# *Robot-assisted Millin's retropubic prostatectomy: case series*

Bertram Yuh, MD,[1] Rajesh Laungani, MD,[2] Adam Perlmutter, DO,[3] Daniel Eun, MD,[2] James O. Peabody, MD,[2] James L. Mohler, MD,[3] Hans Stricker, MD,[2] Khurshid A. Guru MD[3]

[1]Department of Urology, State University of New York at Buffalo, New York, USA
[2]Vattikuti Urology Institute, Henry Ford Health System, Detroit, Michigan, USA
[3]Department of Urologic Oncology, Roswell Park Cancer Institute, Buffalo, New York, USA

YUH B, LAUNGANI R, PERLMUTTER A, EUN D, PEABODY JO, MOHLER JL, STRICKER H, GURU KA. Robot-assisted Millin's retropubic prostatectomy: case series. The Canadian Journal of Urology. 2008;15(3):4101-4105.

***Introduction/objective:*** *Simple prostatectomy continues to be an effective surgical option for patients with symptomatic high volume benign prostatic hyperplasia. Recent trends towards minimally invasive urologic surgery, in particular for prostate cancer, have created surgical alternatives with additional potential benefits. We report on the feasibility of robot-assisted retropubic prostatectomy.*

***Materials and methods:*** *This series consists of three cases of simple prostatectomy performed through a robot-assisted retropubic (Millin) approach at two institutions. All patients had preoperative bothersome lower urinary tract symptoms with two patients presenting in urinary retention. Average preoperative transrectal ultrasound estimated prostate volume exceeded 300 cm$^3$. All patients were ruled out for malignancy.*

***Results:*** *Average age for the patient group was 76.7 years with mean prostate specific antigen (PSA) of 25.1. Estimated blood loss averaged 558 ml (150-1125) and mean operative time was 211 minutes (178-230). One patient had a simultaneous inguinal hernia repair performed. The patient with the largest prostate required incision extension for removal of specimen. There were no acute intraoperative or perioperative complications. Mean hospital stay was 1.3 days and one patient required blood transfusion. Average adenoma weight was 301 grams (66-640). One patient developed bladder neck contracture several months postoperatively.*

***Conclusions:*** *Robotic-assisted retropubic simple prostatectomy is a reasonable and safe alternative to an open technique. Faster recuperation and reduced blood loss are potential benefits to this approach. The longer operative time and extraction incision for very large prostates (> 200 gms) may offset some of the advantages of the minimally invasive method.*

**Key Words:** prostatectomy, robot-assisted, retropubic, open technique

## Introduction

Despite significant advances in endourologic options for the surgical treatment of benign prostatic hyperplasia (BPH), simple prostatectomy remains an attractive option for patients with larger glands (> 80 gm). Open simple prostatectomy offers the advantages of decreased need for re-operation, avoidance of dilutional hyponatremia (TUR syndrome) and concomitantly addresses bladder diverticuli, calculi and/or associated inguinal hernia.[1,2] Furthermore, some patients cannot tolerate the dorsal lithotomy positioning necessary for transurethral prostate resection. The morbidity for transurethral resection increases as the prostate size and resection time increases.

Accepted for publication March 2008

Address correspondence to Dr. Khurshid A. Guru, Department of Urologic Oncology, Roswell Park Cancer Institute, Elm & Carlton Streets, Buffalo, NY 14263 USA

In the spectrum of techniques for prostate removal, minimally invasive surgery has become increasingly prevalent. Rehman et al and others have described a laparoscopic technique and found laparoscopic simple prostatectomy to be a safe alternative to open simple prostatectomy with reduced blood loss, shorter hospital stay and quicker convalescence.[3] Robotic-assisted surgery can offer some of the same benefits with technical enhancement. We report the first case series of robot-assisted Millin's simple prostatectomy.

## Case series

Demographic, operative, and postoperative parameters are summarized in Tables 1, 2, and 3.

