Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 8, Issue, 09, pp.39449-39455, September, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

CASE STUDY

PREVALENCE OF INGUINAL HERNIA RECURRENCE IN PATIENTS UNDERGOING LICHTENSTEIN SURGERY IN UNIVERSITY HOSPITAL OF NORTHEASTERN BRAZIL IN FIVE YEARS

[1]Bruna Michelle Freire de Araújo, [1]Camila Barreto Vianna Martins, [2]Amália Cinthia Meneses Rêgo and [3,*]Irami Araújo-Filho

[1]Graduating Medical at the Federal University of Rio Grande do Norte, Natal, Brazil
[2]Director of the School of Health Potiguar University - Laureate International Universities – Ph.D in Health Science, Natal /Brazil
[3]Full Professor of General Surgery at the Rio Grande do Norte Federal University – Ph. D in Health Science, Natal Brazil

ARTICLE INFO

Article History:
Received 25th June, 2016
Received in revised form
19th July, 2016
Accepted 08th August, 2016
Published online 30th September, 2016

Key words:
Inguinal Hernia;
Lichtenstein Hernia Repair;
Direct Inguinal Hernia;
Indirect Inguinal Hernias;
Herniorrhaphy;
Recurrence.

ABSTRACT

Purpose: To identify and analyze the prevalence of hernia recurrence in patients operated with the Lichtenstein technique at the Onofre Lopes University Hospitalof the Federal University of Rio Grande do Norte in 2007, and analyze the data in relation to the possible causes.
Methods: An observational study, descriptive, retrospective, analysis of prevalence, which was approved by the HUOL Ethics Committee053713/2012. Initially, we performed a study of patients undergoing primary inguinal hernia repair by the Lichtenstein technique, by searching the computer program MV 2000® that is used to mark surgical procedures. Later, research was carried out of the records in the Medical Records and Statistics Service / Onofre Lopes University Hospital during November 2012 to April 2013, and collected data from patients who met the inclusion criteria, and completed a structured form data extraction.
Results: Among the 369 patient records studied, 53 were excluded because did not meet the inclusion criteria, resulting in a 316 patients study sample. Among all patients analyzed, it was not found any recurrence after 5 years of surgery. The average age was 52,09 years, 23,52% had a family history in first-degree relatives, 23,58% were active smoking and 59,17% were involved in professions related to the great efforts.
Conclusion: It was found that in 5 years follow-up there was no recurrence after inguinal hernia repair by Liechtenstein technique. Further studies should be carried out, aiming to know whether this technique should be the first choice in relation to low postoperative recurrence rate.

Citation: Bruna Michelle Freire de Araújo, Camila Barreto Vianna Martins, Amália Cinthia Meneses Rêgo and Irami Araújo-Filho. 2016. "Prevalence of inguinal hernia recurrence in patients undergoing lichtenstein surgery in university hospital of northeastern brazil in five years", *International Journal of Current Research*, 8, (09), 39449-39455.

INTRODUCTION

Inguinal hernia is an out-pouching of the peritoneum, with or without its contents, which occurs through the muscles of the anterior abdominal wall at the level of the inguinal canal in the groin. It almost always occurs because of the inherent weakness of the abdominal wall where the spermatic cord passes through the inguinal canal (Read, 2009). Inguinal hernia repair remains the most common general surgical procedure in the United States, with over 800,000 performed annually.

****Corresponding author**: Irami Araújo-Filho,***
Full Professor of General Surgery at the Rio Grande do Norte Federal University – Ph. D in Health Science, Natal Brazil.

It has a long history, and thus a wide variety of techniques have been described. The goals of inguinal hernia repair, however, remain the same for all techniques: to provide long-lasting, secure closure of the pelvic floor defect, reduce pain, and improve quality of life. In modern-day repair, recurrence after hernia repair has remained fairly low (Śmietański *et al*., 2012; Ruiz-Jasbon *et al*., 2014). A concerning trend is the increase in chronic pain seen after inguinal hernia repair. Though mesh implantation has been associated with this trend, most believe that chronic pain is a result of surgical technique, difficulty with identification of hernia anatomy, and other unknown patient factors (Read, 2009).

