

# Inguino-Crural Hernias, a Subject Still Under Evaluation: Which Surgical Technique should be Chosen?

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## Abstract

Inguinal hernias are a common condition in general surgery and represent a significant public health problem with a substantial economic burden in terms of frequency and cost. Inguinal hernias are predominant in men, but all age groups can be affected. Treatment is purely surgical. Inguinal hernia surgery is the primary surgical activity for general and visceral surgeons worldwide. Surgical techniques are numerous, ranging from simple repair to prosthetic repair. Techniques using prostheses are now the gold standard in the surgical management of simple inguinal hernias. In our prospective open-label study, 125 cases of inguinal hernias were operated on. Sixty-eight percent of patients underwent simple repair, and 32% were treated with prosthetic repair. Outcomes are difficult to assess and vary from patient to patient. The results depend on the quality of the patient's musculopectineal region, risk factors, lifestyle, the quality of the synthetic material used, and, above all, the surgeon's experience. Currently, there is no consensus on best practices for inguinal hernia surgery. The only criterion for evaluating one technique over another is the recurrence rate. In our series, we observed that the Lichtenstein procedure is the preferred technique and should be used for all patients, even young ones. The McVay repair technique has the lowest recurrence rate compared to other repair methods.

**Keywords:** hernias; groin; easy diagnosis; surgery; recurrence

## Introduction

Inguinal hernias are a common condition in general surgery with a very significant socioeconomic impact. It is a very widespread pathology throughout the world and particularly in Algeria.

A hernia is the protrusion of an organ through an abnormal opening at weak points in the body, the abdominal wall. A groin hernia causes a protrusion in the groin area.

It can be inguinal, crural, or femoral (as it's called in English). Inguinal hernias can appear at any age, with a male predominance. Inguinal hernias are more common in men, while femoral hernias are more prevalent in women. Diagnosis is straightforward. Generally, it is made during a physical examination while standing, by observing a bulge in the groin area. An uncomplicated inguinal hernia is painless, reducible, soft, and protrudes when standing, during coughing, dysuria, or defecation. Femoral hernias are often diagnosed in obese women with acute intestinal obstruction.

These hernias are acquired. They are due to muscular and aponeurotic weakness and are done through weak points.

In addition, patient-related factors such as age, professional or sporting activity, and associated pathologies must be taken into account.

The treatment is essentially surgical, it aims to strengthen the transversalis fascia.

The procedures are numerous, ranging from simple sutures to prosthesis placement. The management of inguinal hernias has seen surgical advances with the advent of prosthetic mesh and laparoscopy.

**The objective Our work** is to evaluate the surgical techniques for repairing inguinal hernias performed in our department, thus enabling maximum postoperative comfort with a lower recurrence rate.

