

Laparoscopic radical prostatectomy training for residents: Hospital Universitario La Paz model

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Introduction In the last decade, we have seen the advance of laparoscopic surgery in urology. All laparoscopic procedures in our department are performed by staff members and are assisted by a single resident, ensuring resident training in laparoscopic surgery. The aim of this study is to evaluate the results of the Hospital La Paz training program for residents in the field of laparoscopic surgery.

Material and methods We have done a retrospective review of LRP performed by the residents in our department. We also evaluated different variables. Descriptive statistical analysis was done and the results were compared with the descriptive analysis of the initial series of our department.

Results We reviewed 82 patients, with an average age of 61.6 years. Most cases were pT1c at diagnosis. Average surgical time was 288 minutes, with a transfusion rate of 9.7% and a intra and postoperative complication rates of 1.2% and 7.3%. The mean hospital stay was 3.3 days. Histological results of this series are: 76.8% of pT2 and 23.2% of pT3. The biochemical relapse rate is 15.8%. Global surgical margin rate is 20.7%. The global continence rate is 52.4%.

Conclusions The outcomes of LRP performed by residents are similar to the ones reported in the initial series of our department. The fact that 84.6% of the residents formed in this period actually belong to different laparoscopic units supports the success of La Paz Hospital training model.

Key Words: laparoscopy ◊ radical prostatectomy ◊ resident ◊ training ◊ model

INTRODUCTION

In the last decade, we have seen the advance of laparoscopic surgery in urology in a fast and extensive way. This situation has had an effect in all urology departments that have tried to support this important change by introducing staff members to these new techniques or incorporating new staff members already trained in the laparoscopic approach. On the other hand, these changes have had an important impact in residents training because they must assume to lose part of their training while staff members are being trained in this minimally invasive technique. Since our department began the laparoscopic program in 2002 [1, 2] we have performed more than 1,500

laparoscopic radical prostatectomies (LRP), over 400 laparoscopic radical nephrectomies and others retroperitoneal procedures and more than 200 laparoscopic radical cystectomies. All laparoscopic procedures in our department are performed by staff members and assisted by a single resident, ensuring resident training in laparoscopic surgery. In the last year of their training, the resident performs an average of 8–10 LRP, with the assistance of another urology resident from the same year and the supervision of a staff professor. We think that LRP may represent the best model to begin laparoscopic surgery because of the minimal risk of mortality related with haemorrhage compared to laparoscopic nephrectomy [1]. Furthermore, the high number of cases per year represents another

important issue that supports LRP as the best model for training [3].

The aim of this study is to evaluate the results of the Hospital La Paz residents training program in the laparoscopic surgery field.

MATERIAL AND METHODS

We have done a retrospective review of LRP performed by the residents in our department from May 2005 to April 2010. We evaluated the following surgical variables: surgical time, transfusion rates, positive surgical margins (PSM), complications, hospital stay, TNM staging according to 2009 classification, functional results, biochemical relapse and pathological stage.

Data was analyzed at our hospital biostatistics section with SPSS software 20 for Windows. A descriptive statistical analysis was done and the results were compared to the descriptive analysis of the initial series of our department. The selection criteria for ideal patients for resident performance are: 1) high probability of organconfined diseases, 2) erectile dysfunction, poor erectile function or a little or no interest in sexual function. On this basis, we selected 84 LPRs performed by residents with all data necessary for the study. However, 2 of them were lost in the follow up, so only 82 patients were included.

Quantitative values were compared with Student's *t*-test, and qualitative values were compared with the chi-square or Fisher's exact test. Values are shown in numbers, percentage and range. Significance is shown with a *p* value <0.05.

RESULTS

Average age of patients was 61.6 years (range 47–76) and mean body mass index (BMI) was 26.42 (range 21.9–30.5). 80 patients (97.5%) were cT1 at diagnosis and 2 (2.5%) were cT2 (unilateral suspicious digital rectal exam).

Surgical results

The average surgical time was 288 minutes (range 100–360) collected from the operation room regis-

try that includes the anaesthetic time, with a transfusion rate of 9.7% and an intra and postoperative complication rates (not including transfusion) of 1.2% (1/82) and 7.3% (6/82) respectively.

