ORIGINAL RESEARCH

Comparing the post-operative outcome in patients undergoing Lichensteins mesh repair for inguinal hernias between the Prolene Soft Mesh and the Composite Heavy Weight Prolene Mesh

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ABSTRACT

Background: Approximately 75% of all abdominal wall hernias are inguinal hernias, which are the most prevalent type of hernia worldwide.The purpose of the study was to evaluate the effects of prolene soft mesh versus heavyweight composite polypropylene mesh on post-operative pain in patients having lichensteins mesh repair for inguinal hernias. **Methods:** This study was carried out in the KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum, which is connected to KLE University's J.N.M.C. Belgaum, in the Department of General Surgery. **Results:** There was a noticeable male prevalence, with 96.67% of patients in group SG and 100% of patients in group CG being male. Group CG had a mean age of 49.50±14.03 years, while group SG had a mean age of 51.93±18.73 years (p=0.571). In group SG, the mean illness duration was 12.67±9.85 months, while in group CG, it was 15.10±8.98 months (p=0.321). Groups SG and CG had similar mean pulse rates (79.60±5.64 vs. 82.37±5.46 /min; p=0.059), diastolic blood pressure (73.73±6.76 vs. 124.33±11.94 mmHg; p=0.165), and systolic blood pressure (120.33±9.99 vs. 124.33±11.94 mmHg; p=0.165). In group SG, 56.67% of patients had the right inguinal hernia , compared to 50% in group RP (p=0.673). **Conclusions:** Compared to heavyweight composite polypropylene mesh, prolene soft mesh, or lightweight macro-porous polypropylene mesh, dramatically reduced the post-operative pain in patients having lichensteins mesh repair for inguinal hernia.

Keywords: Lichenstein's mesh, Inguinal mesh repair, Prolene soft mesh, Polypropyle

INTRODUCTION

Inguinal hernia repair is the second most common surgical treatment after appendicectomy and is among the most common general surgical operations performed globally, accounting for 10 to 15% of all surgical procedures[1, 2]. General surgeons working in nations with low resources have therapeutic problems while managing inguinal hernias[3]. Among the characteristics of the disease in developing nations include late manifestation of the illness and a deficiency of contemporary treatment options like mesh and laparoscopy[3,4] Since Bassini's 1887 publication of his pioneering account of inguinal hernia repair, numerous methods for hernia repair, including Shouldice, Darning, Desarda, Modified Bassini, Lichtenstein mesh repair and the more laparoscopic repair have been published[2,5].

Recently, laparoscopic and Lichtenstein mesh repairs have gained popularity due to their quick recovery times and low rates of recurrence[6,7]. The development of knitted, malleable PPM Prolene mesh in 1962 and monofilament knitted polyethylene plastic mesh in 1958 and 1958 respectively brought about a radical transformation in the notion of hernia repair[8,9]. The materials were invented and produced by American surgeon Francis Usher. His inventions

cleared the path for developments that are now taken for granted. PPM is still the most often used technique in both laparoscopic and open surgery. Nonetheless, Dacron, a machine-knit polyester polymer, was the first widely used nonmetallic mesh.

In 1984, the Lichtenstein repair promoted the frequent use of mesh, highlighting the Halstead concept of no tension. Positioned between the transversalis fascia and the external oblique aponeurosis, the prosthesis that strengthens the weak posterior inguinal wall extends well beyond the Hesselbach triangle. Mesh implants are passively compressed by the body's natural healing process rather than actively shrinking. Mesh shrinkage only happens in proportion to tissue contraction [10]

While the incidence of recurrence following hernia surgery has decreased to less than 1% in the last 20 years due to the use of traditional microporous or heavyweight polypropylene meshes, a major concern has been the formation of a rigid scar plate that impairs quality of life by causing patient discomfort and chronic pain. Over half of the patients who have a big mesh prosthesis in their abdominal wall report experiencing paresthesia, feeling the hard edges of the mesh, and having their ability to move their abdominal wall physically restricted[11]

Thus, lightweight composite mesh was created with the belief that the ideal mesh should be as thin as feasible, low in bulk, and only strong enough to withstand the pressure of the abdominal wall. big pore size mesh has the benefit of allowing tissue to grow through its big pores, resulting in a scar that is smaller and more integrated. The new lightweight composite meshes include a higher percentage of absorbable material, a greater pore size, a lower mass, and a smaller filament size. As a result, the patient's quality of life is improved, fewer foreign bodies are implanted, the scar tissue is more flexible with nearly physiologic abdominal wall motion, and there are less patient complaints.

