Experience with laparoscopic prostatic adenomectomy

F. Delgado-Guerrero a,*, L.M. Covarrubias-Méndez a, A. González-Gómez b, J. Bernal-Hernández b, J. Torres-Aguilar a and R. Arellano-Cuadros a

a Urology Service, Hospital Juárez de México, Servicio de Salud (SS), Mexico City, Mexico
b Hospital Star Medica, México, Querétaro, Mexico

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Abstract

Background: Up to the present, transurethral resection of the prostate has been recognized as the standard surgical treatment for prostatic growth. The first report of a laparoscopic procedure for the management of prostatic growth was in 2002, when Dr. Mariano Mirandolino published an anecdotal case of laparoscopic prostatic adenomectomy (LPA) in Brazil. Since then 19 studies have been published reporting on the experience with this laparoscopic technique. The procedure was begun at our hospital in mid-2010.

Aim: The aim of the present study was to describe the experience with LPA at our hospital, along with the characteristics of the patients that underwent the procedure.

Methods: Patients that underwent LPA within the time frame of 2010 to December 2014 were included in the study. Preoperative characteristics, intraoperative findings, and postoperative results were documented.

Results: A total of 58 patients were included. The median age was 66 years (range: 46 to 85 years). Twelve patients presented with chronic degenerative diseases. Mean surgery duration was 148.6 min with a range of 90 to 240 min, and mean blood loss was 228.56 ml, with a median of 400 ml. The mean weight of the extracted adenomas was 118 ± 34 g. The postoperative means were: hospital stay, 2.7 days, time with a transurethral Foley catheter, 7.79 days, and time with a Penrose drain in the space of Retzius, 6.4 days. Follow-up was carried out in outpatient consultation for a mean 4.2 months, and IPSS questionnaires were applied one month after surgery, showing a mean improvement of 15 points (p < 0.001). In relation to postoperative complications (9%), acute urinary retention due to bladder clots presented the day after the procedure.

Conclusions: LPA is an alternative procedure to transurethral resection of the prostate that shows good functional results and a low complication rate.

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*Corresponding author at: Hospital Juárez de México Cerrada de Mixcoac No.5 Col. Mixcoac C.P. 03910, México D.F. Tel: +55639864. Email: delgadoguerrero11@hotmail.com (F. Delgado-Guerrero).
PALABRAS CLAVE
Adenomectomía prostática laparoscópica; Hiperplasia prostática benigna; Cirugía prostática

Experiencia de adenomectomía prostática laparoscópica

Resumen

Introducción: Hasta el día de hoy, la resección transuretral de próstata se ha reconocido como el tratamiento quirúrgico estándar del crecimiento prostático. El primer reporte de un procedimiento laparoscópico para el manejo del crecimiento prostático data del 2002, cuando el Dr. Mariano Mirandolino publicó en Brasil un caso anecdótico de una adenomectomía prostática laparoscópica (APL). Se han publicado 19 estudios con reporte de la experiencia con esta técnica laparoscópica. En nuestro hospital se inició el procedimiento a mediados del año 2010.

Objetivo: El propósito del presente estudio es describir la experiencia de la APL en nuestro hospital, así como describir las características de los pacientes sometidos a dicho procedimiento.

Material y métodos: Se incluyeron los pacientes a los que se les realizó APL desde el 2010 hasta diciembre del 2014. Se documentaron las características prequirúrgicas, los hallazgos transquirúrgicos y los resultados posquirúrgicos.

Resultados: Se incluyeron 58 pacientes. La mediana de edad fue de 66 años (rango 46-85 años). Se encontraron 12 pacientes con enfermedades crónico-degenerativas. El tiempo quirúrgico promedio fue de 148.6 min, rango de 90-240 min, media en el sangrado de 228.56 ml y mediana de 400 ml. El peso del adenoma extraído tuvo una media de 118±34 g. Los promedios durante el posquirúrgico fueron: estancia hospitalaria de 2.7 días, tiempo con sonda Foley transuretral de 7.79 días, tiempo con drenaje penrose en el espacio de Retzius 6.4 días. El seguimiento se realizó en la consulta externa durante una media de 4.2 meses, un mes después de la cirugía se tomaron encuestas de iPSS, encontrando una mejoría promedio de 15 puntos ($p < 0.001$). En las complicaciones del posquirúrgico (9%), presentaron al día siguiente del procedimiento retención aguda de orina por coágulos vesicales.