Patients with inguinal hernias may present with complaints of a painless bulge, pain in the groin without a bulge, or some variation in between. It is very important to accurately document the preoperative symptoms and confirm that they are consistent with an inguinal hernia. Some patients may have other causes for their symptoms, such as epididymitis, testicular pain, or endometriosis (Ruiz-Jasbon *et al*., 2014; Liem *et al*., 2003; Chesley *et al*., 2015). Symptoms from an inguinal hernia may include a burning or pinching sensation in the groin. The pain may radiate into the scrotum, labia, or vagina, down the leg, or around the back. They may have worsening pain with prolonged sitting, prolonged standing, bending, coughing, straining, getting out of a car, or toward the end of the day (Ruiz-Jasbon *et al*., 2014).

Inguinal hernias are most commonly seen in men and are of the indirect type—that is, the result of a patent processus vaginalis. These hernias typically present with a bulge in the groin that may extend into the scrotum or labia. A less common variant, an interstitial hernia, dissects within the oblique muscle layers and presents with an oblong bulge extending superolaterally. Direct hernias are a result of weakness in the transversalis fascia and are more commonly seen in older males. Femoral hernias are rare and typically seen in women, as their pelvis is broad and the femoral space is wider (Liem *et al*., 2003). Inguinal hernias are frequently classified as direct or indirect, depending on whether the hernia sac bulges directly through the posterior wall of the inguinal canal (direct hernia), or whether it passes through the internal inguinal ring alongside the spermatic cord and follows the course of the inguinal canal (indirect hernia) (Table 1) (Read, 2009).

This involves securing a piece of synthetic mesh (classically polypropylene) medially to the pubic tubercle, inferiorly to the shelving edge of the inguinal ligament (ileopubic tract), and superiorly to the rectus abdominus, internal oblique, and transversus abdominus. This repair recreates the floor of the inguinal canal and the deep (internal) inguinal ring, with the spermatic cord passing through the lateral portion of the mesh (Szopinski *et al*., 2012). The main risk factors for primary inguinal hernia are male sex and increasing age. Chronic cough, manual labour involving heavy lifting and pregnancy are conventionally regarded as risk factors because they lead to high intra-abdominal pressure. Obesity, smoking and family history have also been suggested as risks factors (Read, 2009; Śmietański *et al*., 2012). Repair of the inguinal hernia should be timed to provide the most benefit to the patient and the least risk from the procedure. It was considered at one time that all inguinal hernias should be repaired to reduce the morbidity and mortality associated with potential incarceration or strangulation. Based on two prospective clinical trials in men with asymptomatic or minimally symptomatic inguinal hernias, the option of watchful waiting has been shown to be of low risk (Bisgaard *et al*., 2007). Clinical experience and consensus suggest that surgical intervention is an effective treatment for inguinal hernia. After 80s, various techniques in surgery appeared for treating this type of hernia (Ruiz-Jasbon *et al*., 2014). Repairs can be divided into open repairs and laparoscopic repairs. The open repairs can be divided into tissue repairs and prosthetic repairs. Laparoscopic repairs can be divided into groups based on the method of accessing the preperitoneal space (via the abdomen or without entering the abdominal cavity) (Śmietański *et al*., 2012; Liem *et al*., 2003).

Table 1. The Nyhus/Stoppa classification scheme has divided hernias into 4 types

Nihus/Stoppa classification	
Type 1	Indirect hernias with normal internal ring anatomy
Type 2	Indirect hernias with dilated internal rings with preserved posterior wall
Type 3	Hernias with defects in the floor of the inguinal canal
	A Direct inguinal hernia
	B Indirect and direct hernia (pantaloons)
	C Femoral hernia
Type 4	Recurrent hernias
	A Direct hernia
	B Indirect hernia
	C Femoral hernia
	D Combined hernia

Hernia development is considered to be due to genetic factors as well as acquired factors. Patients with inguinal hernias have been shown to have a higher proportion of immature type III collagen as compared to type I collagen. Patients with a family history of hernia are four times more likely to have an inguinal hernia (Chesley *et al*., 2015). Medical diseases that have been associated with a higher risk of inguinal hernia include aneurysmal disease, other collagen disorders, hiatal hernia, and sleep apnea. In addition, it is commonly believed, though never scientifically proven, that increases in abdominal pressure contribute to the development of hernia. Such activities include straining due to constipation or prostatic hypertrophy, chronic cough or clearing of the throat, and heavy lifting as part of a daily job. Exercise has been shown to have a protective effect on hernia development. It is important to control for these risk factors preoperatively in order to improve outcomes after hernia repair (Sakorafas *et al*., 2001). Lichtenstein repair: First described in 1984, this technique has become the standard for inguinal herniorrhaphy because it is a tension-free repair.

