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Comparative study of use of self-gripping polyester mesh verses suture fixed polypropylene mesh in Lichtenstein hernioplasty in inguinal hernia

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Abstract

Introduction: Inguinal hernia is a very common disease. It is estimated that at least 5% of the population will develop a groin hernia in their lifetime, making groin hernia repair one of the most common operations performed by general surgeons. The only way to treat inguinal hernia is surgery.

AIM: The aim of our study is to compare the outcome after Lichtenstein's inguinal hernia repair using conventional mesh v/s self-fixating Pro grip mesh. The primary endpoint of the study will be the incidence of post-operative pain.

Objectives

1. To compare the outcome in terms of operative time.
2. To compare the postoperative pain.
3. To compare the duration of hospital stay.
4. To compare the incidence of inguinodynia.
5. To compare the incidence of recurrence.

Methods: 60 patients with diagnosis of inguinal hernia underwent open hernioplasty after being randomized in to two groups, one half of them using Pro grip mesh and other group using Polypropylene mesh in a period of one year duration at Department of General surgery at IGIMS Patna.

Operative data were recorded and the patients were followed-up accordingly.

Result: The present study concluded that Self Gripping Mesh (Pro grip) repair is superior to Polypropylene Mesh in short term outcomes and in certain long terms outcomes like chronic groin pain.

Conclusion: Open Inguinal hernioplasty using Self Gripping Mesh (Pro grip) has better outcome in terms of operative time, Post-operative pain, Hospital stay, Early return to professional life and chronic pain.

Keywords: Open hernioplasty, operative time, pro grip mesh, polypropylene mesh, post-operative pain

Introduction

Surgery for inguinal hernia is one of the most common operations seen in clinical practice [1]. Improved surgical techniques and better understanding of the anatomy and physiology of the inguinal canal have significantly improved outcomes for many patients. For any successful management of hernia problem better to understand its pathophysiology. In this context some important factor related to the physiology of the inguinal canal or factors that prevent herniation still exist. Lateral and superior displacement of the internal ring beneath the transverse abdominis muscle and approximation of the cura results in a shutter mechanism at the internal ring [2]. When the arcuate fiber of the internal oblique and transverse abdominis muscle are contract, they tighten and move near to inguinal ligament (shutter mechanism) at the inguinal canal [3, 4]. Upward and downward movement of transverse abdominis muscle needs proper explanation. The term obliquity of the inguinal canal is not the perfect term since the spermatic cord is lying throughout its course on the transversalis fascia, repeated act of trying that leads to increasing intra-abdominal pressure do not increase the incidence of hernia in new born inspite of absent obliquity of the inguinal canal or shutter mechanism. Similarly, every individual with a high arch or a patent processus virginals does not develop hernia [5]. Factors to prevent herniation are not restored in the traditional technique of inguinal hernia repair and yet 70-98% of patients are cured. Inguinal hernia repair has been evolving for the past centuries and the pace of evolution accelerated in the last decade with introduction of the tension -free repair,

laparoscopic repair and with organizing the specialized hernia clinics. Lichtenstein presented has since become the most frequently use one [6]. Previously Lichtenstein technique was unsuitable to performed but refined and revolutionized over most several decades as a result its reduce risk of morbidity. Surgeons quickly popularized this technique of tension free mesh repair, and it became the gold standard for the treatment of inguinal hernias. Modification started from the non-absorbable sutures to absorbable suture, glues and now self-fixating system. Fixation of the mesh with sutures is a tedious procedure and accounts for the majority of the operative time. A self-gripping semi-absorbable mesh has been developed for the anterior tension free inguinal hernia repair.

Pro grip mesh is a self-gripping mesh indicated for the use in inguinal and incisional hernia repairs. It is designed to offer patients greater comfort following surgery and allow surgeons the ability to position and secure the mesh in less than 60 seconds, which may contribute to the reduction of operation time [7]. The macro porous polyester mesh has reabsorb able polylactic acid (PLA) micro-hooks on one side of the mesh, which secure quickly without sutures, tacks, fibrin glue, or any other forms of fixation and provides tissue gripping properties during the following 12 months. The flap is made of the same fabrics as the mesh, i.e. polyester and PLA micro hooks. After reabsorption of the PLA part of the mesh, only the low weight polyester fabrics remain in groin area providing the long term wall reinforcement.

Material and Method

This study was single -center, randomized, comparative two group study. It compare between two meshes used in hernia repair by self-gripping mesh (Pro grip) and polypropylene mesh. It was conducted on 60 patients admitted with the diagnosis of inguinal hernia. The present study was done at Department of General Surgery at IGIMS, Patna between march 2019 to march 2020 with a follow up period of 3 months.

