" A COMPARISON OF POLYPROPYLENE VERSUS POLYDIOXANONE (PDS) FOR MESH FIXATION IN ASSESSING POSTOPERATIVE PAIN USING VISUAL ANALOGUE SCALE IN INGUINAL HERNIA REPAIR"

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Endorsement

This is to certify that the dissertation entitled **"A COMPARISON OF POLYPROPYLENE VERSUS POLYDIOXANONE (PDS) FOR MESH FIXATION IN ASSESSING POSTOPERATIVE PAIN USING VISUAL ANALOGUE SCALE IN INGUINAL HERNIA REPAIR"** is a bonafide research work done by **REG NO: BH0119012.**

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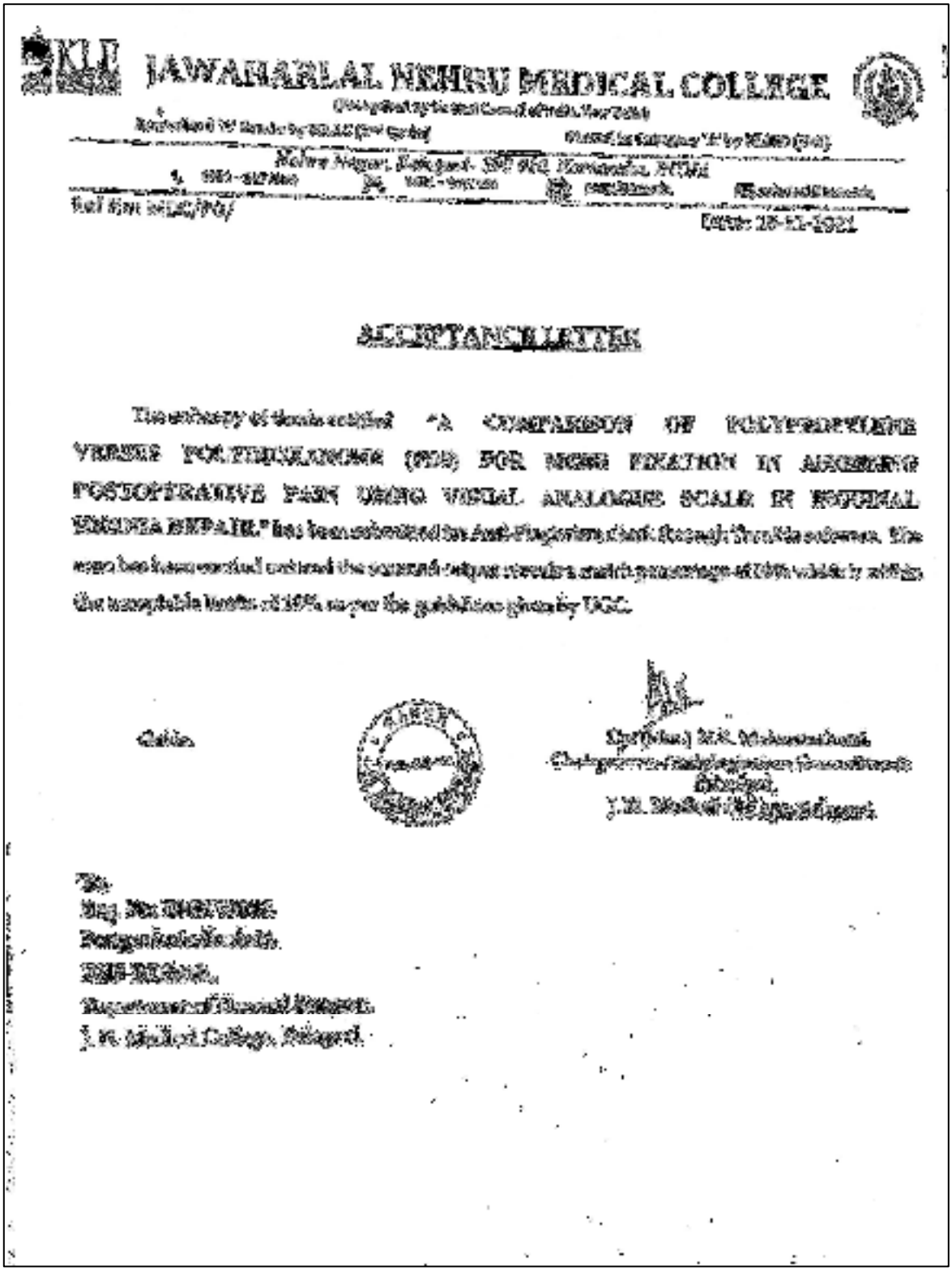

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ACCEPTANCE LETTER

To,

LIST OF ABBREVIATIONS

BMI	–	Body Mass Index
BP	–	Blood Pressure
ECG	–	Electrocardiogram
HBsAg	–	Hepatitis B Surface Antigen
HIV	–	Human Immunodeficiency Virus
INR	–	International Normalized Ratio
KAHER	–	KLE Academy of Higher Education and Research
KLES	–	Karnataka Lingayat Education Society
IEA	–	Inferior epigastric artery
DIH	–	direct inguinal hernia
IIH	–	Indirect inguinal hernia
IOA	–	internal oblique aponeurosis
EOA	–	External oblique aponeurosis
TAM	–	Transversus abdominis muscle
POP	–	Postoperative pain
NAS	–	non absorbable suture
IHR	–	Inguinal hernia repair
Temp.	–	Temperature
USG	–	Ultrasonography
VAS	–	Visual Analogue Score

ABSTRACT

INTRODUCTION- The most common type of hernia is inguinal hernia, approximately comprising of 75 percent of all abdominal wall hernia. Lichtenstein hernioplasty is open tension-free technique for IHR, a prosthesis used is commonly polypropylene, to support the inguinal muscle layer. The rate of success is no longer sufficient, in terms of recurrence, but also in terms of, length of hospital stay, wound complications, quality of life and chronic pain. POP may be caused by injury to the nerves by suture or prosthesis. In our study, we hypothesise that absorbable suture that is polydoxanone which is used for mesh fixation decreases the postoperative pain compared to polypropylene suture that is non-absorbable suture in patient undergoing lichtenstein hernia repair.

AIMS AND OBJECTIVE OF THE STUDY: The objective of the present study is to compare the effectiveness of polyprolene versus polydioxanone (PDS) in reducing the post operative pain measured by the visual analogue scale in inguinal hernia repair as the primary objective. And to compare the effectiveness of polyprolene v/s polydioxanone in reducing the post operative complications apart from post operative pain as the secondary objective.

MATERIALS AND METHODS:- A Hospital based one year RCT was conducted in the Department of General surgery , KLE'S Dr.Prabhakar Kore Hospital and Medical Research Centre, Belagavi from 1st January 2020 to 31st December 2020 and required data was collected from 60 patient who were clinically diagnosed to have inguinal hernia and were divided in two groups group A (patients undergoing mesh fixation with Polydioxanone) and group B (mesh fixation with polyproylene) in

Lichtenstein inguinal hernia repair. Pain was assessed based on VAS, at 1 week, 1 month and 3 months and compared in both groups.

Results - A total of 60 patients were included in the study, all of which underwent Lichtenstein hernia repair with mesh fixation done with polydioxanone suture material or polypropylene suture material. In this study Postoperative pain at 1 week was significantly lower in group A compared to group B (Z-value = -2.5873 p-value = 0.0097) , Postoperative pain at 1 month was more in group B compared to group A with little significance (Pvalue= 0.2282) and Postoperative pain at 3 months was significantly more in group B compared to group A with P-value = 0.0016. Postoperative pain in Group A showed significant change from 1 week to 3 months (P-value = 0.0001) as well as from 1 month to 3 months. (P-value = 0.0033). Postoperative pain in Group B showed significant change from 1 week to 1 month (P-value = 0.0033) as well as from 1 week to 3 months (P-value=0.0013). Our study also showed that the occurrence of post operative complications such as hematoma or seroma was also marginally higher in case of the polypropylene group.

Conclusion - The study indicated that sutures of polydioxanone material to secure a mesh in lichtenstein hernia repair was a simpler and efficient alternative, in terms of post operative pain at the inguinal region, in comparison to the traditional use of polypropylene material. Inspite of taking into account a small sample size with a short follow up period, we can still recommend using polydioxanone suture material for securing a mesh in a patient undergoing Lichtenstein Hernia repair.

Keywords - Polydioxanone suture (PDS), polypropylene suture, inguinal hernia, Lichtenstein hernia repair, postoperative pain, mesh.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF GRAPHS

INTRODUCTION

The most common type of hernia is inguinal hernia, approximately comprising of 75 percent of all abdominal wall hernia.[1-3] Lichtenstein hernioplasty is an open tension-free technique for IHR, the prosthesis used is commonly polypropylene, to support the inguinal muscle layer.[4] The risk of hernia recurrence is less in routine use of mesh techniques compared to non-mesh technique.[5] Originally, Lichtenstein et al reported the use of NAS for fixation of the mesh.[4] The rate of success of the same is no longer sufficient, as well as in terms of recurrence, but also in terms of, length of hospital stay, wound complications, quality of life and chronic pain. Complications like Chronic pain occur in sixteen to sixty two percent undergoing IHR.[8] POP may be caused by injury to the nerves by suture or prosthesis.[6] Increased preoperative physical activity scoring, in patients with increased pain response to a standard heat stimulus may have a decreased frequency of pain after IHR.[7] The underlying cause for POP is not clear. It may be linked to nerve entrapment during surgery, although this is not the only issue, as many people experience sensory complications after surgery but do not experience pain. Prolonged POP can also be caused by a chronic inflammatory response during prosthetic repair, but there is no way to tell the difference between the numerous causes of chronic pain and discomfort. It is shown that tension-free mesh repair compared with non-mesh IHR causes decreased POP. The prosthetic mesh is sutured to form the newer deep inguinal ring and to strengthen the abdominal wall by NAS or absorbable sutures. The possible outcomes of various types of sutures on POP after IHR has not been studied in detail.

In our study, we hypothesise that using absorbable sutures that is polydioxanone which is used for mesh fixation decreases the postoperative pain compared to polypropylene sutures that is non-absorbable suture in patient undergoing lichtenstein hernia repair.

OBJECTIVE

The objective of the present study is to compare the effectiveness of polypropylene versus polydioxanone (PDS) in reducing the post operative pain measured by the visual analogue scale in inguinal hernia repair as the primary objective.

And to compare the effectiveness of polypropylene v/s polydioxanone in reducing the post operative complications apart from post operative pain as the secondary objective.

REVIEW OF LITERATURE

"Hernia is defined protrusion of tissue or an organ from it's normal cavity, may protrude outside abdominal cavity or between body cavities." It is clear that hernia is anatomical weakness or defect. Inguinal hernia is one of the oldest cause of pain and swelling to humankind and commonest general surgery procedure.[9]

History of hernia repair

"Hernia" word in latin means "rupture". One of the historic reports of abdominal wall hernias is dated in 1600 BC, during which they were treated with bandage and trusses. [9]

Evidence of first operative repair of inguinal hernia involve scrotal incision along with orchidectomy in first century AD. Groin hernia classification was first documented in 14th century on the basis anatomical defect and later in 1559 on the basis of DIH or IIH.

In 1889, Bassini revolutionized operative treatment for inguinal hernia, published his surgical dissection and statistics regarding low recurrence rates - five recurrence in over 250 patients over five years of follow up.[10] In addition, Lotheissen in1898 introduced true Cooper's ligament repair, it fixes pectineal ligament to poupart's ligament.

Use of synthetic patches were attempted in staring 1900s with silver wire filigree sheets. But were eventually discontinued due to higher recurrence rate and peritoneal erosion. Further Lichtenstein popularised sutureless hernia repair in polyethylene mesh over inguinal ligament. In view, to decrease recurrence and to avoid mesh placement, shouldice advent of a four layer closure of inguinal canal. Now a days minimal invasive posterior approaches are popularising day-by-day.

