



## Comparative Study of Skin Staples and Polypropylene Sutures for Securing the Mesh in Lichtensein Tension Free Inguinal Hernia Repair

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### ABSTRACT

**Background:** *Since time immemorial, inguinal herniorrhaphy is one of the oldest and commonest operations in the surgeon's technical armamentarium. Since the first true herniorrhaphy was performed by Bassini as early as 1887 AD, modifications and surgical techniques have shared a common disadvantage: suture line tension. To use this already defective tissue particularly under tension is counter-productive and total reinforcement with a sheet of mesh securing the areas much beyond the boundary of Hasselbach's triangle is much more effective procedure<sup>3</sup>. With the use of modern mesh prosthetics, it is now possible to repair all adult inguinal hernias without distortion of normal anatomy and with no suture line tension.*

**Aims and Objectives:** *To compare the use of skin staples versus polypropylene sutures to fix the mesh.*

**Settings and design:** *This is a prospective study carried out in SSG Hospital from July 2002 to April 2005.*

**Materials and Methods:** *This study comprised of 54 patients undergoing 60 repairs randomized into stapler group and polypropylene group.*

**Results:** *The duration of surgery and length of hospital stay in the group with mesh fixation by staples was less as compared to mesh fixed by polypropylene sutures. Also the complication rate was less as compared to the other group.*

**Conclusion:** *It can be concluded that in a set up like ours, catering to poor and rural patients, this technique of mesh fixation is as effective as conventional fixation with polypropylene sutures with an important added advantage, which was significant, and that is reducing the operative time, being less painful and providing good fixation of mesh and the most important, early return to work.*

**Keywords:** *Hernioplasty, Polypropylene mesh, Staples, Lichtenstein.*

### Introduction

Inguinal hernias in adults are associated with disorders of collagen in the fibro-connective tissue of the groin, which leads to the weakening of

transversalis fascia and hence leads to development of hernia<sup>1</sup>.

To use this already defective tissue particularly under tension is counter-productive and total

reinforcement with a sheet of mesh securing the areas much beyond the boundary of Hasselbach's triangle is much more effective procedure<sup>3</sup>. With the use of modern mesh prosthetics, it is now possible to repair all adult inguinal hernias without distortion of normal anatomy and with no suture line tension.

With the mesh repair, the wide overlapping results in uniform distribution of intra-abdominal pressure over much wider surface of overlapped area. But still there were chances of recurrence because of multiple reasons but technically it was because of improper fixation, particularly, in areas of pubic tubercle and internal ring<sup>4</sup>. Therefore the stress was laid on proper fixation of the margins of the mesh to the groin tissue<sup>4</sup> so as to prevent recurrence as it has been seen that there is a tendency for mesh to fold, wrinkle or curl around the cord and even shrinkage.

As a result, the following study was designed to compare the use of skin staples versus polypropylene sutures to fix the mesh. This comparison was done to study the feasibility, accessibility and ease of use of stapler in fixing the mesh, to study the duration of hernia repair using staples as compared to polypropylene sutures, to study the duration of post operative hospital stay in both the stapler and polypropylene groups and to study the duration of pain and complications post-operatively in both the stapler and polypropylene groups.

### Materials and Methods

This study was carried out in the Department of Surgery, SSG Hospital, Vadodara between 2002 to 2005.

All adult patients with primary inguinal hernias were included. Complicated hernias (e.g obstruction, strangulation) and recurrent hernias were excluded. Patients were randomized either to the staples group (where the mesh was secured with staples) or the polypropylene group (where the mesh was sutured with polypropylene sutures). Informed consent was obtained. Basic blood chemistry including haemoglobin was done.

Baseline ECG & Chest X-rays were done if indicated. A single dose of intravenous cefotaxime 1 g was administered 1 hour prior to surgery.

### Method of surgery

The skin incision is deepened down to the external oblique aponeurosis. About 5-8 ml of local anaesthetic agent is injected under the external oblique aponeurosis, which serves to flood the inguinal canal and anaesthetize the three nerves, and the cord with its cremaster covering is elevated from the floor.

Care must be taken to include the external spermatic vessels when elevating and dissecting the spermatic cord from the floor of the inguinal canal. Cremasteric fibers are transversely incised at the level of the internal ring to thin out the cord. Indirect hernia sacs are dissected free and then opened for digital examination of the femoral ring. The sac is then inverted into the preperitoneal space without excision or ligation. In the case of a large direct hernia, after the femoral ring is examined through a small opening in the canal floor, the sac is simply inverted by the use of an absorbable suture.

