

Postgraduate course in minimally invasive urological surgery

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Background: Minimally invasive surgeries are increasingly common as the first option for most urological diseases. However, laparoscopic techniques are difficult to master, especially for surgeons who were not trained during their residency programs. Therefore, postgraduate courses are important for such matters. This study aims to evaluate the results of postgraduate courses in minimally invasive urological surgery.

Methods: A specific questionnaire was used to evaluate the impact of the course on urologists' professional activities. The questionnaire also evaluated demographic data and previous surgical experience. The postgraduate course was divided into 10 monthly modules, each one with 36 hours of activities, from March to December. All students of the laparoscopic postgraduate course from the last five years were enrolled in the study.

Results: Forty-one students were included in the study. Thirty-nine students were male (95.1%), and the mean age was 39.5 years (range, 30–60 years). Students from all regions of the country were enrolled. Thirty (73.2%) students had minor laparoscopic experience. All students improved their laparoscopic skills and were able to include new procedures in their daily surgical practice. Eleven students (26.8%) had no laparoscopic experience, and all of them started to perform laparoscopic procedures. The median level of impact on professional life was 75 points (range, 0–100 points).

Conclusions: The postgraduate course is an appropriate way to acquire urological laparoscopic skills. The annual course allowed improvement and initiation of laparoscopic procedures, which significantly impacted urologists' daily activities.

Keywords: Education; laparoscopy; urology

Submitted Feb 25, 2018. Accepted for publication Mar 12, 2018.

doi: 10.21037/tau.2018.03.18

View this article at: <http://dx.doi.org/10.21037/tau.2018.03.18>

Introduction

The number of urologic laparoscopic procedures has increased since the first laparoscopic radical nephrectomy was described (1,2). Minimally invasive surgery is usually the method of choice for the management of most urological diseases (3-5). However, the development of minimally invasive surgery has created an educational challenge for surgeons who have never experienced such techniques during training (6-8). In addition, most laparoscopic procedures have a long learning curve, as the skills required for laparoscopy are different of those for open surgery, such

as the counter-intuitive movements of the instruments and an indirect view of the surgical site (9,10).

The acquisition of skills in laparoscopy is associated with a learning curve that traditionally has been acquired during residency training and specialization in short- and long-term postgraduate courses (6,10,11). Some courses last from hours to a few days, while others are held over months or years; the latter are usually less available. There are many typical ways to acquire laparoscopic skills, such as theoretical classes, practice in traditional and virtual simulators, and surgeries in animal models (12-14).

The postgraduate course in minimally invasive urological

surgery of our institution has been completed for five years. The program has already certified 50 students; however, it has never been evaluated or validated. The aim of this study is to evaluate the impact of the postgraduate course on the daily practice of these certified urologists.

Methods

The postgraduate course is composed of 10 modules, one per month, from March to December. Each module lasts for 36 hours and is divided in three consecutive days. Total postgraduate time is 360 hours, including 80 hours for research project development. Each 36-hour module is divided in 12 hours of theoretical classes, 12 hours of training in virtual simulators and in live animal models, 6 hours observing live surgeries and 6 hours for the development of a scientific research project. A specific topic is addressed according to complexity in each month, as follows: adrenalectomy, nephrectomy (total, radical and partial), pyeloplasty, stone surgeries, ureteral re-implants, pediatric urology, urogynecological procedures, benign prostate hyperplasia surgeries, radical prostatectomy and robotic radical prostatectomy. Each student performs approximately 50 laparoscopic procedures as the first surgeon and approximately 50 as the first assistant at the end of the postgraduate course.

Laparoscopic experts present theoretical classes and discuss videos of minimally invasive surgical techniques in each of the modules. Practical training is performed in an experimental surgical center that has ten fully equipped laparoscopic sets. Animals used for live surgery are minipig BR pigs, which are anesthetized and supervised by veterinarians, in accordance with the rules of the ethics committee for animal use. The postgraduate students are divided in groups of two per pig and perform procedures supervised by urologists with experience in laparoscopy.

The students observe live surgeries, also as part of the training, in order to follow every detail regarding perioperative care for each technique. All students have to develop and present, at the end of the course, an original manuscript, a literature review, or an experimental study according to the rules of the educational program.

To evaluate the impact of training on daily practice of the certified surgeons, a questionnaire containing 18 questions was developed using the REDCap (Research Electronic Data Capture) digital platform (15). REDCap is a worldwide digital platform for the construction and management of online surveys and databases, specifically

geared to support the capture of data for research projects (15). The questionnaire (*Figure 1*) was prepared by several professionals, such as biostatisticians, urologists and behavioral science specialists, covering specific issues: demographic data, impact of the postgraduate course on daily surgical activity, number of current laparoscopic procedures, experience before and after the course, type and complexity of the surgeries performed, the capacity to perform laparoscopy alone, and initiation and evolution of minimally invasive techniques. The questionnaire, approved by the Ethics Committee, was emailed to all former students. Participation in the study did not grant any advantage or disadvantage over the final course result.

