INGUINAL HERNIA – LAPAROSCOPIC VERSUS OPEN – A SINGLE CENTER EXPERIENCE

D. Ion^{1,2}, Oana Ciocîrlan¹, V.R. Vornicu¹, D.N. Păduraru^{1,2}, Alexandra Bolocan^{1,2}, O. Andronic^{1,2}

¹The University of Medicine and Pharmacy Carol Davila, Bucharest, Romania

²Emergency University Hospital of Bucharest, Romania

Corresponding author: Dan Nicolae Păduraru
 Phone no.: +40744756443
 E-mail: dan.paduraru.nicolae@gmail.com

Abstract

Inguinal hernia is one of the most common surgical pathologies, which appears mainly due to the weakening of the abdominal muscles. Currently, the gold standard in the repair of inguinal hernias by open approach is the Lichtenstein procedure, while the gold standard of laparo-endoscopic procedures are the pre-peritoneal transabdominal technique (TAPP) and the total extraperitoneal technique (TEP). The purpose of this study is to evaluate, for a period of 4 years, the cases of inguinal hernias operated both by laparoscopic and open procedures to analyze their characteristics, under the conditions in which none was imposed as absolute gold standard for groin hernias. The present study was retrospective and descriptive, including a number of 214 cases hospitalized with the diagnosis of inguinal hernia. In the surgery of the groin hernia, both laparoscopic and open procedures have demonstrated their feasibility. Our study shows the preference for open surgery in elderly patients and those with comorbidities, as well as a faster evolution, with earlier discharge in the case of laparoscopic interventions.

Keywords: *inguinal hernia, laparoscopic, open, alloplastic*

Introduction

Inguinal hernia is one of the most common surgical pathologies, which appears mainly due to the weakening of the abdominal muscles. It is characterized by abnormal protrusion of the contents of the peritoneal cavity at the level of a parietal defect [1]. The existence of an increased number of cases of inguinal hernia and the important complications that they can give, if not treated properly, has led to a continuous evolution of the treatment methods.

Until the first laparo-endoscopic interventions were performed and perfected, the only method of treatment of inguinal hernias was by open

procedures, such as: Lichtenstein, Bassini, Shouldice. These procedures are still used today in many cases of inguinal hernias due to the lower difficulty level and a smaller learning curve.

Currently, the gold standard in the repair of inguinal hernias by open approach is the Lichtenstein procedure [2], while the gold standard of laparo-endoscopic procedures are the pre-peritoneal transabdominal technique (TAPP) and the total extraperitoneal technique (TEP).

The purpose of this study is to evaluate, for a period of 4 years, the cases of inguinal hernias operated both by laparoscopic procedures, as well as opened by 4 teams with experience in

both procedures, to analyze their characteristics, under the conditions in which none was imposed as absolute gold standard for groin hernias.

Material and Method

The study was retrospective and descriptive, performed on a number of 214 cases hospitalized with the diagnosis of inguinal hernia and treated in the General and Emergency Surgery Clinic III belonging to the University Emergency Hospital of Bucharest.

This study included a period of 4 years, between January 2015 and December 2018, with the aim of analyse the cases performed by the laparoscopic procedure TAPP versus the open alloplastic procedure Lichtenstein.

The study group included patients who met all the inclusion criteria and none of the exclusion criteria. The general group was divided into two groups according to the type of surgery performed: laparoscopic (TAPP) - 64 cases, respectively open technique (Lichtenstein) - 150 cases.

Inclusion criteria:

- Age over 18 years;
- Diagnosis of inguinal hernia confirmed intraoperatively;
- Open surgery (Lichtenstein procedure) or laparoscopic surgery (TAPP);
- Interventions in the election regime;
- One-sided surgical intervention.

Exclusion criteria

- Emergency interventions;
- Tissue procedure;
- Patients with unfavorable evolution due to the associated countries independent of the surgery;
- Bilateral surgery;
- Need for conversion from laparoscopic to open procedure;

The study was conducted in accordance with Law 206 of 2004, updated on January 28, 2016, on good conduct in scientific research, technological development and innovation and according to the declaration from Helsinki.

Results

Regarding the sex of the patients included in the study, a number of 18 women (representing

8.4%) and a number of 196 men (representing 91.6%) were identified. The distribution of cases in relation to the type of surgery, presented in table 1, does not highlight a relevant statistical significance ($p = 0.22$).

