

Trans abdominal pre peritoneal inguinal hernioplasty: initial experience in resident training service

Abstract

Introduction: Abdominal wall hernia surgery is one of the most common procedures performed by general surgery departments. The most common techniques currently used are: plastic surgery without mesh (Shouldice), plastic surgery with mesh (Lichtenstein) and laparoscopic plastic surgery (TAPP or TEP). More and more surgical groups are performing laparoscopic inguinal hernioplasty. Numerous studies have shown that treatment of inguinal hernias by laparoscopy has recurrence rates comparable to those established by conventional surgery. However, it has been objected that learning laparoscopic surgery is more difficult and longer than that required for the conventional technique.

Objectives: To analyze the results obtained in the short and medium term during the initial experience in the development of the transabdominal pre peritoneal technique (TAPP) in a service that trains residents.

Materials and methods: We conducted a prospective, observational study of the first 30 patients operated for inguinal hernias according to the TAPP technique in the General Surgery Service of the Hospital Escuela Eva Perón of Granadero Baigorria, during the period from June 2017 to June 2018.

Results: 30 patients underwent elective surgery. 28 men and 2 women (93.3% and 6.7%), with a mean age of 51.17 years (range: 21 and 78 years); the mean BMI was 26.86. All were operated by TAPP (transabdominal pre peritoneal) technique. 100% of the surgeries were performed by a resident always accompanied by a staff surgeon. Comorbidities: 9 patients (30%) had arterial hypertension. 3 patients (10%) had asthma and another 3 (10%) had diabetes. 27 were indirect inguinal hernias, 6 were direct and 2 were mixed. 5 patients (16.6%) had a contralateral hernial defect as an intraoperative finding and bilateral hernioplasty was performed. The average anesthetic time was 130 minutes (range 90-180 minutes). Sixty percent of the cases were managed as outpatient surgeries, the remaining 40% were hospitalized for 24 hours because they were admitted to the operating room in the afternoon. Complications: 2 patients (6.66%) presented cord or testicular hematomas. One patient (3.33%) presented infection of the umbilical trocar wound. One patient (3.33%) had recurrence in the immediate postoperative period. Two patients (6.66%) presented chronic groin pain (more than 30 days) of mild intensity, evaluated by VAS (visual analogue scale) and required additional analgesia. There were no conversions from laparoscopic to conventional repair. Seven patients (23.3%) were not working at the time of surgery. Of the remaining 23, 82% returned to their usual work activity one week after surgery. 20 patients (66.6%) went for follow-up one year after the operation and underwent a survey, which showed that 100% of the patients surveyed were satisfied with the operation and would recommend it.

Conclusion: Laparoscopic inguinal hernioplasties have a low rate of recurrence and complications, comparable to those obtained with the conventional technique. Likewise, the learning curve is longer, but it is possible to perform it during the training stage as a resident doctor.

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Introduction

Abdominal wall hernia surgery is one of the most common procedures performed by general surgery departments. It is estimated that globally around 20 million hernias are repaired each year, and of these surgeries approximately one million are performed in the United States alone, where 80% of the cases are exclusively hernias of the inguino-crural region.^{1,2} In general, it is described that 27% of men have at some point in their lives the risk of being operated for an inguinal hernia, this figure is much lower in the case of women, where only reaches 3% of its population.³

The complexity of the anatomy of the inguinal region and the poor initial results led to the development of a large number of surgical techniques in order to reduce recurrences. Once acceptable percentages of recurrences were achieved, efforts were directed to develop a technique that also offered little pain and early return

to normal activities. Hence, tension-free techniques became the preferred technique for many surgeons.⁴ There is no consensus to define an ideal technique, and there is still controversy and dissent on this issue. It is surprising that despite more than 16,000 publications since the beginning of the last century, hernia repair has remained a perplexing problem for surgeons worldwide.¹ Achieving excellent long-term results with a low recurrence rate and avoiding chronic groin pain remains difficult. Also surprising is the lack of consensus as to the optimal repair technique to ensure a durable long-term result.

