced.

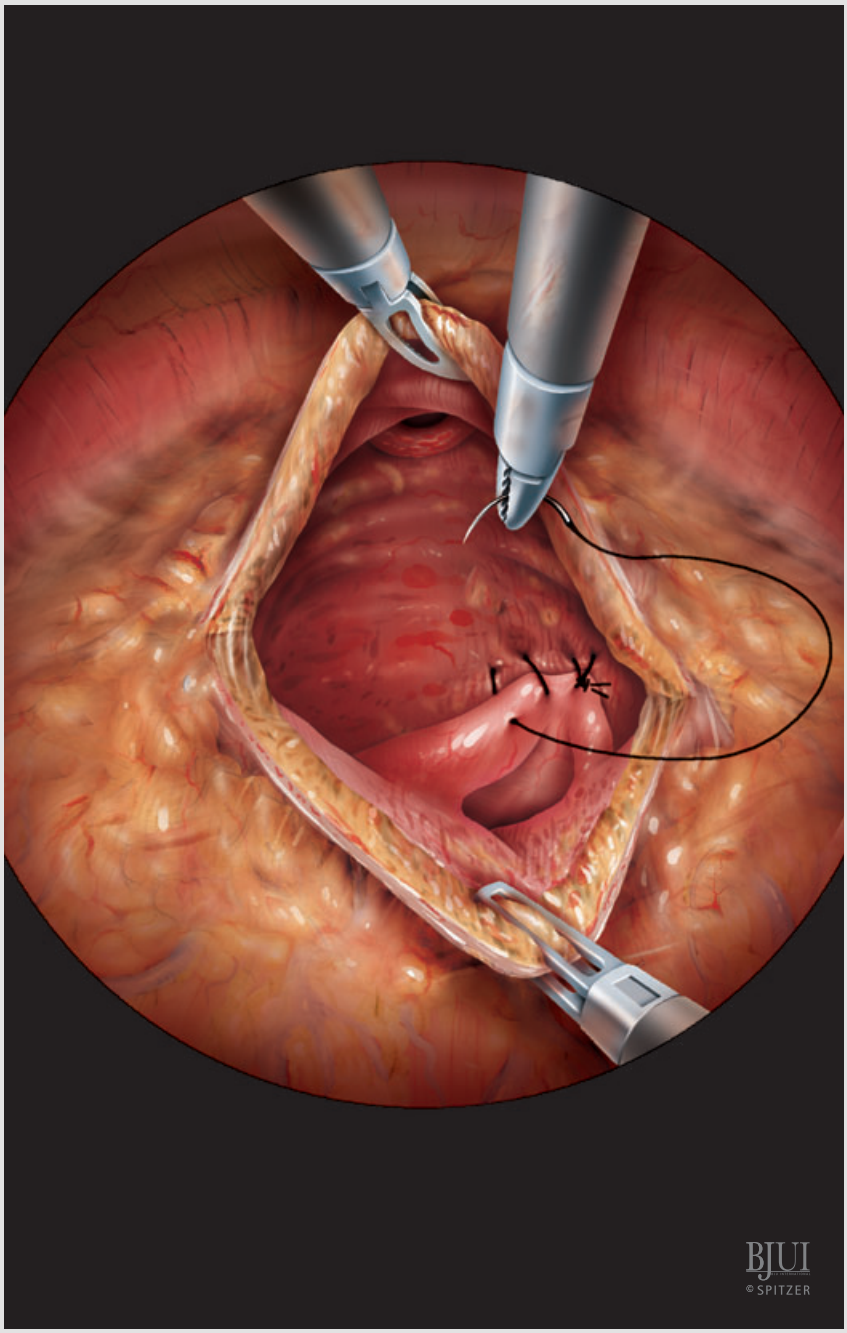

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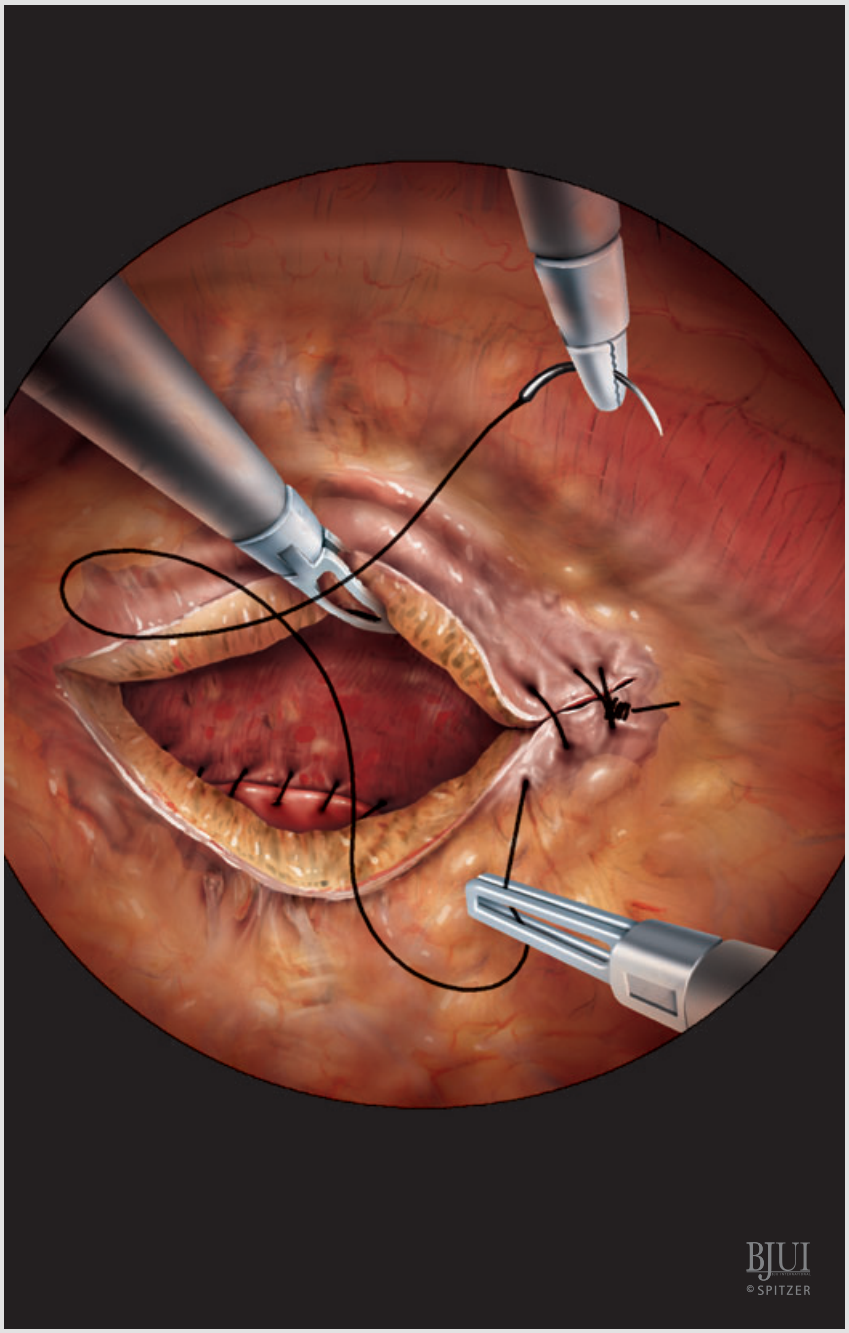
Figure 11

Closure of the prostatic capsule and placement of the drain.

A 20–25 cm running suture of dyed size zero poliglecaprone 25 (Monocryl®) is used to close the prostatic capsule: monofilament slides better and it also maintains a high tensile strength. A leak test is performed with 150 mL saline solution and thereafter the retropubic space is drained with a suction drain and the bladder irrigated with saline solution.



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ALTERNATIVE METHOD OF ENUCLEATION

The enucleation of the adenoma may be quicker if performed with finger assistance. Once the plane between capsule and adenoma has been developed, the gas flow is stopped and the right index finger is introduced through the 2–3-cm suprapubic incision into the cleavage plane. The adenoma is then digitally enucleated. The index finger of the left hand can be placed in the rectum to facilitate/guide a complete enucleation through DRE. The specimen is removed through this incision. Insufflation is restarted after the suprapubic incision is closed with a size zero polyglactin running suture.

