

Original Research Article

A clinical study of trans-rectus sheath extrapreperitoneal procedure and Gilbert's repair in the treatment of groin hernia

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ABSTRACT

Background: The focus to improve surgical technique has changed from recurrence to chronic postoperative inguinal pain (CPIP). Nerve injury or stretching due to surgical approach or mesh fixation led to CPIP. Transrectus sheath preperitoneal procedure (TREPP) is a new open technique in which the mesh is placed preperitoneally via medial approach. The goal of this study was to evaluate and compare the results of TREPP with another open anterior approach- Gilbert's repair which also doesn't need mesh fixation; in view of operative time, duration of hospital stay, CPIP, recurrence and cost effectiveness.

Methods: Between November 2013 and October 2015, an observational clinical study of TREPP and Gilbert's repair in the treatment of groin hernia was conducted in the department of surgery, SMHS Hospital. Patients were enrolled after detailed history, clinical examination, all baseline investigations.

Results: A total of 40 patients above 18 years of age with primary unilateral inguinal hernia were operated: 20 with TREPP and remaining 20 with Gilbert's technique. Out of those who underwent TREPP 75% had indirect type and 25% had direct type hernia. Similarly, out of those who underwent Gilbert's repair, 65% had indirect type and 35% had direct hernia. Operative time was significantly lower in TREPP with mean of 58.6±11.47 minutes in comparison to 68.4±9.54 minutes in Gilbert's repair. Also, the mean hospital stay was 21.2±3.69 hours in TREPP whereas it was 31.2±6.03 hours in Gilbert's repair.

Conclusions: TREPP is a more feasible new technique for inguinal hernia repair with better results in terms of CPIP especially. It is more promising because of the complete preperitoneal view, the short learning curve, and the stay-away-from-the-nerves principle thereby offering better outcome and patient satisfaction.

Keywords: Groin hernia, TREPP, Gilbert's repair, Mesh

INTRODUCTION

Hernia

The word hernia is derived from the Latin word for rupture. It is defined as an abnormal protrusion of an organ or tissue through a defect in its surrounding walls. Abdominal wall hernias occur usually at sites where the aponeurosis and fascia are not covered by striated muscle.¹

75 percent of all abdominal wall hernias are found in the groin. Of all groin hernias, 95% are hernias of the inguinal canal with the remainder being femoral hernia defects. Inguinal hernias are nine times more common in men than in women. Although femoral hernias are found more often in women, the inguinal hernia is still the most common hernia in women. The overall lifetime risk of developing a groin hernia is approximately 15% in males and less than 5% in females. In the same way, the complications of hernias (incarceration, strangulation, and bowel

obstruction) are found more commonly at the extremes of age.²

Inguinal hernias may be broadly classified as indirect or direct.

Indirect inguinal hernias

These are termed such because of their indirect passage through the internal ring.³ These develop at the site of the internal ring formed by a normal defect in the transversalis fascia through which the spermatic cord in men and round ligament of uterus in women pass into the abdomen from the extra-peritoneal plane. Indirect hernias are more commonly found on the right side, which is attributed to delayed descent of the right testicle in men and subsequent delay in the atrophy of the processus vaginalis that normally follows this descent.⁴

Direct inguinal hernias

Direct hernias result from a weakness in the posterior wall of inguinal canal and occur in Hesselbach's triangle which is bounded laterally by the inferior epigastric vessels, medially by lateral edge of the rectus abdominis and inferiorly by the inguinal ligament.

Direct hernias occur more commonly in older men with a weakened transversalis fascia.

Clinical presentation

Patients suffering from inguinal hernias can either be asymptomatic or symptomatic having symptoms such as groin pain, change in bowel habit, urinary symptoms, and certain complications (incarcerations, strangulation, peritonitis).