The diagnosis of Inguinal hernia was made on basis of history of reducible inguinal swelling, positive coughs impulse and not possible to get above swelling on clinical examination. Detailed history was collected including age, chief complaints and duration, history of previous abdominal surgeries, family history, occupation, marital status and others associated conditions etc. Detailed physical examination was conducted by any experienced surgeon.

Inclusion Criteria

1. Direct inguinal hernia
2. Indirect Inguinal hernia.
3. Irreducible Inguinal hernia.

Exclusion Criteria

1. Strangulated inguinal hernia.
2. Obstructed inguinal hernia.
3. Infected inguinal cases.

Alternate patients are divided in Group A (Self gripping Polyester Mesh) and alternate patients in Group B (Prolene Mesh).

Group A: (Pro grip): This group included 30 patients in whom self-gripping polyester mesh with absorbable polylactic acid micro hook will be used without suture fixation for inguinal

hernia repair.

Group B: (Polypropylene Group): This group included 30 patients in whom Polypropylene mesh will be used and mesh will be fixed with polypropylene suture 1-0 for inguinal hernia repair.

Operative Technique

Under spinal anesthesia, the operation was performed with patient in the supine position. After giving skin incision, inguinal canal opened and dissection of hernial sac with herniotomy was performed. The self-gripping flap of the mesh is released and loosely closed around the cord away from deeper part of the wound. The mesh is carefully oriented to its final position. The fixation is achieved by applying pressure on the mesh, starting caudally on the pubic bone, then medially onto the internal oblique structures. No suture are taken to fix the mesh. The cranial part of the mesh is fixed under the external oblique apo-neurosis by digital manipulation, exercising care in order to avoid folding the mesh. Lastly, the mesh is pushed down to towards the inguinal ligament and the lateral part is allowed to fold onto the deep aspect of the divided external oblique apo-neurosis. In its final position, the mesh is anchored into the tissue both at the transversalis structures, as well as to the ligament and external apo-neurosis.

Post-operative care and follow-UP

Operating time measured as the time of total procedure i.e. starting from skin incision till the final suture taken for skin closure.

The patients were followed up for postoperative pain which was evaluated using visual analogue scale.

Presence of any swelling at wound site, discharge, discoloration or scrotal swelling was documented. Patients were assessed for postoperative pain using visual analogue scale on day 1, day 2 and on day 7. Patient was asked to ambulate as early as possible after effect of spinal anesthesia wore off. Postoperative duration of hospital stays and recurrence rate was also documented.

Patients were discharged if they have no wound infection, ambulatory, taking orally, felt comfortable and requested for discharge. Sutures were removed on 8th to 10th post-operative day. Chronic pain was defined as pain persisting beyond the normal tissue healing time more than 3 months.

Patient were followed up at 1 month, 3 months and 6 months interval to record any late complication such as seroma and recurrence of hernia.

Results

Total 60 patients of inguinal hernia were admitted and divided by alternate patients using self-gripping Pro grip mesh (PG) or Polypropylene mesh (PPL) in two group. all data collected and stastically analyzed and values were reported as mean, average and percentage. The observation made in this study between self-gripping mesh (Pro grip) and Polypropylene group were as follow. Mean age in our study was 45.5 years ranging from 25-68 yrs.

Comparison of Operative Time

Operative time for Lichtenstein's Inguinal hernia repair using conventional mesh was 38.16 min (average) while using self-gripping mesh was 25.2min (average).

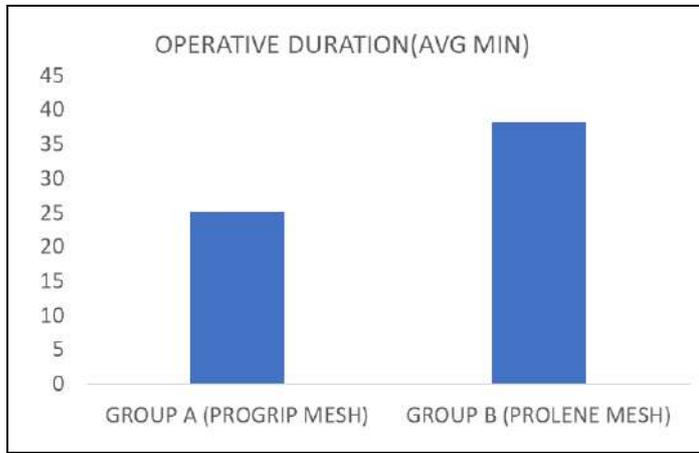


Fig 1: Operative Time for Lichtenstein’s Inguinal hernia repair.