Results

Fifty students were certified from 2010 through 2014. Forty-one of 50 (82%) students completed the questionnaire and were included in the analysis. One (2%) former student refused to participate, one (2%) student was permanently incapacitated after a brain stroke, and 7 (14%) students were not located, despite active searching. Of the 41 participants included in the survey, all filled out the consent form. Demographic data are shown in *Table 1*. Mean age was 39.5 years (range, 30–60 years) and only two students (4.9%) were female. Urologists from most Brazilian states were represented in the study.

Thirty-two (78%) students had previously completed some type of laparoscopy course. Thirty (73.2%) students had already previous experience in laparoscopy, and 11 (26.8%) students had never performed any laparoscopic intervention. All students with no laparoscopic experience started performing laparoscopic urologic procedures after completing the course. In addition, 39 (92.3%) of the former students answered that they improved their surgical techniques, and 80% included new techniques or new procedures in their surgical practice. *Figure 2* shows the new laparoscopic surgeries incorporated in the students' practice. Median annual number of procedures per student was 15 and ranged from 2 to 100.

Using a visual scale bar ranging from 0 (none) to 100 (maximum), the students evaluated the degree of impact of the course on their professional activity, as shown in *Figure 3*. The median score was 75. The students mentioned a significant impact and influence of the course in their daily practice, including or improving laparoscopic techniques, as shown in *Figure 4*.

At the end of the course, 18 former students were able

Questionnaire - Postgraduate in Minimally Invasive Urologic Surgery

I have read and agree to the consent form for this study

- Yes
 No

1. Age (at the moment of graduation)

2. Sex

- Male
 Female

3. What is your city of professional activity?

4. What is your state of professional activity?

5. Did you take any laparoscopy course prior to the postgraduate Sirio Libanès Hospital?

- Yes
 No

6. Did the knowledge acquired during the course improve your laparoscopic techniques?

- Very little
 Little
 Enough
 Moderately
 Greatly
 Immensely

7. Did you include new procedures in their daily surgical practice stemming from the knowledge acquired in postgraduate studies?

- Yes
 No

8. Which procedures?

- Radical Prostatectomy
 Radical Nephrectomy
 Partial Nephrectomy
 Total Nephrectomy
 Pyeloplasty
 Pielolithotomy ou Ureterolithotomy
 Adrenalectomy
 Nephroureterectomy
 Renal Cyst Marsupialization
 Ureteral Reimplant
 Retroperitoneal Lymphadenectomy
 Others: _____

9. Did you start your laparoscopic surgeries after the course?

- Yes
 No

10. If you have not yet performed the laparoscopic technique, why did not this become possible?

- Lack of financial resources
 Personal Technical Difficulty
 Insecurity or fear to exercise the method
 Chose not to include such techniques in his daily practice
 Others: _____

11. Do you consider that the postgraduate course of the Sirio Libanès Hospital enabled you to start or evolve your laparoscopic practice?

- Yes
 No

12. Did you improve your professional performance after postgraduate?

- Yes
 No

13. Quantify in the scale below the degree of impact in your professional life.

0 ----- 100

14. After completing postgraduate course, did you find it necessary to complement with other courses, fellows and/or other forms of improvement to initiate or advance your laparoscopic urological surgeries?

- Yes, to start
 Yes, to move forward
 No

15. Would you recommend the postgraduate to your fellow urologists who want to start or evolve in the practice of minimally invasive surgery?

- Yes
 No

16. In your opinion, check below all the laparoscopic surgeries feasible to be performed after the completion of the postgraduate learning

- Radical Prostatectomy
 Radical Nephrectomy
 Partial Nephrectomy
 Total Nephrectomy
 Pyeloplasty
 Pielolithotomy ou Ureterolithotomy
 Adrenalectomy
 Nephroureterectomy
 Renal Cyst Marsupialization
 Ureteral Reimplant
 Retroperitoneal Lymphadenectomy
 Others: _____

17. Currently, on average, how many laparoscopic urologic surgeries do you do annually?

18. What did the postgraduate course in minimally invasive surgery of the Sirio Libanès Hospital represent in its daily surgical practice?

- After the course I started the laparoscopic urological surgeries
 I improve my techniques I already used
 Included new techniques and new surgeries in my surgical arsenal
 Has not added any changes in my professional life

Figure 1 Questionnaire. Questions 1–4 evaluated demographic data. Questions 5 and 6 evaluated previous experience with laparoscopic procedures. Questions 7–18 evaluated results and impact of the course on the student's professional activity.

to perform most laparoscopic procedures but had no expertise to complete a laparoscopic radical prostatectomy. After completing the course, all students felt no necessity for fellowship programs or other forms of improvement in order to initiate or advance their laparoscopic surgeries, except for laparoscopic and robotic radical prostatectomy. All former students would recommend the course for urologists who wish to initiate or improve their minimally invasive techniques in urological laparoscopy.