Treatment modalities

The treatment of all hernias, regardless of their location or type, is surgical repair. Elective repair is performed to alleviate symptoms and to prevent the significant complications of hernias, such as incarceration or strangulation. The risks of elective groin hernia repair, even in the patient with a complicated medical history, are exceedingly low. Outcomes of surgical repair are generally excellent with minimal morbidity and relatively rapid return to baseline health.²

The overall mortality rate for elective hernia repair increases with age. Risk is approximately 0.1% in patients younger than 60 years and as high as 3.3% in those older than 80 years.⁶

Elective repair of inguinal hernias can be undertaken using an open or a laparoscopic approach. Open inguinal hernias can be further subdivided according to whether the repair is performed anterior or posterior to the inguinal floor.⁵

Open approaches

Anterior repairs (non-prosthetic)

It includes: Marcy repair (Henry Orlando Marcy, 1871), Bassini's repair, Cooper's ligament/McVay repair (Chester McVay, 1942), and Shouldice's repair (Earle Shouldice, 1952).

Anterior repairs (prosthetic)

It includes: Lichtenstein tension-free repair and plug and patch technique (Gilbert's repair).

Pre-peritoneal repairs

It includes: trans rectus sheath extra-peritoneal procedure (TREPP) (Akkersdijk); Read-Rives repair; Rives, Stoppa, or Wantz repair; iliopubic tract repair; Kugel repair; and prolene hernia system.^{7,8}

Laparoscopic approaches

Laparoscopic groin hernia repair was first performed by Ger in 1979.² It includes: trans-abdominal pre-peritoneal (TAPP) repair, and totally extra-peritoneal (TEP) repair.

TREPP

In 2006, a novel technique was developed combining advantages of both Lichtenstein procedure and TEP. This technique concerns an open procedure in which mesh is placed preperitoneally. It differs from other preperitoneal techniques due to its medial approach avoiding interference with the course of all inguinal nerves through the lateral abdominal wall and thereby being better technique in terms of chronic postoperative inguinal pain (CPIP).⁹

Plug and patch technique (Gilbert's repair)

It's a modification of the Lichtenstein repair and was developed by Gilbert in 1987 and later popularized by Rutkow and Robbins in early 1990s. In addition to the placement of prosthesis (i.e. the patch), the technique includes placement of a plug through the internal ring. The internal ring is therefore reinforced by the leaflets of the patch as well as the plug. The technique involves rolling a flat piece of polypropylene into a tight cylinder and placing it alongside the spermatic cord as it passes through the internal ring. Currently, preformed plugs in various sizes are available and are usually fixed to the margins of the internal ring with one or several interrupted sutures.⁵

Aims and objectives

The present study was a clinical study of TREPP and Gilbert's repair in the treatment of groin hernia. The patients were divided into two groups. One group of

patients underwent repair via TREPP and the other group via Gilbert's procedure; selected by alternate randomization into each group. The main aim of this study was to compare these two procedures in terms of the following: operative time; duration of hospital stay; complications/morbidity profile-CPIP-pain that persists or occurs after normal tissue healing has taken place and can reasonably be defined as pain persisting three months after inguinal hernia repair; recurrence rate; and cost effectiveness.⁹

METHODS

This was a prospective clinical study comprising of patients admitted for elective open surgical repair of inguinal hernia in the Department of Surgery, SMHS Hospital, Srinagar during the intervening period from November 2013 to October 2015.

The study was granted clearance by the standing ethical committee of Government Medical College, Srinagar before commencement.

The sampling technique involved was simple random sampling technique.

Patients were selected by alternate randomization into each group, unbiased from either sex above 18 years of age and were evaluated as per a predetermined proforma.

Patients enrolled were evaluated in the outpatient department of surgery, SMHS Srinagar and diagnosed on the basis of: detailed history, clinical examination, and ultrasound of abdomen and pelvis.

Inclusion criteria

Patients with age >18 years, either of the sex, and patients having unilateral or bilateral hernia were included in the study.

Exclusion criteria

Patients with age <18 years, complicated hernia, failed previous open hernia repair, recurrent hernia, and patients refusing consent were excluded.

