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COMPARATIVE ANALYSIS OF THE SURGICAL TREATMENT OF INGUINAL HERNIA BY ADAPTING THE TRANSABDOMINAL PRE-PERITONEAL LAPAROSCOPIC TECHNIQUE (TAPP) WITHOUT MESH FIXATION WITH THE TRADITIONAL OPEN LICHTENSTEIN TECHNIQUE

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Abstract: Introduction: Inguinal hernioplasty is one of the most frequent operations in Brazilian university hospitals. Issues related to recurrences and complications are taken into consideration, when choosing the best surgical procedure for each patient. The two most used methods use the open approach proposed by Lichtenstein and the videolaparoscopic approach, usually by the transabdominal preperitoneal technique (TAPP). Due to the high cost of the mesh fixation devices (tackers), necessary for the positioning of the polypropylene mesh by laparoscopy, this method is currently rarely used in the Unified Health System (SUS). However, there is a recent tendency not to fix meshes in defects smaller than 2 centimeters when the surgery is performed using the minimally invasive approach. **Goals**: To evaluate the rate of recurrence and post-surgical complications in patients operated using the TAPP technique without mesh fixation, compared to those undergoing the traditional Lichtenstein method, in a Brazilian public hospital. **Methods**: To analyze the occurrence of surgical complications according to the Clavien-Dindo Classification and recurrences up to three months postoperatively, in a retrospective cohort of patients operated on at Hospital Universitário Cajuru, in Curitiba, between March 2019 and 2020. **Results:** A total of 116 patients were analyzed, 67 operated via TAPP and 49 via the traditional open route. The TAPP group had a greater number of cases with bilateral hernia, while those in the open route were significantly older (p=0.004). There was no significant difference in terms of recurrence (p=0.072) and complications (p=0.056) between the methods. **Conclusion**: Both approaches proved to be equivalent for inguinal hernia repair in a short-term postoperative comparison. This suggests that the TAPP technique adapted for not fixing the mesh in defects smaller than 2 cm can be used

on a larger scale in Brazilian public hospitals, making it a positive cost-effective alternative within the scope of the SUS (Brazilian Unified Health System).

Key words: inguinal hernia; relapse; complication; Lichtenstein; TAPP.

INTRODUCTION

Inguinal hernias are chronic conditions related to an abnormal protrusion of abdominal contents through the inguinal canal, resulting from imperfections in the anatomical structures that form this region (PEDROSO et al., 2017). They can be classified as indirect or direct, according to the site of involvement. Indirect hernias are those that emerge along the inguinal canal, being characterized by the persistence of the peritoneal-vaginal conduit and have a congenital nature. The direct ones, in turn, occur due to the fragility of the transversalis fascia, which causes bulging of the abdominal contents into the Hesselbach triangle. These alterations are extremely frequent, representing 75% of abdominal wall hernias, with a high prevalence in general surgery services.

According to *Hernia Surge Group* (2018), which brings together the main societies dedicated to the treatment of hernias, around 20 million operations are performed annually throughout the world. Of this total, two-thirds are indirect and one-third direct.

The socioeconomic impacts related to this pathology are considerable, since in the United States it is estimated that the 800,000 inguinal herniorrhaphies performed annually generate approximately 10 million days not worked (CUNHA E SILVA et al., 2017). Likewise, the risks of complications directly related to hernias, such as intestinal obstruction, have a high financial impact (SEID et al., 2007). The occurrence of relapses can range from 0.1 to 10% of operated cases, depending on the technique used, causing additional productive disability, whose frequency is higher in males (TEIXEIRA et al., 2017).

Over the years, several surgical repair techniques have been developed, starting from those that proposed reinforcement of the posterior wall of the inguinal canal by means of sutures, to the most modern ones, performed using a minimally invasive approach, using prostheses (inorganic meshes) without tension.

