

Conventional inguinal hernia repair with self-fixating mesh versus totally extraperitoneal laparoscopic repair with polypropylene mesh: early postoperative results

Herniorrafia inguinal convencional com tela autofixante versus videolaparoscópica totalmente extraperitoneal com tela de polipropileno: resultados no pós-operatório precoce

JOSÉ ANTONIO CUNHA-E-SILVA¹; FLÁVIO MALCHER MARTINS DE OLIVEIRA, TCBC-RJ¹; ANTONIO FELIPE SANTA MARIA COQUILLARD AYRES, TCBC-RJ¹; ANTONIO CARLOS RIBEIRO GARRIDO IGLESIAS, TCBC-RJ¹.

ABSTRACT

Objective: to evaluate the early postoperative results of inguinal hernia repair by the conventional technique with self-fixating mesh versus laparoscopic totally extraperitoneal repair with polypropylene mesh. We compared pain, surgical time and early complications. **Methods:** this is a prospective, case-series study of 80 consecutive patients treated in the surgical clinic of the Gaffrée e Guinle University Hospital (HUGG). We included patients with unilateral inguinal hernia, not relapsed and operated only on an elective basis. We divided patients into two groups of 40 patients each, SF group (conventional technique using self-fixating mesh) and LP group (laparoscopic technique with polypropylene mesh). We followed patients up until the 45th postoperative day. **Results:** of the 80 patients, 98.7% were male and the majority had indirect right inguinal hernias (Nyhus II). There was no difference between the groups studied in respect to pain and operative time. However, more complications occurred (seroma and hematoma) in the open surgery group. **Conclusion:** both operations have proved feasible, safe and with minimal postoperative pain and a low operating time.

Keywords: Hernia, Inguinal. Laparoscopy. Visual Analog Scale. Herniorrhaphy.

INTRODUCTION

Currently herniorrhaphy is the most performed surgical procedure in the world¹⁻⁵. More than 800,000 patients undergo the procedure annually in the United States (USA)^{1,2}. In Brazil, according to data from the Ministry of Health, approximately 115,598 inguinal herniorrhaphies were performed between January 2014 and June 2015⁶.

Since 1887, when Bassini⁷ published her first knowledge about the surgical repair of hernias of the inguinal region, several operations have been described for the surgical treatment of this disease³. Of the techniques of open repair, the Lichtenstein procedure⁸, with fixation of polypropylene mesh for a tension-free repair, is the one in greater use currently^{3,9}. Laparoscopic herniorrhaphy, on its turn, has been gaining strength lately, as it causes less pain and shorter postoperative

recovery time^{5,10}. Minimally invasive techniques can be performed either totally extraperitoneally (TEP) or through transabdominal preperitoneal (TAPP) access.

Technological advances have also allowed the development of different types of surgical mesh, such as with resorbable material, self-fixating adhesives, low weight and fixation with fibrin glue^{3,11,12}. This large arsenal of available material, associated with a wide variety of techniques (open or laparoscopic), raises questions about the gold standard for the treatment of inguinal hernia.

In view of the high incidence of this disease in the world, and lack of consensus on the best procedure or mesh^{5,13}, the aim of this study was to compare the early postoperative period results between two techniques of herniorrhaphy, especially in relation to pain, surgical time and early complications. The first one represents a classic technique, however, using a new type of surgical mesh, namely inguinal herniorrhaphy based on

1 - Gaffrée e Guinle University Hospital (UNIRIO), Rio de Janeiro, Rio de Janeiro State, Brazil.

the repair of Lichtenstein with the use of a self-fixating mesh. The second applies a technique represented by minimally invasive access, but with the use of the classic polypropylene mesh (totally extraperitoneal laparoscopic inguinal herniorrhaphy using the polypropylene mesh).

METHODS

This is a case series study performed at the Surgery Clinic A of the Gaffrée e Guinle University Hospital (HUGG) from August 2011 to August 2014. We defined sampling by convenience in the formation of groups. In total, we divided 80 patients into two groups of 40 individuals each: SF group, represented by those submitted to open herniorrhaphy using a self-fixating mesh, and VL group, referring to the patients operated by video-laparoscopy.