A precut sheet of polypropylene mesh 8 x 16cm (3x6 inches) is used. If necessary, it is trimmed to accommodate the varying sizes of the inguinal floor. The medial end of the mesh is rounded to the shape of the medial corner of the inguinal canal. With the cord retracted upward, utilizing a running suture of nonabsorbable monofilament material or staples as per the group, the rounded corner is fixed to the aponeurotic tissue over the pubic bone medial to the pubic tubercle. The mesh must overlap the pubic bone by 1.5-2cm. The periosteum of the bone is avoided.

A slit is made in the lateral end of the mesh creating two tails, the wider one (2/3) above, the narrower one (1/3) below. The upper wide tail is grasped with a hemostat and passed cephalad underneath the spermatic cord. This maneuver positions the cord between the two tails of the mesh in its final position between the cord and the canal floor.

The wider upper tail is then placed over the narrower one and held in a hemostat. The upper Leaf of the external oblique aponeurosis is freed from the underlying internal oblique aponeurosis and muscle to accommodate a 6-8cm wide sheet of mesh. With the cord retracted downward, the upper edge of the mesh is fixed to the internal oblique aponeurosis or muscle utilizing a few interrupted absorbable sutures or staples while avoiding injury to, or entrapment of, the iliohypogastric nerve. Using a staple or single nonabsorbable monofilament suture, the lower edges of the two tails are fixed to the shelving margin of Poupart's ligament just lateral to the completion knot of the lower running suture. This creates a new internal ring made of mesh. The crossing of the two tails produces a configuration similar to that of the normal transversalis fascia sling, which is assumed to be largely responsible for the normal integrity of the internal ring.

The tails are trimmed leaving approximately 3-4cm of mesh beyond the internal ring. These are tucked underneath the external oblique aponeurosis, which is then closed over the cord using absorbable suture material. Skin is closed with nylon or staples.

Post-operatively, patients were observed for 4-5 hours until they had emptied their bladders, and were discharged home when considered safe. Some patients were kept in hospital overnight for social, as opposed to surgical reasons. Patients were reviewed in outpatient clinic 7 days after surgery, for stitch/clip removal and information concerning wound complications, duration of pain and return to normal activities.

Statistical analysis was performed using the students unpaired "t" test Patients were followed up at 1 month, 3 months, 6 months, 9 months , 1 year and then at 6 months interval and evaluated for neuralgia and recurrence at each follow-up. Some patients were reminded by post to come to the hospital for follow-up.

## Observations and Results

There were 27 patients in each group. The distribution of age, sex, side of hernia and type of hernia is given in Table 1.

**Table 1:** Distribution of patients in both groups

	STAPLES	POLYPROPYLENE
Median(range) age (yrs)	40(20-80)	35 (20-70)
Sex(M : F)	23:04	27:00
Type of Hernia		
Right: Left	12: 12	17:07
Bilateral	3	3
Direct: Indirect	15: 15	11 : 19

**Table 2:** Duration of hernia repair in both groups

	STAPLES GROUP ( min + s )	POLYPROPYLENE GROUP ( min + s )	P
Start to beginning of mesh insertion	30 (20-45)	29.30 (20-47)	>0.10
Beginning of mesh insertion to end	12.30(09-20)	24(20-30)	<0.001
Total operation time	42.30 (31-64)	54.30 (38-72)	<0.001

(Values are Median (Range))

**Table 3:** Length of post-operative hospital stay

	STAPLES	POLYPROPYLENE	TOTAL
Day Case	09	08	17
1 Day	10	09	19
> 2 Nights	08	10	18

The median duration of pain was same (2 days) in both the groups.

The stapler group returned to work at median 12 days compared with 14 days in polypropylene group. This difference was statistically insignificant.

**Table 5:** Complications in both groups

Complication	Staples (n=30)	Polypropylene (n=30)	Total (n=60)
Seroma	4 (13.3%)	5 (16.6%)	9(15%)
Heamoma	0	0	0
Wound gaping	0	1 (3.3%)	1 (1.6%)
Swelling & Induration	8 (26.6%)	7 (23.3%)	15 (25%)
Testicular atrophy	0	0	0
Neuralgia	0	0	0
Mesh infection	0	0	0
Recurrence	0	0	0

Most of our patients were poor, uneducated agricultural labourers who came from villages nearby Baroda. Hence, maintaining a regular follow up with all these patients was very difficult task. Our main aim was to keep three monthly follow up. However we were not successful in encouraging all of our patients for the same.