Conclusiones: La APL es un procedimiento alternativo a la resección transuretral de próstata que muestra buenos resultados funcionales y baja tasa de complicaciones.

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Introduction

Benign prostatic hyperplasia is a common disorder in advanced-aged patients. Its incidence and importance has increased in tandem with the life expectancy of the general population. As a result, treatments have continually diversified and advanced, and among them, transurethral resection of the prostate (TURP) has been recognized as the standard surgical treatment.1

TURP is generally reserved for small-to-medium-sized prostates. When the prostate is larger than 75 g, simple open prostatectomy is preferred, because with TURP there is an increase in complications such as bleeding and post-TURP syndrome.1

Despite the increased popularity of HoLEP laser prostatic adenoma enucleation and its good results, open surgery continues to be the criterion standard for large prostates, due to the high cost and low availability of the Holmium laser in our environment.1

In 2002, Dr. Mariano Mirandolino published an anecdotal case in Brazil of a surgery performed in 1999 on a 71-year-old patient that presented with a prostate that measured 100 g by digital rectal examination and 173 g by ultrasound. A pre-peritoneal laparoscopic approach through the space of Retzius was performed on said patient, similar to that applied in radical prostatectomy, except employing the basic principles of vesicocapsular prostatectomy (longitudinal incision of the prostate capsule up to the bladder neck). Mirandolino reported blood loss of 800 ml, surgery duration of 225 min, a surgical specimen of 75 g, and hospital stay of 4 days. In his report, he emphasized that this procedure had the advantage of not needing to be performed in the lithotomy position, which is contraindicated in some advanced-age patients.1

After this first publication in 2002 by Dr. Mirandolino on this technique, there were similar reports in 2004 from Northwestern University by Nadler et al. in Chicago,3 Rehman et al. in New York,4 and Rey et al. in Bordeaux, France, describing the technique and providing examples of their results.7

The first case series of 18 patients was published in 2004 by Van Velthoben et al. in a joint effort of 3 European countries.8 In 2005 Sotelo et al. reported the experience of 17 patients recruited from Venezuela and the United States, detailing in their discussion the modifications of the technique for reducing its complications. To date, it is the only case of adenocarcinoma in the pathologic result of the surgical specimen.9

In 2006, 2 of the first studies comparing the laparoscopic technique with open surgery were published. Porpiglia et al.10 and Baumeth et al.11 formed 2 groups of 20 and 30 patients in each study, respectively. The laparoscopic approach in the latter study employed the Millin, or retropubic, technique (a transversal incision of the capsule) rather than the vesicocapsular incision that had been used until then. The most significant differences in favor of the laparoscopic procedure were found in relation to total blood loss (367 vs. 647 ml), hospital stay (5 vs. 8 days), and
the time needed for postoperative bladder irrigation (0.33 vs. 4 days). There was also improvement in the obstructive symptom score measured by the IPSS (7 vs. 8 points) and in complications, although with no statistical significance. However, there was a considerable increase in surgery duration (115 vs. 54 min) with the laparoscopic method.

Two other comparative case series were reported in 2009 by McCullough et al. in France and in 2011 by García-Segui et al. in Spain. The first Latin American case series was published in 2006 by Mirandolino et al. in Brazil and the second by Castillo et al. in 2008, reporting on 59 patients with similar results, emphasizing that a mean 95.2 g surgical specimen was obtained.

In 2014 in Mexico, a series of 13 cases was reported by Salinas-González in which there was less intraoperative bleeding than with the open procedure, but a longer surgery duration.

Added to these experiences are the most recent case series reported between 2009 and 2014 in Spain, Korea, China, Poland, Greece, and Mexico.

In our hospital, the procedure began to be performed in mid-2010, due to the rotation of urology residents that observed the technique in Buenos Aires and Barcelona, offering an alternative to patients with adenomas larger than 70 g.

**Materials and methods**

**Surgical technique**

The surgical technique based on the original has been described by various authors. The patient is placed in the Trendelenburg decubitus dorsal position. The extremities can be placed together or slightly apart to allow the monitor to be closer to the surgeon. The first incision is made under the umbilicus with dissection by layers, taking care not to open the peritoneum (fig. 1).

To create the extraperitoneal space, CO2 insufflation can be done digitally under the aponeurosis, or with the Veress needle. The first trocar (that will hold the lens) is then placed and the opening of the space is completed through blunt dissection under direct vision with the lens.