Inclusion criteria were patients older than 18 years with unilateral inguinal hernia and operated on electively. Exclusion criteria comprised incarcerated and relapsed hernias, patients using systemic steroids, those with complaints or evidence of prostatism, and those who refused to participate in the survey.

Several surgeons, all with previous experience in minimally invasive surgery and members of the clinical body of HUGG's Surgery Clinic A, participated in the operations. All patients received antibiotic prophylaxis with 1g of Cephalothin intravenously, 30 minutes before the incision.

Conventional Inguinal Hernioplasty (SF group):

Under spinal anesthesia with sedation and following the basic principles of the Lichtenstein technique⁸, we used a self-fixating mesh for tension-free repair of the hernia. The self-fixating mesh is a low molecular weight mesh, having a number of small, absorbable hooks on one of its faces, therefore dispensing with any additional attachment. These are made of polylactic acids that degrade as soon as their integration with the underlying connective tissue occurs¹⁴⁻¹⁸. In this study, this we placed mesh on the posterior wall of the inguinal canal, passing the pubis, the ileopubic tract and the joint tendon. In

cases where there was great destruction of the inguinal canal's posterior wall, we performed reconstruction of the floor with separate stitches of polyglactin 910.

Totally extraperitoneal laparoscopic hernioplasty (VL group):

Under general anesthesia, we made a 10-mm infra-umbilical incision, through which we incised the anterior sheath of the rectus abdominis muscle ipsilateral to the location of the hernia. After lateral removal of the musculature to expose the preperitoneal space, we inserted a 10-mm trocar with CO₂ insufflation at 8-10 mmHg for the pre-pneumoperitoneum. With the introduction of 30° optics by this initial trocar and the dissection of the midline to the anterior superior iliac spine, it was possible to create a pre-peritoneal "work space" filled with CO₂. We inserted two other 5-mm trocars in the midline under direct vision, which allowed the dissection and correction of the hernia defect. We positioned a 15x10cm polypropylene mesh, without any fixation, in this space. Once we removed the pre-pneumoperitoneum, the mesh remained confined to the dissected bed¹⁹.

Postoperative analgesia was similar between groups and was restricted to the administration of non-steroidal anti-inflammatory drugs (intravenous tenoxicam 20mg 12/12 hours). Rescue analgesia was performed, when necessary, with intravenous dipyrone 1g in up to six daily administrations. We evaluated postoperative pain in two moments: the first (T1) six hours after the end of the operation, and the second (T2), at the time of hospital discharge. We estimated pain with the visual analogue scale (VAS), considering values from 0 to 2 as mild pain intensity, from 3 to 6 as moderate intensity, and from 7 to 10, as severe pain^{14,19}.

Other variables evaluated in this study were gender, age, laterality, Nyhus classification, operative time and operative complication rate. We followed the patients for an average of 45 days from the operation, and performed two revision visits: the first in the 15th postoperative day, and the second, 30 days after the first revision.

The study was approved by the HUGG Ethics in Research Committee (protocol CAAE02697412.3.0000.5258)

and the included patients agreed to participate in the study after signing an Informed Consent Form.

We calculated the difference between the relative frequencies of the variables of interest using the chi-square test and the Fisher's exact test (two-sided), and the differences of means with the student's t-test. We used the Excel 2010 software and the SPSS 17.0 (Statistical Package for Social Science - Chicago, IL, 2008) for the analysis. Statistical significance was considered at $p < 0.05$.

RESULTS

Regarding the clinical-epidemiological data, the majority of patients were male (98.7%). The age ranged from 18 to 90 years, and the values were similar in the two groups evaluated, as shown in Table 1. The right inguinal hernia was more frequent and responded by 67.5% of the cases (54 patients), displaying homogeneity between groups (SF group= 65% and VL group= 70%) (Table 1). As to the Nyhus classification, we observed a predominance of indirect hernias, 53.7% of them being classified as Nyhus II (43 cases), followed by Nyhus IIIa ($n=28$, 35%) and finally Nyhus IIIb (9, 11.3%). The SF group presented a lower number of cases classified as

Nyhus IIIa (25%) when compared to the VL group (45%). On the other hand, in the Nyhus IIIb classification, the SF group had a higher value (17.5%) when compared to the VL group (5%). However, both differences were not statistically significant (Table 1).