An estimate of usage patterns of groin hernia repair techniques used in the United States in 2003 estimated that the most popular repair technique was Lichtenstein, with approximately 295,000 herniorrhaphies or 34% of all surgeries (Ruiz-Jasbon *et al*., 2014; Chesley *et al*., 2015). In this technique, a polypropylene mesh (8x12cm) is trimmed to fit the floor of the inguinal canal, and it is sutured to the public tubercle and to the inguinal ligament. The mesh is then anchored to the conjoined tendon and after meticulous hemostasis, a closed suction drain is placed beneath the external oblique aponeurosis (Sakorafas *et al*., 2001, Szopinski *et al*., 2012). The inguinal hernia recurrence is an important postoperative complication. According to T. Bisgaard *et al*., in 47,975 primary inguinal hernia repairs, which 43,043 were Lichtenstein repair, and 4932 were open sutured repairs (Bassini, McVay and Shouldice), the risk of reoperation after Lichtenstein repair was a quarter of thatafter sutured repair (Bisgaard *et al*., 2007). Peacock and Madden assumed that a fundamental defect in collagen metabolism in patients could

result in inguinal hernia recurrence, because it can cause abnormalities in the transversalis or endopelvic fascia (Miserez and Simons, 2014). Risk factors are related to the use of Foley catheter and the small size of polypropylene mesh in addition to the factors already associated with primary hernias (Matthews *et al*., 2007). Though recurrent hernia has to be regarded as a disease caused by multiple factors, patients comorbidities, iatrogenic procedures, surgeon experience and mesh quality should be considered (Bisgaard *et al*., 2007; Jansen *et al*., 2009). The hernia repair represent the most common group of major operations performed by general surgeons, and the inguinal recurrence repair is included in this group.It is naive to think that health care policy makers would not be interested in restraining and even decreasing this cost (Chesley *et al*., 2015; Matthews *et al*., 2007). Hernia inguinal studies are mainly about the surgical procedures. Liem *et al*. compared hernia inguinal recurrence after laparoscopic repair and after conventional repair (with or without mesh); although Silvestre *et al*. reported that the mesh type used in the Lichtenstein repairs (light polypropylene mesh and heavy polypropylene mesh) influenced the recurrent hernia (Liem *et al*., 2003; Silvestre *et al*., 2011).Studying the prevalence data, we intend to contribute to the inguinal hernia recurrence data in Surgery Service in Onofre Lopes Hospital (Natal/RN). Few researches were developed in this subject, especially in Brazil. In this present study, we analyzed the recurrence hernia rate in Lichtenstein technique, and analyzed if it should be the hernia repair first choice, including the postoperative risks, especially recurrence.

Objectives

General Objectives

To determine the prevalence of hernia recurrence in patients operated with the Lichtenstein technique in Onofre Lopes University Hospital.

Specific Objectives

- Identify cases of recurrence within five years.
- Identify possible causes in selected sample, if there are cases of hernia recurrence
- If there is recurrence, calculate the frequencies of each case to identify those most closely related to the identified cases.

Justification

In the present study, we see the need to analyze the recurrence rate in patients operated using the Lichtenstein technique, in order to know if this technique really should be the first choice when we refer to low rates of postoperative complications, mainly recurrence. In addition, it is expected to contribute to the collection of data on inguinal hernia recurrence in General Surgery service of the University Hospital Onofre Lopes in Natal/RN, since little research has been carried out in this direction, especially in Brazil.

MATERIALS AND METHODS

Study Design

Observational study, descriptive, retrospective and prevalence analysis.

Place

Onofre Lopes University Hospital of the Federal University of Rio Grande do Norte, Northeastern Brazil.

Period

Data were collected from November 2012 to April 2013, with the variables analyzed in relation to the period from 2007 to 2012.

Population and Sample

The study population consisted of all patients undergoing inguinal hernia repair in 2007, with a sample space defined according to the exclusion criteria specified below.

Inclusion Criteria

They were obtained data to patients undergoing surgery for inguinal hernia repair from January to December 2007.