EPIDEMIOLOGY

75% of all anterior abdominal wall hernias are inguinal hernias. There is approximately 27% of risk of developing inguinal hernia in a male and 9% in females in their lifetime.[16]

Although femoral hernia are more common in females. Annually eight lakh hernia repairs are done in India.[17]

Surgical anatomy [11-15]

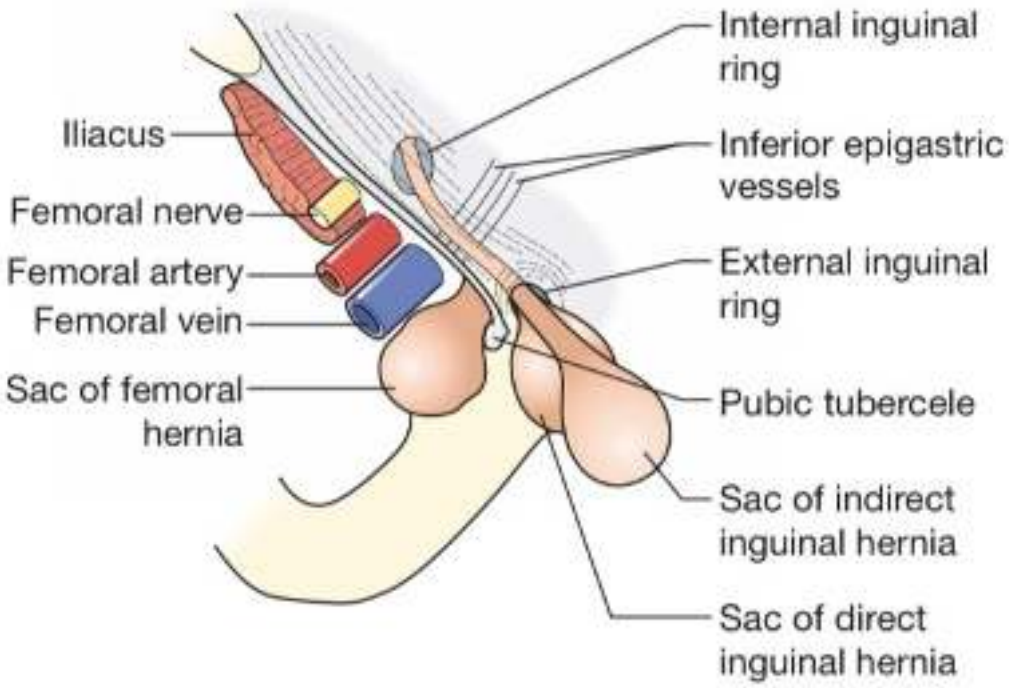


Figure 1: Relations of inguinal hernia

Inguinal canal

It's an diagonal tube that runs right above the inguinal ligament's medial half. It measures about 4 centimetres in length. The size fluctuates with age and, while both sexes have it, males have it more developed. In both sexes, the ilio-inguinal nerve passes via the inguinal canal. Superficial ring is a triangular defect in EOA, that runs medially and caudally to the internal ring, which is where the spermatic cord enters

the scrotum in men. Direct inguinal hernias (DIH) location is medial to IEA, protruding from superficial ring, and

DIH are found medial to IEA, protruding from superficial ring. IIH protrude through the deep ring into the superficial ring, together with the spermatic cord, on the lateral side of the IEA.

Boundaries of inguinal canal

Anterior wall

Inguinal canal is anteriorly bounded by skin, scarpa and camper's facsia and the EOA. The anterior wall, 33% laterally is strengthened by the internal oblique just above the inguinal ligament's origin.

Posterior wall

A powerful conjoint tendon, which is a condensation of TAM and internal oblique muscle, makes up medial half of the posterior wall. Laterally by tendinous muscle fibres produced from the transverse abdominis strengthens transversalis fascia, which forms the interfoveolar ligament.

Roof of the canal

It's an arch formed by transverse abdominis and internal oblique fibres.

Floor

It is formed by the inguinal ligament joining transversalis fascia and the gimbernat's ligament medially. Gimbernat's ligament is a thick band of tissue that lies posterior to the inguinal ligament's medial end. It's made up of thigh fascia lata fibres and medial inguinal ligament fibres. The inguinal fibres continue with the pectineal fascia and goes posterolaterally to the medial end of the pectineal line.

LAYERS

Superficial fascia

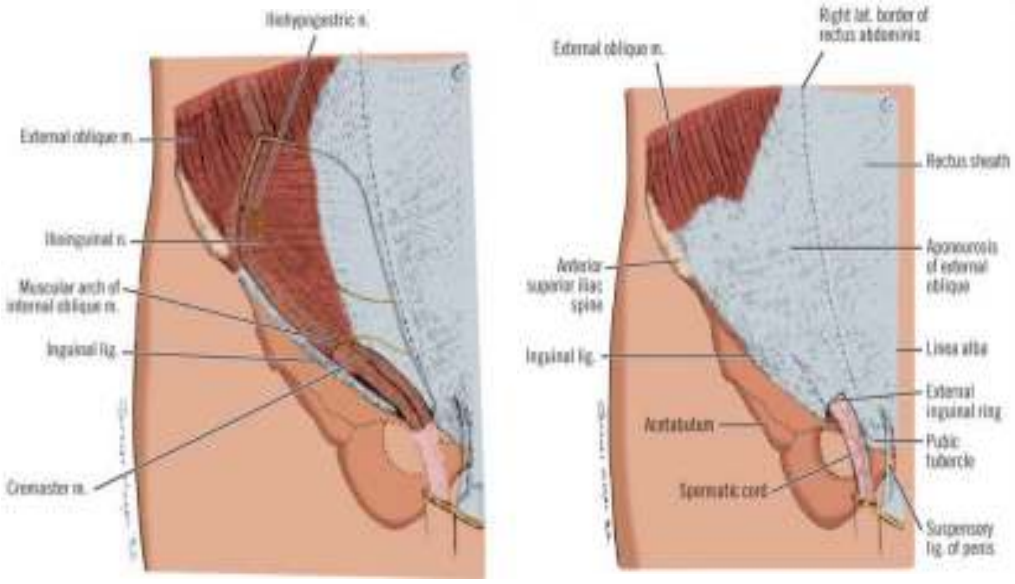


Figure 2 : Layers of inguinal region and spermatic cord

Between the muscles of the anterior abdominal wall and skin is the superficial fascia of the abdominal wall. The fascia in the lower half metamorphoses into 2 surface - superficial and deep - camper's and scarpa's fascia respectively, which contains subcutaneous arteries and nerves.

Aponeurosis of External Oblique (EOA)

External oblique muscle fibres pointing inferiorly and medially and lying deep beneath the skin. A superficial and deep layer make up the EOA. The anterior rectus sheath is formed

- linear decussation of the aponeurosis, together with the bilaminar IOA and transversus abdominis. The EOA serves as the inguinal canal's superficial barrier.

Aponeurosis of internal Oblique (IOA)

Upper abdomen, the internal oblique fibres are directed superiorly and laterally; however, they run somewhat inferiorly in the inguinal region. To produce a conjoint tendon, the medial aspect of the IOA combines with fibres of transversus abdominis. The cremaster muscle fibres originate in the internal oblique, wrap around the spermatic cord, and attach to the testis. The cremasteric reflex is maintained by these muscle fibres.

Transversalis fascia and transversus abdominis muscle (TAM)

This is a connective tissue that runs between the extraperitoneal fat's inner surface and the TAM. It is dense and thick in inguinal area. The transversus abdominis aponeurosis adds to its strength. It is slender and united to the pubis, medial to the femoral vessels, behind the conjoint tendon. A few fibres also go laterally along the ASIS, while others run medially at the back of the rectus abdominis and down to the pubis at the back of the conjoint tendon, forming the deep crural arch. The inferomedial rim of the deep ring is strengthened by fibres of this arch. The transversalis fascia surrounds testis and mixes with areolar tissue on the tunica vaginalis' parietal layer.

The TAM layer is oriented horizontally for the most part, however the fibres in the inguinal region run slightly obliquely downward. Inguinal hernia can be prevented and treated by maintaining the strength and continuation of TAM and aponeurosis. The iliopubic tract makes up the lower crus of the deep ring, whereas the transversus abdominis aponeurotic arch makes up the superior crus. The TAM is attached to the lateral edge of the internal ring, forming a shutter mechanism that prevents an indirect inguinal hernia.

Superficial inguinal ring

The aponeurosis of the EOM has a triangular region superolateral to the public crest, with the apex pointing along the line of deeper aponeurosis fibres. The pubis crest is at the base, while the crura are on the sides. The lateral crus is the stronger of the two because it is reinforced by inguinal ligament fibres that penetrate into the pubic tubercle. The medial crus is a slender ligament that connects the pubis symphysis to the pubis symphysis and interlaces with fibres from the opposite side. The intercrural fibres are formed by a few fibres that arch above the ring's apex. The lateral crus curves to form a groove in which the spermatic cord sits.

Deep inguinal ring

An oval aperture from the fascia transversalis is positioned about 0.5 inch above to the inguinal ligament, midway between the symphysis pubis and ASIS. The inferior epigastric vessels form its inferomedial border, which is bordered superolaterally by the transversalis fascia's arched lower margin.

Nerves in inguinal region

The ilioinguinal nerve is formed by the junction of the T12 and L1 nerves. The TAM medial to the ASIS serves as a lateral entry point into the groin. It goes along the spermatic cord until deep ring, just below the EOA. It can be discovered above the spermatic cord within the cremasteric fibres in 35% of instances. It can be discovered running between the deep and superficial ring of the EOA.

Iliohypogastric: The T12 and L1 nerves give rise to the ilio-hypogastric nerve. It is between the EOA and IOA medial to the spermatic cord, passing through the TAM superior to the ilio-inguinal nerve. During the identification and dissection of the conjoined area, it can be found. The ilio-inguinal and ilio-hypogastric nerves can

sometimes come together before entering the groin. It has also been noted that the ilio-hypogastric or ilio-inguinal nerves are sometimes absent.

Genitofemoral: L1 and L2 nerve give rise to genito-femoral nerve. As it joins the inguinal canal deep to the lateral crus of the deep ring, it follows the gonadal vessels. In some circumstances, an aberrant ilio-inguinal nerve may accompany genito-femoral nerve.

Hesselbach triangle

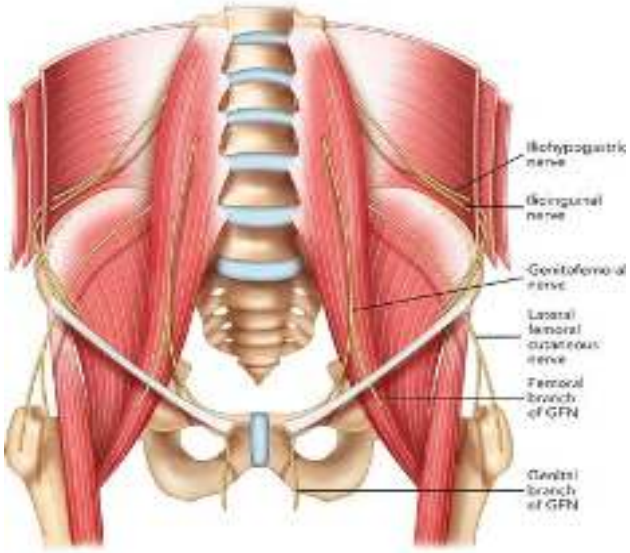


Figure 3 : Nerve supply to inguinal region

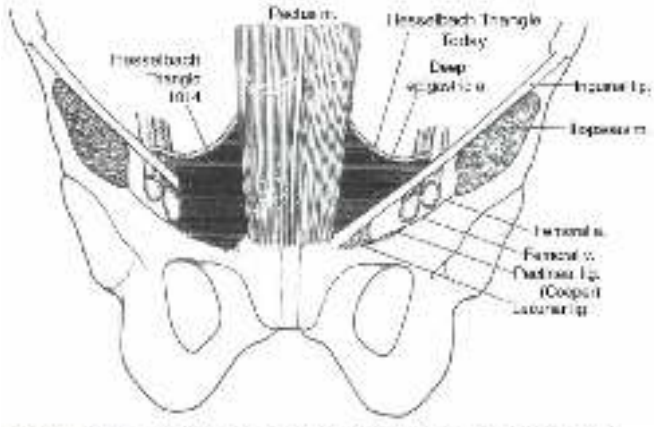


Figure 187.21. Hesselbach triangle. (From Skandalakis JE, Gray SW, Rowe JR. Anatomical Complications in General Surgery. New York: McGraw-Hill; 1983, with permission.)

Figure 4 : Hesselbach Triangle

Etiology and Pathophysiology[18-21]

1. Congenital and anatomical factors

- In the younger age group, the central cause of an IIH is patent processus vaginalis.
- Females are more resistant to DIH because the hermetical attachment of EOA is narrower. Women, on the other hand, have musculo-aponeurotic attachments that frequently result in femoral hernia.
- The obliquity of the inguinal canal is caused by an increase in intraperitoneal pressure, which causes compression of the canal's anterior and posterior walls, partially obscuring the canal.

2. Shutter mechanism

When the transverse abdominis and internal oblique muscles contract sharply, the fibres shorten, causing the arch to straighten out and fall near or over the inguinal ligament, covering the fascia of transversalis abdominis.

The shutter will also move downwards, pressing on the internal ring and preventing the ring from being pressed against from within the abdomen. This causes the ring to close, acting as a sphincter that tightly encircles the cord.

3. Integrity of the fascia transversalis

The status of collagen fibres that forms the fascia transversalis tissues, provide strength and determines its ability to bear increase in intra abdominal changes pressure. The strength of transversalis fascia is reduced by a factor that prevents normal collagen production, leads to increased collagen breakdown, or causes aberrant collagen fibre production.

4. Ball valve mechanism

In males contraction of cremaster muscle pulls up spermatic cord and plugs superficial inguinal ring.

5. Other factors

Muscle and fascia weakening with age, obesity, decreased physical activity, and multiple pregnancies. Unnecessarily long and very low transverse abdominal incisions for urological, gynaecological, and appendicectomy incisions, which might arise after a surgery, illness, or prolonged bed rest. Inguinal hernia is caused by pulmonary disorders, prostatism, persistent constipation, and genito-urinary causes.

Components [22]

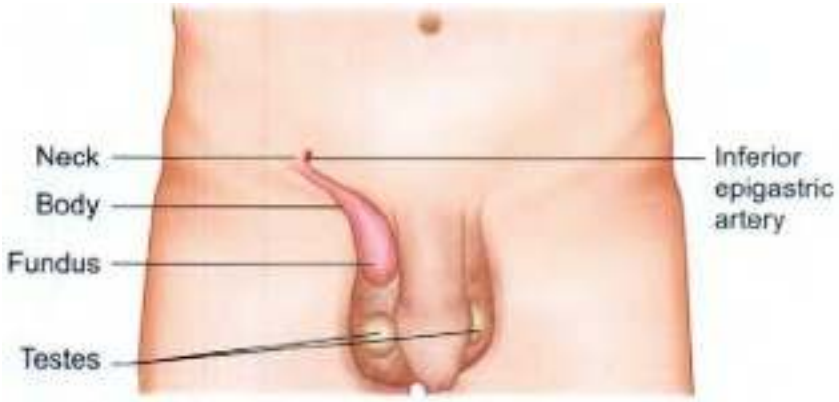


Figure 5: Parts of hernia

The sac is a peritoneal continuation with mouth, neck, body, and fundus. Indirect sacs have a small neck, while direct sacs have a wide neck. Infants, children, and indirect sacs have a thin body, but direct and long-standing hernias have a thick body. The layers of the abdominal wall whereby the sac passes is sac coverings.