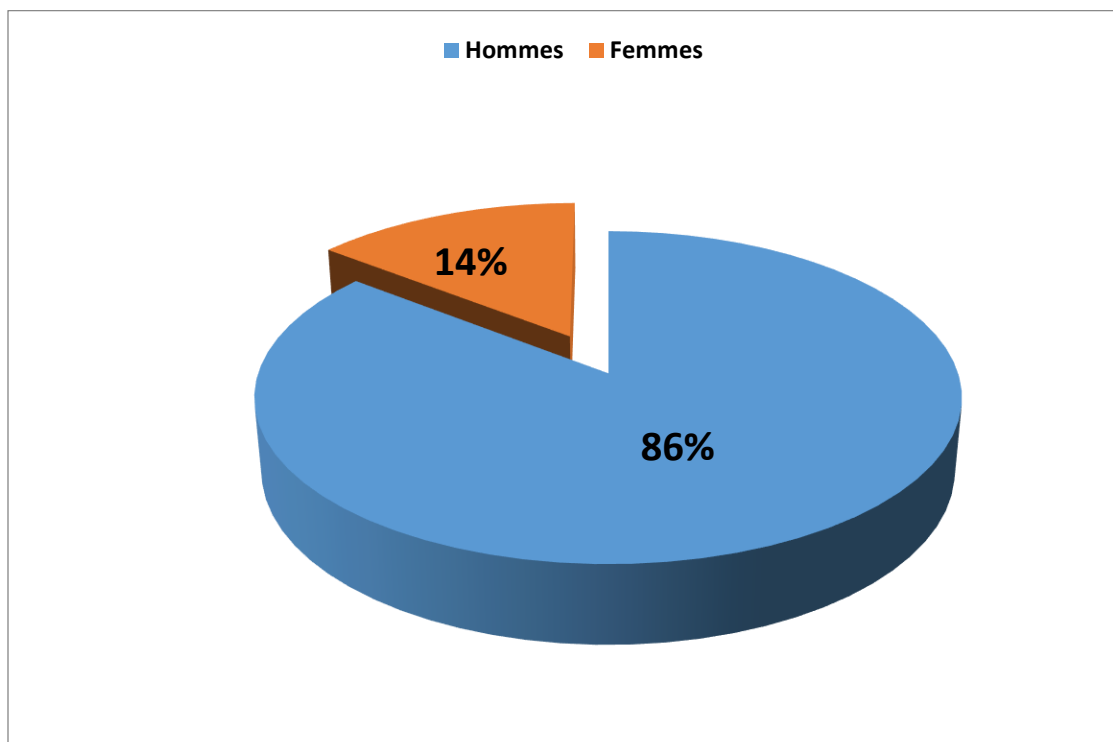
**Patients and methods:** This was a prospective, open-label study of a sample of 125 patients over 18 years of age who underwent elective surgery in the general surgery department of the University Hospital of

Sétif, from January 2019 to June 2025. All patients underwent a clinical examination with a thorough medical history to identify risk factors or triggers. Ultrasound and/or CT scans were performed as needed to identify or investigate associated conditions. Patients who underwent emergency surgery for a complicated inguinal hernia were excluded from this study. Simple herniorrhaphy was performed using non-absorbable sutures. Prosthesis interposition was indicated based on local findings, age, and risk factors. Patient follow-up lasted more than one year. Initially, we studied immediate and long-term morbidity and mortality. Subsequently, we compared and evaluated the outcomes of the surgical

techniques with a minimum follow-up of 6 months for each patient. The average follow-up was six months, ranging from 3 to 36 months. A multivariate analysis was performed to determine predictive factors for hernia recurrence.

## Results

One hundred and twenty-five patients underwent surgery. These included 107 men and 18 women. The average age of our patients was 35 years (range 19–87 years). The male-to-female ratio was 5.9.



**Figure 1:** Distribution of inguinal hernias according to sex.

The average age of men was 37 years, with a range from 19 to 87 years. The average age of women was 30 years, with a range from 28 to 70 years.

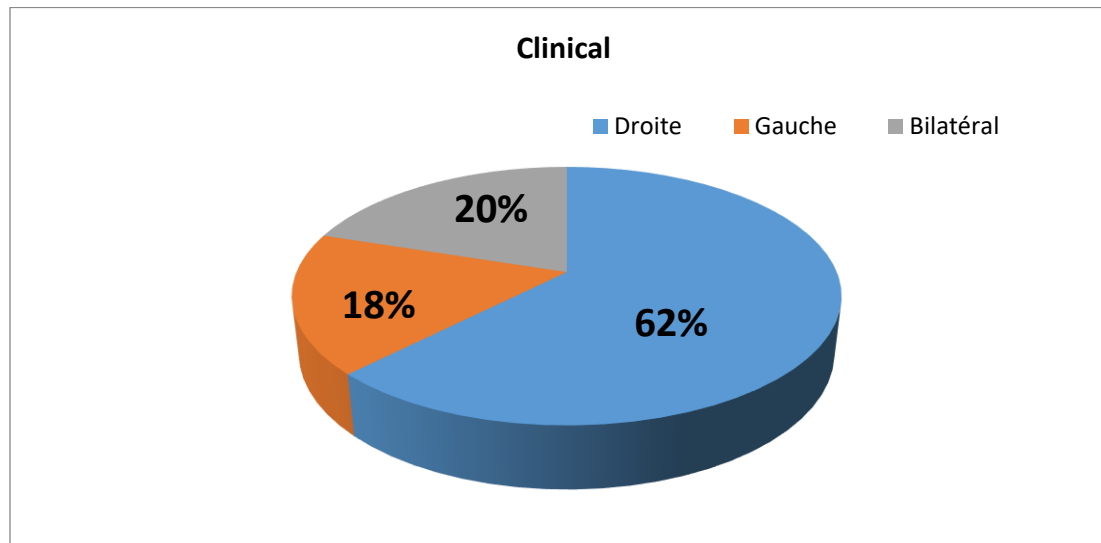
The risk factors identified were dysuria mainly related to prostatic hypertrophy, chronic cough, carrying heavy loads, obesity, chronic constipation and multiparity.