### *Case 1*

A 70-year-old Caucasian male with past medical history of hypertension presented with a PSA of 44.8 ng/dl and obstructive lower urinary tract symptoms including two episodes of urinary retention. He also had a reducible right inguinal

TABLE 1. **Demographic detail**

| Case | Indication | Concomitant condition | Previous transurethral surgery | IPSS/ bother score | Estimated prostate volume ($cm^3$) | PSA (ng/dl) |
|---|---|---|---|---|---|---|
| 1 | Retention hernia | Hernia | No | 15/5 | 273 | 45 |
| 2 | LUTS* retention | None | No | 13/4 | 97 | 5.1 |
| 3 | LUTS* | None | No | 25/3 | > 600 | 25.4 |

*Lower urinary tract symptoms

TABLE 2. **Operative parameters**

| Case | Concomitant procedure | Overall operative time (min) | Prostatectomy time (min) | EBL (ml) | Intraoperative conversion/ complication |
|---|---|---|---|---|---|
| 1 | Hernia repair (HR) | 280 + 75 for HR | 225 | 400 | No/none |
| 2 | None | 225 | 178 | 150 | No/none |
| 3 | None | 262 | 230 | 1125 | No/none |

TABLE 3. **Postoperative results**

| Case | Prostate volume (gm) | Pathology | Hospital stay (days) | CBI used | Transfusion (units) | Complications at 6 months |
|---|---|---|---|---|---|---|
| 1 | 197 | BPH | 1 | No | None | None |
| 2 | 66 | BPH | 1 | No | None | None |
| 3 | 640 | BPH | 2 | Yes | 2 | 1 |

BPH: Benign prostate hyperplasia; CBI: Continuous bladder irrigation

hernia. Transrectal ultrasound guided prostate biopsy revealed prostatic volume of 273 $cm^3$ and benign prostatic tissue. The patient subsequently underwent robot-assisted simple retropubic prostatectomy with right inguinal hernia repair. The prostate specimen weighed 196 gm and demonstrated no evidence of malignancy. No perioperative or postoperative complications developed.

*Case 2*

A 78-year-old male with a past medical history of hypertension and hyperlipidemia presented with complaints of longstanding lower urinary tract symptoms including intermittent episodes of urinary retention. PSA was 5.1 ng/dl. Transrectal ultrasound guided biopsy of the prostate revealed a prostate volume of 97 $cm^3$ and no evidence of malignancy. Patient elected to undergo robot-assisted retropubic simple prostatectomy. Final pathologic analysis demonstrated 66 gm of benign prostatic hyperplasia. Postoperatively, the patient had significant improvement in urinary symptoms and PSA declined to 0.2 ng/dl.

*Case 3*

An 82-year-old male with a past medical history of hypertension and acid reflux presented with significant lower urinary tract symptoms refractory to medical therapy and a PSA of 25.4 ng/dl. Transrectal ultrasound guided biopsy revealed a prostate volume greater than 600 $cm^3$ and no evidence of malignancy. The patient underwent robot-assisted simple retropubic prostatectomy. Final pathology revealed no evidence of malignancy and a prostate weight of 640 gm. Four months postoperatively, the patient developed a bladder neck contracture and underwent successful transurethral incision of the bladder neck. Over the next 6 months, he had minimal voiding symptoms and voided to completion.

## Technique

The patient is placed in steep Trendelenberg position and pneumoperitoneum is obtained via a Veress needle. A camera (12 mm) port is placed at the umbilicus with two robotic arm (8 mm) ports placed on the right and left side. A right assistant side (12 mm) port is placed in the right lower quadrant, a few centimeters above the anterior superior iliac spine. The fourth arm (8 mm) is placed on the left side and provides traction to aid with surgical exposure. A final 5 mm suction port is placed between the right assistant and the camera port. The posterior peritoneum is incised lateral to the umbilical ligament and the bladder is released from the anterior abdominal wall. The bladder is retracted using the cobra grasper through the fourth arm. A transverse capsulotomy is performed using electrocautery and the adenoma is bluntly separated from the capsule using a grasper and the blunt side of the monopolar hook. Circumferential dissection is performed to free the adenoma from the prostatic capsule. Sharp dissection is performed at the apex to avoid thermal injury to the external urethral sphincter. Next the prostatic fossa is inspected and hemostasis is obtained. The posterior bladder neck mucosa is approximated to the posterior aspect of the prostatic capsule to prevent bladder neck contracture. A urethral catheter is passed into the bladder and the capsulotomy is closed in transverse fashion using running 2-O Vicryl suture. The specimen is placed in a specimen bag and removed through the camera port, with or without incision extension depending on adenoma size. A 1 cm cystotomy incision is created and a 24 Fr Malecot catheter is inserted through a left lateral port site into the bladder at the surgeon's discretion. A JP drain is placed through the right lateral port site and positioned in the pelvis.