Exclusion Criteria

Will not be analyzed data relating to patients with inguinal hernia already relapsed or secondary undergoing inguinal hernia surgery, patients operated by other techniques, female patients, younger than 18 years old and patients without information described in the charts.Were selected only the patients who had undergone Lichtenstein technique virgins of any previous surgical treatment in 2007. Therefore, patients admitted to hospital with recurrence other hernia repair techniques were excluded. It was used only male patients and 18 years to make the sample more homogeneous the possible. Regarding the collection of data on hospital records, were excluded those patients who in 2007 did not have the clear information in their medical records on the repair technique employed hernia. The readmission to hospital was not to fix hernias undergoing Lichtenstein technique, but only for revision surgery, routinely, to assess the patient postoperatively. Only that. The return in the hospital was only for revision surgery and check que all was well with the patient operated by said surgical technique. There was no hospital readmission after five years of patients referred to the study sample due to recurrence of the hernia technique under study. There was no splitting into subgroups of patients in order to favor the Lichtenstein technique as perfect or infallible. The hospital mentioned in the study is of tertiary and quaternary care, therefore, primarily performs most major surgeries. The inguinal hernias are procedures for small and medium complexity, so had only in 2007, according to the criteria of inclusion and exclusion adopted, only 316 patients undergoing Lichtenstein technique.

Data Collection Instrument

Data were collected through analysis of medical records of patients undergoing inguinal hernia repair in 2007, registered in the Onofre Lopes University Hospital Computerized Platform, MV2000® program, located by medical record number to be checked and subjected to structured form containing the variables to be analyzed. In the cases with positive recurrence, patients would be contacted via telephone about their current health status in relation to the procedure performed, and requested to attend the Onofre Lopes University Hospital clinic surgery by filling informed consent and informed second Resolution 466/2012 of the National

Research Ethics Committee in Brazil. Accepting participate, would be administered questionnaire with complementary variables and performed surgical reassessment to evaluate the current state of health.

Data Collection Procedures

After submission and approval of the project to Onofre Lopes University Hospital Ethics Committee, according to the protocol number 155416, at first it was done a survey of patients who underwent hernia repair by searching on MV2000® computer program used to marking of surgical procedures in Onofre Lopes University Hospital, containing the name, medical record number, name of the surgeon responsible and the date of surgery. Following was held search of records in the hospital Medical File Service using the medical record number previously obtained with the further collection of data from patients who met the inclusion criteria, and completion of the structured data extraction form.

Variables Analyzed

Dependent Variables

Recurrence prevalence of primary inguinal hernia by Liechtenstein technique.

Independent Variables

They consist of age, family history, profession and lifestyle.

Data Analysis

Since this is a retrospective, observational and descriptive study, data analysis was done through the measures of central tendency, mean ± standard deviation (odds ratio) and percentage measures.

Ethical Aspects

The research project was developed in full, registered in BRAZIL PLATFORM, containing all the required documents, provided by the education, research and extension HUOL department, following the ethical principles of Resolution 466/2012 of the National Research Ethics Committee in Brazil. Using statement of consent of the head of the institution the project was submitted to the Onofre Lopes University Hospital Ethics Committee and approved in November 2012, with number 155 416.

Financing

This study was funded with own resources of the guiding teacher and students of the project, involving reams, printing, xerographic copies, pens, transportation and phone bills.

RESULTS

In the period between December 2012 and July 2013 were analyzed 369 medical records, including patients who underwent inguinal hernia repair in Onofre Lopes University Hospital in 2007. Of these, 53 patients were excluded because 8 were female, 34 underwent the procedure by other techniques (21 by Shouldice, 12 by Bassini and 1 by McVay), 7 had recurrent inguinal hernia and 4 patients did not present any data in the record.

Thus, the study sample consisted of 316 patients (Table 2). Patients included in the sample had a mean age of 52.09 years, ranging from 19 to 90 years. Among all analyzed patients, it was not found any recurrence after 5 years of surgery. Thus, there was no need to get in touch with patients and apply the consent and informed term. Nevertheless, 27 (8.54%) patients needed to undergo a new hernia contralateral side during those five years, or had already done before 2007. Of these, 74 (23,52%) had a family history in first-degree relatives (Table 3). In addition, it was observed that 74 (23,58%) patients had active smoking as a life habit, and 187 (59,17%) patients were involved in professions related to the great efforts, not being reported the period spent on these activities.