| Risk factors         | Number | Percentage |
|----------------------|--------|------------|
| Dysuria              | 45     | 36%        |
| Chronic cough        | 30     | 24%        |
| Obesity              | 10     | 08%        |
| Chronic constipation | 21     | 17%        |
| Carrying heavy loads | 13     | 10%        |
| Multiparity          | 06     | 0.5%       |

**Table I:** Risk factors for inguinal hernias.

One hundred patients had a medical history: 22% had insulin-dependent diabetes, 35% were taking oral antidiabetic medication, 25% had hypertension, 28% had both diabetes and hypertension, 10% were on long-term corticosteroid therapy, and 5% had undergone chemotherapy. A surgical history was found in 20% of cases, predominantly for contralateral inguinal hernia repair. The diagnosis was made following

the onset of pain and bulging in the groin area, self-reported by the patient in 76% (n = 95) of cases. Ultrasound and, occasionally, CT scans performed for other reasons led to the diagnosis in 30 patients. Physical examination confirmed the clinical and anatomical characteristics of the hernias.



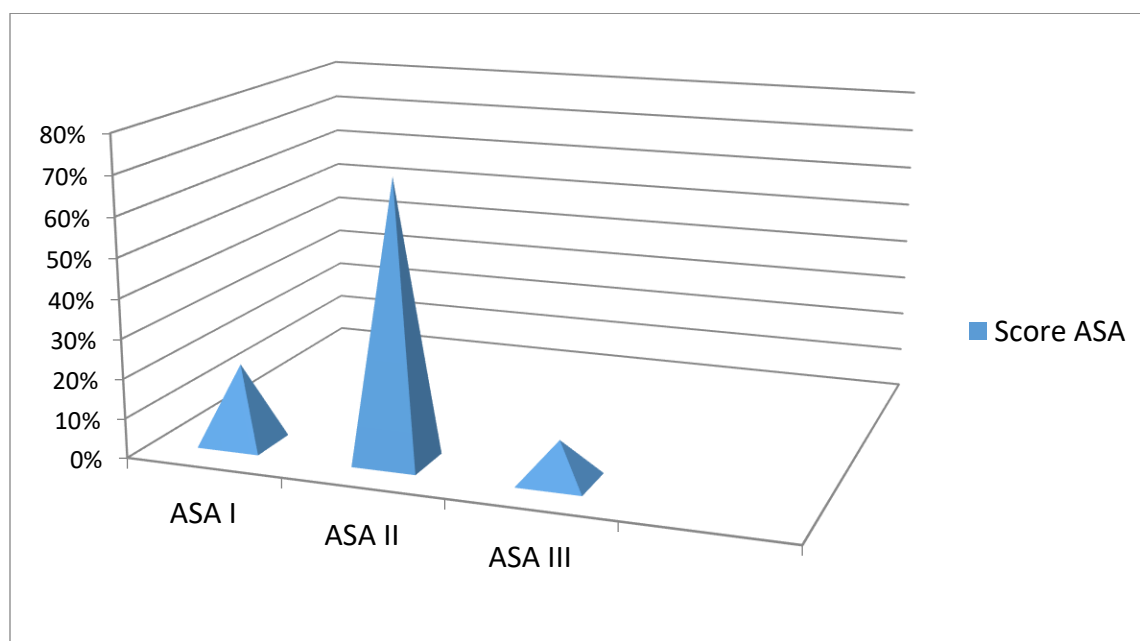
**Figure 2:** Clinical and anatomical characteristics of hernias.