This was followed by all baseline investigations and a pre-anaesthetic check-up by the anaesthesiologist and an informed written consent prior to surgery.

Forty patients were included in the study. Twenty patients were being operated by TREPP and other half by Gilbert's procedure.

Materials used were: ultrapro mesh (monocryl-prolene-composite mesh-7.6×15 cm, 15×15 cm) and sutures (vicryl 2-0, silk) available in hospital.

Prophylactic antibiotic (injection ceftriaxone-1 gm) and tetanus toxoid were administered before the procedure in each patient.

Surgery was performed on routine elective basis after proper investigations as per the following operative techniques.

TREPP

TREPP was performed under spinal anaesthesia. A 6 cm transverse incision was made about 1 finger fold above the line between ipsilateral pubic tubercle and the anterior superior iliac spine and 1 cm lateral to midline following Langer's lines to reach the preperitoneal space.

After dividing the subcutaneous tissue and Scarpa's fascia, anterior rectus sheath was exposed and divided parallel to the incision. The muscle fibres of the rectus abdominis were retracted medially and fascia transversalis was divided. The inferior epigastric vessels were identified and retracted medially as well. With a gentle finger dissection, the pre-peritoneal space was created, behind pubic bone with loose connective tissue (Retzius' space) and laterally (Bogros' space). Using three long and thin retractors, a perfect preperitoneal space overview was achieved and all possible hernia orifices (direct, indirect, and/or femoral) could be visualized.

A direct hernia was reduced immediately. Using anatomical landmarks; abdominal wall ventrally, the psoas muscle dorsolaterally and the external iliac artery and vein medially; the funiculus was identified with the deferential duct (female: round ligament), the testicular vessels, and hernia sac in case of indirect hernia which was then reduced. Ultrapro mesh (monocryl-prolene-composite 7.6×15 cm) was then placed in the pre-peritoneal space covering the orifices of all possible hernias with cord structures lying anteriorly. After deployment, the intra-abdominal pressure kept the mesh positioned between the peritoneum and the fascia transversalis without necessitating fixation. The anterior rectus sheath was then closed.

Plug and patch technique (Gilbert's repair)

This open procedure was performed with the patient under regional anaesthesia in supine position. An inguinal incision of 5-6 cm was made to expose external oblique aponeurosis, which was incised up to above the internal ring with the anterior space created with blunt dissection for allowing the subsequent mesh placement. The cord was retracted sparing the ilioinguinal nerve, external spermatic vessels and genital branch of the genitofemoral nerve. Then the internal spermatic fascia was opened. In case of indirect hernia, sac was separated from cord, resected and closed. In direct hernia, the fascia transversalis was opened and partially resected, sac being excised or reduced depending on its volume. A 15×15 cm ultrapro mesh was used to make a cone shaped plug which was inserted

through deep ring. The remaining mesh was used as an onlay patch which was slipped behind the cord and placed under external oblique aponeurosis with an aperture for the spermatic cord and adequate coverage of pubis tubercle, the upper shelf of the inguinal ligament, and the conjoint tendon with the lateral part far beyond the entire internal ring orifice. It is routinely not sutured. Both arms of the slit were sutured together, thereby functioning as a pseudointernal ring.

The aponeurosis was then closed, skin was then closed back using interrupted silk 2-0. No drainage system was necessary.

Post-operative care

After the operation patients were shifted to the ward and monitored. For the immediate postoperative pain relief, injectable diclofenac sodium 75 mg was used and later oral diclofenac sodium 75 mg was used. Patients were made ambulatory, and orals were started in the evening on the same day of operation in both the techniques.

Patients were discharged from the hospital as soon as they were ambulatory and tolerated full orals. Patients were then called for follow-up at one week, two weeks, four weeks, three months, six months, one year or whenever necessary.