Table 2. Exclusion Criteria

Other techniques	34
Shouldice	
Bassini	21
McVay	121
Female pacients	8
Pacients with recurrent inguinal hernia	7
Pacients without information described in the charts	4

Table 3. Variables of patients included in the research

Hernia recurrence within 5 years	0
Mean age	52,09 anos
New hernia repair in contralateral side	27 (8,54%)
Family history	74 (23,52%)
Active smoking	74 (23,58%)
Professions related to the great efforts	187 (59,17%)

DISCUSSION

The University Hospital Onofre Lopes belongs to State Federal University of Rio Grande do Norte, located in Northeast Brazil. It is a general hospital, of 240 beds, which performs even complex procedures such as kidney and liver transplantation. The vast majority of male patients undergoing inguinal hernia surgery by Liechtenstein technique was made up of farmers, locksmiths, miners and bricklayers, so people subjected to great physical efforts. Even in this group of patients, Liechtenstein technique proved effective and there was no relapse of inguinal hernia for the time reported in research in the study. By mid-2005, the Liechtenstein technique was not widely used in the hospital, as many former teachers were trained and fans of techniques Bassine, McVay and Shouldice. Allied to this point, the cost of polypropylene mesh in Brazil was still high in the early 2000, which influenced the low utilization of Liechtenstein technique in patients seeking hospital for treatment. From 2006 there was a reversal of the situation, with the entry of new surgeons who showed that Liechtenstein technique it showed lower recurrence of hernias, it was easier to teach resident physicians in general surgery and caused less pain patients. Currently, Liechtenstein hernia repair technique is the most used in the Onofre Lopes University Hospital, in Northeastern Brazil. The gold standard in the United States involves implantation of mesh. It has been shown to provide a secure repair with little or no tension, as compared with tissue repair. Also, since most patients have intrinsically weak pelvic floor tissue or may have a wide defect with absent tissue, the implant can augment the security of repair by bolstering the muscles or bridging the defect. Hernia recurrence rates using mesh implantation are typically under 5% nationally and are reported by experts to be less than 1% (Bisgaard *et al*., 2007; Miserez and Simons,

2014; Matthews *et al*., 2007). This compares to recurrence after elective tissue repair, which may reach as high as 15% to 20%, depending on the patient characteristics and surgical technique performed. There are a multitude of hernia mesh biomaterials and techniques that have been developed. Outcomes are variable and dependent on surgeon technique and expertise. No single repair is considered to be superior. For the best outcome, it is important that the surgeon be informed about the risks and benefits of each implant and to know the correct surgical technique recommended for the chosen mesh biomaterial (Jansen *et al*., 2009; Silvestre *et al*., 2011). Hernia recurrences are usually caused by technical factors, such as excessive tension on the repair, missed hernias, failure to include an adequate musculoaponeurotic margin in the repair, and improper mesh size and placement. Recurrence also can result from failure to close a patulous internal inguinal ring, the size of which is always assessed at the conclusion of the primary surgery (Jansen *et al*., 2009). Other factors that can cause hernia recurrence are chronically elevated intra-abdominal pressure, a chronic cough, deep incisional infections, and poor collagen formation in the wound.

Recurrences are more common in patients with direct hernias and usually involve the floor of the inguinal canal near the pubic tubercle, where suture line tension is greatest (Voyles *et al*., 2003). After primary hernia repair, up to ten percent of recurrences are reported, which is the main postoperative complication. Important factors described in recent studies to obtain good results include the technique used, being the Liechtenstein technique unless associated with relapse, the experience of the surgeons and the good conditions of service1 (Read, 2009). In the present study were not identified relapses, which is in agreement with studies that show the low rate of complications with the use of Liechtenstein technique (Nathan and Pappas, 2003; Stephenson, 2003). These results also support the idea that the rate of recurrence is associated with the experience of the surgeons and the quality of service. Recurrence after modern repair of hernias in the hands of experienced surgeons, appears to be slowing and is generally accepted around 1%, provided with screen use. Relapse rates before age 70, when there was still little information about the surgical techniques were reported around 10 and 15% (Voyles, 2003; van Veen *et al*., 2007).