Three years following surgery, the use of lightweight mesh for Lichtenstein hernia repair improved certain elements of pain and suffering but had no effect on the rate of recurrence[12]. Data from recent retrospective investigations and randomized controlled trials suggest that light meshes offer some benefits in terms of foreign body awareness and postoperative discomfort[13, 14]

In order to compare the heavyweight composite polypropylene mesh and the lightweight macro-porous prolene soft mesh for reducing post-operative discomfort in patients having lichensteins mesh repair for inguinal hernia and thus improving the outcome of surgery, the current study was conducted.

METHODS

This one-year randomized controlled experiment took place from January 2012 to December 2012 in the general surgery department of KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, Belgaum, which is affiliated with KLE University's Jawaharlal Nehru Medical College, Belgaum. Prior to starting, the study received approval from the Jawaharlal Nehru Medical College's Ethical and Research Committee in Belgaum.

The study involved 60 patients who were hospitalized for mesh repair due to an inguinal hernia. The sample size of 60 was chosen as the effect magnitude is unknown. Thirty people were assigned to the study group (lightweight macro-porous, prolene soft) and another thirty to the control group (heavy weight composite prolene mesh).

All patients undergoing mesh repair for inguinal hernias were included in the study; patients who were pregnant, subjects with uncontrolled diabetes mellitus, subjects with pulmonary tuberculosis, subjects with persistent cough, and subjects with strangulated or obstructed hernia were excluded.

Written informed consent was obtained from the patients who met the selection criteria. They were fully told about the study's purpose, particularly the advantages of utilizing both heavy and light weight mesh in lichenstein's mesh repair.

RANDOMIZATION

The patients were asked to select at random from an opaque brown envelope that contained information about the mesh options available for their hernia repair. The patients were split into two groups of thirty each, according to the choice they chose.

- Patients who chose prolene soft mesh, a lightweight mesh used in lichenstein's repair of an inguinal hernia, comprised group SG (study group).
- Those who chose heavy-weight composite polypropylene mesh were placed in group CG (Control group).

Through an interview, demographic information such as age, sex, and past was gathered. Specifics such length of time and lump size were recorded. These patients also underwent a clinical examination, and the results, which included size, location, cough impulse, and visible peristalsis, were recorded on a proforma that had been previously created and evaluated.

INVESTIGATIONS

The following investigations were conducted on the tests listed below. Hemoglobin, total leucocyte counts, differential counts, red blood cell counts, erythrocyte counts, serum creatinine, blood urea nitrogen, bleeding and clotting time, microscopy and routine urine tests, chest x-rays, and electrocardiograms are examples of routine blood counts.

PAIN CONTROLL

Following surgery, patients in both groups received the same analgesic injection—50 mg of diclofenac intramuscularly [1-0-1]—after surgery.

VARIABLES OF OUTCOME

1. PAIN: The Visual Analogue Score, which goes from 0 to 10, was used to measure pain, with 0 denoting no discomfort and 10 denoting the highest level of agony. Additionally, the pain was separated into three categories: mild (VAS score < 3), moderate (VAS score 4-6), and severe (VAS score ≥ 7).
2. RESUMING TO DAILY ACTIVITY:

FOLLOW UP

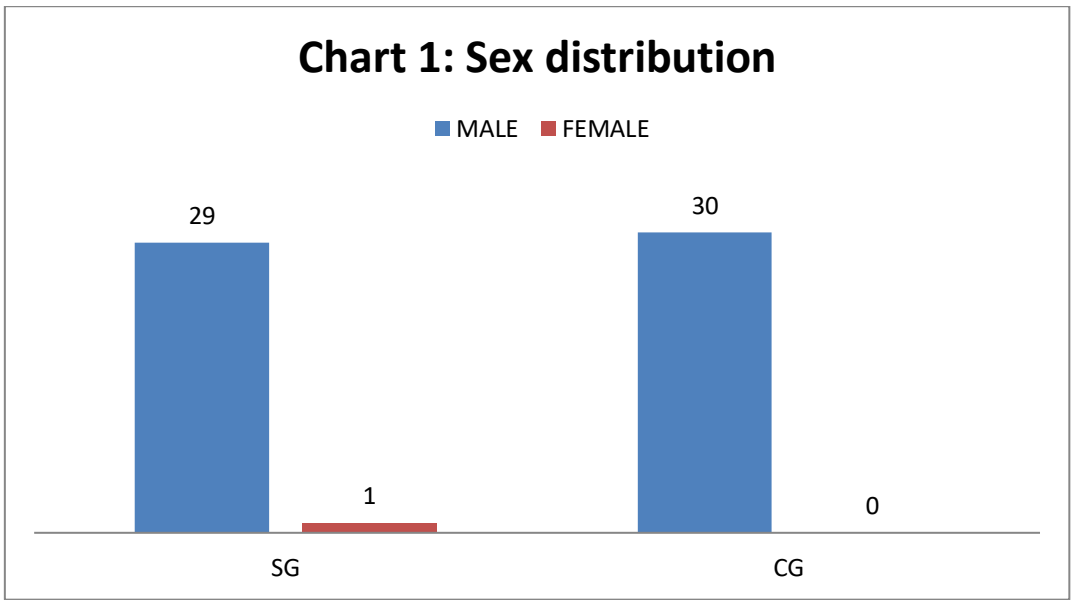
Patients were checked on at the following intervals: one week following surgery (before to release); two weeks after surgery; and four weeks after surgery.