	Laparoscopic	Open	Total
Female	4	14	18 (8.4%)
Male	60	136	196 (91.6%)

Table 1 - Distribution of patients by sex

The age of the patients showed values ranging from 18 to 89 years, with an average of 55.42 years and a standard deviation of 15.66. Table no. 2 and Figure 1 show a higher median age in the open surgery group compared to those in the laparoscopic surgery group. An independent-samples t-test was conducted to compare the age and patients for the two groups. There was a significant difference between the laparoscopic and open groups regarding the age of the patients: $t = 7,086$ ($p < 0.0001$). These results suggest that age is a factor taken into account when choosing the surgical procedure (Table 3).

	Total	Laparoscopic	Open
Sample size	214	64	150
Lowest value	18	22	18
Highest value	89	79	89
Arithmetic mean	55.42	44,96	59,89
Median	58.0	44,5	63
Standard deviation	15.663	12.166	14.869

Table 2 - Statistical data on the age of the patients

Figure 1 - Statistical data on the age of the patients in relation to the procedure used

Difference	14.93
Standard error	2.107
95% CI	10.777 to 19.083
Test statistic t	7.086
DF	212
Significance level	P < 0.0001

Table 3 - T-test for age - Laparoscopic versus Open

The distribution of patients in relation to the type of inguinal hernia shows a maximum number of patients with indirect inguinal hernia - 104 cases, followed by a number of 98 cases of direct inguinal hernias and a number of 12 cases of mixed hernias (Table 4). From the perspective of the type of surgery, a higher significance of indirect hernias is observed for laparoscopic interventions. The Chi-square test of independence was calculated by comparing the frequency for each type of hernia. Significant interaction was found ($\chi^2(2) = 14.85$, $p < 0.001$).

Type	Laparoscopic	Open
Direct	18 (18,36%)	80 (81,64%)
Indirect	44 (42,30%)	60 (57,70%)
Mixt	2 (16,66%)	10 (83,34%)

Table 4 – Distribution of patients in relation to the type of inguinal hernia

The associated pathologies of the patients were quantified as the number of affected organs / systems (renal, cardio-vascular, metabolic, neurological, hepatic, etc.) being identified a number of 163 patients, representing 76.2%, who had comorbidities. The data on the distribution of patients in relation to the number of comorbidities are presented in Table 5. A Chi-square test of independence was calculated comparing the number of comorbidities for each group of patients. Significant interaction was found ($\chi^2(4) = 24.07$, $p < 0.001$). That means that laparoscopic procedures were preferred in patients with fewer comorbidities.

Comorbidities	Laparoscopic	Open
0	28	51 (23.8%)
1	21	77 (36.0%)
2	13	58 (27.1%)
3	2	23 (10.7%)
4	0	5 (2.3%)

Table 5 – Distribution of patients in relation to the number of comorbidities

The duration of the surgery showed variations between 30 and 215 min, with an average of 101 minutes. The statistical data presented in table 6 and figure no. 2 shows an average of this higher parameter in the patients in which the surgery was performed laparoscopically, but the independent t-test performed does not reveal a statistically significant difference between the two groups ($p = 0.04$).

	Total	Laparoscopic	Open
Sample size	214	64	150
Lowest value	30	60	30
Highest value	215	210	215
Arithmetic mean	101.00	107.50	98.23
Median	90.0	97.50	90.0
Standard deviation	31.556	31.660	31.206

Table 6 – Statistical data regarding the duration of the surgery

Figure 2 – Statistical data on the duration of the surgery (minutes)

	Total	Laparoscopic	Open
Sample size	214	64	150
Lowest value	2	2	2
Highest value	16	12	16
Arithmetic mean	5.66	4.59	6.12
Median	5	4	5
Standard deviation	2.543	1.973	2.624

Table VII – Statistical data on the number of days of hospitalization

The number of days of hospitalization varied in our study group between 2 and 16 days, with an average of 5.66 days. In the case of the patients operated on laparoscopic approach, the average number of days of hospitalization was 4.59, so that in the case of those operated on the

open technique it would be 6.12 (Table no. 7 and Figure no. 3). These observations were also supported by the independent-samples t-test that was conducted $t = 4.19$ ($p < 0.0001$) (Table 8).

Figure 3 – Statistical data on the number of days of hospitalization

Difference	1.53
Standard error	0.365
95% CI	0.81 to 2.25
Test statistic t	4.191
DF	212
Significance level	$P < 0.0001$

Table 8 - T-test for spitalization days - Laparoscopic versus Open

The occurrence of postoperative complications was quantified only from the presence or absence of them, and not from the perspective of severity, patients with adverse evolution were excluded from the study. The postoperative complications noticed were: serum / hematoma in the wound, scrotal edema and groin pain. The total number of patients with complications identified was 33, representing 15.4% (Table 9). Reported for each group, the incidence of complications was 17.18% for laparoscopic interventions and 14.66% for open interventions, the statistical significance being insignificant ($\chi^2 (1) = 0.0068$, $p = 0.79$).