## Discussion

Simple prostatectomy is the standard treatment for BPH in men with prostates over 150 grams. Traditionally, the open approach has been associated with increased blood loss, prolonged hospital stay, and more discomfort compared to endoscopic surgery. With recent technological advances and a trend towards minimally invasive modalities, robot-assisted laparoscopic prostatectomy is being more commonly performed in patients with prostate cancer. The benefits of minimally invasive surgery can potentially translate to robot-assisted simple prostatectomy including reduced blood loss, decreased postoperative pain and shorter hospital stay. The only other published series using robotic-assisted technology for performing prostatectomy incorporates a transperitoneal suprapubic (Freyer) approach.[4] To our knowledge, no series of robotic-assisted retropubic (Millin) prostatectomy has been published. The current published literature of laparoscopic and robotic simple prostatectomy is summarized in Table 4.

Baumert demonstrated significantly lower blood loss in patients undergoing laparoscopic simple prostatectomy versus open simple prostatectomy (367 ml versus 643 ml).[5] Sotelo et al in their laparoscopic simple prostatectomy series noted a blood loss ranging from 100 ml to 2500 ml with an average of 516 ml.[6] Meanwhile in the robotic-assisted series from the

TABLE 4. **Laparoscopic/robotic simple prostatectomy series summary**

| Author | Technique | Cases | EBL mean (ml) | Operative time (min) | Mean adenoma weight (gm) | Hospital stay (days) | Conversion to open |
|---|---|---|---|---|---|---|---|
| Porpiglia[10] | laparoscopic | 20 | 411 | 107 | 71 (50-103) | 8 | 0 |
| Baumert[5] | laparoscopic | 17 | 367 | 115 | 77 | 5 | 0 |
| Sotelo[6] | laparoscopic | 17 | 516 | 156 | 72 (32-120) | 2 | 0 |
| Van Velthoven[11] | laparoscopic | 18 | 192 | 145 | 48 | 6 | 0 |
| Rehman[3] | laparoscopic | 2 | 125 | 150 | 120 (102-138) | 3 | 0 |
| Sotelo[4] | robot-assisted | 7 | 298 | 205 | 50 (40-65) | 1 | 0 |
| Current series | robot-assisted | 3 | 558 | 211 | 301 (66-640) | 1 | 0 |

same author an average blood loss of only 298 ml was noticed, however the mean pathologic specimen weight was approximately 50 gms.[4] Several authors have observed blood loss to be directly related to prostate specimen size.[7-8] Estimated blood loss in the current series ranged from 150 ml to 1125 ml. In the case with blood loss of 1125 ml, the 640 gm adenoma is an outlier significantly larger than the adenoma sizes removed in comparative laparoscopic series. The average adenoma weight removed in this series exceeds 300 grams, likely adversely escalating the estimated blood loss. With additional experience using this technique and smaller prostate sizes, blood loss would potentially be diminished. Possible reasons for reduced bleeding with robotic-assisted surgery include precise visualization of each bleeding vessel secondary to the 3-D visualization and optical magnification. The compressive effect of pneumo-peritoneum also provides hemostasis.

In the first published report of laparoscopic simple prostatectomy, Mariano et al reported an operative time of 3.8 hours to remove a 120 gm prostate.[9] The operative times in the current series ranged from 3 to 6 hours. The 6 hour case includes a right inguinal hernia repair. Similar to other surgical learning curves, the mean operative time for robot-assisted laparoscopic prostatectomy should decrease with increasing surgical experience.

Given the patient population at risk for BPH, it is not uncommon to find evidence of cancer on postoperative adenoma removal. Despite no evidence of occult malignancy in this series, other series have demonstrated the presence of adenocarcinoma in simple prostatectomy specimens.[10-11] Negative prostate biopsy is mandatory prior to performing a simple prostatectomy.