Deferred complications were 2 bladder outlet obstructions related to a urethral stenosis not related with anastomosis, 1 case of bulbar urethral stenosis, 1 case of distal urethral stenosis that required urethroplasty later on, and 1 umbilicus hernia repaired in the follow up. The mean hospital stay was 3.3 days in both groups (range 2–7 days) (Table 1).

Oncological results

The pathology results of this series are: 76.8% of pT2 and 23.2% of pT3. The biochemical relapse rate is 15.8%, five cases with pT2 and eight cases with pT3, with a follow up of at least 24 months (range 24–95 months). PSM rate is 20.7% (17/82), and specifically in the pT2 group the rate is 20.6% (13/63) (Table 2).

Functional results

According to the functional results we have only evaluated the continence rate. The global continence rate is 52.4% (43/82). The global incontinence rate is 47.56% (39/82) with a mild incontinence (1 small pad per day) in 21.9% (18/82), moderate (1–2 pads) in 10.9% (9/82) and severe (≥ 3 pads/day) in 14.6% (12/82). A total of 3 cases of the 39 incontinent patients were resolved by a surgical procedure.

Comparison with staff members series

We compared the results of residents LRP with our department initial series from 2002 to 2005 (over 358 cases), which includes the learning curve of 4 staff members (Figure 1), and we have not found significant differences between groups (*p* >0.05) in most of the variables. The mean age of patients from the initial staff members series was 64.2 years (range 45–74), with an average BMI of 27 (range 20.8–33.7), surgical time was 210 minutes (range 75–630), transfusion rate of 8.5% and hospital stay of 3.3 days. From the oncologic point of view, the PSM rate was 23.1% and the biochemical relapse rate was the only variable with statistical significance between groups: 7.2% in staff members *vs.* 15.8% in the residents group (*p* = 0.017). Mean follow up of staff member series: 10 months (Evaluation time of our initial series) (Tables 1 and 2). Considering the complications rate, there are no important differences. However, attending certain complications in the staff group, we reported 9 rectal injuries and only 1 case in the resident group. This injury was identified intraoperatively and resolved by 2 running

Table 1. Results of La Paz Hospital residents and staff series

	Staff	Resident	<i>p</i> value
Surgical time (min)	210	288	0.538
Transfusion rate	8.5%	9.7%	0.680
Hospital stay (days)	3.3	3.3	0.871
Follow up (months)	10	56,7	0.0001*

sutures in 2 layers. In the staff group, 6 cases were identified intraoperatively and closed by 2 running sutures in two layers without postoperative complications, and the other 3 cases developed a rectourethral fistula requiring a temporary colostomy in 1 case because of local peritonitis. These 3 cases were resolved by surgical approach, one case by transperineal approach with fistula resection and closure of the urethra and the rectum, and the other 2 cases were resolved by transanal approach and with a rectum's mucosa flap. The three cases were resolved successfully.

Furthermore, there were 6 reoperations in the staff group but none in the resident group. These 6 reoperations occurred during the first 24–48 postoperative hours. 4 cases were reoperated because of Santorini plexus bleeding, 1 case because of an ileal lesion and 1 case because of ileal lesion and Santorini bleeding. The outcome of the 6 cases was favourable (Table 3). When we performed the first evaluation of functional results from our department initial series, in the first 175 cases and with a follow up of 12 months the global continence was of 68.2%, with a mild–moderate incontinence of 14.9% (≤ 3 pads/day) and severe incontinence of 16.8% (>3 pads/day).

DISCUSSION

Despite the large debate about the benefits of laparoscopic approach in the treatment of prostate cancer

along the years, minimally invasive treatments are winning the debate and nowadays are the techniques of choice for many different surgeons around the globe. However, the chance to learn LRP is still not easy for residents in our continent and probably throughout first world countries. The development in Spain of LRP is clearly related to our department [1, 2] and we have developed national laparoscopic courses that have been useful for an important number of urologists in our country, as well as many international courses named UROLAP in 2004, 2005 and 2007 [3]. This experience has allowed us to really know the difficulties of beginning a laparoscopic program in different hospitals and, of course, to know the important limitations to resident training in laparoscopic surgery. Following our philosophy for resident training, it was decided to incorporate our residents in the laparoscopy program once the technique was established. Thus, since 2004, the resident has a main role in our department laparoscopic surgical program.