Eighty men underwent surgery for inguinal hernias and 27 men for inguinoscrotal hernias. Three women underwent surgery for inguinal hernias and 15 women for femoral hernias.

| Men (107)       |        |    | Women (18)     |        |    |
|-----------------|--------|----|----------------|--------|----|
| Type of hernia  | Number | %  | Type of hernia | Number | %  |
| Inguinal        | 80     | 75 | Inguinal       | 03     | 17 |
| Inguino scrotal | 27     | 25 | Femoral        | 15     | 83 |
| Crural          | —      | —  |                |        |    |

**Table II:** Type of hernia according to sex.

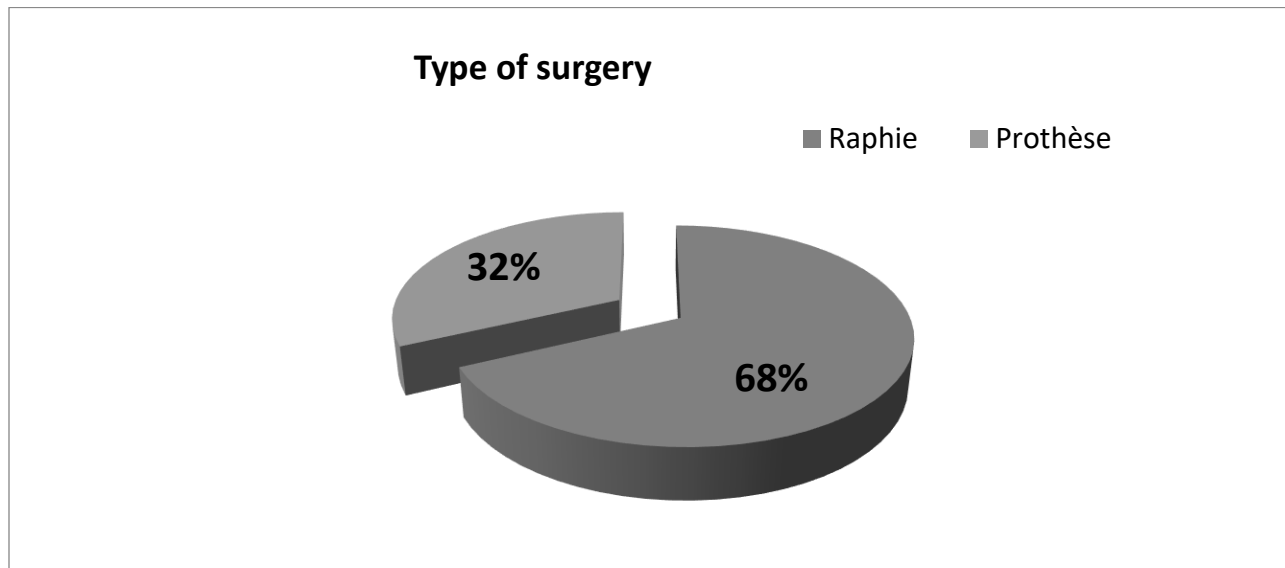
The surgical intervention was scheduled electively. Patients were classified according to the ASA score as ASA I in 20% (n = 25) of cases, ASA II in 70% (n = 87), ASA III in 10% of cases (n = 13).