According to hernial sac contents 0mentum –

Omentocele, lntestine –

Enterocele,

Richter's hernia

Urinary bladder - sac-cystocele

Littre 's hernia

Amyand's hernia - Appendix in inguinal hernial sac

CLASSIFICATION [25-26]

BOX 44-3 Nyhus Classification of Groin Hernia

Type I
Indirect inguinal hernia: internal inguinal ring normal (e.g., pediatric hernia)

Type II
Indirect inguinal hernia: internal inguinal ring dilated but posterior inguinal wall intact; inferior deep epigastric vessels not displaced

Type III
Posterior wall defect
A. Direct inguinal hernia
B. Indirect inguinal hernia: internal inguinal ring dilated, medially encroaching on or destroying the transversalis fascia of Hesselbach triangle (e.g., scrotal, sliding, or pantaloon hernia)
C. Femoral hernia

Type IV
Recurrent hernia
A. Direct
B. Indirect
C. Femoral
D. Combined

Figure 6 : Nyhus classification

I. Gilbert Classification

Type I: Hernia has got snug internal ring through which a peritoneal sac passes out as indirect sac.

Type II: Hernia has a moderately enlarged internal ring which admits one finger but lesser than two finger breadth. Once reduced it protrudes during coughing or straining.

Type III: Hernia has got large internal ring with defect more than two finger breadth. Hernia descends into the scrotum or with sliding hernia. Once reduced it immediately protrudes out without any straining.

Type IV: It is direct hernia with large full blow out of the posterior wall of the inguinal canal. The internal ring is intact.

Type V: It is a direct hernia protruding out through punched out hole/ defect in the transversalis fascia. The internal ring is intact.

Type VI: Pantaloon/double hernia.

Type VII: Femoral hernia.

Type VI and VII are Robbin's modifications.

Figure 7 : GILBERT'S CLASSIFICATION

Indication

An inguinal hernia can only be treated with surgery. A hernia bandage (truss) can occasionally alleviate hernia symptoms in people who cannot be operated on due to poor health or a refusal to be operated on. The only real reason to operate on an asymptomatic inguinal hernia is to prevent strangulating hernia. This danger is minor in men, but because it is much higher in women due to the larger proportion of misdiagnosed femoral hernias, it is frequently suggested that women with inguinal hernias undergo surgery. Many patients who require emergency surgery for a strangulated hernia, on the other hand, are unaware that they have a hernia or, if they are aware, are unconcerned about it.

Operative management

Repair techniques: [27-28]

Anterior repairs

1. **Shouldice technique**
2. **Cooper's ligament repair**
3. **Halsted procedure**
4. **Bassini's repair**
5. **Lichtenstein repair**
6. **"Plug and patch" repair**

Posterior repairs

1. **Stoppa's repair**

2. **TAPP (Transabdominal preperitoneal repair)**

3. **TEP (Totally extraperitoneal repair)**

STEPS OF LICHTENSTEIN HERNIA REPAIR[29]

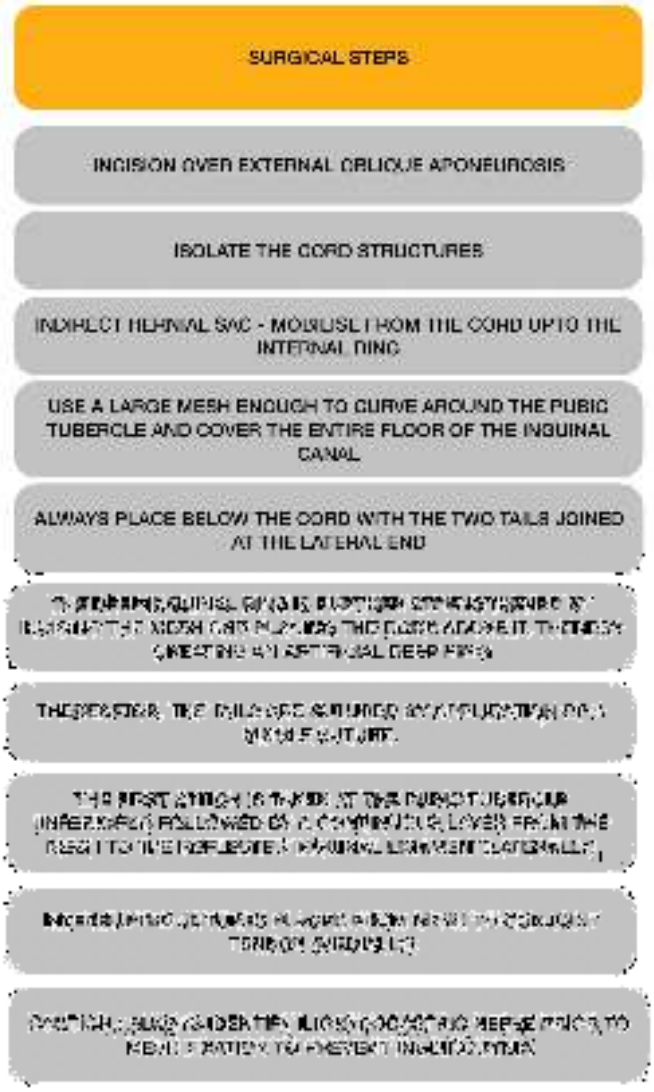


Figure 8: Steps of Lichtenstein hernia repair

Persistent post operative pain:[30-31]

Groin pain

- Causes - entrapment of the nerve, neuroma, periostitis of pubic tubercle.

Groin pain - nociceptive or neuropathic

."**Nociceptive pain -** It is a dull, pulling type of pain seen by heavy lifting." The nervous system's conductors are intact, and they can be visceral / somatic. Many of these individuals have nociceptive discomfort as a result of sutures or staples applied over tissues.

"**Neuropathic pain**: It is present as a sharp pain experienced by movement or can occur at rest." Abnormal conduction is seen.

Neuropathic pain types

1. Peripherally generated

2. Centrally generated

3. Sympathetically maintained.

POP common causes - osteitis pubis, and entrapment of ilio-inguinal nerve.

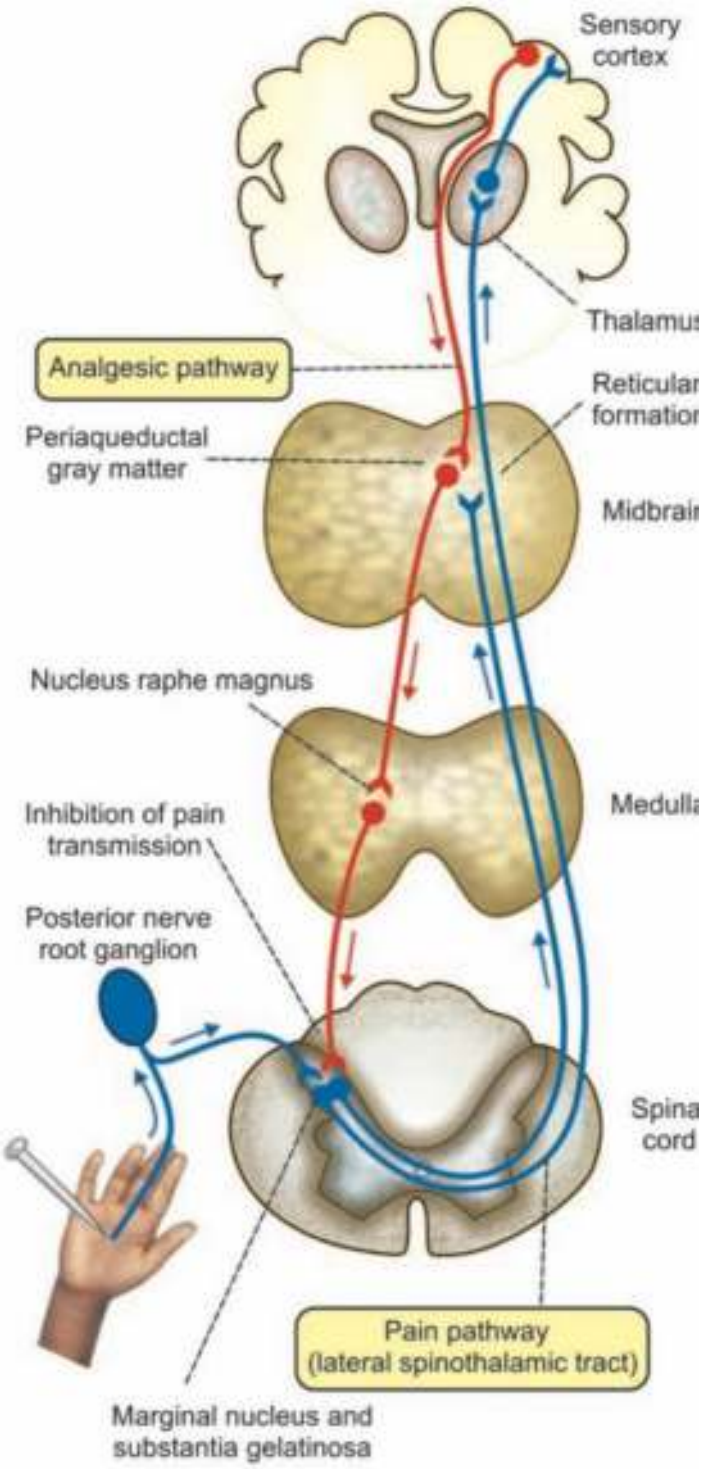


Figure 9: Pain Pathway

SUTURE MATERIALS

Types and Characteristics of suture material[32]

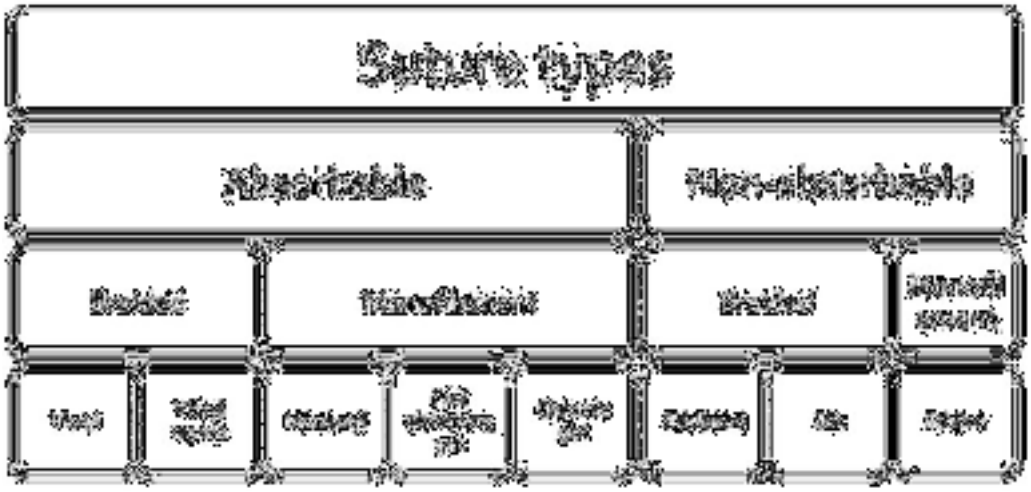


Figure 10: Types of suture material

Characteristics	Polydioxanone	Polypropylene
Raw material	Polyester polymer	Polymer of propylene
Type	Monofilament	Monofilament
Strength	70% - 2 weeks 50% - 4 weeks 14% - 8 weeks	Infinite - more than one year
Absorbabilty	hydrolysis Minimal - 90 days Complete - 180 days	Non-absorbable - stays in body tissue
Tissue reaction	Mild	Low

POLYPROPYLENE (PROLENE) (CH2-CH (CH3-) [33]

It's a monofilament suture that's chemically extruded from a pure and coloured polymer that doesn't get adsorbed or weakened by tissue enzymes. Polypropylene is a propane - based thermoplast. 100000 g/mol is its molecular weight. Even after being implanted, it is designed to withstand physical degradation.

It has an extraordinarily high tensile strength that it maintains after implantation indefinitely. Because of its low adhesion to tissue, it can be used as a permanent suture. It can be stretched up to 30% before breaking, making it beneficial in instances when postoperative suture tension is necessary to accommodate postoperative swelling, as well as preventing tissue strangulation. Because the material has no coefficient of friction, it is easy to handle and knot. It is non-biodegradable and inert. Ethylene dioxide is used to sterilise it.