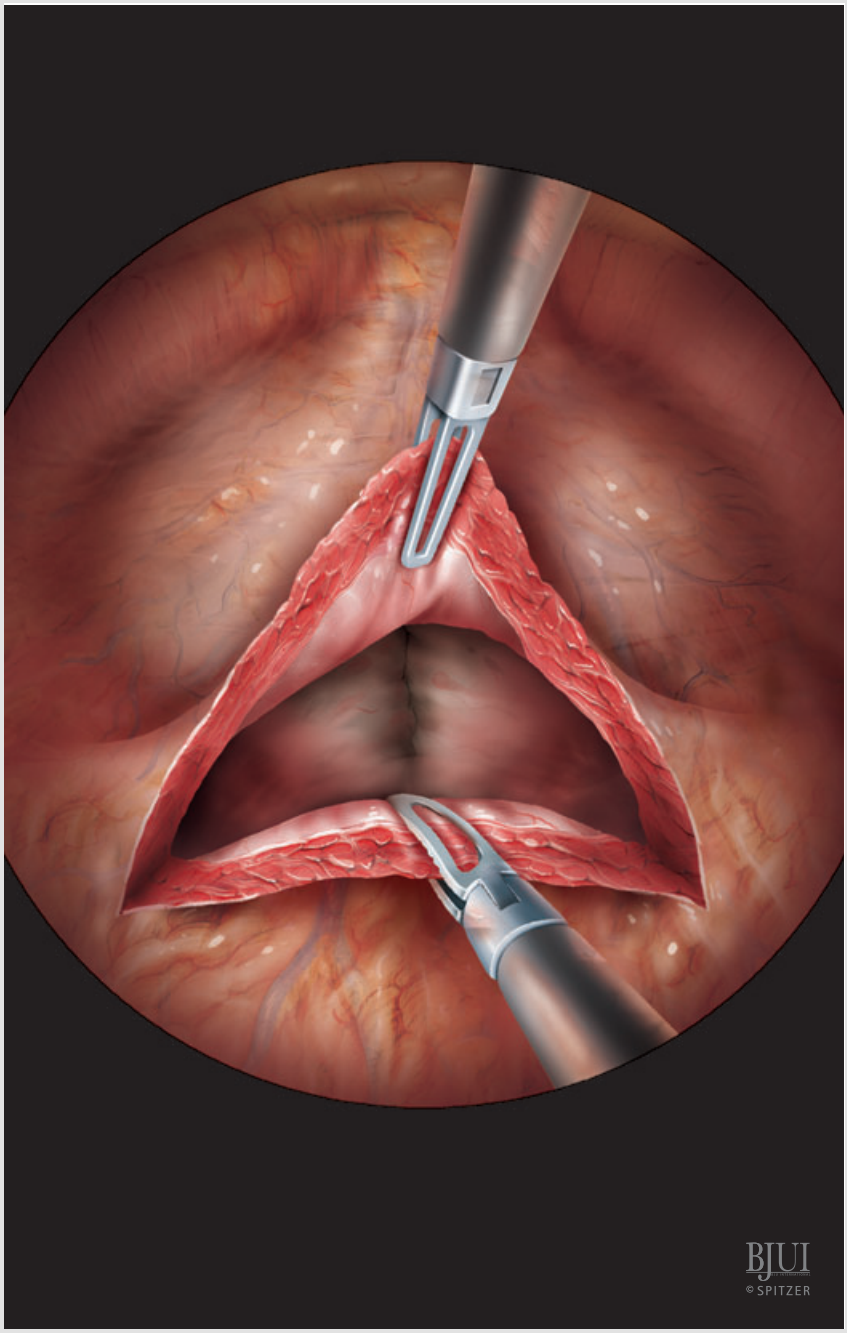

Figure 12

Extraperitoneal transvesical approach.

In this case, a transverse cystotomy incision is made proximally to the junction of the bladder and prostate: in this manner the anterior bladder neck is incised and entry is gained into the bladder lumen. A circular incision is made on the vesical mucosa overlying the prostate lobes in the vicinity of the bladder neck area, which is deepened until the prostate adenoma is identified. Careful blunt and electrocautery dissection is performed to reach the proper subcapsular plane outside the prostate adenoma. Monopolar scissors or the suction-irrigation cannula are used to free the adenoma from the inside of the prostate capsule. At the end of the procedure, the transverse cystotomy is closed in a watertight manner with running 2-0 polyglactin suture on a CT-1 needle.

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INDICATIONS FOR THE LAPAROSCOPIC APPROACH

Laparoscopic simple prostatectomy can be useful in cases in which the prostate is too voluminous to be removed by TURP in a short time (with the exception of bipolar TURP instruments that make use of saline solution avoiding the TUR syndrome), in which BPH is accompanied by bladder diverticula or bladder stones, or if it is difficult to insert the urethroscope because of a serious urethral stricture, and where the patient has difficulty in assuming the lithotomy position.

Possible advantages:

1) Better control of bleeding due to magnified view and gas pressure.
2) Less morbidity and pain with respect to OP because of smaller incisions and absence of retractor use. This could lead to smaller surgical incisions, better cosmesis, less risk of wound infections, less use of analgesics and consequently a shorter hospital stay and earlier return to normal activities.

Drawbacks:

1) Prolonged operative duration.
2) Absence of haptics/force feedback (balanced however by the better view offered by the laparoscope).
3) Learning curve.

A transperitoneal transvesical approach could be also used for laparoscopic treatment of BPH. We routinely perform both trans- and extraperitoneal adenomectomies; however, the transperitoneal approach presents risks for bowel complications (ileus, peritonitis, bowel injuries) and urine leak from the bladder suture (that could determine a urine peritonitis). With the extraperitoneal approach, the risk of bladder rupture in case of bladder tamponade (by clots) is avoided as well as the additional anaesthesiology risks determined by the steep Trendelenburg position (required by the transperitoneal approach).

CONCLUSIONS

Laparoscopic retropubic simple prostatectomy combines the advantages of OP (durable clinical results and lower re-operation rates) with the minimally invasive characteristics of laparoscopy. In the hands of an experienced laparoscopist, it appears safe, feasible, reproducible and a minimally invasive alternative to open surgery for patients with large prostate adenomas.

ACKNOWLEDGEMENTS

Anastasios D. Asimakopoulos is a scholar of Alexander S. Onassis Public Benefit Foundation.

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Abbreviation: **OP**, open prostatectomy.

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