Discussion

The results of this study show that the postgraduate course

not only allows urologists to start laparoscopic activities but also to improve surgical techniques. All students are performing laparoscopic surgeries after the postgraduate course, and 80% of them are performing new procedures.

Brinkman *et al.* reported that regular training or a dedicated postgraduate course can improve the urologist's comfort level in being willing to perform laparoscopy (16). In agreement with Brinkman *et al.*, we also found that our students were able to improve their laparoscopic skills. Mulla *et al.* compared different training methods in basic laparoscopic skills and observed good efficacy of traditional and virtual simulators (17). Tjiam *et al.* examined the usefulness of the skills program in urological laparoscopy

(PLUS), which contains five stations in training boxes and is based on the American FLS (Fundamentals of Laparoscopic Surgery) program. The authors concluded that the course is an important tool for step-by-step primary training, covering different aspects of basic laparoscopic skills (9). All PLUS stations, such as peg transfer, cutting a circle, single knot tying, clip and cut and needle guidance are included in our program training.

The postgraduate course of our institution includes all the methodologies reported by Mulla and Tjiam (9,17) and added to other teaching methods, such as lectures, article discussions, surgeries in animal models and observing live surgeries. The later ultimately will grant the students better knowledge regarding patient positioning and padding, team positioning, trocar placement and eventual difficulties in such step, immediate pre- and postoperative care and other details important to the accomplishment of each procedure that otherwise could not be learned.

Torricelli *et al.* analyzed the laparoscopic training program of urology residents from the University of São Paulo (18). There was a combination of virtual and manual simulators and a 10-week period in which swine models were available for training in such a program. Residents became more familiar with the procedures, the average duration of the procedures decreased and fewer surgical complications were observed at the end of the program. There ultimately were faster and safer procedures. In comparison, our course involves similar training techniques, but with a different methodology and a longer training period. In our annual course, extirpative surgeries were addressed in the initial two modules, followed by six modules of reconstructive procedures and the last two modules focused on the most challenging surgeries (laparoscopic and robotic prostatectomy).

Throughout the year, students enhance each technique through repetitive training, in accordance with the study of Gettman *et al.* (19). This repetitive training allows a

Table 1 Demographic data

Variable	n (%)
Sex	
Male	39 (95.1)
Female	2 (4.9)
Age (years)	
30 to 40	27 (66.0)
41 to 50	10 (24.4)
51 to 60	4 (9.8)
Country regions	
North	3 (7.3)
Northeast	9 (22.0)
South	4 (9.8)
Southeast	19 (46.3)
Midwest	6 (14.6)

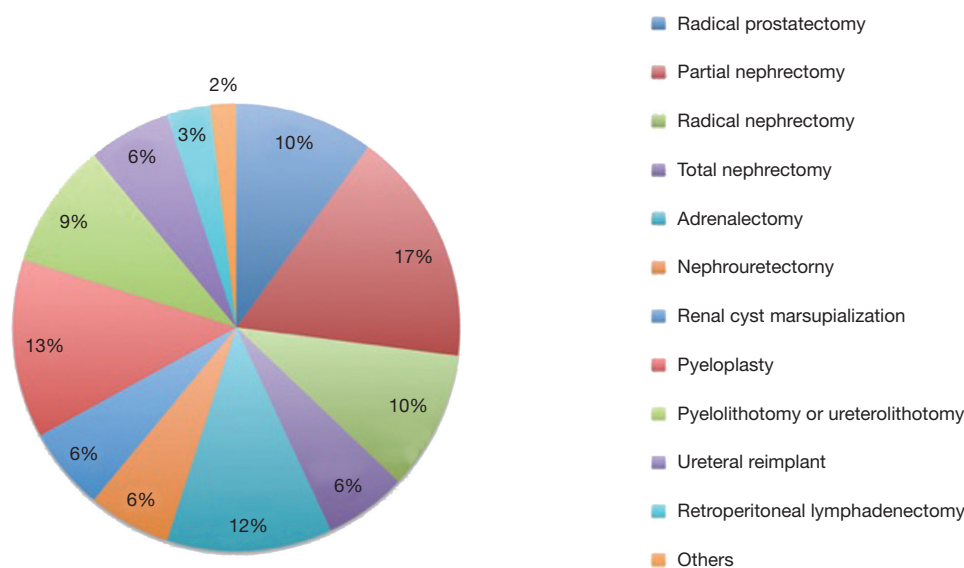


Figure 2 New procedures included in the daily surgical practice after postgraduate course.

