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## Evaluation of sutureless mesh repair for inguinal hernia: A prospective study

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#### Abstract

**Background and Aims:** Hernias are among the oldest known affliction of humankind. Many procedures have been developed till date to minimize or abolish tissue tension during repair of inguinal hernia. In present study we aimed to evaluate sutureless mesh repair for inguinal hernia.

**Material and methods:** The present study was conducted on 50 consecutive male patients between 20-50 years of age and having uncomplicated inguinal hernia. Patients were operated upon using sutureless mesh repair technique. During the follow up patients were evaluated in terms of post-operative complications, hospital stay, operative time and recurrence if any.

**Results:** We found that mean operative time was 39.36 ( $\pm 2.96$ ) minutes and mean total duration of stay in hospital was 1.06 days. There were no complications in the immediate period. At one week postoperatively, seroma formation, wound infection and scrotal swelling were seen in 3 (6%) cases, 2 (4%) cases and 1 (2%) case respectively.

**Conclusion:** Sutureless tension free mesh repair for the treatment of inguinal hernia cases is an effective technique in terms of decreased time of operative procedure and hospital stay, and decreased postoperative complications.

**Keywords:** Inguinal hernia, sutureless mesh repair, postoperative complications

#### Introduction

Hernias are among the oldest known affliction of humankind. Inguinal hernia is a common problem that affects a large number of people around the world with male preponderance. Hernia is a surgical disease of high significance, with 20 million inguinal hernia repairs done annually worldwide <sup>[1]</sup>.

Hernias have been a subject of interest since the dawn of surgical history. The earliest recorded reference for hernia was in 'Egyptia Papyrus of Ebers' 1522 BC. The history of hernia surgery for groin hernia has gone through many stages of development till the era of tensionless repair in twentieth century. Laproscopic repairs although can be done but have steep learning curve <sup>[2]</sup> and still open repair is the main stay of treatment.

Five principles of modern hernia repair include antiseptic/aseptic operation, high ligation of the sac, tightening of the internal ring, reconstruction of the posterior inguinal floor and tension free repair.

Tissue tension during the reconstruction of the posterior inguinal wall is thought to be the major cause of hernia recurrence. Many procedures have been developed till date to minimize or abolish tissue tension during repair such as the use of synthetic non absorbable graft "mesh" which is utilized to strength the posterior inguinal wall <sup>[3]</sup>. The use of alloplastic material for hernia repair was introduced by Stock (1954) and Usher (1962). In 1970, it was Lichtenstein who advocated and introduced his pioneer concept of tension free repair of primary inguinal hernias using synthetic mesh <sup>[4]</sup>. This method was further improved by Gilbert's tensionless and sutureless repair.

These days mainly two types of repairs are done ie sutured (traditional Lichenstein) and sutureless <sup>[5]</sup>. The technique of sutureless repair of hernia has attracted attention of many due to less morbidity and recurrence rate. Improvement in surgical techniques, together with the development of new prosthetic materials and a better understanding of how to use them, have significantly improved the outcome <sup>[6]</sup>.

However there are some conflicting opinions also regarding the use of sutureless technique and surgeons are still scared to use it completely. So, in view of literature available this present study was planned to evaluate the sutureless Technique of mesh repair for inguinal hernia in terms of post-operative complications, operative time, and cost of the procedure and hospital stay.

**Material and method**

The present study was conducted in the department of general surgery at tertiary care rural hospital after ethical committee clearance. It included 50 consecutive male patients between 20-50 years of age and having uncomplicated inguinal hernia admitted for elective surgery under spinal anaesthesia. Detailed written informed consent was taken.

Patients having complicated inguinal hernia, recurrent inguinal hernia, and bilateral inguinal hernia were excluded from the study. Patients with history of collagen vascular disease and those who had some underlying predisposing factors or co-morbid diseases were also excluded from the study.

All the patients were kept fasting for 8 hours, the operation area was shaved and cleaned one day before surgery.

The patients were brought to the operating room where a surgical safety checklist was performed. Preoperatively, 1 gram of i.v. ceftriaxone was administered to all the patients after test dose. The inguinal canal was approached from an open anterior approach after dividing the skin, scarpa fascia, and external oblique aponeurosis. The cord was examined for an indirect sac, any direct hernia was reduced, and the posterior inguinal wall was reinforced with a piece of flat polypropylene mesh of size 3” x 6”. The mesh was tailored to the individual patient requirement as an onlay patch anterior to the posterior wall of inguinal canal overlapping generously in all directions including medially over the pubic tubercle. The mesh was laid on posterior inguinal wall without any fixation. Hemostasis was achieved; external oblique aponeurosis was re-approximated using a continuous 2-0 vicryl suture, the skin was closed using an ethilon 2-0 interrupted suture. The operative field was cleaned and dried. Anti-septic dressing was done and patients were shifted to ward.