Regarding pain stratification, there was no significant difference between the groups in both moments evaluated. The evaluation of pain revealed that, in T1, 67.5% of the SF group and 60% of the VL group had mild pain; Moderate pain occurred in 30% of the SF group and 37.5% of the VL group; And 2.5% of both groups classified pain as intense. In T2, at the time of hospital discharge the results were identical: 75% classified as having mild intensity pain (values 0-2 for EVA) and 25% with moderate intensity pain (values 3-6 for EVA) (Table 2). However, as for the need of rescue analgesia, 17 patients from the SF group requested it at least once, whereas in the VL group only nine patients had this need (Table 2).

Regarding operative time, there was no difference with statistical significance between the studied groups (Table 2); In both groups 87.5% of the operations were performed in up to 50 minutes.

There was no death among the patients studied. The observed complications all occurred in the

Table 1. General characteristics, classification and laterality according to surgical groups.

	SF Group n=40 (%)	VL Group n=40 (%)	p value (<0.05)
Gender			
Female	1 (2.5)	0 (0.0)	
Male	39 (97.5)	40 (100.0)	0.98
Age (descriptive measures)			
Average \pm SD*	56.9 \pm 15.7	55.8 \pm 15.2	0.76
Laterality			
Right	26 (65.0)	28 (70.0)	
Left	14 (35.0)	12 (30.0)	0.81
Classification			
Nyhus II	23 (57.5)	20 (50.0)	
Nyhus IIIa	10 (25.0)	18 (45.0)	0.07
Nyhus IIIb	7 (17.5)	2 (5.0)	

* SD: standard deviation.

Table 2. Assessment of pain, surgical complications and operative time according to surgical groups.

	SF Group n = 40 (%)	VL Group n = 40 (%)	p value (< 0.05)
Pain-T1 *			
Mild	27 (67.5)	24 (60.0)	0.91
Moderate	12 (30.0)	15 (37.5)	
Severe	1 (2.5)	1 (2.5)	
Pain-T2 **			
Mild	30 (75.0)	30 (75.0)	0.98
Moderate	10 (25.0)	10 (25.0)	
Severe	0 (0.0)	0 (0.0)	
Rescue analgesia			
0	23 (57.5)	31 (77.5)	0.17
1	13 (32.5)	9 (22.5)	
2	4 (10.0)	0 (0.0)	
Operative time (min.)			
20-49	35 (87.5)	35 (87.5)	0.98
= 50	5 (12.5)	5 (12.5)	
Surgical complications			
Without complications	33 (82.5)	40 (100.0)	0.02
Seroma	5 (12.5)	0 (0.0)	
Hematoma	2 (5.0)	0 (0.0)	
Surgical wound infection	0 (0.0)	0 (0.0)	

* six hours after the procedure; **on hospital discharge

SF group, in those patients whose operative time was over 50 minutes, so that five patients (12.5%) presented seroma and two others (5%) had hematoma, a result that showed a statistical significance ($p=0.02$).

DISCUSSION

In addition to the medical aspect related to the high incidence of inguinal hernias, there is a relevant economic aspect in the treatment of this disease. It is estimated that the 800,000 inguinal herniorrhaphies performed in the USA carries about ten million unworked days per year^{5,20}. Although this cost is difficult to estimate, it is obviously a huge expense and with great

economic impact. Thus, it is fundamental to choose a technique that, in addition to a low rate of relapse and complications, is associated with a faster recovery, with an early resumption of labor activities^{5,20,21}.

In our study, there was a predominance of male patients, most of whom present with hernia Nyhus type II^{3,19,22,23}. The most frequent topography was to the right, which is expected due to the delay in atrophy of the peritoneal-vaginal conduit on this side, associated to the tamponade exerted by the sigmoid colon on the left inguinal canal.

Although we know the difficulty of measuring postoperative pain due to its subjective nature, we used two methods to quantify it: the numerical scale of pain and the

patient's need for rescue analgesia^{1,6,8,11,12,14,15,19}. Although there was no difference between the groups regarding the pain scale, with 97.5% of the patients reporting mild to moderate pain and only one patient with severe pain in both groups, we noticed that the patients in the SF group requested more doses of analgesics than in the VL group, although this fact is also devoid of statistical significance.