The three most commonly used techniques at present are: plastics without mesh (the Shouldice technique being the one with the best results), plastics with mesh (mainly with the Lichtenstein technique) and laparoscopic plastics (TAPP or TEP). Differences in cost, learning curves, postoperative recovery and complications can be found among them.⁵

In relation to the laparoscopic repair of hernias in the inguinocrural region, the first reports were made by the surgeon Ralph Ger in 1982. He occluded the neck of the hernial sac in a series of 13 patients using metal clips applied laparoscopically, the intervention was successful in 12 of them.¹ Throughout the last decade of the 20th century, and especially after the success of laparoscopic cholecystectomy, different techniques for repairing this type of hernia by means of minimally invasive surgery began to emerge. The two most used until now are the transabdominal preperitoneal laparoscopic herniorrhaphy (TAPP), described by Arregui in 1992, which performs laparoscopic repair of the defect and the totally extraperitoneal herniorrhaphy (TEP) described by Mc Kernan in 1993, which creates the working area without penetrating the abdominal cavity, completely in the preperitoneal space. Both are effective alternatives to open repair.⁴

In recent years more and more surgical groups have been performing laparoscopic inguinal hernioplasty. Since the first works published by R. Ger, the discussion has revolved around whether the laparoscopic technique was capable of presenting recurrence rates comparable to the conventional technique. In this regard, numerous studies have shown that the treatment of inguinal hernias by laparoscopy has recurrence rates comparable to those established by conventional surgery.^{6,7} However, it has been objected that learning laparoscopic hernia surgery is more difficult and longer than that required for conventional surgery, mainly due to the visualization of the anatomical elements from a new perspective, and that the long learning curve required to master the technique safely was accompanied by greater complications and recurrences.⁶

In the last decade several recommendations have emerged for the TAPP technique that have improved its performance: wide dissection of the inguinocrural region, placement of large meshes and their adequate fixation. This has made it possible to achieve recurrence rates very similar to those of the conventional technique.⁵

One of the advantages associated with laparoscopic repair methods in these hernias is the possibility it offers to perform an excellent evaluation of both myopectineal quadrilaterals, being able to detect hernial defects not identified by physical examination, also allows the realization (in the case of TAPP) of a diagnostic laparoscopy. There are also studies that report a clear decrease in postoperative pain and less need for analgesia, faster recovery with early return to normal activities, and superior aesthetic results, with minimal incidence of infection of surgical wounds.^{8,9} Disadvantages include the need for a long learning curve, the use of general anesthesia, higher initial cost, and the possibility of serious complications, especially in the early stages of this learning curve, which are not usually seen with open hernia repair.¹ A TAPP repair exposes patients to risks such as injury to the bowel, bladder and vascular structures (inferior epigastric, spermatic vessels, external iliac, deep iliac, obturator and circumflex vessels), which can occur during the creation of the initial pneumoperitoneum, subsequent insertion of the trocars and dissection of the space of Bogros and Retzius. Injuries are often linked to inexperience with laparoscopic groin anatomy. Other complications unique to laparoscopic hernia repair are trocar site hemorrhage, trocar site herniation, and damage to the epigastric or gonadal vessels. Less serious complications, associated more with the use of laparoscopy than with the surgeon's technique, are hypotension secondary to elevated intra-abdominal pressure, hypercapnia, subcutaneous emphysema, pneumothorax, and increased peak airway pressures.

The "learning curve" can be divided into two phases: the immediate phase (where at least 20 surgeries are required to obtain anatomic knowledge and surgical skills based on the ability to

perform surgery during this initial phase) and the late phase (which demonstrates the technical expertise to perform endoscopic surgery without complications or conversions and with a sustained recurrence of less than 1%).¹⁰ It is generally accepted that to decrease recurrence to less than 1%, a novice surgeon should perform more than 30 cases. The most common reasons for recurrence are incomplete dissection of the myopexy orifice, inadequate reduction of the peritoneal sac, unnoticed hernias, incomplete dissection of lipomas or preperitoneal fat, rolling of the mesh edges, and inadequate coverage of the mesh to the hernia defect. The presence of an experienced surgeon during these early cases helps prevent unnecessary complications and helps shorten surgery time.^{10,11} During the training period it is advisable to make a careful selection of patients, as this is an important parameter for the success of the operation. Irreducible hernias and those in patients with previous lower hemiabdomen surgery should be excluded in the initial cases. Including people with higher body mass index, history of abdominal and scrotal surgery is also a risk factor for intraoperative complications and conversion, even for experienced surgeons.¹²