Following parameters were recorded: gender, age, comorbidities, and past surgical history; hernia characteristics: type of hernia (direct, indirect, or femoral), side of hernia, unilateral or bilateral, primary or recurrent; operative time (from the time of skin incision to closure); intraoperative complications if any; postoperative complications if any; wound assessment for any seroma, hematoma or wound infection; duration of hospitalization for each patient; recurrence evaluation by physical examination during regular follow ups; and evaluation of cost of surgery by both the techniques

Statistical analysis

Statistical software statistical package for the social sciences (SPSS) (version 20.0) and Microsoft excel were used to carry out the statistical analysis of data. Data was analyzed by means of descriptive statistics: percentages, means and standard deviations. Graphically the data was presented by bar diagrams. Student's independent t-test was employed for parametric data. Chi-square test or Fisher's exact test, whichever appropriate was applied for non-parametric data. P value <0.05 was considered statistically significant.

RESULTS

Age distribution

In TREPP, minimum age was 28 years and maximum age was 67 years with mean age of 51 ± 11.67 years. In

Gilbert's procedure, minimum age was 34 years and maximum age was 72 years with mean age of 51.2 ± 10.12 years, difference being statistically insignificant (p value=0.954) (unpaired t test).

Table 1: Age distribution.

Age group (years)	TREPP (n=20)	Gilbert's repair (n=20)	P value
21-30	1	0	0.954*
31-40	3	4	
41-50	6	7	
51-60	5	6	
61-70	5	2	
71-80	0	1	
Mean $\pm$ SD	51.0 $\pm$ 11.67	51.2 $\pm$ 10.12	

*Statistically insignificant difference (p value>0.05).

Sex distribution

Majority of the cases belong to male sex in both the groups. Only one female patient had right indirect inguinal hernia and was randomized to TREPP technique, difference being statistically insignificant (p value=1.000) (Fisher exact test).

Table 2: Sex distribution.

Sex	TREPP	Gilbert's repair	P value
Males	19	20	1.000*
Females	1	0	

*Statistically insignificant difference (p value>0.05)

Distribution of cases

Most of the cases in both the methods had indirect inguinal hernia.

Table 3: Type of hernia.

Type of hernia	TREPP		Gilbert's repair	
	Right side	Left side	Right side	Left side
Indirect inguinal	8	7	6	7
Direct inguinal	3	2	4	3

Operative time

Most common duration of intervention in TREPP was 51-60 minutes and in Gilbert's repair was 71-80 minutes. The difference is statistically significant.

Hospital stay

It was noted that TREPP group of patients had less duration of hospital stay than the Gilbert's Repair group of patients, difference being statistically significant (P value <0.001) (unpaired t test).

Table 4: Operative time.

Operative time (minutes)	TREPP (n=20)	Gilbert's repair (n=20)	P value
31-40	1	0	0.006 *
41-50	2	0	
51-60	7	4	
61-70	6	6	
71-80	3	7	
81-90	1	3	
Mean±SD	58.6±11.47	68.4±9.54	

Statistically significant difference (p value<0.05), significant (p value=0.006) (unpaired t test).

Complications

In TREPP, no intraoperative complication was noted. In Gilbert's procedure, an intraoperative complication noted was.

One case of electrocautery burn-5%.

Incidence of CPIP was found to be 5% in TREPP in comparison to 35% in Gilbert's repair; thereby difference being statistically significant (p value=0.044).

In TREPP no recurrence was observed. In Gilbert's repair, only one patient had recurrence during the follow-up period of one year. The difference was thereby statistically insignificant, p value=1.000 (unpaired t-test).

Table 5: Hospital stay.

Duration of hospital stay (hours)	TREPP (n=20)	Gilbert's repair (n=20)	P value
12-24	18	8	<0.001 *
24-36	2	12	
Mean±SD	21.2±3.69	31.2±6.03	

Statistically significant difference (p value<0.05)

Table 6: Complications.