Comparison of Post- Operative Pain

Post -operative pain was considered as the most frequent and disabling complication of hernia repair. In our study post-operative pain was scaled on the basis of VAS (visual analogue scale) shows mean of VAS score in group A on 1st, 2nd and 7th day were 4.36, 2.46 and 1.36 and in group B 5.43, 3.4 and 2.23 which were less in Group A compared to Group B.

Comparison of Chronic Pain

The patients in both groups were followed up after discharge for a period of 3 months with regular OPD checkups. The overall incidence of chronic pain which persist for more than 3 months (Inguinodynia) in group A were 40% (n=12) while that in group B were 70% (n=21).

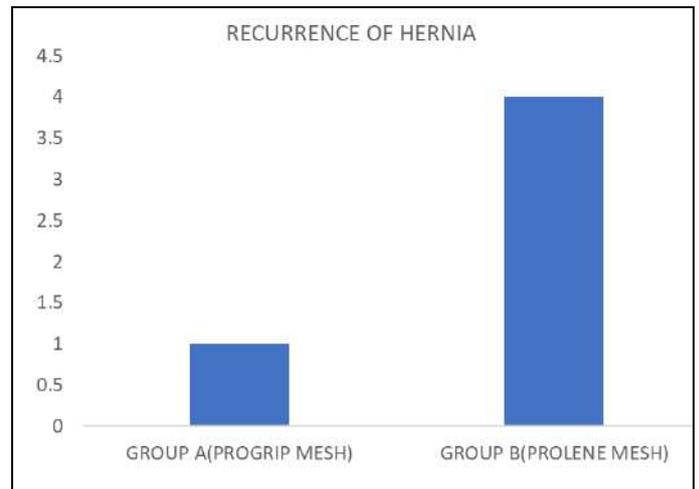


Fig 4: Comparison of chronic pain.

Comparison of Recurrence of Hernia

Recurrence of hernia in group A were 3.33% (n=1) and in group B 13.33% (n=4).

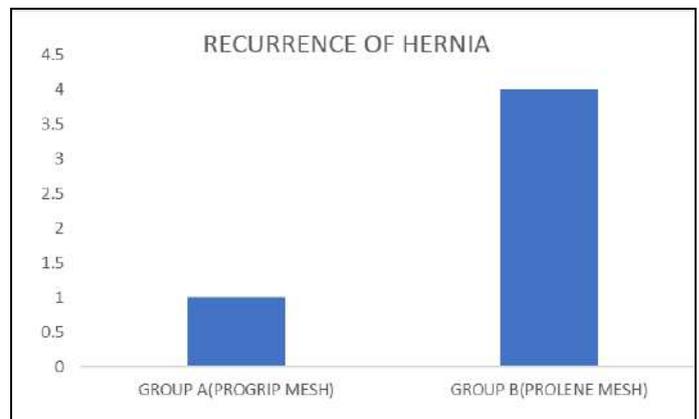


Fig 5: Comparison of recurrence of hernia.

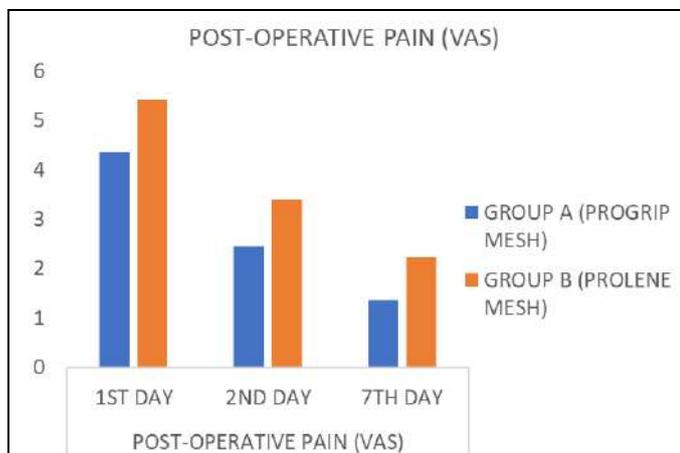


Fig 2: Comparison of post- operative pain (VAS score).

Comparison of Post - Operative Stay

Post-operative stay in group A for 1 day were 93.3% (n=28), 2nd day 6.7% (n=2) and in group B stay for 1 day were 0%, 2nd day 16.67% (n=5) and for 3rd day 83.33% (n=25).