STATISTICS

After being coded, the collected data was input into a Microsoft Excel spreadsheet. The chi-square test and Fisher's exact test were used to compare the categorical data, which were reported as rates, ratios, and percentages. The expression for continuous data was mean±standard deviation. It was determined that a "p" value of less than or equal to 0.05 was statistically significant.

RESULTS

In the current study (Chart 1), all patients (100%) in group CG and 96.67% of patients in group SG were male



In the current study (Table 1), the mean age of group SG was 51.93±18.73 years, while group CG, mean age was 49.50±14.03 years. But statistically speaking, the difference was not significant (p=0.571).

Table 1: Mean age:

	SG group (n=30)		CG group(n=30)		P-value
	Mean	SD	Mean	SD	
Age (year)	51.93	18.73	49.50	14.03	0.571

In the current investigation (Table 2), the average illness duration was 12.67±9.85 months in group SG and 15.10±8.98 months in group CG. But statistically, this difference was not significant (p=0.321).

Table 2: Mean Duration:

	SG group (n=30)		CG group (n=30)		P-value
	Mean	SD	Mean	SD	
Duration (months)	12.67	9.85	15.10	8.98	0.321

The study found that there were no significant differences in the mean pulse rate between groups SP and RP (79.60±5.64 vs 82.37±5.46 /min; p=0.059), diastolic blood pressure (73.73±6.76 vs 75.80±8.59 mm Hg; p=0.305), or systolic blood pressure (120.33±9.99 vs 124.33±11.94 mm Hg; p=0.165).

In the current study, 56.67% of patients in group SG and 50% of patients in group CG had the right inguinal hernia noted. But statistically, this difference was not significant (p=0.673).

At the study's as shown in Table 3, at th time of first follow-up, every patient in group SG experienced moderate pain, but 60% of patients in group CG and 40% of patients in group CG reported severe pain, with pain scores ranging from 4 to 6. There was a statistically significant difference (p<0.001).

Table 3: Mean VAS Score:

	SG group (n=30)		CG group (n=30)		P-value
	Mean	SD	Mean	SD	
First wk	4.50	0.57	5.97	1.07	<0.001
Second wk	2.30	0.88	4.27	1.48	<0.001
Third wk	0.63	0.72	2.57	1.79	<0.001

The majority of patients (90%) in group SG reported pain scores ≤3 (light pain) at the second follow-up, while 26.67% of patients in group CG said the same. 10% of patients in group SG reported having a pain level of 4 to 6, which corresponds to moderate pain, whereas 66.67% of patients in group CG reported having a pain score of >7, which corresponds to severe pain. There was a statistically significant difference (p<0.001).

The third follow-up, 100% of patients in group SG reported having pain scores ≤3, which is considered light discomfort, while 53.33% of patients in group CG said the same. 46.67% of patients in group SG reported moderate pain, with a pain score of 4 to 6. There was a statistically significant difference (p<0.001).

The study found that the mean pain scores in group SG were considerably lower than those in group CG during the first (4.50±0.57 vs 5.97±1.07), second (2.30±0.88 vs 4.27±1.48), and third (0.63±0.72 vs 2.57±1.79) phases (p<0.001).

In this study, group SG (3.90±0.97) and group CG (3.40±1.33) had similar mean reductions in pain scores from the first to the third follow-up (p=0.092).

The assessment of resuming to day today activities (Table 4), the SG shows more number of patients (89.65%) getting back to day-today activities at early period of within 5 day compared to CG group. While, in the CG group only 0.60% of patients show early activity.

Table 4: Resume to day today activity:

	SG group (n=30)		CG group (n=30)	
	MALE(29)	FEMALE(1)	MALE(30)	FEMALE(0)
IN 5 DAYS	26 (89.65 %)	01 (100%)	18 (0.60 %)	00 (--)
AFTER 5 DAYS	03 (0.10 %)	00 (--)	12 (0.40 %)	00 (--)

DISCUSSION

In the event of a primary unilateral inguinal hernia, the evidence-based inguinal hernia recommendations advise a Lichtenstein hernia repair, which involves reinforcing the inguinal floor with a polypropylene mesh[15]. Recurrent inguinal hernias dropped from 15-20% to less than 5% following the introduction of mesh hernia treatment[16]. This decline has led to the current focus of inquiry being prolonged postoperative pain. Even if the prevalence of persistent postoperative pain may have remained constant over time, recurrence prevention took precedence over this and received little attention.