Visual analog scale (VAS) was used to evaluate the pain severity of the patients on the 1st postoperative day at 1 hr, 6 hr, 12 hr and 24 hr. First dressing was done after 24 hours. Sutures were removed on 7<sup>th</sup> post op day and all the participants were examined for complications on 1month, 3 month and 6 month.

During the follow up patients were evaluated in terms of post-operative complications, hospital stay, operative time and recurrence if any. After completing the collection of data, the data was analyzed and observations were made and results were

drawn.

**Results**

Fifty consecutive patients of inguinal hernia who fulfilled the inclusion criteria were included in the study. Distribution of patients according to age group is shown in table 1.

**Table 1:** Distribution of patients according to age group

Age-group (years)	Frequency	Percentage
20- 30	21	42
31- 40	10	20
41- 50	19	38
Total	50	100

Mean age (years)  $\pm$ SD =36 $\pm$ 10.27

Characteristics of inguinal hernia are shown in table 2.

**Table 2:** Distribution of patients according to the Characteristics of inguinal hernia

Characteristics	Total number of cases (n=50)	
	Right (n=30)	Left (n=20)
Side	Right (n=30)	Left (n=20)
Type	Direct (n=7)	Indirect (n=43)
Content	Gut (n=20)	Omentum (n=30)
Size of deep ring	Normal (n=7)	Dilated (1.5-3cm) (n=43)
State of posterior wall	Normal (n=43)	Punched out/diverticular defect (n=7)

Duration of operative procedure and hospital stay is shown in table 3.

**Table 3:** Duration of operative procedure and hospital stay

Parameters	Value
Duration of operative procedure in minutes (Mean $\pm$ SD)	39.36 $\pm$ 2.96
Total duration of hospital stay in days (Mean $\pm$ SD)	1.06 $\pm$ 0.23

Postoperative pain score at different time intervals is shown in table 4.

**Table 4:** Postoperative pain score at different time intervals

Time interval	Mean Postoperative pain score	SD
1 hour	4.12	0.79
6 hour	3.44	0.57
12 hour	2.70	0.61
24 hour	1.70	0.79

Postoperative complications at different time intervals are shown in table 5.

**Table 5:** Postoperative complications at different time intervals

Time period	Complications					
	Seroma	Infection	Scrotal swelling	Mesh removal	Paresthesia	Recurrence
Immediate postoperative	0	0	0	0	0	0
1 week postoperative	3	2	1	0	0	0
1 month postoperative	0	0	0	1	0	0
3 months postoperative	0	0	0	0	0	0
6 months postoperative	0	0	0	0	0	0

**Discussion**

Different types of repair have been described for inguinal hernia repair but due to conflicting opinions the efforts to find new techniques are still going on. The main factor underlying these searches is to decrease the recurrence rates. Other factors to consider are applicability, complication rates, hospital stay, and

overall cost-effectiveness of the techniques [7, 8].

All the failures in surgical reconstruction techniques were ascribed to the basic principle, tension on the suture line. With the use of modern prosthetic materials, it has now become feasible to perform all hernia repairs with minimal alteration in the normal anatomy and without tension.

The ideal mesh should be biocompatible and its fixation should not produce any structural damage so that there are fewer chances of complications like seroma and hematoma formation. Conventionally, the mesh is usually secured by sutures. Although these hernioplasties are considered to be tension free but still sutures can strangulate muscle fibres, compress regional nerves, or give rise to a lesion leading to disabling pain or dysesthesia [9-15].

Sutureless hernioplasty is believed to be associated with less tension in the suture line. A better levelling leads to better embodiment of mesh without formation of dead space, chances of nerve entrapment and hence post-operative complications are reduced with better post-operative recovery and a decrease post-operative hospital stay [5].

In the present study, mean age of the patients was 36 years (table 1). Our results were in concordance with the results obtained by Ghafoor T *et al*, who also reported similar findings in their study. Mean age of the patients in their study was 38.03 years.<sup>6</sup>

The majority of the cases in the present study. i.e. 60 percent of the patients had right inguinal hernia, whereas the remaining 40 percent of the patients had left inguinal hernia (table 2). Our results were in concordance with the results obtained by Nordback I *et al*, who reported that 44.1 and 33.1 percent of the cases of their study group were of right and left hernia respectively [16].

In the present study, majority of the cases (86 percent) were of indirect hernia (table 2). Our results were in concordance with the results obtained by Ersoz F *et al*, who reported that 62.8 percent of the patients were of indirect hernia [17].

In the present study, in 60 percent of the cases, the content of the hernial sac was omentum, while in the remaining 40 percent of the cases, the content was gut (table 2). In one of the previous study conducted by Ghafoor T *et al*, authors reported that gut was present in the hernia sac in 46.6 percent of the cases [6].