However, the results may also reflect the time of postoperative follow-up. In 1989, Lichtenstein *et al*. reported their experience with 1000 patients, with minimal complication rate and no recurrence after 1 to 5 years follow-up (Nathan and Pappas, 2003). In the 90s several randomized studies comparing the use or not of the screen began to appear in the literature, but with a wide variation in data collection and publication of results. In 2000, the European group "Hernia Trialists Collaboration" identified and reviewed 15 such studies. The recurrence rate was lower in the group that used the screen, but it was noted that there was a high variation in rates and time follow-up of the patients (3 to 4 weeks to 8 years). The average recurrence rates were 1.4% in 1513 repairs with screen and 4.4% in 1634 repairs with no screen (Stephenson, 2003). Recent studies have shown that the patient's follow-up needs to occur in several years, because hernia inguinal recurrence tends to increase with time. Bisgaard *et al*. have shown that recurrence rate and reoperation was significantly lower in patients that underwent Liechtenstein technique in the first 5 years after surgery, compared to patients with no mesh repairs. But this reoperation rate increased after 5 years of follow-up, although remaining lower when compared to repairs without mesh (Bisgaard *et al*., 2007; van Veen *et al*., 2007). Patient's evaluation after hernia repair is important to recognize the inguinal hernia recurrence. In the present study, this evaluation was performed by analyzing medical records, with no physical assessment of patients after 5 years of the procedure. Eklund *et al*. showed in their study that the use of questionnaires and the absence of physical assessment of patients to identify recurrences can over look about half recurrence (Eklund *et al*., 2007). Similarly, Danielsson *et al*. found in their studyninehernia recurrence in the physical examination, while only six were identified by the patient (Danielsson *et al*., 1999). So, if patients were seen and had physical examination after 5 years, recurrences could be identified, even if the patient hasn't observed it.

Family history has also been linked to the hernia inguinal development and recurrence, showing that genetic factors can play an important role in the disease manifestation (Jansen *et al*., 2009). In the present study, 14.65% of patients that underwent primary hernia repair in 2007, had already undergone contralateral hernia repair, and 23.52% of them had hernia inguinal family history. Lau *et al* noticed that positive family history is the most determining factor for the development of primary inguinal hernia in male, and also the recurrence after primary hernia repair, regardless of surgery technique (Miserez *et al*., 2014). In another study, Bellon *et al*. showed that the genetic factors are associated to the transversalis fascia fragility, which when present, tends to have bilateral involvement (Bellón *et al*., 2001). Thus, if there were a longer follow-up, a recurrence rate could be found in this group of patients. Another important point is that despite the high number of patients with significant risk factors for inguinal hernia development and recurrence, such as smoking and professions related to great efforts (agriculture, construction, fishing…), recurrence was not identified. Smoking alters the collagen metabolism and increases predisposition to the hernia recurrence, but it occurs in variable time, which confirms the need for longer patient's follow-up (Jansen *et al*., 2009; Bökkerink *et al*., 2014). Most recurrent hernias require the use of prosthetic mesh for successful repair (Shulman *et al*., 1990; Haapaniemi *et al*., 2001; Hernia Trialists Collaboration, 2002). Choosing a different approach (usually posterior) avoids dissection through scar tissue, improves visualization of the defect and reduction of the hernia, and decreases the incidence of complications, particularly ischemic orchitis and injury to the ilioinguinal nerve. Recurrences after initial prosthetic mesh repairs can be caused by displaced prostheses or the use of a prosthetic of inadequate size. Recurrences are best managed by placing a second prosthesis through a different approach (Karthikesalingam *et al*., 2010; Sevonius *et al*., 2009; Tripoloni and Schierano, 2012). A meta-analysis of 58 reports comparing synthetic mesh techniques to nonmesh repairs has demonstrated an almost 60% reduction in recurrence with the use of mesh (Hernia Trialists Collaboration, 2002). This report concluded that there was no difference in the rate of hernia recurrence between laparoscopic and open approaches that used mesh (Kyriakidis *et al*., 2011; Negro *et al*., 201128,29). A recent meta-analysis of recurrent hernia repairs reported no difference between open and laparoscopic mesh repairs in rerecurrence or chronic groin pain (Karthikesalingam and Markar, 2010). Recurrence is more common after repair of recurrent hernias and is directly related to the number of previous attempts at repair. Large population-based studies

have reported a rerecurrence rate of 4% to 5% in the first 24 months, which increases to 7.5% at 5 years (Haapaniemi *et al*., 2001; Sevonius *et al*., 2009). Tension-free and mesh-based repairs have the lowest rates of reoperation after recurrence and result in a reduction in recurrence of approximately 60% compared with more traditional repairs (Haapaniemi *et al*., 2001).