The purpose of the present study is to analyze the results obtained in the short and medium term during the initial phase in the development of the pre-peritoneal transabdominal technique in a service that trains residents.

Materials and methods

A prospective observational study was carried out with 30 patients operated according to the TAPP (transabdominal preperitoneal) technique, from June 2017 to June 2018, in the General Surgery service of the Hospital Escuela Eva Perón. This stage was considered as the initial phase in the training in this technique, where all procedures were performed by a 4th year resident, supervised by a staff surgeon with experience in TAPP.

Patients of both sexes, older than 14 years, with uni or bilateral primary inguinal hernias, able to tolerate general anesthesia, were included. Patients with giant hernias, recurrent or incarcerated hernias, patients with a history of lower abdominal surgery, uncontrolled comorbidities or BMI>35 were excluded. Patients were admitted on the same day of surgery. No preoperative shaving or antithrombotic prophylaxis was performed. Patients were asked to urinate before entering the operating room (Figure 1).

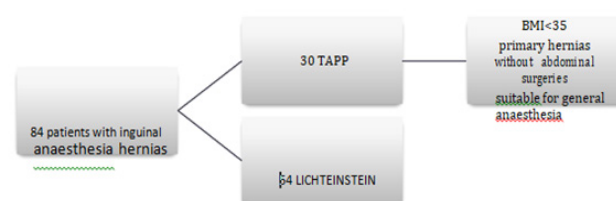


Figure 1 Patient history.

Antibiotic prophylaxis was performed with Cefazolin 1gr. EV. Diclofenac 75 mg every 12 hours for 3 days was indicated to control postoperative pain. At 24 hours after the procedure, elongation exercises were prescribed and physical activity was incorporated progressively, being able to use a bicycle 48 hours after the surgery. At the time of the control one year after surgery, a survey was carried out to assess the degree of postoperative pain by means of the VAS (Visual Analog Scale) and the degree of satisfaction with the procedure.

Surgical technique: patient in supine decubitus, with fixation of the arms to the trunk. Trendelenburg 30°. Lateral tilt to the opposite side of the hernia, where the surgeon and assistant are positioned. Supraumbilical arch incision. Pneumoperitoneum. Placement of 10 mm umbilical trocar and two 5 mm trocars following an imaginary transverse umbilical line. Identification of the hernial defect. Opening of the peritoneum from lateral to medial starting above the EIAS and medially until the lateral ligament of the bladder is crossed. Anatomical repairs. Wide dissection. Complete dissection and reduction of the hernial sac. Identification and preservation of spermatic cord elements. Placement of polypropylene mesh. Fixation with spiral staples at the level of Copper’s ligament, anterior rectus muscle and transverse muscle. Peritoneal flap closure with polyglactin 3.0 surget. Closure of laparoscopic port aponeurosis.

The variables studied were mostly obtained from the patients’ medical records. These are age, sex, BMI, comorbidities, abdominal surgical history, work and physical activity performed, type of hernia, surgical time from the beginning of the anesthetic period to the end of it, postoperative stay, postoperative pain, return to work and physical activity and complications found in the series.

Patients were followed up for a period of 1 year, recording complications, labor insertion and postoperative pain control.

Statistical analyses

Quantitative variables are summarized with mean, standard deviation, minimum and maximum values. Qualitative variables are described with absolute frequencies and percentages.