The volume of enucleated prostatic adenoma tends to be lower than the prostatic volume measured on ultrasound.[11] Two of the adenomas in the current series were smaller than their predicted size on ultrasound, Tables 1 and 3. While surgical technique and prostate dimensions can affect volume removed, the discrepancy is more likely a result of ultrasound measurement incongruity.

The overall complication rate for open simple prostatectomy is 10%-40%.[12] Small laparoscopic series have reported complication rates between 19%-30%. The lone complication in the current series is a bladder neck contracture, which was successfully managed with a transurethral incision of the bladder neck. The overall complication rate of 33% in this series thus does not differ significantly, though the small sample size precludes making generalizations.

Limitations of robotic-assisted retropubic prostatectomy are the previously described increased operative time and concerns of transperitoneal access. For patients with significantly enlarged prostates, like several described here, an extraperitoneal approach would prove to be challenging from a technical standpoint due to limited operative (extraperitoneal space) field. While the extraperitoneal approach may be better for smaller prostate glands, space limitations and immense prostates may be better served by a transperitoneal approach. There were no associated bowel injuries or ileus in any of the described patients. The lone published robotic-assisted series also adopts the transperitoneal approach.[4] Glands exceeding 200 grams may be difficult to remove with robotic assistance during the initial learning curve. The patient with the 640 gram prostate ultimately required a larger extraction incision, negating some of the advantages of minimally invasive surgery. This select patient in our series also had the longest operative time, heaviest blood loss, and experienced a postoperative complication.

## Conclusion

Robot-assisted laparoscopic Millin's retropubic prostatectomy is technically feasible. Larger series with long term follow-up are needed to define the role of robot-assisted simple retropubic prostatectomy in the treatment of benign prostatic hyperplasia. □

References


1. Semmens et al. Trend in repeat prostatectomy after surgery for benign prostatic disease: Application of record linkage to healthcare outcomes. *Br J Urol* 1999;8:972-975.
2. Schlegel PN, Walsh PC. Simultaneous preperitoneal hernia repair during radical pelvic surgery. *J Urol* 1987;137:1180-1183.
3. Rehman J, Khan SA, Sukkaieh T, Chughtai B, Wlatzer WC. Extraperitoneal laparoscopic prostatectomy (adenomectomy) for obstructing benign prostatic hyperplasia: transvesical and transcapsular (Millin) techniques. *J Endourol* 2005;19:491-496.
4. Sotelo R, Clavijo R, Carmona O, Garcia A, Banda E, Miranda M, Fagin R. Robotic simple prostatectomy. *J Urol* 2008;179:513-515.
5. Baumert H, Ballaro A, Dugardin F, Kaisary AV. Laparoscopic Versus Open Simple Prostatectomy: A Comparative Study. *J Urol* 2006;175:1691-1694.
6. Sotelo R, Spaliviero M, Garcia-Segui A, Hasan W, Novoa J et al. Laparoscopic Retropubic Simple Prostatectomy. *J Urol* 2005;173:757-760.
7. Frota R, Turna B, Santos BM, Lin YC, Gill IS, Aron M.The effect of prostate weight on the outcomes of laparoscopic radical prostatectomy. *Br J Urol* 2008;101:589-593.
8. Boczko J, Erturk E, Golijanin D, Madeb R, Patel H, Joseph JV. Impact of prostate size in robot-assisted radical prostatectomy. *J Endourol* 2007;21(2):184-188.
9. Mariano MB, Graziottin TM, Tefilli MV. Laparoscopic prostatectomy with vascular control for benign prostatic hyperplasia. *J Urol* 2002;167:2528.
10. Porpiglia F, Terrone C, Renard J, Grande S, Musso F. Transcapsular Adenomectomy(Millin): A Comparative Study, Extraperitoneal Laparoscopy versus Open Surgery. *Eur Urol* 2006;49:120-126.
11. van Velthoven R, Peltier A, Laguna MP, Piechaud T. Laparoscopic Extraperitoneal Adenomectomy(Millin): Pilot Study on Feasibility. *Eur Urol* 2004;45:103-109.
12. Serretta V, Morgia G, Fondacaro L, Curto G, Lo bianco A. Open prostatectomy for benign prostatic enlargement in southern Europe in the late 1990s: a contemporary series of 1800 interventions. *Urology* 2002;60:623-627.