In our study 86% of cases came under L2 class of Schumpe lick classification, which corresponds to type 2 of Gilbert classification. Deep ring was dilated (1.5 to 3 cm) in 86 percent of the cases, while it was normal in remaining 14 percent of the cases (table 2). All these 86% cases were of indirect hernia. Our results were in concordance with the results obtained by Vincent PJ *et al* who also reported that in 61 percent of the cases of inguinal hernia in their study, dilated deep ring was present [18].

In the present study, punched out/diverticular defect in transversalis fascia was found to be present in 14 percent of the cases, while posterior wall was found to be normal in 86 percent of the cases (table 2). On further analysis, it was observed that all the hernia cases with punched out/diverticular defect in transversalis fascia were of direct type. All of these 14 cases came under class 5 of Gilbert classification [19].

Mean duration of operative procedure in the present study was found to be 39.36(±2.96) minutes, with maximum of 45 and minimum of 29 minutes (table 3). Our results were in concordance with the results obtained Ersoz *et al*, who reported that, mean procedural time for suture less mesh repair of inguinal hernia in their study was 32.4 minutes [17].

Mean postoperative pain score at 1 hour, 6 hour, 12 hour and 24 hour was 4.12, 3.44, 2.70 and 1.70 respectively (table 4).. Our results were in concordance with the results obtained by Al-Tammimi AS, who reported that mild post-operative pain appeared in 70% of patients [3].

Lionetti in his study compared suture less hernioplasty with Lichtenstein hernioplasty. He reported that average VAS scores were significantly lower in suture less hernioplasty than in Lichtenstein hernioplasty [20].

Mean hospital stay in our study was 1.06 days (table 3). In 47 cases, patients were discharged after 24 hours of surgery. However; in 3 cases, postoperative pain, as assessed by VAS, was significantly higher after 24 hours. So, these 3 patients were discharged after 48 hours postoperatively. Our results were in concordance with the results obtained by Ersoz F *et al*, who reported that mean hospital stay was 1.14 days in their patient group [17].

There were no complications in the immediate period. At one week postoperatively, seroma formation, wound infection and scrotal swelling were seen in 3 (6%) cases, 2 (4%) cases and 1 (2%) case respectively (table 5). At one month postoperatively, mesh had to be removed in 1 case (2%). No complication was seen at 3 months and 6 months postoperatively (table 5). Our results were in concordance with the results obtained by Ersoz F *et al*, who also reported similar findings. In their study, at one week postoperatively seroma formation and scrotal edema was found to be present in 9.1% and 7% cases respectively [17].

In another study conducted by Ghafoor *et al*, seroma formation, wound infection and scrotal swelling occurred in 5.5%, 3.3% and 2.2% of the cases respectively [6]. In another study, conducted by Al-Tammimi AS, post-operative wound infection was present in 6 percent of the cases. The incidence of post-operative heavy uncomfortable large scrotal swelling was 6.5% [3].

Seroma formation is common with the use of synthetic mesh in hernia repairs, and is probably a physiological reaction to the foreign body. In our study the wound seroma that developed in 3 patients (table 5), resolved within 1-2 weeks with conservative management without aspiration. Surgical site infection that developed in 2 patients was treated with oral antibiotics and regular dressings in one patient and in the second case the mesh was removed at 1 month post operatively. Scrotal edema developed in one patient and responded well to conservative treatment employing scrotal support, oral antibiotics and nonsteroidal anti-inflammatory drugs. There was no recurrence over a period of 6 month follow up in any of our cases.

Chronic post herniorrhaphy groin pain is defined as a persistent postoperative pain that fails to resolve 3 months after surgery. In the studies in which mesh was fixed, entrapment of the ilioinguinal, iliohypogastric or genitofemoral nerve was thought to be responsible for the pain, neuralgia and paresthesia. In our study these complications were found in 0% cases, upto six month of follow up. In a study Alfieri S *et al* reported that postoperative chronic pain was present in 9.7% after 6 months and in 4.1% of cases after 1 year [21]. Mean cost of procedure in the present study was 7163.80 INR.

Hence authors are of the opinion that sutureless tension free mesh repair technique is associated with low morbidity and complication rate and hence it can be used safely for inguinal hernia repair. The main advantage of a tension-free sutureless repair is given by the relevant reduction in postoperative chronic neuralgia, which is a common complication and, depending on its intensity, can also potentially compromise a patient's work and social activities.

But this study has some inherit limitations like small size study group and a limited period follow-up of 6 months only. Large multicentric studies with longer period of follow-up can be planned to validate the results of present study.

## Conclusion

So from the present study, it may be concluded that sutureless tension free mesh repair for the treatment of inguinal hernia cases is an effective technique in terms of decreased time of

operative procedure and hospital stay, and decreased postoperative complications.

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