

TAPP Versus Lichtenstein Results a Prospective Controlled Comparative Study

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Abstract:

Inguinal hernia repair is one of the most common surgical procedures. The best therapeutic option for the primary hernia has been studied, but there still no proof of the ideal approach. Much work has been devoted to the diagnosis and therapy of inguinal hernias, providing recommendations to help surgeons standardize their techniques and improve results. This study compares the results of inguinal hernia repair with the laparoscopic transabdominal preperitoneal procedure (TAPP) and the Lichtenstein technique.

Methods: prospective comparative controlled trial conducted between November 2019 and October 2022 (36 months), 400 patients included divided into two groups of 200 patients for each technique. Parameters studied included occurrence of chronic pain beyond 3 months as primary endpoint; duration of operation, postoperative complications, immediate postoperative pain, resumption of daily activities, return to work and sports and quality of life as secondary endpoints.

Results: 400 adult male patients with primary unilateral hernias were followed up at 3 months and 363 patients at 6. The TAPP procedure resulted in less early postoperative pain up to 30 days after surgery ($p < 0.000001$), identical operative time (mean 48.75 vs. 48.36. $p = 0.69$). TAPP caused fewer postoperative complications ($p < 0.012$), and less chronic pain at 3 months ($p < 0.002$, $RR = 0.42$) and at 6 months 1.6% vs 13.8% ($p < 0.00001$, $RR = 0.125$). Faster return to work in the TAPP group 19.64 days vs. 31.8 days ($p < 0.0001$), faster return to daily activities 2.9 days vs. 9.38 days ($p < 0.0001$). Faster return to sporting activities 32.1 days vs. 60 days ($p < 0.0001$).

Conclusion: The preperitoneal transabdominal approach for curing a non-recurrent unilateral inguinal hernia is safer and associated with less chronic postoperative pain, and less early postoperative pain. It also has the advantage of enabling patients to return to work and daily activities more quickly, thereby enhancing their quality of life.

Key words: Inguinal hernia repair; TAPP; Lichtenstein; chronic pain

Introduction

An inguinal hernia is defined as the temporary or permanent protrusion of intra-abdominal viscera through the fascia transversalis that forms the posterior wall of the inguinal canal. Its management is exclusively surgical [1, 2]. Globally, more than 20 million patients undergo hernia surgery worldwide every year, with 160,000 and 700,000 hernia operations performed in France and the United States respectively. In 95% of cases, hernias are performed on young, active males aged between 20 and 60 [3,4]. In Algeria, the national public health survey published in 1994 by INSP [5] showed that 2 to 6% of chronic conditions affecting young, active men were inguinal hernias. In our department, it accounts

for 20% of our surgical activity, with 300 groin hernias operated on each year. An average of 150 hernias per year are operated on in general surgery departments in the Algiers region [6].

The introduction of prosthetic mesh for hernia repair led to the adoption of the tension-free technique, introduced by Lichtenstein in 1986 [7, 8]. This technique is easily reproducible [9, 10]. It has a recurrence rate of less than 1%. In addition, it has a lower chronic pain rate than raphies [11]. However, Lichtenstein is criticized for the risk of subjecting the ilioinguinal nerve (IIN), iliohypogastric nerve (IHN) and, above all, the genital branch of the genitocrural nerve (GCN) during dissection of the

hernia sac and during plate fixation, during pre-facial placement of the prosthesis [12,13]. The incidence of this chronic pain varies from 0.7 to 75% [14, 15, 16]; this wide variation in figures is largely due to differences in the definition of chronic pain [17, 18, 19]. Overall, the incidence of clinically significant chronic pain averages between 10 and 12%, decreasing over time [20, 21,22]. Today, we are witnessing a paradigm shift; in fact, in hernia repair, the major concern of surgeons today is to reduce this chronic postoperative pain.