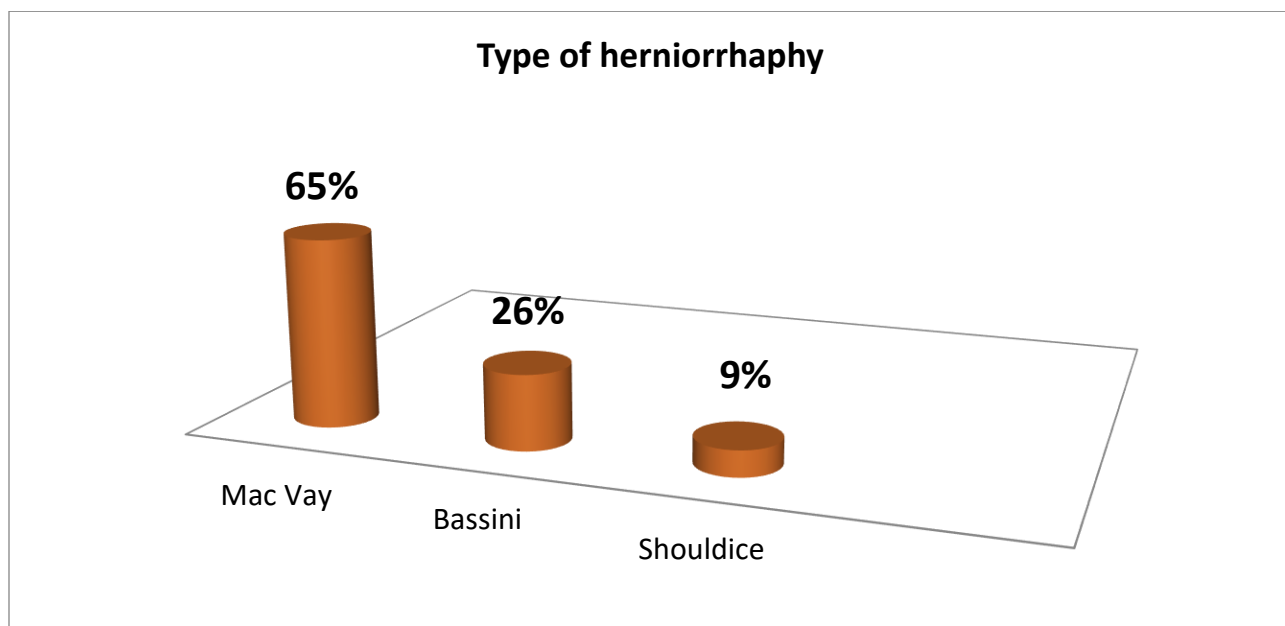
**Figure 3:** ASA classification of our patients.

The hernia was simple in 78% (n = 98) of cases and located on the right in 80% of cases (n = 100).

The hernia was treated with simple suture in 68% of cases (n = 85). Fifty-five cases involved the McVay surgical technique, 22 the Bassini technique, and 8 the Shouldice technique. Hernia repair with a Lichtenstein-type mesh was performed in 32% of cases.