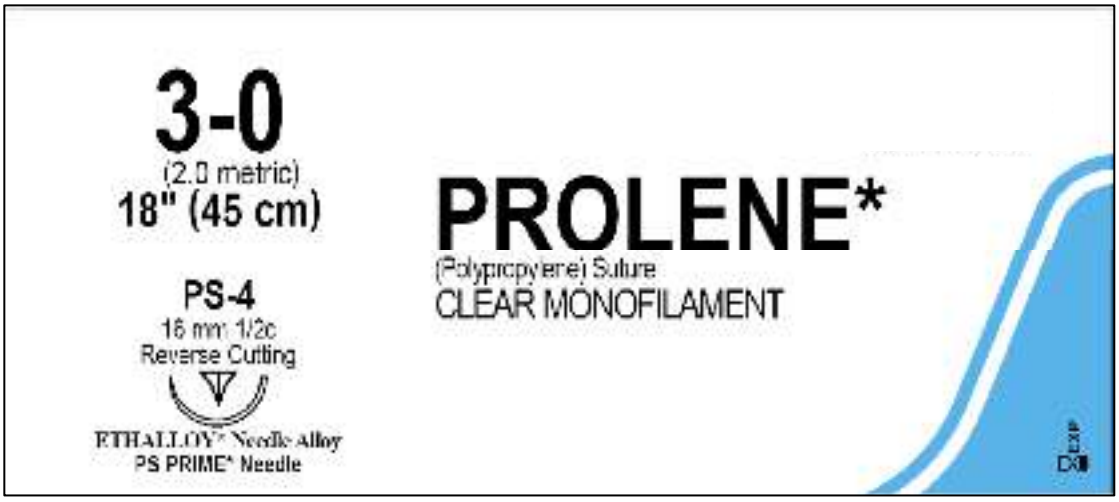


Figure 11: Polypropylene suture material

Polydioxanone (PDS)[34]

The polymer's inherent flexibility allows the polydioxanone suture to be fashioned into a monofilament fibre that can be used for sutures of all sizes. Sutures made of polydioxanone have more flexibility than polypropylene sutures and are stronger than other monofilament sutures. Polydioxanone suture lasts longer in the body than other synthetic absorbable sutures, with 58 percent versus 1 to 5% at four weeks and 14 percent compared zero percent at eight weeks, respectively. It causes a low-order tissue reaction and is easily absorbed through hydrolysis.

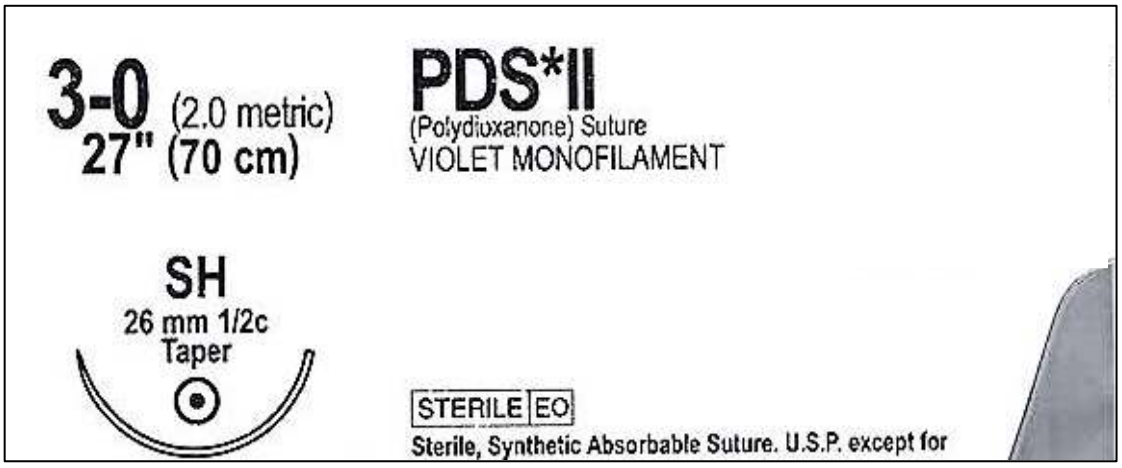


Figure 12: Polydioxanone suture material

MATERIALS AND METHODS

This one year RCT was conducted in the General surgery department, KLES Dr. Prabhakar Kore Hospital and MRC, Belagavi over a period, from January 2020 to December 2020

Study design: The study design was single blinded randomized controlled trial.

Study period: This study was conducted for the period of one year from January 2020 to December 2020

Place: This study was done in the General surgery department, KLES Dr. Prabhakar Kore Hospital and MRC, Belagavi attached to KLE University's JNMC, Belagavi.

Sample size: 60 patients - two groups each of 30.

Sampling procedure

Computer generated random numbers were used to assign the type of surgery to the patients that is, group A (patients undergoing mesh fixation with PDS) and group B (mesh fixation with polypropylene) in Lichtenstein inguinal hernia repair, Patients were blinded to the intervention. The sample size was taken as sixty, with thirty in each group by applying the formula,

The mean d1 and standard deviation S2 for group 1 is 3.80 and 3.163.

The mean d2 and standard deviation S2 for the second group is 6.23 and 4.031. Z alpha = 1.96 at 5% alpha error

Z beta = 0.842 at 20% beta error S is average of S1 and S2

d is the difference between d1 and d2

$$N = \frac{2S^2 \{z\ alpha + z\ beta\}^2}{d^2}$$

N is 31.443 participants in each group, Rounding off to 30

Substituting these values in the formula, N= 30 and enrollment ratio is 1:1 hence, the sample size estimated was minimum of 60 patients. Accordingly 30 patients each were assigned to Polydioxanone (PDS) repair & 30 in Polypropylene repair.

Selection criteria

Inclusion:

1. Written informed consent
2. Age group- more than 18 years
3. Unilateral bilateral inguinal hernia

Exclusion:

1. Irreducible hernias
2. Patients on anticoagulants
3. Emergency surgery
4. Bleeding disorders
5. HIV positive status / Immunocompromised status

Ethical clearance

Ethical and Research Committee was approved for this study, JNMC, Belagavi before the study was started.

Informed Consent

Inclusion Criteria fulfilled by the patients were informed regarding the nature of the study, especially the benefits and demerits of using polydioxanone as the suture material to fix the polypropylene mesh in Lichtenstein hernia repair and a written consent was taken (**Annexure I)**.

Randomization

Randomization was done by computer generated random numbers which were used to assign the type of surgery; each group consisted of 30 patients; Patients undergoing hernia repair, wherein fixation of the mesh with polydioxanone (PDS) material in Lichtenstein mesh repair was assigned study group A and those where polypropylene material in Lichtenstein mesh repair formed the control group were assigned study group B.

Investigations

Routine blood counts – Haemoglobin, TLC, differential counts, RBC counts. RBS, serum electrolytes, Serum creatinine

Prothombin time and INR Chest X-ray and ECG.

Ultrasonography of abdomen and pelvis viral markers (HIV & HbsAg).

Surgical procedure

The skin and subcutaneous tissue was incised. The EOA was opened. The cord structures identified. The ilio-inguinal nerve was identified. The DIH sac was reduced without opening the same, whereas the indirect sac was mobilized off the cord upto the level of deep inguinal ring, after it was divided from cord structures, transfixed, excised and reduced. In all cases a sheet of polypropylene mesh was placed over the posterior wall, behind the spermatic cord with an incision is taken over the mesh; the cord placed between tail of the mesh such that the mesh meet laterally, forming a new deep inguinal ring. The key stitch or Bassini's stitch was taken over the periostium of pubic tubercle, using polyprolene 3-0 for one set of patients and Polydioxanone (PDS) 3-0 for another set of patients. Mesh was sutured to the inguinal ligament with continuous interlocking suture after the key stitch was taken laterally. Mesh was sutured to the conjoint tendon with interrupted sutures medially. The EOA approximated by continuous absorbable sutures and subcutaneous layer closed with absorbable intermittent suture. Skin closure was sutured by non absorbable sutures.

Figure 13 : Polydioxanone suture material

Figure 15 : Polypropylene suture material

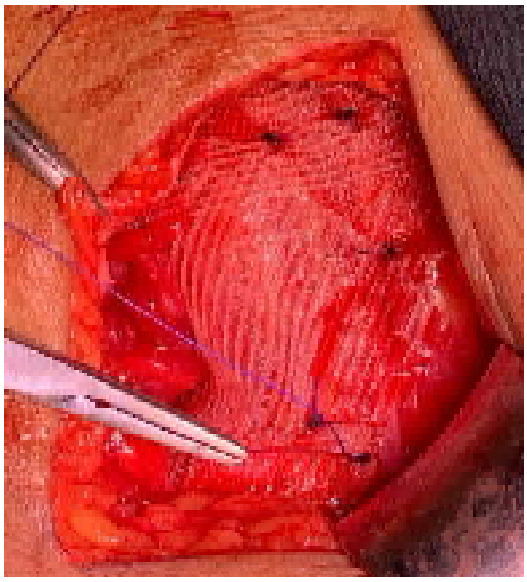


Figure14:Polydioxanone suture material

Figure 16: Polypropylene suture material

Pain management

Injection paracetamol 1gm IV TID was given to both the groups post-operatively for analgesia. On discharge oral paracetamol tablet 650 mg was given as per the patient's pain.

Outcome variables

Pain was assessed based on VAS, scores from 0 to 10 considering 0 negligible pain and 10 with maximum pain.

No pain – score = zero

Mild – score = zero -three

Moderate – score between four to six

Severe – score = seven - ten

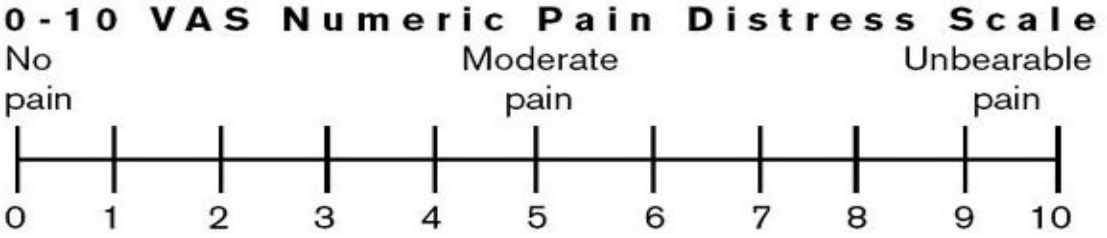


Fig 17: Visual Analogue Scale

Follow up

Patients were followed up —

Postoperative day 7

1 month follow up

3 months follow up

STATISTICAL ANALYSIS

Microsoft Excel Spreadsheet was used to enter the data which was collected. The categorical data was expressed as rates, ratios and percentages and comparison was done using chi–square tests, Mann-Whitney U tests and Wilcoxon matched pairs test. Mean ± standard deviation was used to express continuous data. A 'p' value </= 0.05 was considered as statistically significant.

RESULTS

The present one year randomised controlled trial was conducted in the department of General Surgery at KLES Dr. Prabhakar Kore Hospital and Medical research Centre, Belagavi from January 2020 to December 2020.

A total of 60 patients admitted with inguinal hernia requiring mesh repair were included in study. These patients were further randomised into two groups of 30 each as below:

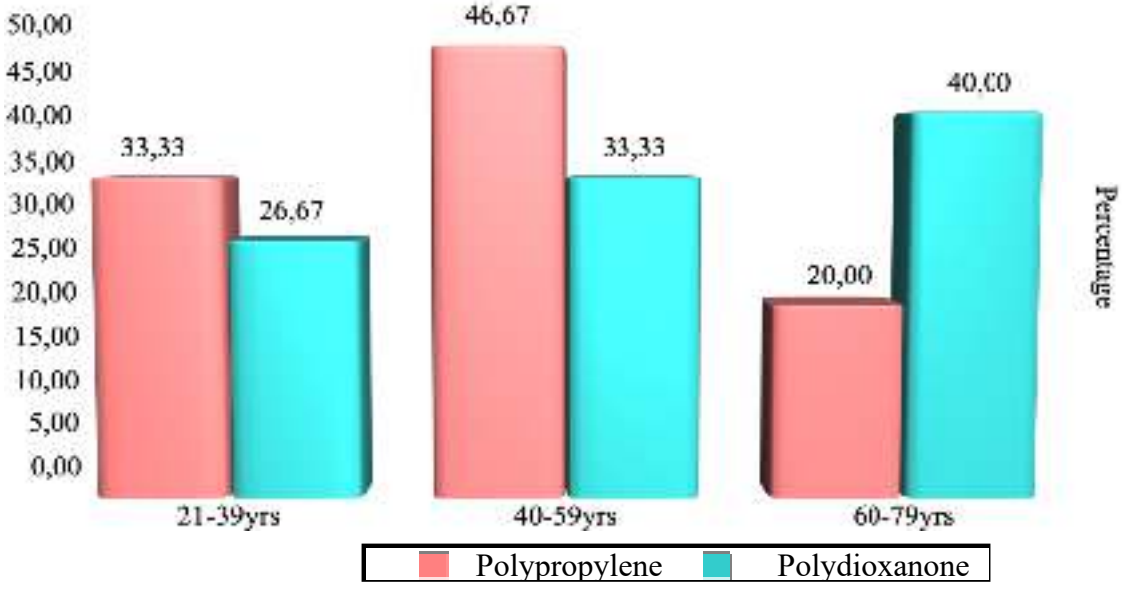
- Patients wherein mesh was fixed with Polydioxanone suture material for Lichtenstein hernia repair formed Group A
- Patient wherein mesh was fixed with Polypropylenesuture material for Lichtenstein hernia repair formed Group B

The data was coded and entered in Microsoft Excel spreadsheet. The data was analysed and the observation were tabulated as below.