Surgical techniques have evolved, and the advent of laparoscopy has rehabilitated the posterior preperitoneal site for implanting prosthetic material. This site was first used by STOPPA [23]. As described by its author, it is a very debilitating technique. This drawback was overcome by the laparoscopic approach, namely TAPP, introduced in 1992 [23,24] and TEP (Total Extra Peritoneal technique), which followed in 1993 [24].

Theoretically, posterior reinforcement makes more sense. This is because the prosthesis will be pressed against the wall by abdominal pressure. Similarly, the laparoscopic approach avoids some of the handicaps of open surgery responsible for the genesis of chronic pain, by the absence of the inguinal skin incision, and the absence of dissection of the superficial and genital sensory branches of the ilioinguinal and iliohypogastric nerves and the genital branch of the genitocrural nerve. These theoretical advantages, combined with the minimally invasive nature of the laparoscopic approach, would imply fewer inflammatory reactions and engrafting sclerosis. Hypothetically, this would mean less chronic postoperative pain and greater patient comfort.

We planned a prospective controlled study comparing two anatomical sites of prosthesis placement, using two approaches, one anterior represented by the Lichtenstein and the other the posterior route which is the TAPP to answer the question: "the endoscopic approach to hernias

Does TAPP reduce the rate of chronic postoperative pain compared to Lichtenstein?

Materials and Methods

The study was carried out over 36 months between November and 2019 and October 2022, at Rouïba Hospital, Algiers, with the primary objective evaluating the rate of chronic postoperative pain in the TAPP versus Lichtenstein group. The WHO definition of chronic postoperative pain, described in International Classification of Diseases ICD-11 [25,26], and the International Association for Study of Pain IASP [26,27], was adopted: "Pain that lasts or recurs for more than three months".

At the same time, we were interested in assessing acute postoperative pain, comparing patients' postoperative comfort, evaluating the time taken for patients to return to daily activity, and finally comparing the duration of time off work. The study included male patients with primary, unilateral groin hernias aged 18 and over. The minimum sample size was 328 patients, but we extended our study to 400 patients divided equally into two groups, p1 and p2.

The 1st arm included patients operated on laparoscopically.

The 2nd arm included those operated on using the Lichtenstein technique. Patients with inguinal hernias presenting for surgery were invited to take part in the study and give informed consent.

Data was collected by the operating surgeon on pre-established data sheets at the first and follow-up consultations.

Primary endpoint: To assess the pain felt by patients, we used three tools:

1-EVA: It's a self-assessment scale for pain intensity, rated from 0 (no pain) to 10 (maximum pain). It's a simple, reproducible and widely documented method. Pain is considered:

-Absent for 0

-Low from 1 to 3

-Moderate to severe for values of 4 to 7

-Intense for values from 8 to 10

2-Questionnaire DN4: The neurological pain questionnaire consists of two parts :

-The first is based questioning the patient.

-The second part is the clinical examination.

Patients are asked to answer 10 yes/no questions after three months surgery.

3-Carolina Comfort Scale (CCS):

This is a quality-of-life questionnaire after parietal surgery in the third postoperative month. 1-The feel of the prosthesis (0 to 40)

2-Pain (0 to 40)

3-Movement limitation (0 to 40)

And this on eight (8) different activities; the numerical scale corresponds to a descriptive scale rated from 0 to 5.

Statistical analysis:

Statistical analysis was carried out using EPI info software and Excel 2013.

Quantitative variables calculated with their means, standard deviation and 95% confidence interval. Comparisons were made using the STUDENT T-test analysis of variances. Categorical variables were expressed as percentages. Frequencies were compared by Chi2 test and FISHER's exact test, the concordance test used was the kappa test, the correlation test used was the correlation coefficient r. (significance level 0.05).

General characteristics of the population: We have compiled the various characteristics of our study population in Table 1, divided into two homogeneous, comparable groups. This homogeneity enables us to carry out a credible analytical study of the judgment criteria.