Complications	TREPP		Gilbert's repair	
	No. of cases	Percentage	No. of cases	Percentage
Intra op				
Bleeding	0	0	0	0
Cautery burn	0	0	1	5
Post op				
Wound infection	0	0	0	0
Seroma	1	5	0	0
Haematoma	0	0	0	0
Scrotal swelling	0	0	0	0
CPIP	1	5	7	35

Table 7: Incidence of recurrence.

Parameters	TREPP	Gilbert's repair	P value
Number of recurrence cases	0	1	1.000*
Percentage	0	5	

*Statistically insignificant difference (p value >0.05).

Cost effectiveness

In TREPP the average cost per case was about 3350±170.13 INR ranging between 3000 and 3600 INR.

In Gilbert's repair average cost per case amounted to about 3500±187.08 INR ranging between 3200 and 3800 INR.

Each case's cost included that of surgical mesh and suture materials including anaesthetic medications.

The difference was found to be statistically significant; p value=0.012 (unpaired t-test).

Table 8: Cost included per operation.

Cost per case (INR)	TREPP	Gilbert's repair	P value
Mean±SD	3350±170.13	3500±187.08	0.012*

*Statistical difference being significant (p value <0.05).

DISCUSSION

Hernia repair is currently the most commonly performed general surgical operation. The goals of successful hernia repair must include achievement of an effective repair with the lowest possible recurrence, minimal operative and postoperative discomfort with a rapid return to normal activity, and a repair that is cost-effective. After the introduction of mesh in inguinal hernia repair, the focus to improve surgical technique has changed from recurrence to chronic postoperative inguinal pain.

CPIP may seriously affect the patient's life several years after the operation. The pain is frequently perceived as an interference in the patient's daily life and a limitation of their physical activities. Numerous studies have confirmed

the significantly greater frequency of pain after suture repair compared with mesh repair. It is difficult to estimate the true incidence of CPIP, as the type of pain assessment differs between studies. Intraoperatively or postoperatively incurred nociceptive, neuropathic or inflammatory factors are held responsible for chronic pain, whereas the neuropathic component, which is a result of direct nerve damage, is viewed as the most important pathogenic factor involved in chronic pain.⁷

Besides nerve damage during dissection, thermal injury due to electrocautery, inflammatory and/or mechanical reaction to the mesh, stapling of the mesh is the most frequent evoked mechanism.^{8,9}

In TREPP the mesh is placed between the peritoneum and the abdominal wall muscles i.e. the preperitoneal space (sublay) overlapping the abdominal wall defect widely. The intra-abdominal pressure causes the mesh to be pressed against the abdominal wall, keeping it positioned, rather than pushing it away. This is the 'upstream principle'.¹⁰ In contrast, the inlay (or onlay) positioned mesh, as is done in the Lichtenstein technique or Gilbert's repair, does not benefit from this physiological principle and needs fixation.

The risk of nerve damage through dissection of the inguinal canal, risk of nerve entrapment due to nerve suturing, or nerve fixation on the mesh is reduced to an absolute minimum in the TREPP technique. This is mainly because of the strictly medial approach, avoiding contact with the nerves. Besides the rectus sheath has no posterior layer below the linea semilunaris—half way between the umbilicus and the pubic bone. Furthermore, in the most caudal part of the rectus abdominis muscle, the fibers run relatively parallel to the inguinal ligament. The chance of collateral damage to nerve tissue is reduced to an absolute minimum secondary to avoiding the inguinal canal itself during dissection. The TREPP procedure, therefore, reduces the risk for developing postoperative nerve-related chronic pain.¹⁰

TREPP also provides a complete overview of the PPS with the direct vision of all possible hernia orifices, including the femoral hernia in contrast to Gilbert's repair. The risk for an incisional hernia at this level is, theoretically, low because the entrance point is covered by a double layer consisting of muscle tissue and anterior rectus sheath. Moreover, the overlapping mesh may protect the abdominal wall from incisional hernia by covering the location of the rectus muscle in the preperitoneal space.