Table 1: Comparison of Polypropylene and Polydioxanone by age groups

Age groups	Polypropylene	%	Polydioxanone	%	Total	%
21-39yrs	10	33.33	8	26.67	18	30.00
40-59yrs	14	46.67	10	33.33	24	40.00
60-79yrs	6	20.00	12	40.00	18	30.00
Total	30	100.00	30	100.00	60	100.00
Mean age	46.93		51.20		49.07	
SD age	15.56		17.76		16.69	
Chi-square=2.8890 P = 0.2360						

Figure: Comparison of Polypropylene and Polydioxanone by age groups



Graph 1

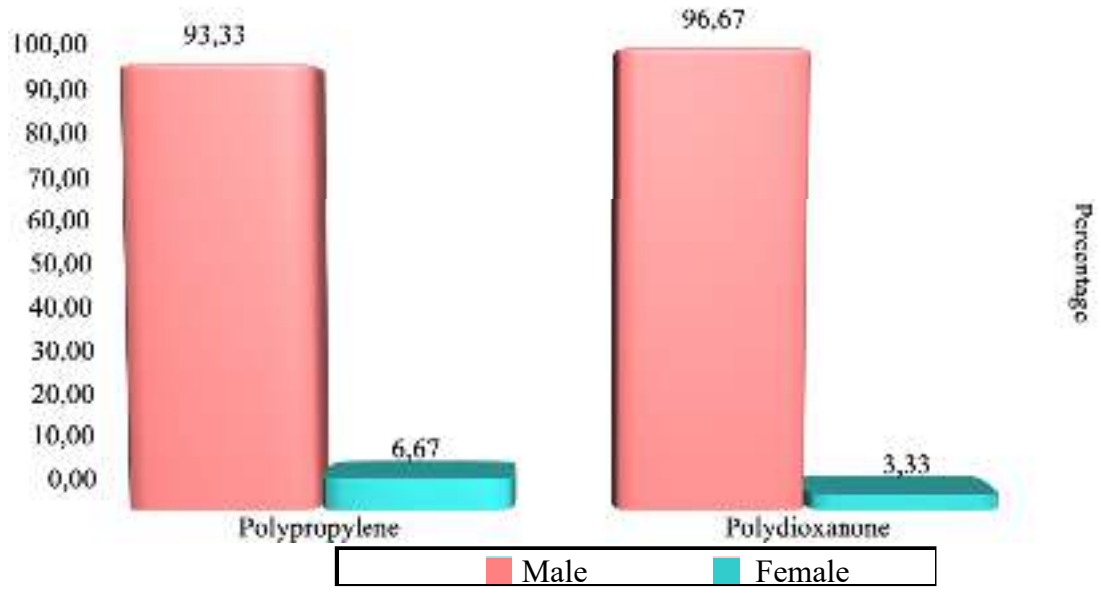
In the present study, distribution of age group in group A (Polydioxanone) and group B (Polypropylene) was 26.67% and 33.33% between 21-39 years, 33.33% and 46.67% between 40-59 years, 40% and 20% between 60 - 79 years was comparable.

In the present study, the mean age group A was 51.20+/-17.76 years compared to 46.93+/- 15.56 years in group B. However the difference was statistically insignificant (p=0.236).

Table 2: Comparison of Polypropylene and Polydioxanone by gender

Gender	Polypropylene	%	Polydioxanone	%	Total	%
Male	28	93.33	29	96.67	57	95.00
Female	2	6.67	1	3.33	3	5.00
Total	30	100.00	30	100.00	60	100.00
Chi-square with Yates's correction = 0.0000 P = 1.0000						

Figure: Comparison of Polypropylene and Polydioxanone by gender



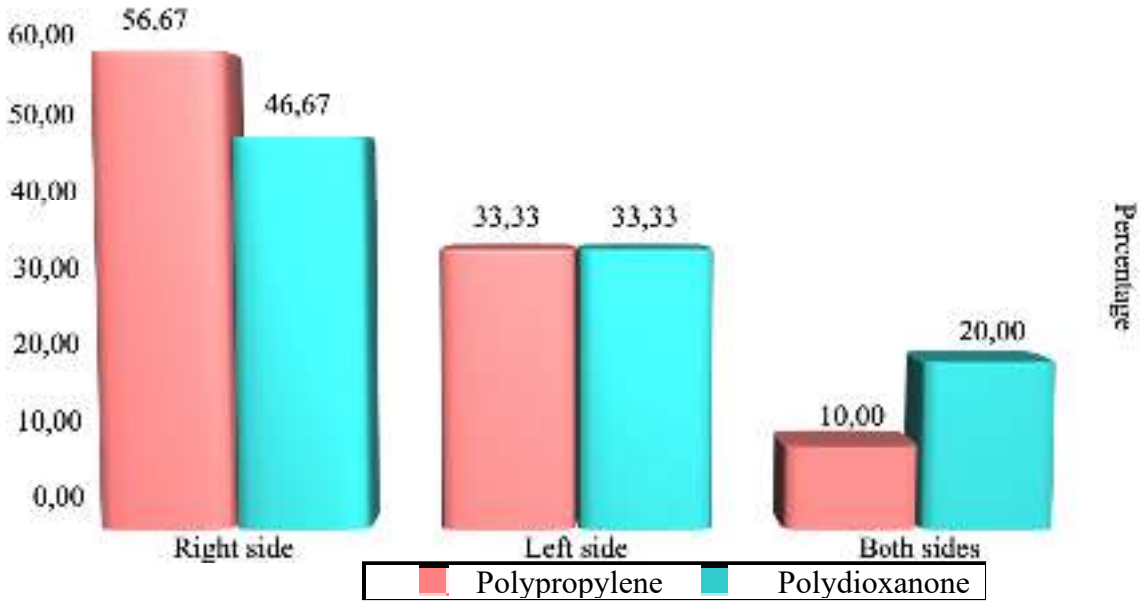
Graph 2

In the present study 96.67% were males and 3.33% were females in Group A and 93.33 % were males and 6.67% were females in group B with no statistical significance

Table 3: Comparison of Polypropylene and Polydioxanone by sides of hernia

Sides of hernia	Polypropylene	%	Polydioxanone	%	Total	%
Right side	17	56.67	14	46.67	31	51.67
Left side	10	33.33	10	33.33	20	33.33
Both sides	3	10.00	6	20.00	9	15.00
Total	30	100.00	30	100.00	60	100.00
Chi-square=1.2900 P = 0.5250						

Figure: Comparison of Polypropylene and Polydioxanone by Sides of hernia

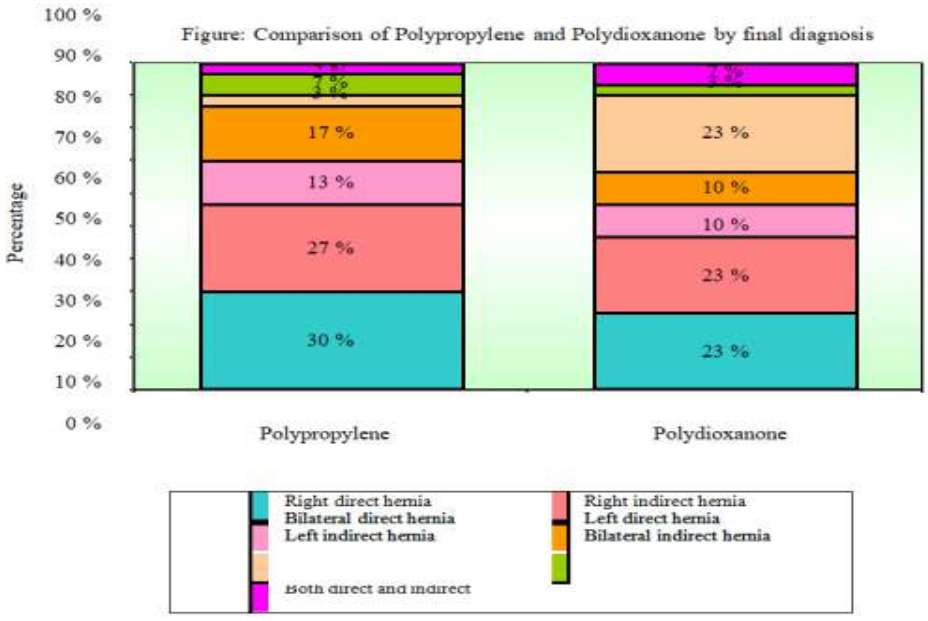


Graph 3

In the present study, 56.67% of patients in polypropylene group had right sided inguinal hernia compared to 46.67 % of patients in Polydioxanone group. 33.33% of patients in both polypropylene group and polydioxanone group had left sided inguinal hernia. 10% patients in polypropylene group and 20% in polydioxanone group had both sided inguinal hernia

Table 4: Comparison of Polypropylene and Polydioxanone by final diagnosis

Final diagnosis	Polypropylene	%	Polydioxanone	%	Total	%
Right direct hernia	9	30.00	7	23.33	16	26.67
Right indirect hernia	8	26.67	7	23.33	15	25.00
Bilateral direct hernia	4	13.33	3	10.00	7	11.67
Left direct hernia	5	16.67	3	10.00	8	13.33
Left indirect hernia	1	3.33	7	23.33	8	13.33
Bilateral indirect hernia	2	6.67	1	3.33	3	5.00
Both direct and indirect	1	3.33	2	6.67	3	5.00
Total	30	100.00	30	100.00	60	100.00
Chi-square=6.1260 P = 0.4090						



Graph 4

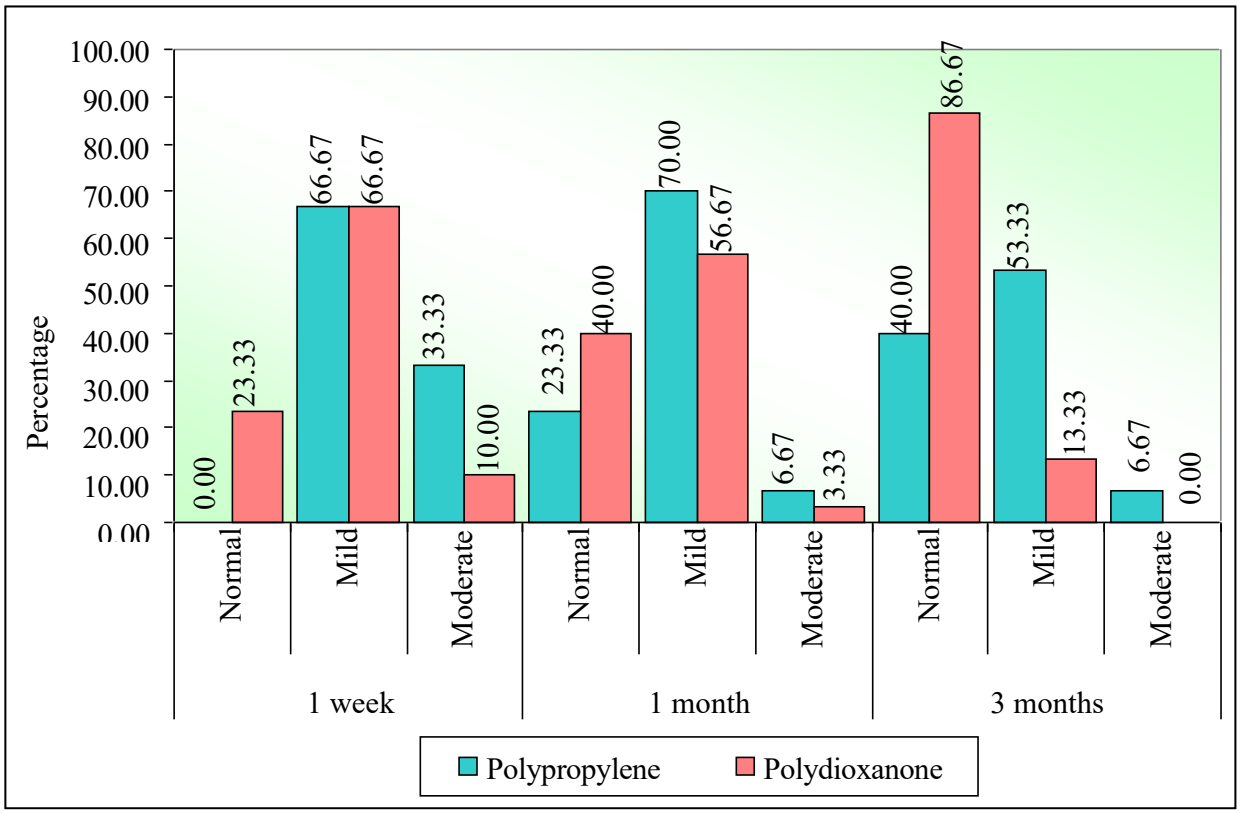
Final diagnosis of inguinal hernias among Group A compared to Group B were as above. In the present study, 30% v/s 23% of hernias were right sided direct hernias in polypropylene group and polydioxanone group, respectively. 27% v/s 23% of hernias were right indirect hernias in polypropylene and polydioxanone groups, respectively. 13% had bilateral direct inguinal hernias in polypropylene group while 10% had the same in polydioxanone group.17% of patients had left direct hernia in polypropylene group while 10% had the same in polydioxanone group. 3% left indirect hernia in polyprolpyene group whereas 23% had the same in polydioxanone group. Patients with bilateral indirect inguinal hernia in polypropylene group compared to polydioxanone group were 7% and 3% respectively. Patients having both direct and indirect inguinal hernia in polypropylene compared to polydioxanone group were 3% and 7% respectively.. However this difference was not statistically significant (p=0.4090).