This evolution seeks to improve the quality of life of patients by reducing relapses and operative complications, especially chronic pain (BARBOSA et al., 2020). The two most used approaches are the traditional open technique, proposed by Lichtenstein, and laparoscopic procedures. There is no global consensus regarding the most appropriate technique, because even with technological advances, the recurrence rate – an old criterion used to assess surgical results – was similar with both methods (PEDROSO et al., 2017).

The Lichtenstein technique, created in 1984 and improved until 1988, changed the world scenario of hernioplasties (ROSCH et al., 2002; MENON et al., 2003). It proved to be an effective procedure, with complication rates of less than 1%, in addition to being easily learned and performed (ETTINGER et al., 2007). Lichtenstein innovated with the use of "network" screens made of polypropylene, which are attached to fabrics. He thus instituted the "tension-free hernioplasty", with the aim of avoiding complications caused by increased pressure on the inguinal region, due to the approximation sutures.

Minimally invasive approaches, performed by videolaparoscopy, from 1990, consist of placing the same type of mesh in the preperitoneal space (MORRELL et al., 2021). There are two variations of this access route to the inguinal canal: transabdominal preperitoneal (TAPP) and totally extraperitoneal (TEP). Surgical

results are comparable (MEYER et al., 2013; SCHEUERMANN et al., 2017), however, the financial cost of transabdominal performance (TAPP) is higher, due to the need to fix the mesh using specific devices called tackers.

Currently, the literature recognizes that it is possible not to fix the mesh in TAPP, only allocating it to cover the deep inguinal ring, when the defects are smaller than 2 centimeters (Figure 1). This adaptation has been gaining notoriety due to its cost reduction (PALMQVIST et al., 2013) and shorter execution time, in addition to causing less tissue aggression when compared to TEP, allowing faster recovery and earlier return to occupational activities (GIUSEPPETTI et al., 2020).

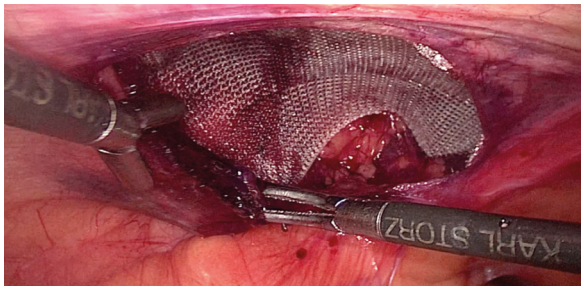

Figure 1 – Positioning of the polypropylene mesh laparoscopically in preperitoneal transabdominal access (TAPP), with the center covering the hernial defect in the anterior pelvic wall

METHODS

This is a retrospective cohort study of surgical results collected from electronic medical records at the General Surgery Service of Hospital Universitário Cajuru, in Curitiba, southern Brazil, over a period of one year. As an outcome, for comparison purposes, complications and recurrences within three months after surgery were considered.

Inclusion criteria were patients of both genders, aged over 18 years, who underwent consecutive inguinal hernioplasty by the same surgical team, in the first operation or reoperation (recurrence treatment), using the TAPP technique without mesh fixation (study group) and the conventional open Lichtenstein route (control group).

Patients with large inguinoscrotal hernias and those with defects greater than 2 cm in diameter were excluded, as they were not suitable for laparoscopic correction without mesh fixation, according to the guidelines of the Brazilian Society of Hernia (CLAUS et al, 2019).

The project was evaluated by the Research Ethics Committee, through Plataforma Brasil. The variables studied were: age (in years), previous inguinal hernioplasty (that is, the current surgery is due to a recurrence of a previous procedure), laterality (right, left and bilateral), occurrence or not of complications and recurrence after three months postoperatively.

The evaluation of surgical complications was performed according to the classification proposed by Clavien-Dindo (DINDO et al., 2004), which is divided into 5 grades, as follows: mild (grades I and II, complications treated pharmacologically, including wound infections operative), moderate (grade III, which require surgical or radiological treatment) and severe (grade IV and V, which are related to organ dysfunction and death).