According to studies most patients with CPIP already suffered from pain preoperatively, identifying preoperative pain as an independent risk factor for CPIP. Moreover, bilateral surgery is significantly associated with CPIP. Inflammatory changes around the mesh cause nociceptive pain which cannot totally be prevented by TREPP or any other technique in which mesh is used. In this respect, hyperfibrosis ('meshoma') might also occur in

a minority of patients. CPIP as a result of iatrogenic nervous damage during the approach and dissection will be lower in TREPP due to the medial approach in contrast to all other open techniques.¹¹

The present study was a clinical study of TREPP and Gilbert's repair in the treatment of groin hernia and analysing their results. 40 patients were included in the study. 20 patients were operated by TREPP and the other 20 patients by Gilbert's repair, after being randomized.

Age distribution

In our study the most common age group in TREPP and Gilbert's repair was 41-50 years with mean age of 51.0 ± 11.67 years in TREPP and 51.2 ± 10.12 years in Gilbert's repair; indicating that groin hernia is more common in older age group in whom the abdominal musculature is weak and prone to herniation after strenuous exercise.

Koning et al in his pilot study on first 50 cases of TREPP mesh repair reported mean age of 54 years (range 24–81 years).¹⁰

Lange et al in his study on first 1,000 patients who underwent TREPP reported mean age of 61.4 years (range 18-99).¹¹

Zieren et al in his study reported mean age of patients who underwent plug and patch (Gilbert's) repair to be 47 ± 19 years.¹³

Huang et al reported in their study that the mean age in Gilbert's repair (mesh plug technique) was 56.8 years (range 61-70 years).¹⁴

Sex distribution

Majority of the patients in our study were males. Only one patient was female with indirect inguinal hernia and was operated by TREPP, indicating that groin hernia is much more common in males than females.

Koning et al in his study included 50 patients for TREPP of which all were men (100%).¹⁰

Lange et al in his study on TREPP included 1000 patients of which 874 were males (93.8%) and 58 patients were females (6.2%).¹¹

Zieren et al conducted his study on plug and patch repair of inguinal hernia over a total 359 patients which included 332 males (92.4%) and 27 females (7.5%).¹³

Huang et al in his study on Gilbert's repair on total of 175 patients reported 141 patients to be males (80.5%) and 34 to be females (19.4%).¹⁴ Benizri et al in his study on plug and patch repair over total of 57 patients included 54 males (94.7%) and 3 females (5.2%).¹⁵

Distribution of cases

Indirect inguinal hernia is the most common hernia, regardless of gender. In men, indirect hernias predominate over direct hernias at a ratio of 2:1. Direct hernias are very uncommon in women.

In our study all cases were of unilateral hernia where most had indirect inguinal hernia, 15 cases in TREPP (75%) and 13 cases in Gilbert's procedure (65%). Direct hernia was present in 5 cases in TREPP (25%) and 7 cases in Gilbert's repair group (35%). Hernia was relatively common on right side. 11 patients (55%) in TREPP and 10 patients (50%) in Gilbert's repair group had right sided hernia whereas 9 patients (45%) in TREPP and 10 patients (50%) in Gilbert's repair group had left sided hernia.

Lange et al in his study reported 464 patients having right sided hernia (50.3%), 370 patients left sided (40.1%) and 88 patients' bilateral hernia (9.5%).¹¹

Huang et al reported in his study a total of 192 groin hernia; of which 101 were right sided (52.6%), 80 were left sided (41.6%), 17 were bilateral (8.8%) and 11 were femoral type (5.7%).¹⁴

Benizri et al in his study over 57 patients reported 30 cases having right sided hernia (52.6%), 14 left sided (24.5%) and 13 with bilateral hernia (22.8%).¹⁵

Operative time

In our study the most common duration of intervention in TREPP was 51-60 minutes with mean of 58.6 ± 11.47 minutes, significantly lesser than in Gilbert's repair where it was 71-80 minutes with mean of 68.4 ± 9.54 minutes.