The analysis of pain behavior between the two groups is difficult because three factors are directly involved: the different techniques used (open vs. laparoscopic), the different meshes used and the non-fixation of the mesh. In the same way that laparoscopic repair seems to be associated with less postoperative pain^{5,10}, the use of the self-fixating mesh also confers this benefit^{3,17}. Perhaps these points were balanced against reducing pain in the two groups analyzed. Non-fixation of the mesh is also to be emphasized, since some series indicate that the non-use of sutures or staples is related to less postoperative pain^{24,25}. However, these are still the subject of debate, requiring studies that are more robust. Esteban et al³ conducted a prospective study with 90 patients submitted to Lichtenstein herniorrhaphy with self-fixating mesh versus classic polypropylene mesh (and fixed with monofilament suture) and did not find difference between the groups.

Regarding operative time, we divided the analysis into two groups: surgical time <50min and surgical time ≥ 50 min. We observed that time was identical between the two groups, so that 87.5% of the patients were operated in less than 50 minutes. In addition to the use of the self-fixating mesh being responsible for the reduction of surgical time, as already verified by some series^{3,17}, we emphasize that laparoscopic repair was

not an increasing factor of the operative time. Although in some series laparoscopic access is associated with longer surgery duration^{5,10}, it is known that the surgeon's experience is inversely proportional to the operative time in laparoscopic herniorrhaphy²⁶⁻²⁸. In the present study, surgeons with expertise in the method performed the laparoscopic procedures, which justifies the low operative time. We observed no intraoperative complications in both techniques and there was no conversion to conventional surgery when using the minimally invasive technique.

No "severe complication" occurred in the immediate or late postoperative period, but we observed local "small complications" in seven cases of the SF group, represented by seroma and hematoma, as reported in table 2. All of them were resolved with non-surgical treatment and there were no cases of surgical wound infection. However, we should note that all these "small complications" occurred in the group submitted to open surgery with more than 50 minutes duration. Thus, it is worth asking whether there is a direct relationship between a higher risk of local complications in patients undergoing long-lasting open surgery, whether laparoscopy exerts any protective factor and whether the self-fixating mesh may have influenced this process. It is not possible to establish this relationship with the data obtained, and further studies are necessary.

In conclusion, although it is still not possible to determine which gold standard technique (best cost-effectiveness) to be routinely employed in the repair of inguinal hernias, we observed that the two operations performed were feasible, safe and related to minimal postoperative pain and to low surgical time in experienced hands.

R E S U M O

Objetivo: avaliar o resultado no pós-operatório precoce do tratamento da hérnia inguinal pela técnica convencional com tela autofixante versus videolaparoscópica totalmente extraperitoneal com uso da tela de polipropileno. Foram comparados, sobretudo, dor, tempo cirúrgico e complicações precoces. **Métodos:** estudo prospectivo, de série de casos, realizado na Clínica Cirúrgica A, do Hospital Universitário Gaffrée e Guinle (HUGG), no qual 80 casos consecutivos foram estudados. Apenas pacientes com hérnia inguinal unilateral, não recidivada e operadas em caráter eletivo foram incluídas no estudo. Os pacientes foram divididos em dois grupos, de 40 pacientes cada; grupo AF (técnica convencional com uso de tela autofixante) e grupo VL (técnica videolaparoscópica com uso de tela de polipropileno). Os pacientes foram acompanhados até o 45º dia de pós-operatório. **Resultados:** dos 80 pacientes operados no estudo, 98,7% pertenciam ao sexo masculino e a maioria era portadora de hérnia inguinal direita indireta (Nyhus II). Não houve diferença entre os grupos estudados no que diz respeito à dor e tempo operatório. No entanto, ocorreram mais complicações (seroma e hematoma) no grupo da cirurgia aberta. **Conclusão:** as duas operações realizadas se mostraram factíveis, seguras e estão relacionadas à mínima dor pós-operatório e a um baixo tempo cirúrgico.

Descritores: Hérnia Inguinal. Laparoscopia. Escala Visual Analógica. Herniorrafia.

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Mailing address:

José Antonio Cunha-e-Silva

E-mail: joseantoniocunha@yahoo.com.br

joseantoniocunha1984@outlook.com