The median follow up in each group was 12 months (3-24 months). Twenty patients in stapler group and 21 in polypropylene group are maintaining a regular follow up. Patients lost in follow up were 7 (25.9%) in stapler group and 6(22.2%) in polypropylene group.

### Discussion

The observations, in our study of 60 inguinal hernia surgeries using Lichtenstein's "tension-free" hernioplasty done at SSG Hospital, which includes both stapler and polypropylene repairs, are being analysed and discussed as follows:

The median age was 40 in stapler group and 35 in polypropylene group, range being 20 to 80 years. Most of the studies in the literature report the same age range of 20 to 80 years. There were 4 female patients (7.4 %) out of total 54 patients. This correlates with the 8-10 % incidence of female patients as reported in other studies.

The majority of our patients (78 %) were agricultural labourers. It is stated that the incidence of groin hernias is the same in sedentary workers involved in clerical jobs and in those involved in heavy manual work indicating that strenuous physical activity alone does not cause hernias.

Most of our patients (n=53) were operated under spinal anaesthesia, intraoperatively, 10 % of patients in each group had combined (Pantaloon) variety of sac. All of these patients were diagnosed to have direct hernias pre-operatively. There were no sliding hernias.

Indirect hernial sacs were freed beyond the neck of the sac, opened and examined, transfixated and reduced into the abdominal after cutting the excess distal sac. In the event of direct hernias, the

sac, if large, was inverted using an absorbable suture.

The median duration of operation in the stapler group was 42 min 30 sec compared with 54 min 30 sec in the polypropylene group, resulting in a difference of 12 minutes ( $P<0.001$ ). There was a significant difference ( $P<0.001$ ) in time from beginning of mesh insertion to end of operation between the stapler group and polypropylene group. Results of the study are given in Table 1. The combined average operating time of our study was 48 min 36 sec.

Thirty-six patients (66.7 %) in our study were discharged within 24 hrs of operation. Ten patients (18.5 %) had to be kept for 7 days as these patients had come from far off places.

In our study none of the 36 patients treated as day case surgery required more than one Intra muscular analgesic postoperatively. The Royal College of Surgeons of England has suggested that to qualify for day case surgery, patients should not require parenteral analgesia after discharge. The implications of day case treatment and early ambulation are considerable.

The patients can return home the same day without incurring hospital bed costs, if ambulatory hernia surgery is done correctly and carefully, patient will be grateful and appreciative and society will benefit by freeing up limited hospital resources for the critically ill<sup>5</sup>.

There was no difference in pain duration in both the groups of our study. No cases of neuralgia were observed in our study.

The median days of return to work were 12 days in stapler group and 14 days in polypropylene group, the difference in return to work in our study was not significant ( $P>0.10$ ).

Most of our patients (66%) were treated as ambulatory day case surgery. Most of the studies also report day case surgeries while others reported a median hospital stay of 1 -2 days.

There were no differences in complications between suture group and polypropylene group.

### Conclusion

The technique of Lichtenstein tension-free repair is simple, relatively easier to learn and less technically demanding as compared to other methods of inguinal hernia repairs, particularly the Shouldice Repair which has until recently been the gold standard recommended by the Royal College of Surgeons of England.

Out here a different way of securing the polypropylene mesh, as described by Egger, has been used in our study. The staples placement was done by routine skin stapler, providing good penetration into the tissues, including the pubic tubercle, with secure fixation of the mesh.

As seen in our study, earlier rehabilitation was possible in our patients and they could go back to work within three weeks of operation.

Thus, in this study of ours, in a smaller number of patients, in a set up like ours, catering to poor and rural patients, this technique of mesh fixation is as effective as conventional fixation with polypropylene sutures with an important added advantage, which was significant, and that is reducing the operative time, being less painful and providing good fixation of mesh and the most important, early return to work.

Although in our set-up the cost of consumables per operation is increased when both mesh and staples are used. However we have economised the cost to a larger extent and ultimately this cost should be carefully weighed against the more efficient use of operative time with reduced wound infection and almost no recurrence. Still much has to be studied as this is a smaller group of patients.

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