It is very difficult to define the learning curve for laparoscopic radical prostatectomy. Initially, it was defined in 50 cases but different publications have stated it in a gap between 40 and 100 cases [4, 5, 6]. This variable response to the different ways developed in different hospitals to begin their laparoscopic programs. There are several circumstances that may reduce this number of procedures according to the training of the surgeons such as: 1) the development of their laparoscopic skills, 2) the access to simulator training, 3) animal training and 4) clinical experience with an experienced professor [4–12].

The residents from our department have their first contact with laparoscopic surgery in the general surgery department during their first resident year. From the second year, their training continues in the urology department until the end of the 5 years of training. Their incorporation to laparoscopic surgery begins in their third year of residence. As we have mentioned before, our residents are the only assistants to the whole laparoscopic surgery in our department. Their incorporation is progressive from the third year until the fifth. The goal of this is so they can themselves perform around 8–10 LRP in their last year of training.

Table 2. *Oncological data*

	STAFF	RESIDENT
Global pT2	73.1% (262)	76.8% (63)
pT2a	7.6% (20)	15.8% (10)
pT2b	8.3% (22)	4.7% (3)
pT2c	83.9% (220)	81% (50)
Global pT3	26.5% (95)	23.2% (19)
pT3a	84.2% (80)	84.2% (16)
pT3b	15.7% (15)	15.7% (3)
pT4	0.4% (1)	0% (0)
GLEASON SCORE		
≤ 6	48.4% (167)	43.9% (36)
7	51.5% (178)	50% (41)
≥ 8	3.6% (13)	6% (5)
Global PSM	23.1% (83)	20.7% (17)
Biochemical relapse (Global)*	7.2% (26)	15.8% (13)
Biochemical relapse pT2	2.7% (10)	6% (5)
Biochemical relapse pT3	4.4% (16)	9.7% (8)

*p value <0.05

Table 3. *Complications in residents group using Clavien–Dindo classification*

Clavien I	8.5% (7)
Clavien II	9.7% (8)
Clavien III	1.2% (1)
Clavien IV	–
Clavien V	–

The importance of training with animals and also with simulators (pelvic trainer, virtual models, etc.) has been published in the past [8, 9]. In our department, there is a pelvic trainer that is available for residents at any time, so they have all the time required to train with it during their residency. We firmly believe that training with the simulator, mainly the suture, is the first essential requirement for resident training in laparoscopic surgery, as it has been published by others [8]. Our hospital offers the possibility to perform laparoscopic surgery in pigs that may be interesting for the resident training program. but although it may offer benefits, we do not consider it indispensable [6–12].

There are a lot of departments that offers this kind of training to residents, but they do not offer surgical training in patients. From our point of view, clinical training in surgery is the most important part of resident training and this fact is still more important in laparoscopic training [5, 6, 10, 13].

As we have shown in this article, the results of the studied variables are similar between the resident LRP group and the staff group, according to transfusion rate, complication rate, hospital stay, and others. Furthermore, the surgical time gap of residents (100–360 min), which is an issue related with surgeon experience, is better than the surgical time of the two surgeons who began the LRP experience in our country (75–630 min). This optimal result in the training of our residents in laparoscopic surgery has been maintained through the years, as we may see in the Figure 1, which shows the surgical time of the first 4 surgeons of the staff to perform LRP (surgeon 1–4), and the first 3 residents who performed PRL (surgeon 5, 6 and 7) at our department (Figure 1).