Age	52.25 years	50.65 years	0.29
BMI	24.63 Kg/m2	24.15 Kg/m2	0.06
Age of hernia	295.89 jr	397.93 jr	0.005
ASA			
ASA I	169	173	0.52
ASA2	28	25	

ASA3	03	02	
Profession			
<i>Employee</i>	115	125	
<i>Self-employed workers</i>	80	70	0.35
<i>Not rated</i>	05	05	
<i>Diagnosis of Hospitalization</i>			
HIG	70	78	0.46
HID	130	122	

Table 1: Characteristics of our study population.

	Laparoscopy	Lichtenstein	P value
Pain at 90 days according to EVA	18	42	0,002
Pain at 90 days according to DN4	04	20	0,001
Pain at 180 days according to EVA	03	24	0,0001
Acute pain on d1 according to EVA	179	195	0,002
Acute pain at d7 according to EVA	111	193	0,00001
Acute pain at d30 according to EVA	21	128	0,00001
Time to return to work in days	19,64	31,8	0,0001
Time to return to daily activities in days	2,94	9,38	0,0001
Resumption of sporting activities in days	32	60	0,0001
Quality of life according to CCS	39	16	0,002
Average surgical time in min	48,75	48,36	0,69

Table 2: Analytical study of results:**Discussion :**

Operating time was similar in both arms, with a mean of 48.36 minutes in the Lichtenstein group versus 48.75 for the laparoscopy group, $p=0.69$ (no

significant difference). The same average was found in the following international series

	Laparoscopy	Lichtenstein
Heikkinen [28]	71.5 \pm 4.3	45.0 \pm 16.8
Paganini [29]		
	66.6 \pm 21.9	48.2 \pm 22.9
Wellwood [30]	46.6 \pm 20.0	46.8 \pm 15.7
Our series	48.75 \pm 11.49	48.36 \pm 8.9

Table 3: Operating times in minutes (mean \pm standard deviation)

Early postoperative pain is a major problem in hernia surgery. It often conditions the length of hospital stay, and the resumption of daily activities and work. According to our study, during the early postoperative period, up to 30 days after surgery, pain was significantly lower in the Laparoscopy group than in the Lichtenstein group.

We Noted a faster regression in the percentage of patients with postoperative pain in the laparoscopy group. Several approaches to postoperative pain management have been studied, including various medical treatments with the use of local anesthetics [31-35].

In our study, all patients were admitted on the day of surgery. Patients were discharged on D1 post-op, after a clinical examination and completion of the follow-up questionnaire. Length of hospital stay was calculated in hours, admission to discharge. There was a small but statistically significant difference in favor of the laparoscopy versus Lichtenstein group, with a respective mean of 22.6 vs. 23.23 hours $p=0.0007$. This difference can be explained by the greater intensity of immediate postoperative pain in the Lichtenstein group, with a demand

for nursing care to be relieved before discharge. Patients in the laparoscopy group were more willing to be discharged.

For all our patients, a single instruction was given to get up early. For all other activities, the choice was left to the patients. Results were in favor of the laparoscopy group, with a mean of 2.94 days versus 9.38 days for the Lichtenstein group ($P=0.0001$). This is in line with data in the literature. In the 2018 guidelines of the Hernia Group [25], reported 05 randomized controlled studies that concluded a clear advantage of laparoscopy over Lichtenstein for return to normal daily activity. Return to work was faster in the laparoscopy group. This advantage was clearly apparent in the sub-groups of the non-employed, where the time was reduced by 55%. The same significant difference was found in favor of laparoscopy in professional or leisure sports activities. Our results are comparable with the latest data in the literature, as illustrated by this meta-analysis by Aiolfi et al [36].

Today, the functional quality of hernia repairs is the major concern. Liguino Dynia or chronic pain is a complication evoked for all hernia repair techniques, long before the advent of mesh-based techniques [37].