The association of the two surgical techniques as categorical variables was tested using the Chi-square test and dichotomous variables using Fisher's exact test. Data were analyzed using IBM SPSS Statistics v.28.0 software (Armonk, NY: IBM Corp.) and p values < 0.05 indicated statistical significance.

RESULTS

A total of 116 patients who underwent inguinal hernioplasties by the same surgical team at Hospital Universitário Cajuru between March 2019 and March 2020 were analyzed. Of these, 49 were operated on using the traditional Lichtenstein open technique and 67 by laparoscopy, following the TAPP technique without mesh fixation of polypropylene. The general characteristics of the sample are presented in Table 1.

Variable		
Age		54 ± 14 (21 - 82)
Prior hernioplasty	No	106 (91,4%)
	Yes	10 (8,6%)
Laterality	Right unilateral	50 (43,1%)
	Left unilateral	40 (34,5%)
	Bilateral	26 (22,4%)
Procedure	Open	49 (42,2%)
	TAPP *	67 (57,8%)
Complications **	No one	100 (86,2%)
	Light	15 (12,9%)
	Moderate	1 (0,9%)
Recurrence	No	111 (95,7%)
	Yes	5 (4,3%)

Table 1 – Epidemiological characteristics of patients included in the study (n = 116), separated by analyzed variables and their proportion in the sample

Categorical variables are described by absolute frequency (percentage) and age by mean ± standard deviation; *TAPP: modified prepe-ritoneal transabdominal hernioplasty without mesh fixation; **surgical complications according to Clavien-Dindo classification.

Table 2 shows the comparison between the two groups of patients, regarding age, presence or absence of previous surgery for hernia repair, laterality, postoperative complications and occurrence of recurrence for the operation to which he was submitted in the study.

Variable	**Classification**	**Open Surgery (n=49)**	**TAPP (n=67)**	**Value of p**
Age		58,7± 12,9 (25 - 82)	51,2± 14 (21 - 73)	*0,004*#
Previous hernia	No	44 (89,8%)	62 (92,5%)	0,741*
	Yes	5 (10,2%)	5 (7,5%)	
Laterality	Right	24 (49%)	26 (38,8%)	*0,006*§
	Left	21 (42,9%)	19 (28,4%)	
	Bilateral	4 (8,2%)	22 (32,8%)	
Bilateral hernia	No	45 (91,8%)	45 (67,2%)	*0,002**
	Yes	4 (8,2%)	22 (32,8%)	
Presence of complications	No	46 (93,9%)	54 (80,6%)	0,056*
	Yes	3 (6,1%)	13 (19,4%)	
Recurrence	No	49 (100%)	62 (92,5%)	0,072*
	Yes	0 (0%)	5 (7,5%)	

Table 2 – Comparison of the characteristics analyzed between the two groups of surgical procedures (open surgery x TAPP) and the statistical analysis of the variables, presented according to p values

Categorical variables are described by absolute frequency (percentage) and age by mean ± standard deviation (minimum value - maximum value).

Significance of the t test for independent samples, $p < 0.05$

* Significance of Fisher's exact test, $p < 0.05$

§ Significance of the Chi-square test, $p < 0.05$

The results demonstrate that the age of patients undergoing open surgery was significantly higher than those operated by laparoscopy, the same did not happen with regard to the existence of previously recurrent hernia, in which each group had five cases. The group submitted to the TAPP technique consisted of a greater proportion of cases with bilateral hernia, a fact that was statistically significant. As for postoperative outcomes related to complications and recurrences, there was no significant difference between the two surgical techniques.

DISCUSSION

The comparison between surgical techniques for correction of abdominal wall hernias is old, and aims at technical improvement and improvement of surgical results, especially with regard to complications and recurrences. Given this scenario, most studies that compare laparoscopic procedures (whether TEP or TAPP) with open ones (without tension and using meshes) do not define superiority between them, and the recommendations must be individualized for each case, following the guidelines proposed by different surgical societies (Hernia Surge Group, 2018). Currently, there is a greater tendency towards laparoscopic surgery, due to the benefits of the minimally invasive approach, in terms of shorter recovery time and earlier return to daily activities and work, in addition to a lower incidence of pain in surgical incisions and better cosmetic appearance compared to conventional open incisions.