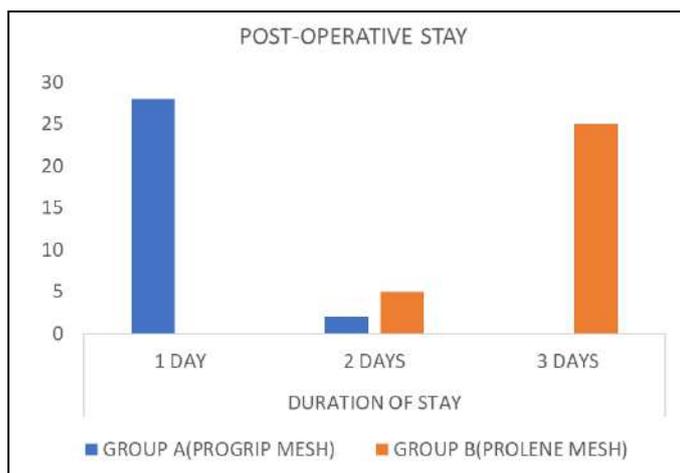


Fig 3: Comparison of post -operative stay.

Discussion

The use of mesh has now become the standard of care in repair of inguinal hernia because mesh implantation is known to reduce recurrence by 50%. It has been observed that choice of the prosthesis in hernia repair is far more important than technique as a determinant of outcome.

Among the several tension free techniques, the Lichtenstein’s method has gained remarkable popularity due to its advantages of easy to perform, better patient comfort and less tissue dissection [8]. Because of the fact that the rate of chronic pain is higher than the rate of recurrence after open inguinal hernia repair, the tension free inguinal hernia repair introduce questions concerning the long term safety of implantation of mesh material, especially the risk of chronic pain [9]. Different studies reported the rate of prolonged pain after hernia surgery from 9.7% to 51.6%; [10, 11] furthermore, the incidence of persistent post-operative inguinal pain that interferes with daily activities is reported to be as high as 6% [12, 13].

A new self- gripping mesh (Parietene Pro grip) has been

developed; this self-gripping mesh is made of lightweight isoelastic large pore knitted monofilament polypropylene fabric that incorporates resorbable micro grips to provide self-gripping fixation during the first few months after implantation^[14].

The micro grips are club shaped 1mm projections that are made of biodegradable polylactic acid. The micro grip integrates into the tissue for 0.5mm below the rim of the mesh and provide stronger tissue incorporation at 5days than fixation with staples^[15]. Fixation is, therefore, greatly facilitated without the requirement for sutures that can penetrate underlying tissue and damage cutaneous nerves. The objectives of this study was to compare the results of inguinal hernia repair between the self-gripping meshes and conventional sutured Lichtenstein meshes, with chronic pain as the main endpoint, and with other post-operative complications as secondary.

In present study, total operative time taken was 38.16 minutes for Polypropylene mesh (group B) and 25.2 minutes for self-gripping mesh (group A). The mean difference between the two groups with respect to operative time in the current study was 12.96 minutes. The duration of surgery was shorter in the group A (self-gripping mesh). However, it is variable and individual surgeon dependent.

In DL Sanders *et al.* study operative time in polypropylene mesh group was 43 minutes and in self-gripping mesh group was 35.4 minutes. L N Jorgensen *et al.* and Yilmaz A *et al.* in their study found statistically significant difference between the two group. In Yilmaz A *et al.* study operative time in polypropylene mesh group was 58.3+15.2 minutes and self-gripping mesh group it was 29.9+4.2minutes.

Chastan P *et al.* found post-operative pain scores in self-gripping mesh group it was 1.1+1.2. In Yilmaz A *et al.* study post-operative pain score in polypropylene group was 1.43+1.04 and in self-gripping mesh group it was 2.07+1.20. In Sanders DL *et al.* study post-operative pain in polypropylene group was 8.6 and in self-gripping mesh group it was 1.3. In present study, post-operative pain (VAS score) were less in self-gripping mesh (group A) on 1st, 2nd and 7th day compare to polypropylene mesh (group B).

In present study the mean duration of post-operative stay in polypropylene mesh group (B) was 2.0 days while that self-gripping mesh group A was 1.5 days. Mean difference between two groups with respect to post-operative stay in the current study is 0.5 days. Jorgensen LN *et al.*, Yilmaz A *et al.* Sanders DL *et al.* found duration of hospital stay in polypropylene group and in self-gripping mesh group was not statistically significant. Chastan P *et al.* found there is no incidence of chronic pain in self-gripping mesh group. In present study, the chronic pain (pain persist for more than 3 months) in self-gripping mesh (group A) were 30% (n=9) less compared to polypropylene mesh (group B) 70% (n=21).

In present study, the recurrence rate of hernia in self-gripping mesh (group A) were 3.33% (n=1) which was very less compared to polypropylene mesh (group B) which was 13.33% (n=4).

Conclusion

Open inguinal hernioplasty using self-gripping (Pro grip - Covidien) mesh been better outcome in terms of operative time, post-operative pain, hospital stay, early to return to professional life and chronic pain, but a greater number of randomized control trails and multicenter trails need to be undertaken to study the pros and cons of this procedure in future.

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