Once the pre-peritoneal space is created, the trocars are placed under digital guidance, and when necessary, under direct vision of the space of Retzius with a 0 or 30 degree endoscopic lens. Trocar placement is variable. We use 5 trocars. The first is a 10 mm trocar at the midline under the umbilicus, the second and third are 5 mm trocars placed in the bilateral rectal position, the fourth is a suprapubic 10 mm trocar, and the fifth is a 5 mm trocar in the right anterior superior iliac spine position (fig. 2).

Once the trocars are inserted and the pre-peritoneal space is prepared, the periprostatic fat is removed by blunt dissection utilizing an aspirator or a gauze with Grasper forceps, when necessary. Care must be taken not to injure the dorsal venous complex located at the midline of the prostate in the direction of the apex, or the endopelvic fascia located at the sides of the fascia, because that can cause bleeding. A 3-4 cm transversal incision is made 1 cm above the bladder neck utilizing monopolar coagulation (fig. 3) and going deeper above the prostate capsule until finding the adenoma (fig. 4).

With the dissection plane now located between the adenoma and the capsule, digital dissection of the tumor is carried out (fig. 5). Adenoma dissection using a harmonic scalpel and aspirator has also been described, but it lengthens surgery duration and reduces sensitivity.

Once the prostatic surgical site is empty, hemostasis with monopolar coagulation is performed.

The prostatic capsule incision is hermetically closed with absorbable 3-0 Vicryl simple running sutures (fig. 6). Bladder irrigation is begun with saline solution through a Foley catheter and the hermetic closure of the prostatic capsule is verified. In the last few years, hemostatic agents like Tissucol have been used to optimize wound closure. A Penrose drain is placed and the trocars are removed under direct vision, making sure there is no bleeding at their sites. The customary technique is used to close the aponeurosis and the skin at the trocar sites.

Even though the technique follows the principles of open enucleation, there are variations in relation to certain details reported in the literature. These include intra or extraperitoneal access, trocar placement and location, the performance or not of vascular control of the dorsal venous complex, the use of a transversal or longitudinal prostatic capsule incision, digital-assisted enucleation or just sing laparoscopic instrumentation, and the performance or not of trigonisation to widen the bladder neck.

**Results**

From 2010 to 2014, 58 procedures of laparoscopic adenectomy were performed by the urology service of the Hospital Juárez de México by a team made up of 4 surgeons and 3 final-year urology specialty residents.
The median age of the patients was 66 years (range of 46-85 years). Twelve patients presented with chronic degenerative disease (6 with high blood pressure, 4 with diabetes mellitus, one with compensated thrombocytopenic purpura, one with Parkinson’s disease, one with compensated coronary syndrome, and one with chronic renal insufficiency). The 3 patients with diabetes mellitus presented with residual urine volumes above 400 ml. Possibly a neurogenic component affected functional status because, unlike the mean, these subjects only presented with a 6-point improvement in the IPSS.

In the preoperative findings, 11 patients that underwent transrectal biopsy of the prostate (TRBP) with between 6 and 12 samples presented with a PSA above 4 and a pathologic report of chronic prostatitis and hyperplasia. Prostate volume determined by digital rectal examination had a grade IV mean prostatic growth and by vesicoprostatic ultrasound it was 118 ± 34 g. To evaluate functional response the IPSS questionnaire was applied before surgery and produced a mean 26 ± 4 points. The questionnaire was not applied to 8 patients because they presented with acute urinary retention that was refractory to treatment with alpha-blockers and they had transurethral catheters.

Mean surgery duration was 148.6 min with a 90-240 min range. Mean blood loss was 228.56 ml. There were 6 reported cases of blood loss greater than 600 ml, requiring transfusion of 2 bags of packed red blood cells on average; one of those patients required conversion to open exploration with packing for 2 days, progressing favorably after the hypovolemia was corrected.
Other intraoperative complications included one undetected rectal lesion upon adenoma extraction with laparoscopic primary closure and hospital medical management with no sequelae, and one case of phimosis caused by the insufflation gas that ceded on the following day of hospitalization.

The mean weight of the extracted adenomas was 62.2 ± 25 g and the histopathologic report of all the specimens was benign prostatic hyperplasia. The postoperative means were hospital stay, 2.7 days (table 1), length of time with transurethral catheter, 7.7 days, and length of time with Penrose drain to the space of Retzius, 6.3 days. Mean outpatient follow-up was 4.2 months and the IPSS questionnaire was applied one month after surgery resulting in an improvement of a mean 15 points (p < 0.001).