The transabdominal preperitoneal approach (TAPP) consists of creating a preperitoneal space, followed by placement of the polypropylene mesh (Figure 1), its fixation and closure of the peritoneum. This procedure has a higher operative cost than the open technique due to the use of tackers to fix the mesh, which restricts its use within the scope of the Brazilian Unified Health System (SUS), since this value is not included in its table. For this reason, it is not a technique frequently used in university hospitals, which treat a large number of patients linked to the public system.

Non-fixation of the mesh is recommended for hernias smaller than 2 cm in diameter in its deep inguinal ring (HABEEB et al., 2020; LI et al., 2017). This technical variation is still not very widespread in Brazil and has the advantage of reducing surgical time and the cost of the operation. In this study we compared the conventional open technique with the laparoscopic variation of TAPP without fixing the mesh, in small unilateral or bilateral hernias.

Although we observed 5 cases of recurrence in this group (7.5%) compared to no recurrence using the open technique, this result was not statistically significant (p=0.072) in our patient population.

Another point widely explored when comparing different methods of repairing inguinal hernias refers to postoperative complications, especially the occurrence of chronic pain. In our study, we categorized complications following the classification proposed by Clavien-Dindo in 2004. The vast majority of operated cases did not present any complications (86.2%) and we also did not observe serious complications. These, when they occurred, were mild (15 patients; 12.9%, usually seromas and hematomas) and moderate (1 case; 0.9%). The comparison between the surgical groups did not show a significant difference (p=0.056) between them in terms of complications, assessed up to three months after the operation. It is noteworthy that chronic pain affects approximately one third of patients submitted to mesh fixation with *tacker*s (*Hernia Surge Group,* 2018), which is due to the possibility of these devices compressing groin nerves, especially the genitofemoral nerve, which is mainly responsible for perpetuating pain. For this reason, we highlight an additional benefit of adapting the TAPP technique without fixing the mesh, in order to contribute to greater patient comfort after surgery.

With regard to the age of the analyzed patients, those operated by TAPP were younger compared to those who underwent Lichtenstein. This denotes a concern on the part of the surgical team regarding the preferential indication of this technique to younger patients, whose return to work

needs to be earlier, as this is the economically active part of the population. According to FURTADO (2015) in his doctoral thesis, 96% of patients submitted to the videolaparoscopic technique return to their usual activities after 2 weeks postoperatively and to work between 10 and 15 days. The small number of cases operated on with hernia that had already relapsed did not significantly affect the sample, which could be a possible confounding factor in the interpretation of the results.

As limitations of this study, we recognize that there was no randomization of patients between groups, which could match the epidemiological characteristics. Indication of the access route was determined during the outpatient consultation, individualized for each patient, regardless of inclusion in the study. In addition, the three-month follow-up period can be considered too short to observe the occurrence of relapses, as they can occur at any time in the lives of patients. On the other hand, we understand that complications and relapses directly related to surgical technique failure tend to occur early, which is why we opted for this observation period.

CONCLUSION

The traditional open technique of Lichtenstein and the modified transabdominal preperitoneal videolaparoscopic (TAPP) technique without polypropylene mesh fixation, proved to be equivalent for the correction of inguinal hernias in the population studied in relation to postoperative complications and recurrences, during follow-up performed in the first three months of surgery. This result favors the laparoscopic technique, as it adds the benefits of the minimally invasive approach to the reduction of operative costs, as it does not require the use of tackers. We can conclude that laparoscopic TAPP correction without mesh fixation is potentially cost-effective and can be used on a large scale in Brazilian public hospitals. It is a technical modification supported by the literature, reproducible and with a relatively short learning curve.

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