Table 5: Comparison of Polypropylene and Polydioxanone with pain status at 1 week, 1 month and 3 months time points by Mann-Whitney U test

Pain status at	Polypro pylene	%	Polydio xanone	%	Total	%	Z-value	P-value
1 week								
No pain	0	0.00	7	23.33	7	11.67	-2.5873	0.0097*
Mild	20	66.67	20	66.67	40	66.67		
Moderate	10	33.33	3	10.00	13	21.67		
1 month								
No pain	7	23.33	12	40.00	19	31.67	-1.2049	0.2282
Mild	21	70.00	17	56.67	38	63.33		
Moderate	2	6.67	1	3.33	3	5.00		
3 months								
No pain	12	40.00	26	86.67	38	63.33	-3.1639	0.0016*
Mild	16	53.33	4	13.33	20	33.33		
Moderate	2	6.67	0	0.00	2	3.33		
Total	30	100.00	30	100.00	60	100.00		

*$p<0.05$

Figure 5: Comparison of Polypropylene and Polydioxanone with pain status at 1 week, 1 month and 3 months time points.



Graph 5

In the present study, it was seen that at 1 week there was no pain in Polydioxanone in 23.33% of patients compared to no patients in polypropylene group, those presenting with mild pain were 66.67% in both the groups and those with moderate pain were 10% in polydioxanone group compared to 33.33% in polypropylene group. The result was significantly higher in polypropylene group.

At 1 month those who presented with no pain were 40% in Polydioxanone group as compared to 23.33% in polypropylene group, those with mild pain were 56.67% in polydioxanone group as compared to 70% in polypropylene group and those with moderate pain were 3.33% in polydioxanone group compared to 6.67% in polypropylene group. The results were higher in polypropylene group although not significant.

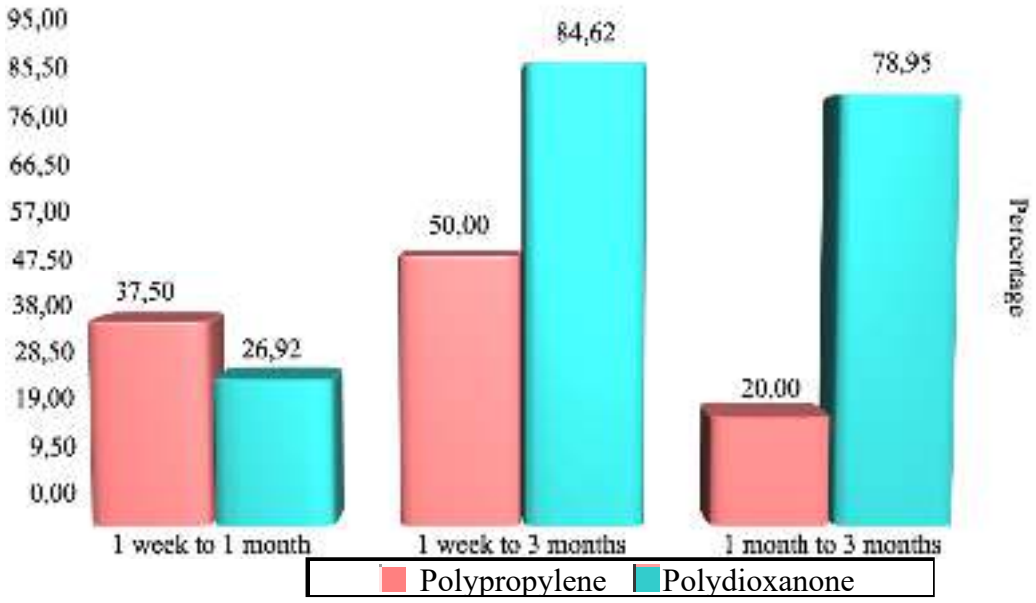
At 3 month those who presented with no pain were 86.67 % in Polydioxanone group as compared to 40% in polypropylene group, those with mild pain was 13.33% in polydioxanone group as compared to 53.33% in polypropylene group and those with moderate pain had no patients in polydioxanone group compared to 6.67% in polypropylene group. The results were significantly higher in polypropylene group.

Table 6: Comparison of 1 week, 1 month and 3 months time points with pain status in Polypropylene and Polydioxanone by Wilcoxon marched pairs test

Groups	Changes from	% of change	Z-value	p-value
Polypropylene	1 week to 1 month	37.50	2.9396	0.0033*
	1 week to 3 months	50.00	3.2194	0.0013*
	1 month to 3 months	20.00	0.8928	0.3720
Polydioxanone	1 week to 1 month	26.92	1.5903	0.1118
	1 week to 3 months	84.62	3.8230	0.0001*
	1 month to 3 months	78.95	2.9396	0.0033*

*p<0.05

Figure 6: Comparison of 1 week, 1 month and 3 months time points with pain status in Polypropylene and Polydioxanone



Graph 6

In our study, in polypropylene group postoperative pain was significantly less from 1 week to 1 month ($p<0.05$) , from 1 week to 3 months ($p<0.05$), but no significant change was seen from 1 month to 3 months.($p>0.05$)

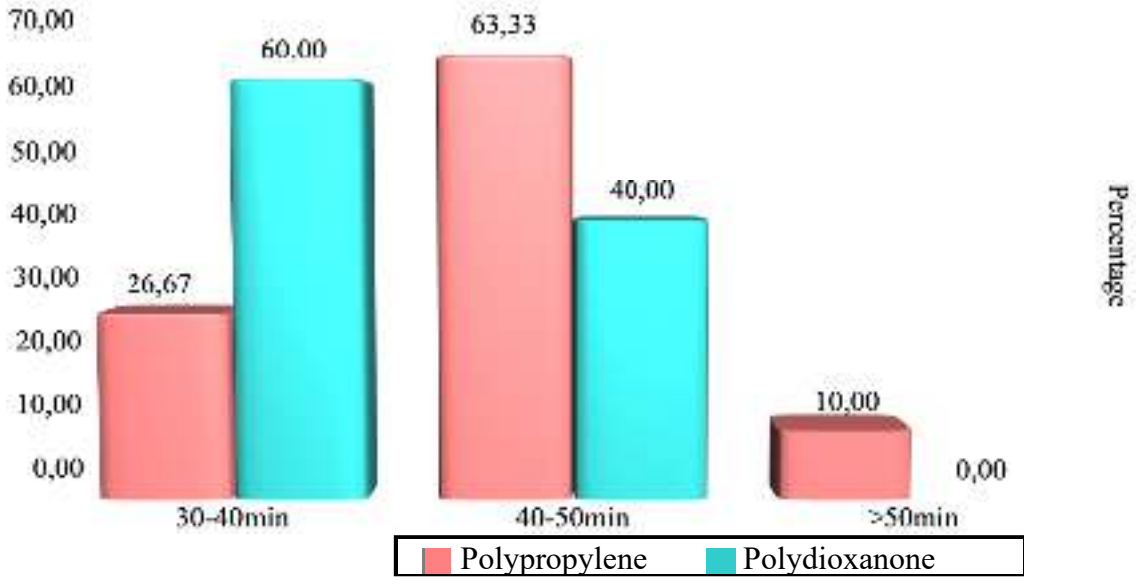
In polydioxanone group, there was no significant change seen in postoperative pain from 1 week to 1 month ($p>0.05$), but a significant decrease in pain was seen from 1 week to 3 months ($p<0.05$) and from 1 month to 3 months ($p<0.05$).

Table 7: Comparison of Polypropylene and Polydioxanone with operative time in mins

Operative time in mins	Polydioxanone	%	Polypropylene	%	Total	%
30-40min	18	60.00	8	26.67	26	43.33
40-50min	12	40.00	19	63.33	31	51.67
>50min	0	0.00	3	10.00	3	5.00
Total	30	100.00	30	100.00	60	100.00
Chi-square=6.5220 P = 0.0380*						

*p<0.05

Figure: Comparison of Polypropylene and Polydioxanone with operative time in mins



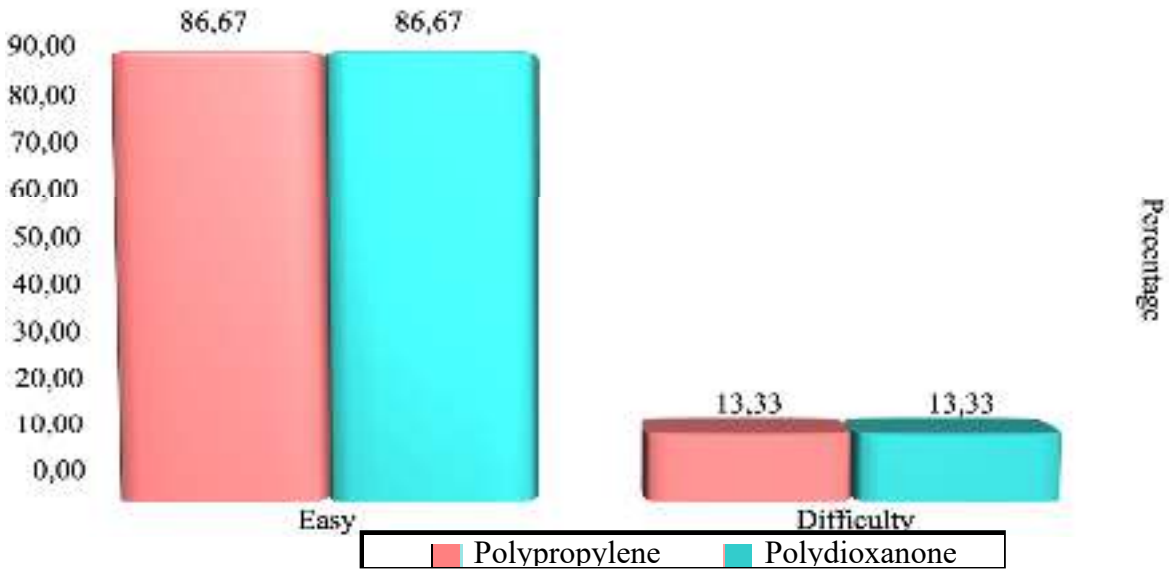
Graph 7

In the above results, it can be seen that out of 30 patients in each group, 60% of patients were among those in which the operative time lasted from 30 to 40 min and 40% were among those wherein the operative time lasted between 40 to 50 min in polydioxanone group, in comparion 26.67% patients had an operative time of 40-50 min, 63.33% had an operative time of 40-50 min and 10 % had an operative time of >50min in polypropylene group. The operative time was significantly higher in polypropylene group. ($p<0.05$).

Table 8: Comparison of Polypropylene and Polydioxanone with surgical ease

Surgical ease	Polypropylene	%	Polydioxanone	%	Total	%
Easy	26	86.67	26	86.67	52	86.67
Difficulty	4	13.33	4	13.33	8	13.33
Total	30	100.00	30	100.00	60	100.00
Chi-square=						

Figure: Comparison of Polypropylene and Polydioxanone with surgical ease



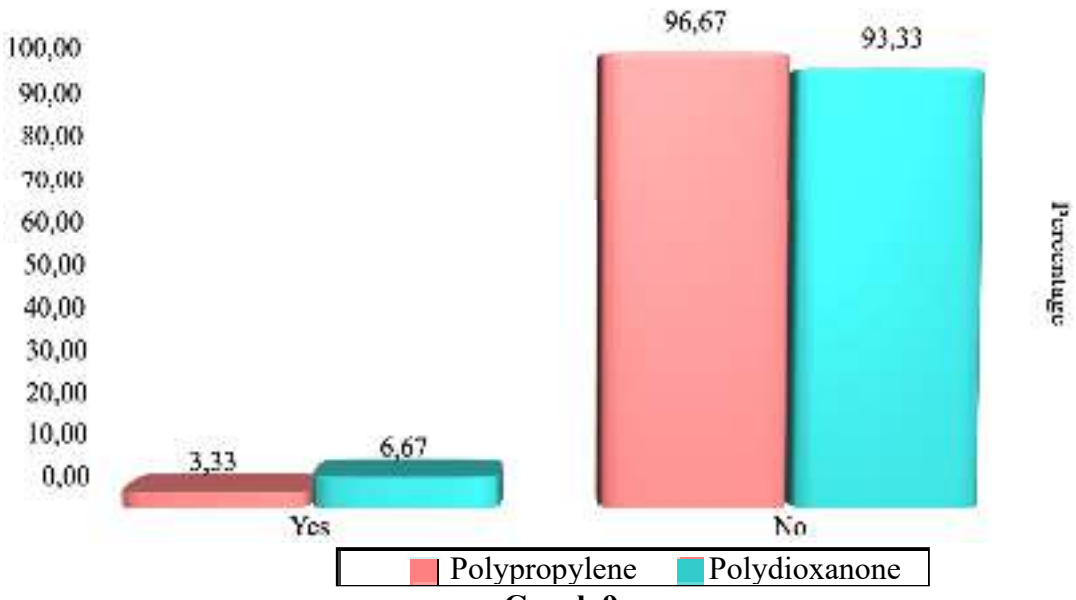
Graph 8

When it comes to the surgeons' ease of fixating the mesh, polydioxanone and polypropylene was preferred equally for both groups.