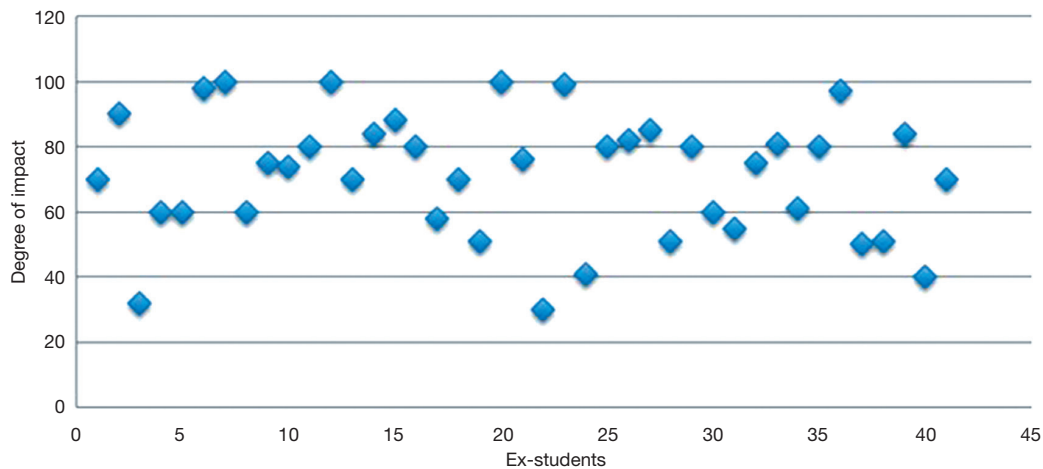


Figure 3 Impact of the postgraduate course on urologists' practice.

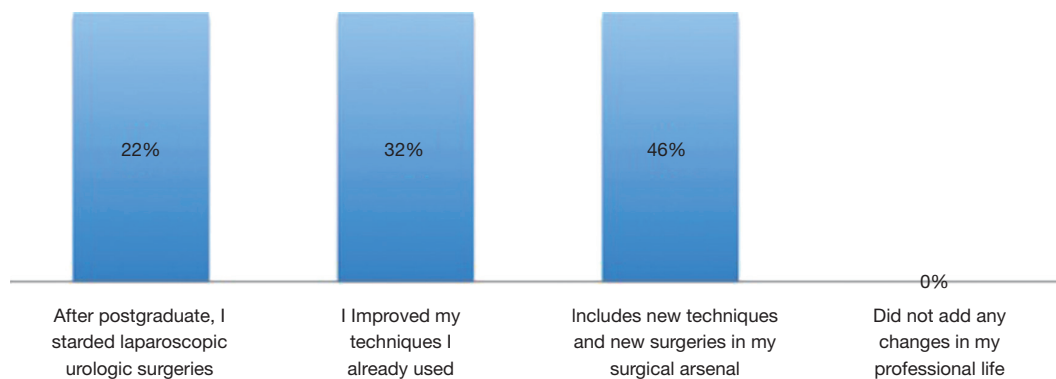


Figure 4 Impact of the postgraduate course in students' daily activities.

controlled environment where all complications or possible errors can be identified and where the surgeon can plan how to avoid and manage complications. Each student performed 50 procedures as the first surgeon and 50 as the first assistant. In an ideal scenario, an experienced surgeon would do a demonstrative surgery in each of the modules. However, it is forbidden to use an animal model for such purposes due to institutional ethical concerns.

We recognize some limitations of our program. One of the main complaints of the students was the inability to safely perform a laparoscopic radical prostatectomy at the end of the course. In addition, our program does not certify students for robotic surgery. However, laparoscopic prostatectomies and robotic techniques were not the aim of the postgraduate course, as the first requires advanced laparoscopic expertise and demands a large learning curve, and the second requires specific training and

certification. The study has also some limitations. Research questionnaires may generate sampling and interpretation biases, and therefore may be a limiting factor of the analysis. However, we were able to reduce such biases as the students answered the questionnaire after certification and as they had time, privacy, and freedom.

Finally, this study has even more importance in a decade where safety of residency training among patients is being questioned. Our next objective is the validation of the postgraduate course with automatic systems that are being developed and could improve the quality of data collection and analysis.

Conclusions

The annual postgraduate course is a reasonable way of acquiring urological laparoscopic skills. The course has

proven to be efficient, impacting urologists' practice in a significant manner.

Acknowledgements

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Ethical Statement: The questionnaire, approved by the Ethics Committee (ID/number of ethical approval: HSL 2015-26/1.039.297), was emailed to all former students.

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Cite this article as: Mariotti AC, Torricelli FC, Andrade WS, Mitre AI, Arap MA. Postgraduate course in minimally invasive urological surgery. *Transl Androl Urol* 2018;7(2):274-279. doi: 10.21037/tau.2018.03.18