Results

During the study period, 30 patients underwent consecutive and elective surgery. There were 28 men and 2 women (93.3% and 6.7%), with a mean age of 51.17 years (range: 21 and 78 years); the mean BMI was 26.86 (Table 1). All patients underwent surgery for inguinal hernias using the TAPP (transabdominal pre peritoneal) technique. 100% of the surgeries were performed by a resident always accompanied by a staff surgeon. it should be clarified that in this series 5 patients presented bilateral hernial defects as intraoperative findings, which were not identified during the preoperative evaluation. All were resolved during the same procedure. Hernias were evaluated separately during the statistical analysis. The most frequent type of hernia, coinciding with the literature, was the indirect type with 27 cases, followed by the direct type with 6 cases and finally the mixed type with only 2 cases (Figure 2).

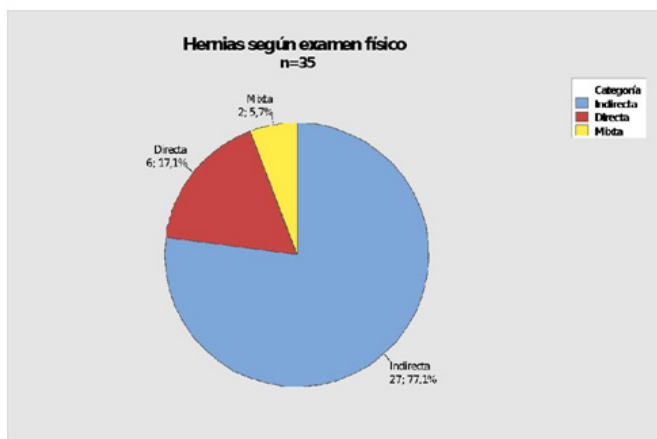


Figure 2 Hernias according to physical exam.

Table 1 Description of the group of operated patients.

Variable	Frequency n=30	Minimum -maximum o percentage (%)
Age (years)	51,17 (13,15)	21-78
Weight (kg)	79,80 (9,32)	64 - 100
Size (mts)	1,71 (0,08)	1,58- 1,87
BMI	26,86 (3,08)	22,00-35,85
Sex (male)		86,67%
Occupation		
No physical demands		26,7%
Physically demanding		43,3%
Housewife		6,7%
Retired/unemployed		23,3%
Physical activity		
Bike		20,0 %
Football		23,3 %
Walks		10,0 %
Other sports		10,0 %
Sedentary		36,7 %

The most prevalent comorbidities were: arterial hypertension, 9 patients (30%), asthma 3 patients (10%), diabetes 3 patients (10%), HIV 1 patient (3.3%), CHF 1 patient (3.3%) (Figure 3). The average anesthetic time was 130 minutes, with a range between 90 and 180 minutes (Figure 4). 18 patients (60%) were managed on an outpatient basis, the remaining 12 (40%) were hospitalized for 24 hours in the general ward, all of them because they were admitted to the operating room at times that prevented outpatient management.

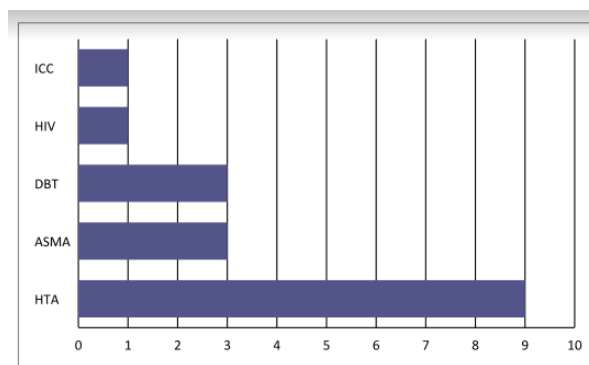


Figure 3 Patient comorbidities.

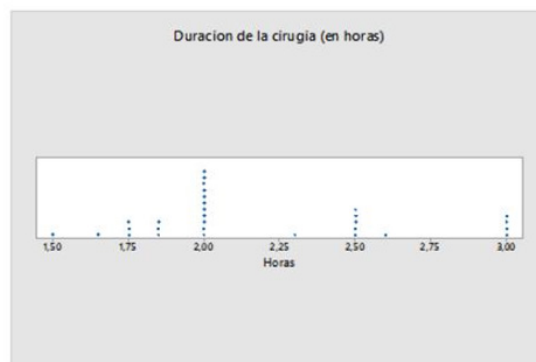


Figure 4 Surgery duration (in hours).