Although laparoscopic repair has a statistical advantage regarding acute pain. Admittedly, comparative studies between conventional and laparoscopic surgery for the analysis of chronic pain are difficult, as definitions and techniques vary from study to study. This wide variation is very apparent, in a 2014 David C. Chen meta-analysis [37] concerning laparoscopic repairs, where 05 randomized controlled trials were included, report chronic pain rates ranging from 0 to 24%.

In 1986, the International Association for the Study of Pain (IASP) defined chronic pain as pain lasting more than 3 months [27]. This temporal definition has been validated by epidemiological studies [35]. It has been used in numerous randomized hernia studies, even though surgery-related pain was not one of the objectives when the definition was formulated. In our study, we defined chronic pain as any pain lasting more than three months. All patients included in the study were assessed from this point onwards using a visual analog scale.

However, 363 of the 400 patients initially included were assessed at 6 months. Similarly, the severity of discomfort that seems clinically significant has been set at a level of moderate, bothersome pain impacting on daily activities in several clinical studies and focus groups on inguinal hernias [31]. Using this threshold, DCPO was 12.5% versus 16.8% respectively in the laparoscopic group and the Lichtenstein technique [38, 39]. Pain etiology is not part of the definition of pain itself. The incidence of chronic pain after groin hernia surgery varies from 0.7% to 75% according to the authors [40]. This rate varies considerably between different studies [196]. It is generally accepted that it is in the order of 10% to 12% [40–41] and that pain affects daily and professional activities in 0.5% to 6% of cases [42]. This has a considerable social, economic and medico-legal impact. Indeed, 5% to 7% of patients suffering from this complication had lodged complaints against their surgeons according to a study carried out in Italy in 2013 [43]. Pain is localized in the inguinal region, on the medial side of the thigh or in the genital region. Sexual problems are also observed.

SERIE	3 months		6 months	
	TAPP	Lichtenstein	TAPP	Lichtenstein
Abbas 2012[44]	NA NA	NA NA	2.2%	7.2%
Pokorny 2008[45]	NA	NA	3.5%	7.26%
Aasvang 2010[46]			8.1%	16%
Our series	9%	21%	1.6%	13.8%

Table 4: TAPP vs Lichtenstein chronic pain rates

In our study, chronic pain was significantly lower in the laparoscopy group at 3 months and 06 months post-operatively, with $P=0.002$ and $P=0.00001$ respectively. The $RR=0.42$ at 03 months and 0.12 at 06 months. Equivalent results have been reported in recent studies. Indeed, in a 2021 meta-analysis of randomized controlled studies, Aiolfi et al [36] report that thirty-five randomized controlled studies including a total of 7777 patients, of whom 3496 patients (44.9%) had undergone Lichtenstein repair, 1269 patients (16.3%) had undergone TAPP repair, and finally 3012 patients (38.) had undergone PET repair. The study concluded that the laparoscopic approach was less prone to PCOD, with a significant difference, and an early return to work and activities.

In our study, we used the French version of the Carolina Comfort Scale (CCS) [47], a questionnaire assessing quality of life specific to hernia surgery.

We reported only the results of positive tests at 03 months, which were 16 patients for the laparoscopy group with a mean score of 5.08 versus 39 patients for the Lichtenstein group and a mean score of 8.57. These results are statistically significant in favor of laparoscopy $P=0.0001$ This last result should be treated with caution, as the application of this test is very difficult in our patients.

Conclusion

Groin hernias are the second most frequently treated condition after acute appendicitis, with over 20 million hernias operated on worldwide. Our study, the first of its kind in Algeria, compared a posterior laparoscopic approach (TAPP) with a conventional anterior approach (Lichtenstein). The functional results obtained in the short and medium term are excellent in favor of TAPP on:

-Reducing chronic postoperative pain.

-Reducing acute postoperative pain.

- A quicker return to daily activities and work.

-Faster resumption of professional and leisure sports activities.

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