Table 9: Comparison of Polypropylene and Polydioxanone with presence of seroma

Seroma	Polypropylene	%	Polydioxanone	%	Total	%
Yes	1	3.33	2	6.67	3	5.00
No	29	96.67	28	93.33	57	95.00
Total	30	100.00	30	100.00	60	100.00
Chi-square with Yates's correction = 0.0000 P = 1.0000						

Figure: Comparison of Polypropylene and Polydioxanone with presence of seroma



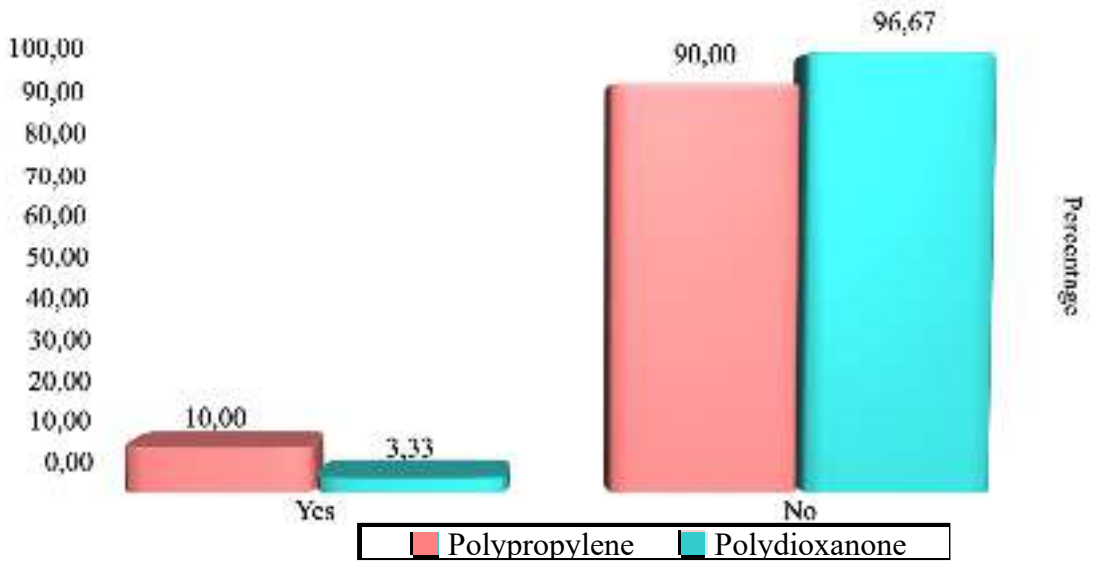
Graph 9

From the results of the above table, it can be seen that, out of a total of 30 respondents in each group, in which, only 3.33% of the patients developed seroma in post operative complication in polypropylene group while just 6.67% developed seroma postoperatively polydioxanone group. The difference or association is not found to be statistically significant ($p>0.05$)

Table 10: Comparison of Polypropylene and Polydioxanone with presence of hematoma

Hematoma	Polypropylene	%	Polydioxanone	%	Total	%
Yes	3	10.00	1	3.33	4	6.67
No	27	90.00	29	96.67	56	93.33
Total	30	100.00	30	100.00	60	100.00
Chi-square with Yates's correction = 0.2680 P = 0.6050						

Figure: Comparison of Polypropylene and Polydioxanone with presence of hematoma



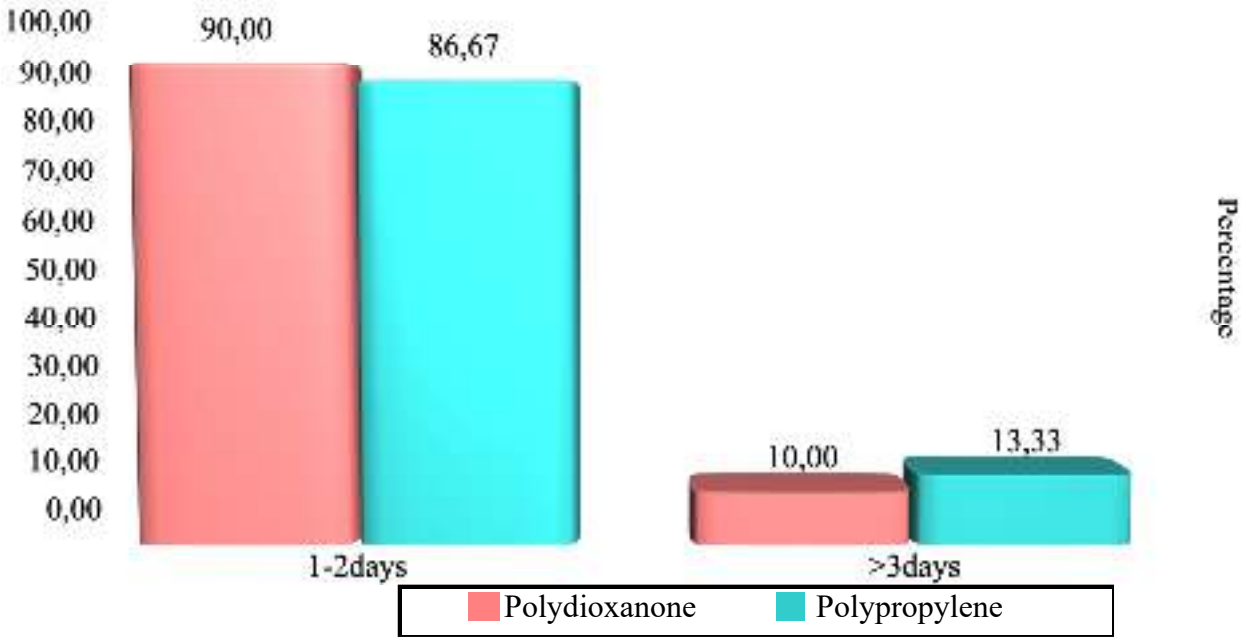
Graph 10

From the results of the above table, it can be seen that, out of a total of 30 respondents in each group, only 10% of the patients developed hematoma as a post operative complication in polypropylene group while 3.33% developed haematoma postoperatively in polydioxanone group. The result was however, not significant. (p=0.6050)

Table 11: Comparison of Polypropylene and Polydioxanone with hospital stay in days

Hospital stay	Polypropylene	%	Polydioxanone	%	Total	%
1-2days	26	86.67	27	90	53	88.33
>3days	4	13.33	3	10	7	11.67
Total	30	100.00	30	100.00	60	100.00
Chi-square with Yates's correction = 0.0000 P = 1.0000						

Figure: Comparison of Polypropylene and Polydioxanone with Hospital stay



Graph 11

From the results of the above table, it can be seen that, out of a total of 30 respondents in each group, 90 % of the patients were discharged within 2 days with no post-operative complications in polydioxanone group while 86.67% of the patients got discharged within 2 days in polypropylene group. Similarly 10% of the patients from polydioxanone group were hospitalized beyond 3 days whereas 13.33% of patients had an in hospital stay of over 3 days in the hospital postoperatively in polypropylene group, with no significant difference seen ($p>0.05$).

DISCUSSION

Although specific numbers are unknown, it is anticipated that over 20,000,000 prosthetic meshes are used each year around the world.[9,35] Since the early twentieth century, synthetic meshes used in hernia repair have been constantly improved.[36] The use of mesh has lowered inguinal hernia repair recurrence rates to below 5%, and post-operative outcome is now generally attributable to other complications, such as pain and Surgical Site Infection.[37-39]

Finding ways to lessen POP and infection after inguinal hernia surgery could have a big impact on QOL.

Fixation, the method of securing the mesh, is linked to chronic pain and infection.[40-41]. In hernia repair, a balance must be struck between the quality of knotting and the local tissue response and unintentional damage to nerves. Many researchers tried to overcome post-operative pain in lichtenstein hernia repair.

Poobalan et al critique the incidence of chronic groin pain post inguinal repair up to 2000 and found prevalence from 0% to 63% a year after surgery[42].

We have done this study to appraise POP in patients where we have used polydioxanone material (Group A) to secure the mesh v/s polypropylene material (group B) in Lichtenstein hernia repair.

In present study, compared post-operative pain with VAS scores on all the three follow ups, wherein there were lower pain scores in group A compared to group B. The groin pain was assessed by VAS on a scale of 1 to 10 with

0 - No pain

1-3 - mild

4-7 - moderate

8-10 - severe pain

In this study Postoperative pain at 1 week was significantly low in group A compared to group B (Z-value = -2.5873 p-value = 0.0097) , Postoperative pain at 1 month was been more in group B compared to group A however was not significant (P-value= 0.2282) and Postoperative pain at 3 months was significantly more in group B compared to group A with P-value = 0.0016.

Postoperative pain in Group A showed no significant change from 1 week to 1 month(P-value=0.1118). There was a significant change in Postoperative pain from 1 week to 3 months (P-value = 0.0001) and 1month to 3 months.(P-value = 0.0033)

Postoperative pain in Group B showed significant changes from 1 week to 1 month (P-value = 0.0033) and 1 week to 3 month (P-value=0.0013)but not significant from 1 month to 3 months.(P- value=0.3720)

Jeroukhimov et al concluded that the chronic pain rate after surgery was increased in the NAS group versus the Absorbable group (37 vs 26 patients p-value 0.05).[43]

We suggested that absorbable sutures have ability to dissolve thus causing lesser nerve irritation, hence lesser pain compared to non absorbable sutures. Polydioxanone is a synthetic, delayed-absorbable, monofilament material which redeems its tensile strength for about 2-3 months in the body. It is hydrolysed by the body by 6 months.

In present study 60 patients who presented with groin swelling were divided into two groups of 30 each. 96.67% were males and 3.33% were females in Group A and 93.33 % were males and 6.67% were females in group B. The mean age, standard deviation and mean duration of the disease in group A and group B were comparable.

In the Paajanen study[44], mesh was secured with absorbable sutures in 84 of 168 patients who underwent Lichtenstein hernia repair and were followed for two years. They concluded that utilising absorbable or non-absorbable sutures had no effect on the occurrence of groin pain.

In our study, we have compared few of the common post operative complications of lichtenstien's repair. The incidence of seroma (3.3% v/s 6.67%) Chi-square with Yates's correction = 0.0000 P = 1.0000 and haematoma (3.3% v/s 10%)(Chi-square with Yates's correction = 0.2680 P = 0.6050) formation was slightly higher in polypropylene group. The results were insignificant.

Our study found that the operative time was somewhat lower in the polydioxanone group compared to the polypropylene group
(50 percent of the procedures took 30-40 minutes in group A and 53.33 percent of the surgeries took 40-50 minutes in group B), however it was not statistically significant. When it comes to surgeons' ease of attaching the mesh, polydioxanone and polypropylene were preferred equally by both for the same.

Similar picture was noted in number of days the patients stayed in the hospital, in group A 86.67% of the patients were discharged within 2 days and in group B a slightly lesser percentage

i.e. 73.33% of the patients were discharged within 2 days. The delayed resolution of the post operative pain, as well as the presence of complications. Can be attributed for the above results.

The sample size in our study and the follow up period was considerably less. Hence need for a larger sample size and longer period of follow up is desired.

CONCLUSION

Based on our findings, we concluded that employing sutures of polydioxanone material to secure a mesh in lichtenstein hernia repair is a simpler and efficient alternative to the traditional use of polypropylene material. In terms of post operative pain, the efficiency of the same proves to be better in the current study.

Inspite of taking into account a small sample size with a short follow up period, we can still recommend using polydiaxone suture material for securing a mesh in a patient undergoing Lichtenstein Hernia repair.

SUMMARY

- This study was conducted in a tertiary health care centre, Dr Prabhakar Kore Hospital and MRC in Belagavi.

- A total of 60 patients were included in the study, all of which underwent Lichtenstein hernia repair with mesh fixation done with polydioxanone suture material or polypropylene suture material.

- Among 60 patients, 96.67% were males and 3.33% were females in Group A and 93.33 % were males and 6.67% were females in group B with no statistical significance.

- In this study Postoperative pain at 1 week was significantly lower in group A compared to group B (Z-value = -2.5873 p-value = 0.0097) , Postoperative pain at 1 month was more in group B compared to group A with little significance (P-value= 0.2282) and Postoperative pain at 3 months was significantly more in group B compared to group A with P-value = 0.0016.