**Figure 4:** Type of hernia repair surgery.



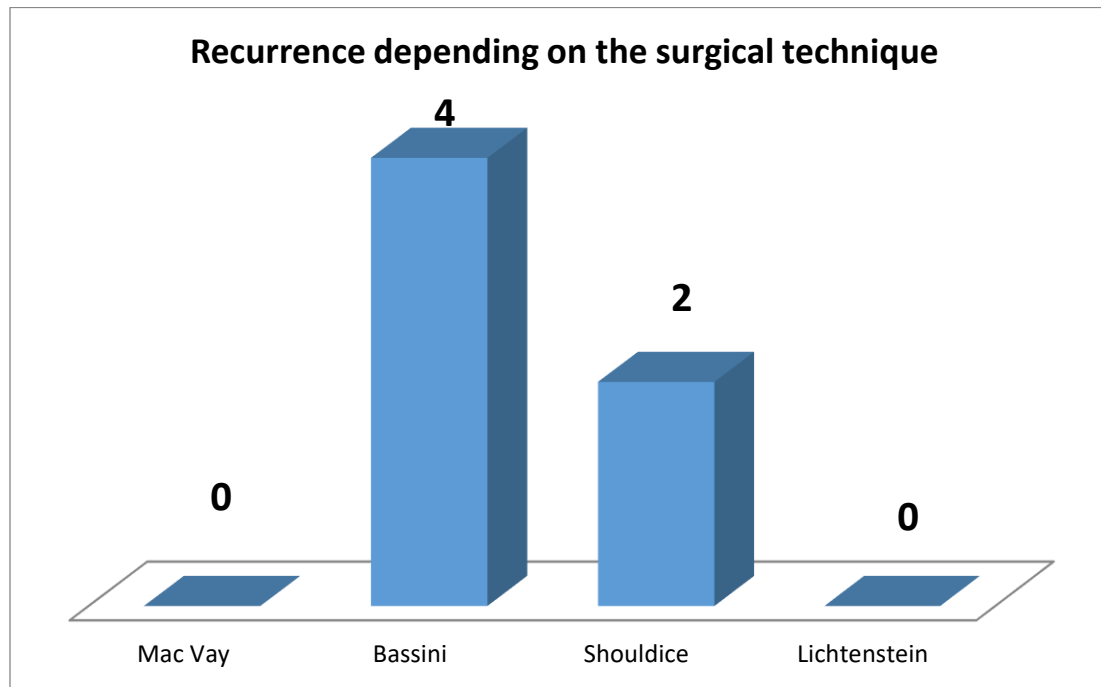
**Figure 5:** Type of Herniorrhaphy

We noted immediate postoperative pain in two patients. Scrotal edema was observed in 11 patients. Surgical site infection was found in four patients after surgery with a prosthesis and in two patients after simple sutures.

We identified six cases of hernia recurrence. These cases were found in men who underwent simple repair with bilateral hernias. No recurrences were reported in women.

| Post-operative care          |                 |         |           |                              |
|------------------------------|-----------------|---------|-----------|------------------------------|
| Post-operative complications | Herniorrhaphies |         |           | Lichtenstein-type prosthesis |
|                              | Mac Vay         | Bassini | Shouldice |                              |
|                              | Number          | Number  | Number    | Number                       |
| Immediate pain               | 0               | 0       | 2         | 0                            |
| Scrotal edema                | 2               | 3       | 6         | 0                            |
| Surgical site infection      | 0               | 1       | 1         | 4                            |

**Table III:** Post-operative course.



**Figure 6:** Recurrence according to the surgical technique.

## Discussion

**Inguinal hernias** These are the most common types of abdominal wall hernias. They include inguinal hernias and femoral hernias. The groin region is an intermediate area between the abdomen and the lower limb. Uncomplicated groin hernias are tolerated for years [1]. They constitute the most frequent reason for consultation in general surgery. Inguinal hernias are common conditions, especially in men. In our series, 107 (86%) men and 18 (14%) women underwent surgery for an inguinal hernia, resulting in a male-to-female ratio of 5.9. The mean age was 37 years (range 19-87 years) for men and 30 years (range 28-70 years) for women. Inguinal hernias were common in young people, and inguinoscrotal hernias were more prevalent between the ages of 50 and 80 [2]. Bilateral hernias were present in manual laborers aged between 40 and 62 years. Femoral hernias were predominant in women over 40 years of age. Diagnosis was easily made through a simple clinical examination. Paraclinical examinations were only necessary to investigate risk factors or in cases of diagnostic uncertainty. Ultrasound is indicated in cases of inguinal pain, unspecified diagnosis, or in cases of irreducible, painless swelling [3]. In our patients, a CT scan was requested in 36% of cases to investigate the cause of dysuria, unexplained pelvic pain, or a painless bulge in the groin. A CT scan is requested in cases of obesity, large hernias, or postoperatively to differentiate between a persistent hematoma, an abscess, and a recurrence. It was requested in 32% of our patients. Sixty-two percent of our patients had a right-sided hernia, compared to 18% on the left and 20% bilateral hernias. The right-sided predominance is likely related to the fact that the majority of humans are right-handed. Patients in our sample were classified as ASA I in 20% of cases, ASA II in 70%, and ASA III in 10%. These findings indicate that inguinal hernias are more common in older individuals. Dysuria was present in 36% of cases. Chronic cough was reported in 30 patients. Obesity, chronic constipation, and physically demanding occupations were observed in our patients. Risk factors for inguinal hernias are numerous. Understanding these factors is essential for choosing the