Koning et al reported in his study over TREPP which included 50 patients (all with unilateral hernia) that the average skin-to-skin time was 20 min, and the mean total theater time was 46 min.¹⁰

Benizri et al conducted study from January 2001 to January 2004 over plug and patch repair in 57 patients and reported mean operative time of 54 ± 11 min using sutures for mesh fixation and of 44 ± 9 min using fibrin sealant (in unilateral hernia).¹⁵

Hospital stay

In our study, patients who underwent TREPP had a mean hospital stay of 21.2 ± 3.69 hours whereas in Gilbert's repair, mean hospital stay was 31.2 ± 6.03 hours. It was noted that TREPP group of patients had significantly less duration of hospital stay than the Gilbert's repair group of patients, thereby having early recovery.

Koning et al in his study performed TREPP over first 50 cases wherein 93% of the patients were treated in the daycare setting.¹⁰

Lange et al conducted his study of TREPP over 1000 patients where all operations were performed as day surgery.¹¹

Zieren et al concluded in his study over plug and patch repair that the mean hospital stay was 2 ± 1 days.¹³

Huang et al in his study reported mean hospital stay of 1.45 ± 1.43 days for the patients who underwent mesh plug technique (Gilbert's repair) for inguinal hernia repair.¹⁴

Complications

In our study the CPIP was found in one patient of TREPP (5%) in comparison to seven patients of Gilbert's repair (35%) after three months of follow up with a statistically significant difference, showing better results in favour of TREPP. Only one case of TREPP (5%) had seroma after surgery and one case of Gilbert's repair (5%) had an intra-operative cautery burn.

Koning et al in his study over TREPP reported no incidence of CPIP.¹⁰

Lange et al in his TREPP study over first 1000 cases of which only 932 patients had completed questionnaire, reported a total of 49 patients experiencing CPIP (5.3%).¹¹ 15 patients had haematomas which were treated conservatively, two patients had a wound abscess that had to be drained operatively. In both mesh remained in situ. Two patients had an infected mesh, which had to be removed.

Huang et al concluded in his study that in total of 175 patients who underwent Gilbert's repair CPIP was reported in 14 patients (8.9%), two patients (1.14%) had bleeding and one (0.57%) had developed testicular atrophy.¹⁴

Benizri et al reported 13 patients (22.8%) in suture group of Gilbert's repairs and 2 patients (3.5%) in fibrin sealant group of Gilbert's repair having CPIP.¹⁵

Recurrence

In our study no recurrence was observed in patients who underwent TREPP. However, in Gilbert's repair, only one patient had recurrence during the follow-up period of one year.

Koning et al reported no recurrence of hernia in the patients who underwent TREPP in his study.¹⁰

Lange et al in his TREPP study reported that out of 915 patients, 11 (1.2%) experienced recurrence after treatment, and 34 patients (3.7%) were uncertain as to whether hernia had recurred.¹¹ Zieren et al in his study of Gilbert's repair over 359 patients reported one patient (0.2%) having recurrence after treatment.¹³

Huang et al in his study reported no recurrence in the patients who were treated by Gilbert's repair.¹⁴

Cost effectiveness

Each case's cost included that of surgical mesh and suture materials including anaesthetic medications and was also proportional to length of hospital stay. In our study, in TREPP the average cost per case was about 3350±170.¹³ INR significantly less than that in Gilbert's repair where it amounted to about 3500±187.08 INR.

Zieren et al in his study over plug and patch repair reported material costs in the operating room of about 146±9 DM (Deutsche mark) amounting to about 5535.33±341.22 INR (100 DM=3791.33 INR).¹³

Limitations

The study was observation study only and to qualitate the findings of this study randomized controlled trials is the way through.

CONCLUSION

TREPP is a more feasible new technique for inguinal hernia repair with better results in terms of especially CPIP, with lesser operative time and length of hospital stay and early recovery. It is more promising because of the complete pre-peritoneal view, the stay-away-from-the-nerves principle, not requiring any mesh fixation and the short learning curve, thereby offering better outcome and patient satisfaction.

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