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Robot-assisted Simple Prostatectomy for Treatment of Lower Urinary Tract Symptoms Secondary to Benign Prostatic Enlargement: Surgical Technique and Outcomes in a High-volume Robotic Centre

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Abstract

Background: Robot-assisted simple prostatectomy (RASP) is a minimally invasive procedure for treatment of patients with lower urinary tract symptoms (LUTS) due to large benign prostatic enlargement (BPE).
Objective: To present the perioperative and short-term functional outcomes of RASP in a large series of patients with LUTS due to BPE treated in a high-volume referral center.
Design, setting, and participants: We retrospectively collected data for 67 consecutive patients who underwent RASP from October 2008 to August 2014.
Surgical procedure: RASP was performed using a Da Vinci S or Si system with a transvesical approach.
Measurements: Complications were graded according to the Clavien-Dindo system. Continuous variables are reported as median and interquartile range (IQR). Comparison of preoperative and postoperative outcomes was assessed by Wilcoxon test. A two-sided value of $p < 0.05$ was considered statistically significant.
Results and limitations: The median preoperative prostate volume was 129 ml (IQR 104–180). For the 45 patients who did not have an indwelling catheter, the median preoperative International Prostate Symptom Score (IPSS) was 25 (20.5–28), the median maximum flow rate (Q_{max}) was 7 ml/s (IQR 5–11), and the median post-void residual volume (PVRV) was 73 ml (IQR 40–116). The median operative time was 97 min (IQR 80–127) and the median estimated blood loss was 200 ml (IQR 115–360). The postoperative complication rate was 30%, including three cases (4.5%) with grade 3b complications (major bleeding requiring cystoscopy and coagulation). The median catheterization time was 3 d (IQR 2–4) and the median length of stay was 4 d (IQR 3–5). The median follow-up was 6 mo (IQR 2–12). At follow-up, the median IPSS was 3 (IQR 0–8), the median Q_{max} was 23 ml/s (IQR 16–35), and the median PVRV was 0 ml (IQR 0–36) (all $p < 0.001$ vs baseline values). The retrospective design is the major study limitation.
Conclusions: Our data indicate good perioperative outcomes, an acceptable risk profile, and excellent improvements in patient symptoms and flow scores at short-term follow-up following RASP.

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Patient summary: We analyzed the perioperative and functional outcomes of robot-assisted simple prostatectomy in the treatment of male patients with lower urinary tract symptoms due to large prostatic adenoma. The procedure was associated with a relatively low risk of complications and excellent functional outcomes, including considerable improvements in symptoms and flow performance. We can conclude that the procedure is a valuable option in the treatment of such patients. However, comparative studies evaluating the efficacy of the procedure in comparison with endoscopic treatment of large prostatic adenomas are needed.

1. Introduction

The surgical management of large benign prostatic hyperplasia remains a challenge. Methods have evolved over the last 30 yr from the traditional open retropubic or transvesical simple prostatectomy, to transurethral techniques including transurethral resection of the prostate (TURP), laser enucleation (holmium:YAG laser enucleation of the prostate, HOLEP), and vaporization methods, as well as laparoscopic simple prostatectomy [1]. Open prostatectomy (OP) and HOLEP currently represent the mainstay of surgical management for large adenomas, particularly for glands larger than 100 g in size, and these techniques have the largest evidence base in the literature [2]. However, OP remains a challenging procedure with a significant complication rate, and HOLEP, although associated with very good postoperative outcomes and low overall complications rates, is still not easy to adopt owing to a perceived steep learning curve and equipment costs [3–6].

To adopt the benefit of minimally invasive surgery for OP, laparoscopic simple prostatectomy and, more recently, robot-assisted simple prostatectomy (RASP) have been developed. Specifically, with the widespread adoption of robotic surgery for prostate cancer, urologists have become very accustomed to operating on the prostate in a laparoscopic environment, allowing a natural transition to simple prostatectomy for benign gland enlargement. A number of centers have reported small case series with perioperative and functional outcomes similar to HOLEP and OP [7–13].

Here we present our surgical technique for RASP and perioperative and short-term functional outcomes in a large series of patients with LUTS due to benign prostatic enlargement treated in a high-volume referral center for robotic surgery.

2. Patients and methods

Ethics review board approval was waived for this retrospective review of patient files. Between April 2008 and October 2014, 67 consecutive men underwent RASP in our institution and were included in this analysis. All patients were offered initial medical management where appropriate. Patients failing medical management or those requiring immediate surgery with a prostate gland larger than 100 g were offered RASP. Patients were counseled on the risks and benefits of the procedure, and were listed for surgery after providing informed consent. All patients underwent initial clinical work-up including history, physical examination, flow rate evaluation including peak flow rate (Q_{max}) measurement, voided volume, and residual volume measurement via transabdominal ultrasound; renal tract ultrasound, transrectal ultrasound (TRUS) prostate volume measurement, prostate-specific antigen (PSA) testing and International Prostate Symptom Score (IPSS) assessment. Postoperative follow-up occurred at 6 wk, and then annually either at our center or with the referring urologist. Postoperative assessment included physical examination, flow rate assessment, residual urine measurement, renal tract ultrasound, PSA, and IPSS.

2.1. Surgical technique

All procedures were performed by one of two surgeons using a Da Vinci Si surgical system (Intuitive Surgical, Sunnyvale, CA, USA) in the four-arm configuration via a transperitoneal approach.

2.1.1. Patient position and port placement

After induction of general anesthesia, the patient is placed in the lithotomy position at a steep Trendelenburg angle with padding of pressure points. The patient receives a single perioperative dose of antibiotic prophylaxis. Our technique uses placement of five trocars similar to that for radical prostatectomy, including a 12-mm camera trocar placed supraumbilically; two 8-mm robotic trocars bilateral on a line between the camera port and the iliac crest at 8 cm from the camera port; and another 8-mm robotic trocar on the left side at 8 cm from the other robotic port and at the same level as the camera port. A lateral 12-mm port is placed 2 cm cranial of the iliac crest on the right side for the assistant (Fig. 1). If needed, an additional 5-mm trocar is placed in between the camera port and the right robotic port for a suction device. Three instruments are used: Hot Shears (Intuitive Surgical) monopolar curved scissors, ProGrasp forceps (Intuitive Surgical), and a large needle driver.

2.1.2. Bladder dropping and opening of the anterior bladder wall

The bladder is filled with 100 ml of saline via an indwelling catheter and then released from the anterior abdominal wall. After bladder dropping, a vertical cystotomy is made starting just above the prostate-vesical junction (Fig. 2).

2.1.3. Dissection of the adenoma

The position of the ureteric orifices is determined to ensure safety during resection, and an initial incision is made at the edge of the adenoma between the 12- and 2-o'clock positions to find the correct plane between the adenoma and the peripheral zone of the gland. This plane is developed bluntly and sharply circumferentially on both sides of the prostate. Vicryl 1-0 stay stitches are used to provide traction on the adenoma to assist dissection. Vicryl stay sutures can also be used where necessary to evert the bladder edges to improve visualization (Fig. 3). The dissection is carried out as far distally as possible without risking injury to the sphincteric complex. At this point an anterior commissurotomy is made, incising with diathermy onto the urethral catheter, allowing the apex of the adenoma to be freed via precise, safe dissection