surgical technique. Obesity, increased intra-abdominal pressure, and especially occupational factors necessitate prosthetic repair to prevent recurrence. Surgical treatment aims to close the weakened opening that caused the hernia using non-absorbable sutures, approximating the muscles using various suturing techniques, or by placing a prosthesis made of non-absorbable mesh without tensioning the surrounding tissues.

Numerous repair techniques exist. A distinction is made between the Bassini, Shouldice, and MacVay techniques and the Lichtenstein plasty techniques. The first herniorrhaphy, performed by Bassini in 1887, involved suturing the conjugate tendon to the inguinal ligament with a few stitches. The Shouldice procedure is the result of an improvement on the Bassini procedure, developed over several decades. It consists of sutures in several layers of running stitches in the different layers of the inguinal region, followed by further reinforcement of the transversus abdominis muscle on the inferior surface of the external oblique fascia [4]. MacVay, an American surgeon and anatomist, observed that the transversalis fascia and the transversus abdominis muscle, attached to Cooper's ligament, added reinforcement to the Bassini technique [5]. The MacVay procedure is therefore characterized by lowering the conjugate tendon to Cooper's ligament, with a releasing incision.

The Lichtenstein technique is currently considered the gold standard for inguinal hernia repair. It is easy, quick, less painful, minimally invasive, effective, can be performed under local anesthesia, and even by novice surgeons. The advantage of prosthetic repair is that it closes the hernial orifice and eliminates the tension of the sutures, which are responsible for postoperative pain. Surgeons now have a wide variety of prosthetic materials at their disposal.

In men, we operated on 75% of inguinal hernias, 25% of inguino-scrotal hernias, and 20% of bilateral hernias. In women, 83% of femoral hernias and 17% of inguino-scrotal hernias were operated on. Specifically, the Bassini technique was used in 26%, the Shouldice technique in 9%, and the MacVay technique in 65%. Prosthetic repair was indicated in 32% of

cases. The indications are very difficult to standardize, given the number of techniques and the personal preferences of each surgeon [6].

Hernia treatment today raises the question of which technique to choose from among several options. However, the choice of therapeutic procedures depends primarily on age, risk factors, the fragility of the groin muscles, postoperative pain, and recurrence.

Since Bassini introduced his technique in 1887, approximately 80 surgical procedures have been described in the literature [7]. The multitude of these surgical techniques testifies to the difficulty of choosing the best approach. In practice, there are two groups of techniques: those that exert tension on the tissues, known as suture repairs, and those called "tension-free," which consist of interposing prostheses without tension on the tissues. Procedures using mesh are superior to other techniques in terms of recurrence and postoperative pain [8]. Postoperative outcomes were favorable, with the exception of two cases of immediate postoperative pain, scrotal edema in 11 patients, and surgical site infection in 6 cases. It is noted that the immediate pain at the surgical site occurred following suture repair using the Shouldice technique and is due to the tension of the sutures in several anatomical layers.

Our study showed that the hernia recurrence rate with the Lichtenstein and McVay techniques was zero compared to the Bassini (4 cases) and Shouldice (2 cases) techniques. Therefore, to accurately assess this recurrence rate, the follow-up period must be sufficient, as a short follow-up period may lead to missing potential recurrences [9]. Herniorrhaphy is a factor in recurrence. The tension placed on the tissues during the treatment of hernias by classic raphies is one of the most important causes of recurrence described in the literature [10-11].