When evaluating complications, 2 patients (6.66%) presented cord or testicular hematomas, which did not require treatment and resolved spontaneously. One patient (3.33%) presented infection of the umbilical trocar wound, which resolved with antibiotic treatment. One patient (3.33%) presented recurrence in the immediate postoperative period, probably linked to technical defects, since it was diagnosed one week after surgery, during the first postoperative control and reoperated by conventional means. Two patients (6.66%) presented chronic groin pain (more than 30 days) of mild intensity, evaluated by VAS (visual analogue scale) and required additional analgesia (Figure 5). No conversions from laparoscopic to conventional repair were recorded.

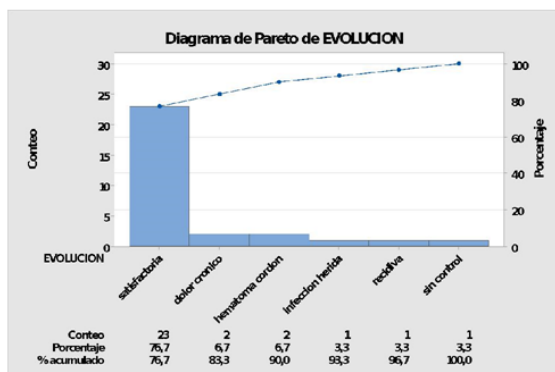


Figure 5 Pareto diagram of EVOLUTION.

Follow-up: 97% of patients attended control 7 days after surgery, 87% attended control one month later and 66% one year after the procedure. We do not know the reasons for which they were absent in successive controls. Seven patients (23.3%) were not working at the time of surgery. Of the remaining 23, 82% returned to their usual work activity one week after surgery, and those who did not do so were due to personal decisions. 20 patients (66.6%) attended a control one year after the operation and were submitted to a survey, which showed that 100% of the patients surveyed were satisfied with the operation and would recommend it.

Discussion

In the present work we report the results of the initial phase of consecutive laparoscopic hernias performed using the transabdominal pre peritoneal technique. The fact of having opted for this minimally invasive technique was due to the preference of the staff surgeons, who were used to performing it. In the series observed, male patients predominated, during the fourth decade of life, coinciding with the works reported.¹ The most frequently found type of hernia was the indirect inguinal hernia.

In the interventional service it is considered that the learning curve should not only be measured in terms of shorter operative time, but also in rates of occurrence of complications and conversions. This is a controversial issue; many authors describe a very variable number of cases to be performed before the learning curve is considered complete, with some studies proposing a number of procedures between 50 - 100 and others between 30 - 50.⁴ The great difference between these reports is perhaps due to the heterogeneity of the studies and the context in which they were performed, in particular the number of hernia repairs performed per year, the selection of patients, the standardization of the technique and the training program itself. The present series does not indicate a minimum number of procedures that serve as a cut-off to consider the learning curve completed or to

reduce possible complications since the curve depends not only on the number of procedures performed but also on the previous skills of the intervening surgeons, the knowledge of the anterior and posterior inguinal anatomy, the type of laparoscopic technique, since the TAPP technique, in our opinion, requires less training than the TEP, the standardization of the technique and the educational program used. In institutions with a high caseload, a strictly standardized technique and a structured educational program, the number of operations a surgeon needs to gain proficiency may be much lower.⁹ Furthermore, it is shown that the results of surgeons in training are not significantly different compared to those of experienced hernia surgeons as long as adequate supervision is ensured, except for operative time.⁷ According to what has just been expressed in our series, the occurrence of intraoperative and postoperative complications was low. Therefore, our proposal is to make a selection of the initial patients, to have an advanced resident with previous experience in laparoscopic procedures, to have previous knowledge of the inguinal anatomy from the posterior approach, to standardize the technique and to have the accompaniment of a staff surgeon trained in TAPP.