From the oncologic point of view, we have shown PSM results comparable to our initial series and to initial series of several groups (Table 4). Furthermore, the PSM rates of both initial series, staff and resident, are comparable to large series of different groups and, as we believe, related with surgeon's experience [14, 15]. It is important to emphasize that a recent publication from a multi-institutional re-

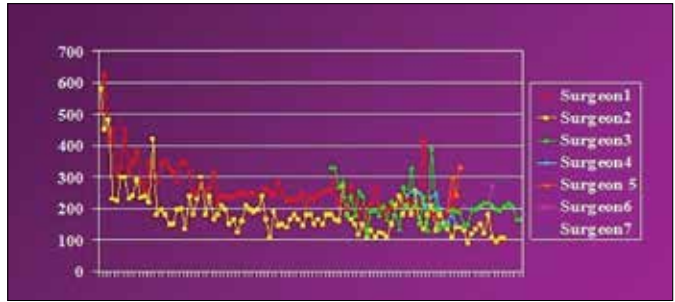


Figure 1. Surgical time of initial series. Surgeon 6 and 7 correspond to the first residents in the laparoscopy program.

search has established the learning curve for LRP approximately in 200 to 250 cases according to the reduction of the PSM [16]. The higher presence of biochemical relapse in the resident group is probably because of the larger follow-up time (10 months vs 56.7 months). The five pT2 cases with biochemical relapse (0.2–0.4 ng/dl) were PSM and may be related with inexperienced surgical technique, which is supported by other publications [16]. The other eight cases were all pT3 and 4 out this 8 were without PSM, so probably related with local stage.

Although there are similar global results according to the complications rate, the differences between groups in the intraoperative rectal injuries and in the reoperation rate, draws us to the conclusion that the best results in the resident group are related with the presence of an experienced professor. However, the learning curve for PSM and functional results are related with surgeon experience [16].

As we have shown, the incontinence rates of both series (Staff: 175 cases and residents: 82 cases) along the learning curve period are similar. We have defined continence as the absence of pad use. The initial experience of staff surgeons over 175 cases showed a severe incontinence rate of 16.8% and for residents of 14.6% over 82 cases, similar to other publications about this topic [17]. We know that the functional results in the residents group will rapidly improve with more experience until it reaches a continence result of more than 90%, because the procedure that

Table 4. Surgical margin of initial series

	HULP Staff	HULP Residents	Berlin	Leipzig	Montsouris	Creteil	Heilbronn
pT2	40/250 16.0%	13/63 20.6%	13/72 18%	2/33 6%	120/775 15%	23/104 22%	25/258 10%
pT3	49/92 53.3%	4/19 21%	12/26 46%	13/37 35%	68/219 31%	16/39 41%	59/159 37%
Global	83/358 23.1%	17/82 20.7%	26/98 26%	15/70 21%	188/994 19%	39/137 28%	84/417 20%

they actually learn is the result of the evolution of our technique through the years, along with the fact that the procedure residents learn nowadays is a completely refined surgical procedure.

The hospital stay for both groups was similar, so we may say that residents training does not have a negative impact in this point, which is important when cost analysis are made [18]. There are groups that have proved the feasibility of early discharge, but from our point of view, discharging our patients at the 2nd and 3rd postoperative day defines our “state of the art”, according to the few readmission rate [19].

The most important fact that supports our resident training model is that 69.2% (9/13) of the residents from the period studied in this article are actually members of the laparoscopic unit in their departments, performing in their daily routines laparoscopic procedures (pelvic and retroperitoneal), while another two are performing only renal laparoscopic surgery. Thus, 84.6% of the residents from our department have developed their own laparoscopic profile in daily clinical practice.

CONCLUSIONS

As we have shown, the LRP outcomes performed by residents are similar to the ones reported in the initial series of more than 300 LRP performed by experienced surgeons in our department in terms of complications, transfusions and hospital stay.

Although our residents do not complete their learning curve during the residence, we think they are in the best situation to begin by themselves or to be incorporated to whatever laparoscopic program, regardless of the kind of hospital. We firmly believe they have the requirements needed to develop a laparoscopic program and reduce the learning curve.

Every kind of training in laparoscopic surgery is desirable, but a scheduled program with an important presence in the operating room and constant suture training in the simulators, as it is developed in our department, ensure as much as possible a consistent training in urologic laparoscopic surgery. The fact that 84.6% of the residents from this period actually belong to different laparoscopic units supports the success of La Paz Hospital model.

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