Complications	Laparoscopic	Open	Total
No	53	128	181 (84.6%)
Yes	11	22	33 (15.4%)

Table 9 – Distribution of patients in relation to the occurrence of postoperative complications

Discussions

Although in some studies laparoscopic surgeries were more frequently used among women [3], [4], in the group of patients analyzed, the sex of the patients did not represent a factor in choosing the type of surgery used, open or laparoscopic.

The age of the patients represented a decision factor in choosing the type of surgery, observation according to the data from the specialized literature [3-5]. This fact is most likely due to comorbidities more commonly present in the elderly. The high number of comorbidities is also correlated with the choice of open procedures, both in our study and in most studies. [6].

The duration of the surgery was shorter in the case of laparoscopic operations, but there was no statistical significance. This observation is contrary to the literature, where laparoscopic interventions have a longer duration [7-10].

Among the outcome evaluation parameters, the number of days of hospitalization was lower for laparoscopically operated patients and the complications were present in both groups of patients, without statistically significant differences between the two groups. These observations are in agreement with the studies identified in the literature [4,7,8], although there are authors who mention a higher frequency of complications in the case of laparoscopic interventions [6,9].

Conclusions

In the surgery of the groin hernia, both laparoscopic and open procedures have demonstrated their feasibility. Our study shows the preference for open surgery in elderly patients and those with comorbidities, as well as a faster evolution, with earlier discharge in the case of laparoscopic interventions.

As the experience accumulates in laparoscopic techniques, the indication widens, the open/laparoscopic usage trend being reversed. This tendency is explained by easier access to specific technology and materials such as prostheses or fixation devices.

References

- [1]Balamaddaiah G. Rama Mohan Reddy S.V.-Prevalence and risk factors of inguinal hernia: a study in a semi-urban area in Rayalaseema, Andhra Pradesh, India. *Int Surg J.* 2016 Aug;3(3):1310-1313
- [2]M Seck, M Cissé, M Sall, M Gueye, A Touré, O Thiam, O Ka, M Dieng. Open Tension Free Repair Of Inguinal Hernias. The Lichtenstein Technique. Advantages And Limits In An African Context: A Retrospective Study Of 109 Cases. *The Internet Journal of Surgery.* 2017 Volume 34 Number 1.DOI: 10.5580/IJS.52788
- [3]D. S. Smink, I. M. Paquette, and S. R. G. Finlayson, “Utilization of laparoscopic and open inguinal hernia repair: A population-based analysis,” *J. Laparoendosc. Adv. Surg. Tech.*, vol. 19, no. 6, pp. 745–748, Dec. 2009.
- [4]Y. El-Dhuwaib, D. Corless, C. Emmett, M. Deakin, and J. Slavin, “Laparoscopic versus open repair of inguinal hernia: A longitudinal cohort study,” *Surg. Endosc.*, vol. 27, no. 3, pp. 936–945, 2013.
- [5]K. K. Pavlosky, J. D. Vossler, S. M. Murayama, M. A. Moucharite, K. M. Murayama, and D. J. Mikami, “Predictors of laparoscopic versus open inguinal hernia repair,” *Surgical Endoscopy*, Springer New York LLC, 15-Aug-2018.
- [6]L. Neumayer et al., “Open mesh versus laparoscopic mesh repair of inguinal hernia,” *N. Engl. J. Med.*, vol. 350, no. 18, pp. 1819-1827+1922, Apr. 2004.
- [7]K. McCormack, N. Scott, P. M. N. Y. . Go, S. J. Ross, and A. Grant, “Laparoscopic techniques versus open techniques for inguinal hernia repair,” *Cochrane Database Syst. Rev.*, Jan. 2003.
- [8]C. G. Schmedt, S. Sauerland, and R. Bittner, “Comparison of endoscopic procedures vs Lichtenstein and other open mesh techniques for inguinal hernia repair: A meta-analysis of randomized controlled trials,” *Surg. Endosc. Other Interv. Tech.*, vol. 19, no. 2, pp. 188–199, Feb. 2005.
- [9]A. Grant, “Laparoscopic compared with open methods of groin hernia repair: Systematic review of randomized controlled trials,” *British Journal of Surgery*, vol. 87, no. 7. pp. 860–867, 2000.
- [10]Y. Hamza, E. Gabr, H. Hammadi, and R. Khalil, “Four-arm randomized trial comparing laparoscopic and open hernia repairs,” *Int. J. Surg.*, vol. 8, no. 1, pp. 25–28, 2010.