Conclusion

After conducting this study, we saw that in five years of follow-up there was no recurrence after inguinal hernia repair by Liechtenstein technique. Further studies should be conducted, with longer follow-up, including monitoring with new physical examination of patients, in order to know whether this technique should be the first choice in relation to low postoperative recurrence rate.

Declaration of conflict of interest

BMFA: declares no conflict of interest

CBVM: declares no conflict of interest

ACMR: declares no conflict of interest

IAF: declares no conflict of interest

REFERENCES

Bellón, J.M., Bajo, A., Ga-Honduvilla, N., Gimeno, M.J., Pascual, G., Guerrero, A., Buján, J. 2001. Fibroblasts from the transversalis fascia of young patients with direct inguinal hernias show constitutive MMP-2 overexpression. Ann Surg 233(2):287-91.

Bisgaard, T., Bay-Nielsen, M., Christensen, I.J., Kehlet, H. 2007. Risk of recurrence 5 years or more after primary Lichtenstein mesh and sutured inguinal hernia repair. Br J Surg 94(8):1038-40.

Bökkerink, W.J., van Laarhoven, C.J., Koning, G.G. 2014. Comment to: update with level 1studies of the European Hernia Society guidelines on the treatment of inguinalhernia in adult patients, Miserez M *et al*. DOI 10.1007/s10029-014-1236-6. Hernia Oct;18(5):771-2. doi: 10.1007/s10029-014-1266-0.

Chesley, P.M., Black, G.E., Martin, M.J., Johnson, E.K., Maykel, J.A., Steele, S.R. 2015. The utilityof pathologic evaluation of adult hernia specimens. Am J Surg May 209(5):783-6. doi: 10.1016/j.amjsurg.2014.12.019.

Danielsson, P., Isacson, S., Hansen, M.V. 1999. Randomised study of Lichtenstein compared with Shouldice inguinal hernia repair by surgeons in training. *Eur J Surg.*, 165(1):49-53.

Eklund, A., Rudberg, C., Leijonmarck, C.E., Rasmussen, I., Spangen, L., Wickbom, G., Wingren, U., Montgomery, A. 2007. Recurrent inguinal hernia: randomized multicenter trial comparing laparoscopic and Lichtenstein repair. *Surg Endosc*., 21(4):634-40.

EU Hernia Trialists Collaboration (2002) Repair of groin hernia with synthetic mesh: Meta-analysis of randomized controlled trials. Ann Surg 235: pp. 322-332.

Haapaniemi, S., Gunnarsson, U., Nordin, P. *et al* 2001. Reoperation after recurrent groin hernia repair. *Ann Surg.*, 234: pp. 122-126.

Jansen, P.L., Klinge, U., Jansen, M., Junge, K. 2009. Risk factors for early recurrence after inguinal hernia repair. BMC Surg 9:18.

Karthikesalingam, A., Markar, S.R., Holt, P.J., *et al*. 2010. Meta-analysis of randomized controlled trials comparing laparoscopic with open mesh repair of recurrent inguinal hernia. Br J Surg 97: pp. 4-11.

Kyriakidis, A.V., Perysinakis, I., Alexandris, I., Athanasiou, K., Papadopoulos, Ch, Mpesikos, I. 2011. Parecoxib sodium in the treatment of postoperative pain afterLichtenstein tension-free mesh inguinal hernia repair. Hernia Feb;15(1):59-64. doi: 10.1007/s10029-010-0737-1.

Liem, M.S., van Duyn, E.B., van der Graaf, Y., van Vroonhoven, T.J. Coala Trial Group 2003. Recurrences after conventional anterior and laparoscopic inguinal hernia repair: a randomized comparison. Ann Surg 237(1):136-41.

Matthews, R.D., Anthony, T., Kim, L.T., Wang, J., Fitzgibbons, R.J. Jr, Giobbie-Hurder, A., Reda, D.J., Itani, K.M., Neumayer, L.A. 2007. Veterans Affairs Cooperative 456 Studies Program Investigators. Factors associated with postoperative complications and hernia recurrence for patients undergoing inguinal hernia repair: a report from the VA Cooperative Hernia Study Group. *Am J Surg*., 194(5):611-7.

Miserez, M., Peeters, E., Aufenacker, T., Bouillot, J.L., Campanelli, G., Conze, J., Fortelny, R., Heikkinen, T., Jorgensen, L.N., Kukleta, J., Morales-Conde, S., Nordin, P., Schumpelick, V., Smedberg, S., Smietanski, M., Weber, G., Simons, M.P. 2014. Update with level 1 studies of the European Hernia Society guidelines on the treatment of inguinalhernia in adult patients. Hernia Apr;18(2):151-63. doi:10.1007/s10029-014-1236-6.