- Postoperative pain in Group A showed significant change from 1 week to 3 months (P-value = 0.0001) as well as from 1 month to 3 months.(P-value = 0.0033)

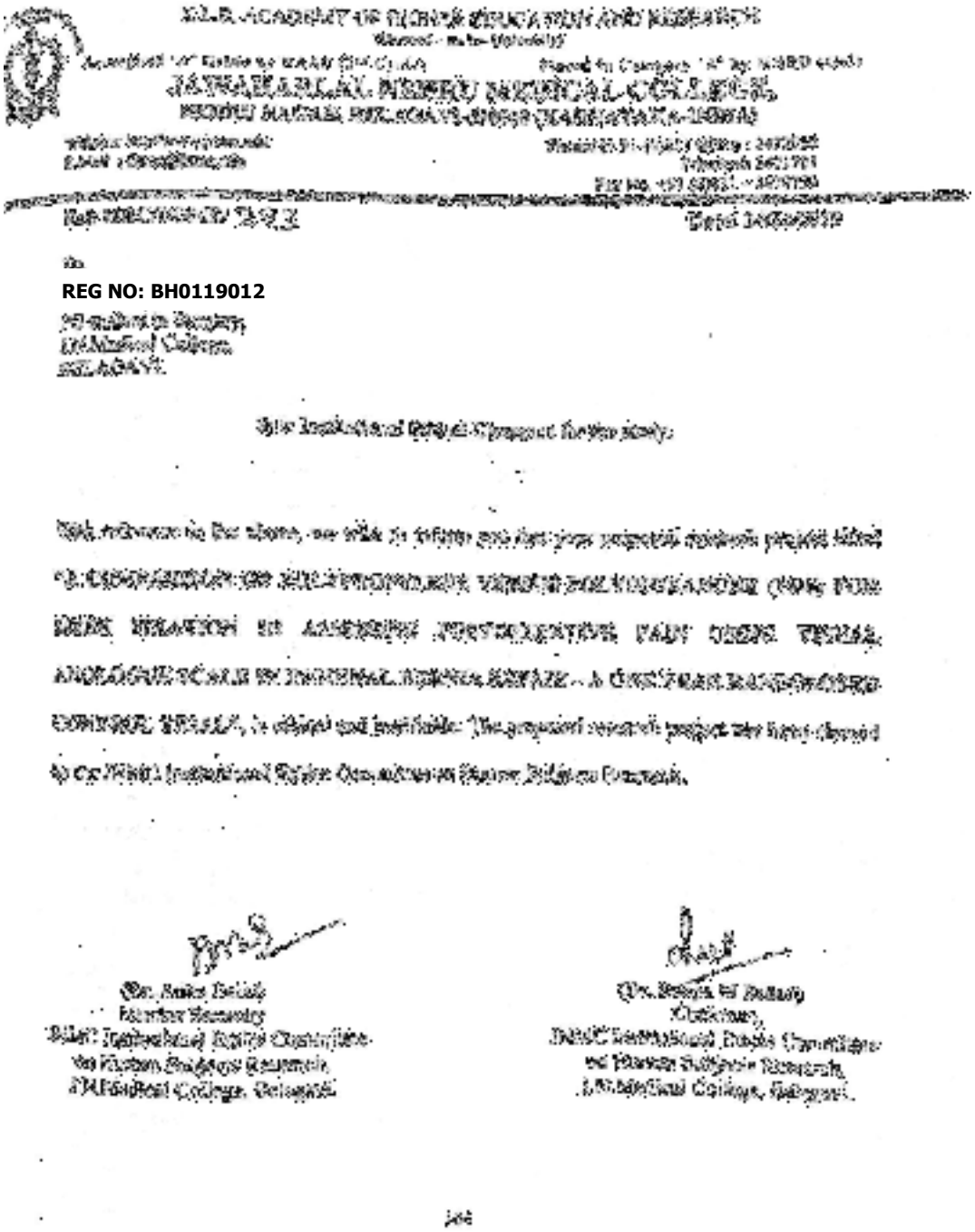
- Postoperative pain in Group B showed significant change from 1 week to 1 month (P-value = 0.0033) as well as from 1 week to 3 months (P-value=0.0013).

- Our study also showed that the occurrence of post operative complications such as hematoma or seroma was also marginally higher in case of the polypropylene group.

- The study indicated that sutures of polydioxanone material to secure a mesh in lichtenstein hernia repair was a simpler and efficient alternative, in terms of post operative pain at the inguinal region, in comparison to the traditional use of polypropylene material.

Therefore, we can advocate the same as a safe and effective alternative to mesh fixation in IHR in view of decrease POP.

ANNEXURE I. ETHICAL CLEARANCE.



REG NO: BH0119012

ANNEXURE II

INFORMED CONSENT

Title of Research Study **A COMPARISON OF POLYPROPYLENE VERSUS POLYDIOXANONE (PDS) FOR MESH FIXATION IN ASSESSING POSTOPERATIVE PAIN USING VISUAL ANALOGUE SCALE IN INGUINAL HERNIA REPAIR**: Study in KLE'S Dr. Prabhakar Kore Charitable Hospital, Belagavi

Principal Investigator: -

DR. _____

Professor,

Department Of General Surgery,

J. N. Medical College, Belagavi.

Co-investigator:-

REG NO: BH0119012

Post Graduate Student,

Department Of General Surgery,

J. N. Medical College, Belagavi.

INTRODUCTION AND PURPOSE: You are requested to participate in a study that is an attempt to find out the effectiveness of PDS in comparison to PROLENE SUTURE IN MESH FIXATION IN INGUINAL HERNIA REPAIR THAT IS LICHENSTEINS TECHNIQUE.

.With attention to patient outcome after open inguinal hernia chronic inguinal region pain and discomfort are major complains due to nerve compression by sutures used for mesh fixation. Since traditionally mesh is fixed with non-absorbable suture material, so this study planned with the objective to compare post-operative outcomes of mesh fixation with prolene versus PDS suture material. About 60 patients with inguinal hernia will be enrolled in this study.

This study will be conducted by **REG NO: BH0119012**, Post Graduate in Department of Surgery, under the direct supervision and guidance of Dr. _____, Professor, Department of Surgery, J. N. Medical College, Belagavi.

You need to be eligible, meeting all the selection criteria to participate in this study. You should be willing to provide information about yourself. 60 subjects will be enrolled in this study who will then be randomized in either of 2 groups (details below).

PROCEDURE: If you agree to participate in this study, you will be randomly allotted into a group (A or B) and accordingly receive either the standard treatment (prolene suture mesh fixation) or the newer treatment (PDS).you will be admitted in the hospital for 5 to 7 days. Inital two days for blood investigations chesh x ray and ultrasound abdomen and pelvis, 3 to 5 days for post operative management and monitoring. Intra operatively, the operative time, surgeons ease along with any other problems faced during surgery will be noted. Postoperative complications will be noted until you are discharged, and follwed up for 3 months.

BENEFITS: The benefits of the procedure under study is to reduce post op chronic pain and associated complications.

RISKS: There is no additional risk compared to the standard treatment.

COMPENSATION: Taking part in the study will not affect the cost of treatment i.e. it will be similar to the cost of standard procedure. In the event that you become injured as a result of taking part in this study, treatment will be offered to you or you will be given information about where to receive medical care: but

you/your insurance company will be responsible for the costs. However, no reimbursement, compensation or free medical care will be given.

CONFIDENTIALITY: Every effort will be made to protect the confidentiality of the information you provide. This means that the researchers will not let anyone, not a part of the study, see the information you provide. Only **REG NO: BH0119012** and Dr. _____ will have access to the information collected. Results of this study may be published but your name will not be revealed.

VOLUNTARY PARTICIPATION / WITHDRAWAL: Taking part in this study is voluntary; you may choose not to enroll in this study. Your decision will not change the present or future health care services offered to you at KLES Dr. Prabhakar Hospital, Belagavi. The alternative that you have is to undergo the traditional procedure that is carried out in KLES Hospital.

If you have any queries about the study, you may contact **REG NO: BH0119012** Dr. _____.If you need any further information regarding your rights as a study participant, you may also contact Dr. ROOPA BELLAD, Chairman of Institutional Ethics Committee, JNMC, Belagavi.

ANNEXURE III

PROFORMA

"A COMPARISON OF POLYPROPYLENE VERSUS POLYDIOXANONE (PDS) FOR MESH FIXATION IN ASSESSING POSTOPERATIVE PAIN USING VISUAL ANALOGUE SCALE IN INGUINAL HERNIA REPAIR" in KLE'S Dr. Prabhakar Kore Charitable Hospital, Belgaum."

Name & Address of the patient: _____

Age of the Patient: _____ IP. No. _____

Weight of Patient: _____ Sex.

Anaesthesiologist: _____ Surgeon: _____

Chief Complaints:

Past History:

- History of
- Diabetes Mellitus:- YES/NO
- Hypertension:- YES/NO
- Asthma:- YES/NO
- PREVIOUS SURGERIES:- YES/NO
- Drug Therapy: YES/NO

Family History:

General Physical Examination:

Weight: Temp: Pallor: Height:

Cyanosis: Pedal Edema: Clubbing:

Pulse : B.P: RR:

SYSTEMIC EXAMINATION:

Cardiovascular System:

Respiratory System:

Per Abdomen:

Central Nervous system:

Spine assessment:

INVESTIGATIONS:

Hb%: Urine Routine:

Any Other:

USG Abdomen &Pelvis:

Diagnosis:

Proposed Surgery

Observations:

Group: _____

Operative time:

Surgeons ease

Post operarive pain: according to VAS

1 week	
1month	
3 months	

Variables of the two techniques

	PDS	**POLYPROPELENE**
1) Operative Time		
2) Surgeons ease		
3) Difficulty in fixing the mesh		
4) Post op pain		
4) Seroma		
5) Hospital stay		

Signature of staff in charge:

GROUP A

Sr no	Age	gender m-1 f-2	duration of hernia in months	side of hernia r - 1/l - 2/ b/l - 3	final diagnosis rdh -1 /rih - 2/ bdh-3/ldh-4/lih-5/bih-6/both-7	pod pain 1week n-0/m-1/mo-2/s-3	pod pain 1month n-0/m-1/mo-2/s-3	pod pain 3months n-0/m-1/mo-2/s-3	operative time 30-40min - 1/40-50-2/>50-3	surgical ease e-1 d-2	seroma y-1/n-2	hematoma y-1 n-2	hos[ital stay in days 1-2=1/ >3=2
1	67	1	7	3	3	1	1	0	1	1	2	2	1
2	50	1	11	1	1	1	1	0	1	1	2	2	2
3	50	1	8	1	1	1	0	0	1	1	2	2	1
4	72	1	38	3	3	0	1	0	1	1	2	2	1
5	23	1	1	1	2	0	1	0	2	1	2	2	1
6	23	1	4	1	2	1	1	0	2	1	2	2	1
7	55	1	4	2	5	2	1	0	2	1	2	2	1
8	62	1	6	1	2	0	1	0	1	1	2	2	1
9	75	1	22	2	4	1	0	0	1	2	2	2	1
10	48	1	7	2	5	1	1	0	1	2	2	2	1
11	35	1	2	3	6	1	0	1	1	1	2	2	1
12	77	1	15	2	4	1	0	1	2	1	2	2	1
13	54	1	10	1	2	2	2	0	2	1	2	2	1
14	50	1	8	1	2	2	1	0	1	1	2	2	2
15	23	1	2	2	5	1	1	0	1	1	2	2	2
16	60	1	5	3	3	1	1	0	1	1	2	2	1
17	68	1	11	1	2	1	1	0	1	1	2	2	1
18	45	1	4	1	1	1	1	1	1	1	2	2	1
19	34	1	3	2	5	1	0	0	1	1	2	1	1
20	75	1	14	1	1	1	0	0	2	1	2	2	1
21	60	1	9	2	5	0	1	0	1	1	1	2	1
22	56	1	4	1	1	1	1	0	2	2	2	2	1
23	22	1	1	3	7	0	0	0	1	1	2	2	1
24	60	1	14	1	1	1	0	0	1	1	2	2	1
25	67	1	12	1	1	0	0	0	1	1	1	2	1
26	44	1	2	2	5	0	0	0	2	2	2	2	1
27	22	1	1	3	7	1	0	0	2	1	2	2	1
28	36	2	14	1	2	1	0	0	2	1	2	2	1
29	78	1	4	2	4	1	1	1	2	1	2	2	1
30	45	1	6	2	5	1	1	0	2	1	2	2	1

GROUP B

Sr no	IP number	Age	Sex m-1/f-2	side of hernia r-1/l-2/b-3	final diagnosis rdh-1/ rih 2 / bdh-3 / ldh-4 / lih-5 / bih-6 / both-7	Postoperative pain 1week 0-no pain, 1 - mild pain, 2 moderate pain, 3 severe pain	Postoperative pain 1 month 0-no pain, 1 - mild pain, 2 moderate pain, 3 severe pain	Post op pain 3 months 0-no pain, 1 - mild pain, 2 moderate pain, 3 severe pain	operative time in mins (30-40min -1)(40-50min -2) (>50min -3)	surgeon's ease e-1/d-2	seroma y-1/n-2	hematoma y-1/n-2	hospital stay in days (1-2days- 1) (>3days-2)
1	1024790	45	1	1	2	1	1	1	1	1	2	2	1
2	1016889	54	1	2	4	1	1	2	1	1	2	2	1
3	1007408	29	1	2	5	1	1	1	1	1	2	2	1
4	1007194	67	1	3	6	1	1	0	1	1	2	2	1
5	1005930	55	1	1	1	2	0	0	2	1	2	2	2
6	1002782	39	1	1	2	1	1	0	2	2	2	1	1
7	1009878	70	1	1	1	2	1	0	2	1	2	2	1
8	1004787	68	1	1	1	2	1	1	2	2	2	2	1
9	1004658	44	1	1	2	1	2	0	3	1	2	2	1
10	1002888	34	1	1	2	1	1	1	2	1	2	2	2
11	1001912	22	1	1	2	2	1	1	3	1	2	2	1
12	1001900	48	1	3	6	1	1	0	2	1	2	2	1
13	1000570	72	1	2	4	1	0	1	1	1	2	1	1
14	1000686	33	1	2	3	1	0	1	1	1	2	1	1
15	996459	53	1	2	4	2	1	0	2	1	2	2	1
16	995741	45	1	1	1	1	2	0	1	1	2	2	1
17	996476	22	1	2	4	1	1	0	2	1	1	2	2
18	995244	75	1	1	1	1	1	0	2	1	2	2	1
19	995815	34	1	3	7	2	1	1	2	1	2	2	1
20	992625	56	1	1	1	2	1	0	2	2	2	2	1
21	1026652	34	1	2	3	2	1	1	2	1	2	2	1
22	1025912	46	1	2	3	1	0	1	2	1	2	2	2
23	1016890	52	1	2	4	1	0	1	2	1	2	2	1
24	1016330	44	1	1	2	1	1	1	2	1	2	2	1
25	1016334	44	1	1	2	1	0	2	2	1	2	2	1
26	1012654	59	2	2	3	1	1	1	1	1	2	2	1
27	1002583	65	2	1	1	2	1	1	2	1	2	2	1
28	1001292	26	1	1	1	1	1	1	2	2	2	2	1
29	998661	21	1	1	2	2	1	0	3	1	2	2	1
30	996022	52	1	1	1	1	0	1	2	1	2	2	1