The Bassini technique remained the standard procedure until recently. When done correctly, it gives a recurrence rate of around 10% [12].

The Shouldice technique remains by far the best cure by raphie and which has the lowest risk of hernia recurrence, with results between 0.7 and 1.7% at three years in the hands of experts and around 10% in the long term [13-14]. However, this technique has a drawback: it is performed under tension, and is responsible for debilitating postoperative pain reported by patients (2 cases in our series). In the 1980s, Lichtenstein developed the concept of tension-free repair with the aim of improving postoperative patient comfort [15].

However, the tension placed on the tissues during the treatment of hernias by classic raphies is one of the most important causes of recurrence described in the literature [16]. This explains the success of tension-free inguinal hernia repair techniques.

The Lichtenstein technique is a procedure with hernia recurrence rates of between 1% and 2% at five years. These rates are around 4% in the long term (beyond 15 years) [17-18].

Other authors agree that hernia recurrence after prosthetic repair occurs within 2 to 5 postoperative years [19-20]. Moreover, since the 1990s, economic considerations and costs to society have been taken into consideration [21].

Regardless of the technique used, assessing the true recurrence rate requires rigorous patient follow-up, both in terms of duration and quality of follow-up [22]. This is why we opted for an open-label prospective study to obtain more precise monitoring of our patients.

The factors for hernia recurrence in our patients were age over 70, smoking, prostate enlargement, obesity with a body mass index over 30, manual labor, and bilateral hernia.

In the literature, other factors have been correlated with this risk. These are patient-related recurrence factors such as chronic intra-abdominal hypertension and connective tissue diseases [23-24]. Other studies have demonstrated the existence of recurrence factors related to the hernia, namely its bilateral nature, the fact that it is a direct hernia or a recurrent hernia [25-26].

The early occurrence of a hernia recurrence suggests that it is linked to a technical defect [27]. No cases of early hernia recurrence were observed in our series.

In the literature, the recurrence rate of primary hernia after intervention of Lichtenstein varies between 0% and 4% [28].

Which technique should I choose?

Simple repairs such as the McVay or Shouldice techniques should be reserved for adolescents and young adults with a still-strong and relatively undamaged abdominal wall. Prostheses should be indicated for adults over 50, patients with underlying health conditions, in cases of bilateral hernias, large hernias, or recurrence.

For us, the Mac Vay technique remains the technique of choice, and can be offered as a first option to young men who have a unilateral hernia, a solid wall without major risk factors.

Otherwise, for large hernias (inguinoscrotal hernia), or recurrent, or bilateral, or associated with pathologies or femoral hernia, the placement of a prosthesis should be preferred.

Ultimately, the benefit of one surgical technique over another is best judged by the reduction in immediate and long-term postoperative morbidity, and above all, by patient satisfaction. The surgeon must therefore master all surgical techniques and practice the one they excel at, while respecting the anatomoclinical data of each patient.

## Conclusion

Inguinal hernias are the most common surgical condition requiring elective surgery in men during general surgery. Surgical treatment is the only solution, primarily based on repair techniques or prosthetic materials that reinforce the posterior wall of the inguinal canal without causing tension. Consequently, surgery should provide the patient with postoperative comfort, a rapid return to activities, and a low recurrence rate. The McVay technique is the preferred method, but in specific situations, the Lichtenstein procedure is the best option. Inguinal hernias remain a subject of ongoing evaluation due to the emergence of prostheses, the widespread use of laparoscopic treatments, advances in anesthesia, numerous risk factors, and, above all, the cost of care. It appears that laparoscopy helps to reduce immediate postoperative pain as well as the incidence of chronic pain [29]. It would also allow a faster resumption of normal activity [30-31].

The question to date is: is there a place for herniorrhaphy?

**Conflict of interest:** None.

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