Miserez, M., Simons, M.P. 2014. Reply to comment to "update with level 1 studies of the European Hernia Society guidelines on the treatment of inguinal hernia in adultpatients" W.J. Bökkerink, C.J. van Laarhoven, G.G. Koning. Hernia Oct;18(5):773-4. doi:10.1007/s10029-014-1286-9

Nathan, J.D., Pappas, T.N. 2003. Inguinal hernia: an old condition with new solutions. *Ann Surg.*, 238(6):148-57.

Negro, P., Basile, F., Brescia, A., Buonanno, G.M., Campanelli, G., Canonico, S., Cavalli, M., Corrado, G., Coscarella, G., Di Lorenzo, N., Falletto, E., Fei, L., Francucci, M., Fronticelli Baldelli, C., Gaspari, A.L., Gianetta, E., Marvaso, A., Palumbo, P., Pellegrino, N., Piazzai, R., Salvi, P.F., Stabilini, C., Zanghì, G. 2011. Open tension-free Lichtensteinrepair of inguinal hernia: use of fibrin glue versus sutures for mesh fixation.Hernia Feb;15(1):7-14. doi: 10.1007/s10029-010-0706-8.

Read, R.C. 2009. Herniology: past, present, and future. Hernia Dec;13(6):577-80.doi: 10.1007/s10029-009-0582-2.

Ruiz-Jasbon, F., Norrby, J., Ivarsson, M.L., Björck, S. 2014. Inguinal hernia repair using asynthetic long-term resorbable mesh: results from a 3-year prospective safety and performance study. Hernia Oct;18(5):723-30. doi: 10.1007/s10029-014-1249-1.

Sakorafas, G.H., Halikias, I., Nissotakis, C., Kotsifopoulos, N., Stavrou, A., Antonopoulos, C., Kassaras, G.A. 2001. Open tension free repair of inguinal hernias; the Lichtenstein technique. BMC Surg 1:3.

Sevonius, D., Gunnarsson, U., Nordin, P. *et al*. 2009. Repeated groin hernia recurrences. *Ann Surg* 249: pp. 516-518.

Shulman, A.G., Amid, P.K. and Lichtenstein, I.L. 1990. The “plug” repair of 1402 recurrent inguinal hernias. 20-year experience. *Arch Surg*., 125: pp. 265-267.

Silvestre, A.C., de Mathia, G.B., Fagundes, D.J., Medeiros, L.R., Rosa, M.I. 2011. Shrinkage evaluation of heavyweight and lightweight polypropylene meshes in inguinal hernia repair: a randomized controlled trial. Hernia 15(6):629-34.

Śmietański, M., Śmietańska, I.A., Modrzejewski, A., Simons, M.P., Aufenacker, T.J. 2012. Systematic review and meta-analysis on heavy and lightweight polypropylene meshin Lichtenstein inguinal hernioplasty. Hernia Oct;16(5):519-28. doi:10.1007/s10029-012-0930-5.

Stephenson, B.M. 2003. Complications of open groin hernia repairs. *Surg Clin North Am*., 83(5):1255-78.

Szopinski, J., Dabrowiecki, S., Pierscinski, S., Jackowski, M., Jaworski, M., Szuflet, Z. 2012. Desarda versus Lichtenstein technique for primary inguinal hernia treatment: 3-year results of a randomized clinical trial. *World J Surg.*, 36(5):984-92.

Tripoloni, D.E., Schierano, M.C. 2012. Comments about the article "Open tension-freeLichtenstein repair of inguinal hernia: use of fibrin glue versus sutures formesh fixation" by Negro *et al*. Hernia Apr;16(2):235-6. doi:10.1007/s10029-011-0896-8.

van Veen, R.N., Wijsmuller, A.R., Vrijland, W.W., Hop, W.C., Lange, J.F., Jeekel, J. 2007. Long-term follow-up of a randomized clinical trial of non-mesh versus mesh repair of primary inguinal hernia. *Br J Surg*., 94(4):506-10.

Voyles, C.R. 2003. Outcomes analysis for groin hernia repairs. *Surg Clin North Am.*, 83(5):1279-87.

****