Three patients (9%) had the complication of urine retention on the first postoperative day due to bladder clots that were drained by aspiration. Bladder irrigation was continued while there was bleeding and it ceded with no need for re-intervention. Other complications presented in just one patient (3%): bladder neck fibrosis that required transurethral incision, untreated stress incontinence, and urinary urgency with a favorable response to anticholinergic treatment. The patient with Parkinson’s disease had acute urinary retention 3 weeks after Foley catheter removal.

Discussion

At present, 17 countries have reported on their experience with this novel technique. A meta-analysis of this information with a total of 587 patients, including our case series, is being carried out, eliminating the studies in which the procedure was carried out with robotics and the single port technique.

The chronic degenerative diseases that could affect the functional result of the surgical procedure were documented in our cases series. We detected unfavorable results in the diabetic patients with preoperative residual urine of more than 400 ml and in a patient with Parkinson’s disease.

Prostate volume in 22 of our patients (66%) was measured through suprapubic ultrasound and in the remaining ones through transrectal ultrasound during TRBP for ruling out prostate cancer due to high prostate-specific antigen levels. This methodology did not affect the mean prostate volume of our series compared with complications of other series (117 vs. 109 g), but there was a difference in the prostate volume comparison (62.1 vs. 80.4 g).

The mean surgery duration in our case series is elevated with respect to that of other reports (148.6 vs. 123.2 min). The mean surgical blood loss in our series was 228.56 vs. 123.2 ml reported in other case series. However, McCullough et al., whose case series is currently the largest with 96 patients, reported a mean blood loss of 350 ml. The causes were carefully analyzed in the service, concluding that it was dependent on finding the correct dissection plane and on reduced surgery duration.

The mean hospital stay was 2.7 days, which was shorter than the 4.57 days reported in other series (range 2.1-7.8 days). There was no statistically significant difference when we compared the length of time our patients had a Foley catheter with that reported in the literature (7.9 vs. 5.3).

Complications are varied, but we concur that the most frequent are intraoperative bleeding, postoperative urine retention due to clots, and urinary incontinence due to sphincter injury during dissection of the adenoma located in the prostatic apex.

One of the limitations of our study was that we did not have maximum flow determination for our patients before and after surgery. Nevertheless, the IPSS showed important improvement (26 and 9 points), which was very similar to our meta-analysis (23.6 and 9.14 points), with a p < 0.0001 in both cases.

Conclusions

Laparoscopic prostatic adenomectomy is a good option for the treatment of adenomas > 75 g, based on the satisfactory functional results and low complication rate demonstrated in reports from different countries. Our case series had similar results.

Further comparative studies are needed to determine which variants have repercussions on the surgical parameters and complications that present during the procedure.

Due to the fact that it is a technique is not performed on a large scale worldwide, there are a limited number of studies on the procedure, but surgical parameters obtained in our study are similar to those reported in the international literature. Therefore it is our hope that other hospitals in Mexico and around the world share their experiences to continue to optimize both the technique and patient selection for even better results.

Ethical responsibilities

Protection of persons and animals. The authors declare that the procedures followed conformed to the ethical standards of the responsible committee on human experimentation and were in accordance with the World Medical Association and the Declaration of Helsinki.

Data confidentiality. The authors declare that they have followed the protocols of their work center in relation to the publication of patient data.

| Table 1 Summary of the results of our case series. General patient characteristics, n = 58 |
|-----------------|-------------------|
| Variable        | Result            |
| Age             | 66 (46 to 85) years |
| Prostatic volume by USG | 118 ± 34 g          |
| Sign and symptom prostate index (IPSS) | 26 ± 4 points          |
| Surgery duration | 148.6 (90-240) min |
| Bleeding (mean)  | 228.56 ml         |
| Complications    | 2                 |
|                 | Rectal injury    |
|                 | Phimosis         |
| Extracted adenoma weight | 62.2 ± 25 g         |
| Hospital stay    | 2.7 days         |
Right to privacy and informed consent. The authors have obtained the informed consent of the patients and/or subjects referred to in the article. This document is in the possession of the corresponding author.

Financial disclosure
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Conflict of interest
The authors declare that there is no conflict of interest.

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