Numerous prospective randomized studies comparing TAPP and Lichtenstein technique found no significant differences in terms of recurrences, which was corroborated in subsequent reviews and meta-analyses. In a meta-analysis of the Cochrane review system, on 41 prospective randomized studies, fewer recurrences were found with the laparoscopic technique when compared to open surgery without mesh, but no significant differences were found with open techniques with "tension-free" mesh.^{5,13} In agreement, in our series we had a low recurrence rate, only one patient in the whole series. It is assumed that this case was due to technical defects and/or inexperience of the intervening resident since it occurred in the third case of the series.

With respect to global morbidity, when including other complications such as hematomas, seromas, wound infections, hydroceles, etc., a rate of 10% of complicated patients was found, which is similar to other series that indicate that the rate of complications in laparoscopic surgery is low. The published incidence of serious complications is 0.1% for intestinal, 0.1% for bladder and 0.09% for vascular lesions. No such serious complications were recorded in this group.

One of the main issues to be addressed when comparing TAPP with the conventional technique is to define if the advantages of laparoscopy are greater than its difficulties and costs. Multiple studies have analyzed them, and even the most critical of the laparoscopic technique accept that it is associated with less postoperative pain in the first week, less recovery time and early return to work.^{5,14,15} The degree of postoperative pain and the promptness with which patients return to their daily activities has become very relevant nowadays. In this work, patients begin to walk around once they have recovered from anesthesia and gradually add physical activity until they return to their usual activities after an average of 7 days. It has been demonstrated that postoperative pain is related to the number of staples used for mesh fixation.^{4,8,9} During an inguinal hernia operation, regardless of the approach used, it is important to avoid injury to the nerve structures during dissection and when securing the mesh. Because of concerns about nerve entrapment or potential injury, some specialists have suggested alternative means of securing the mesh, such as fibrin glue. Others have further suggested that the mesh in the preperitoneal space need not be anchored at all and will be held in place by the intra-abdominal pressure generated by the viscera of the abdominal cavity.¹⁷ In this series only 4 staples were placed in each case, 2 to the Cooper, one to the transverse abdominis and one to the anterior rectus. This is also reflected in the additional requirement of analgesics in the

postoperative period. Regular analgesics were indicated in the first 72 hours postoperatively. Only 2 patients required additional analgesia. U. Scheuermann et al. in their study used the VAS and revealed differences in pain scores within 12 h postoperatively in favor of the TAPP procedure.¹³

One of the details also subject to evaluation during hernia repair, both laparoscopic and conventional, is the time used to perform the intervention. In this case, being the first series of patients operated with this surgical modality, the initial surgical time obtained was superior if compared to the other modalities. Cruz Alonso, in his description of 53 patients, describes a shorter time for unilateral hernias.¹⁶ Similar results to this author, with time under 60 minutes, have been reported by other authors, although taking into account that these are data with a larger sample of patients and surgeons already experienced in the procedure.^{11,18} The time it takes to suture the peritoneum laparoscopically may contribute to increase the operative time, but it implies a lower cost and what is more important, a lower possibility of postoperative complications, such as chronic pain, since as we mentioned before, it has been widely demonstrated that pain is related to the number of staples used in the fixation of the mesh and their location.

In conclusion, laparoscopic inguinal hernioplasties present a longer learning curve than the conventional technique, but in residents with previous experience in laparoscopy it is possible to perform them during their training stage, with a low morbidity and recurrence rate.

Thus, it can be said that the introduction in our institution of this modality of repair of hernial defects in the inguinocrural region constitutes a new option in the treatment of these clinical conditions. The advantages of minimal access surgery in general and in the case of these hernias in particular, including rapid recovery, low frequency of complications and good aesthetic results, are elements to be taken into account when determining the ideal surgical approach for these patients. Although these are initial results, the continuation of these interventions and further evaluations in a larger number of patients will allow us to improve in a general way those elements that still showed certain difficulties when compared to conventional herniorrhaphy, such as surgical time.

Acknowledgments

None.

Conflicts of interest

The authors declare no conflicts of interest.

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