Right now, pain is thought to be the most significant side effect. Twenty percent of patients still have discomfort three months after surgery, and 12 percent report pain that interferes with everyday activities. After surgery, 1-3% of patients still have debilitating pain a year later [16]. Research comparing the effects of heavy-weight versus light-weight meshes on pain indicate a minor benefit for light-weight meshes [17] Under local anesthesia, the Lichtenstein open tension-free mesh hernioplasty is a straightforward procedure that skilled surgical residents can carry out without sacrificing the patient's care or the procedure's long-term results. The process is simple to follow, fast, safe, and cost-effective. It has also been tested throughout time. Furthermore, it is the gold standard for open tension-free hernioplasties and has less problems [10].

In fact, there is very little pain following a Lichtenstein hernioplasty—a meta-analysis of all published randomized studies found that the pain is similar to that following laparoscopic repair [10]. The results of this study during the first follow-up indicate that a significantly higher number of patients who had their inguinal hernia repaired by lichensteins under prolene soft mesh (light-weight mesh) reported having mild to moderate pain, whereas those who had the surgery under polypropylene mesh (heavy-weight mesh) reported moderate to severe pain (p<0.001). In a similar vein, results from the second follow-up revealed a notably greater proportion of patients experiencing mild pain in those who had Lichenstein's repair of an inguinal hernia using prolene soft mesh (a lightweight mesh).

According to data from the third follow-up, patients who had Lichenstein's repair of their inguinal hernia under prolene soft mesh (a lightweight mesh) reported far less pain than those who had the procedure under polypropylene mesh (a heavy-weight mesh).

When it comes to persistent discomfort, meshes are less likely to cause it than suture repair. Rather than the mesh itself, this is assumed to be connected to the capacity to apply tension-free technique. Pain, which can arise for a number of reasons, is still a major mesh repair consequence. Though some research contest it, the majority of them support this. Additionally, some writers have hypothesized that absorbable meshes could help lessen chronic discomfort[18].

Three years following surgery, the use of lightweight mesh for Lichtenstein hernia repair improved certain elements of pain and suffering but had no effect on the rate of recurrence.10 Data from recent retrospective investigations and randomized controlled trials suggest that light meshes offer some benefits in terms of foreign body awareness and postoperative discomfort[19].

Following inguinal hernia repair, a randomized experiment investigated the potential long-term effects of lightweight (LW) polypropylene mesh (large pore size, partially absorbable) in lowering chronic pain and inflammation. Another study found that, three years following surgery, the use of LW mesh for Lichtenstein hernia repair improved certain elements of pain and discomfort[14]. After six months, using lightweight mesh was linked to significantly less pain during activity (p=0.042). The study came to the conclusion that lightweight polypropylene mesh might be better for Lichtenstein inguinal hernia repairs[20].

We conducted a meta-analysis and systematic review of RCTs to investigate if the usage of lightweight meshes affected the discomfort. Regarding severe pain, there was no discernible difference (OR, 0.99; 95% CI, 0.48-2.02; p = 0.97). The lightweight group showed a statistically significant improvement upon reporting any pain (OR, 0.65; 95% CI, 0.50-0.84; p=0.001). The study found that using lightweight mesh had no effect on the frequency of severe pain or the rate of recurrence. Nonetheless, the study suggested that lightweight meshes might be the preferred material for primary inguinal hernioplasty[21].

A different study discovered a significant reduction in the prevalence of chronic postoperative pain with lightweight mesh repair (OR = 0.72, 95% CI 0.57, 0.91). The study came to the conclusion that lightweight mesh repair does have benefits for long-term postoperative discomfort and suggested more controlled studies with better standardization of hernia types and surgical methods [22].

CONCLUSION

The current study's findings concurred with previous research demonstrating the benefit of lightweight mesh in lowering both short-term and long-term post-operative pain. Nonetheless, it's noteworthy that the average decrease in pain score between the first and third follow-ups was similar for groups SG (3.90±0.97) and CG (3.40±1.33) (p=0.092). This further supports the use of lightweight mesh in evaluating pain immediately after Lichtenstein inguinal hernia repair. The smaller sample size, however, may be the cause of the discrepancy between the significantly reduced pain levels and the lack of significance in the mean reduction in pain scores.

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