Tension –Free Inguinal Hernia Repair Comparing 'Mesh' with 'Darn' A Prospective Randomized Clinical Trial.

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ABSTRACT:

BACKGROUND:

Lichtenstein tension free hernioplasty(mesh repair) and Moloney darn repair are commonly practiced repairs for inguinal hernias with acceptably low recurrence rates. Mesh repair is considered more recent than darn repair and both of them are tension free.

OBJECTIVE:

To compare the number of postoperative complications and early recurrence between Mesh repair and Darn repair, for inguinal hernia.

PATIENTS AND METHODS:

The study was conducted at Department of Surgery, Al-Sadur teaching hospital in An-Najaf from 1st august 2007 to 1st august 2008 . A total of 104 patients were selected. 51 patients were treated with Lichtenstein tension free hernioplasty (Group A) and 53 with Darn repair (Group B). Cases were followed up for three months to one year. The study design was quasi experimental.

RESULT:

The male to female ratio was 51:1. The mean hospital stay was 37.18 hours in group A and 47.17 hours in group B. there was statistically significant difference between the groups ($p< 0.05$).

The mean operative time was 44.7 minutes in group A and 50.9 minutes in group B. There was statistically significant difference between the groups ($p< 0.05$). the The total number of postoperative complications was reported in 36 patients, 15 (29.42%) complications occurring in group A and 21(39.62%) in group B. Scrotal swelling was the most common complication followed by urinary retention and wound infection in both study groups. Postoperative complications like scrotal swelling (11.77% vs. 16.98%), haematoma (5.88% vs. 3.77%), urinary retention (5.88% vs. 9.43%), wound infection (1.96 vs. 7.55%) and scar pain (3.92% vs. 1.89%) were unsignificantly low in Lichtenstein tension free hernioplasty as compared to Darn repair ($P > 0.05$). There were no recurrences noted till date in any of the two groups under study.

CONCLUSION

Open inguinal hernia repair with a nylon darn was equivalent to polypropylene mesh with respect to early measures of postoperative outcome and recurrence at 1 year. The mesh was superior to darn in operative time and hospital stay.

***KEY WORDS*:** inguinal hernia,mesh,darn,repair.

INTRODUCTION:

Hernias are common health problem; the incidence is 3-4% in male population. Hernia in inguinal region account for approximately 75% of all forms of hernias and are more common in males than females[1].The indirect inguinal hernia are more common than direct type accounting for (2/3 of inguinal hernias are indirect)[2].

Inguinal hernia can be congenital or acquired. Muscle deficiency contribute to herniation.Deffeciency of connective tissue reduces the strength of transverse apponeourosis and fascia[3]. Denervation of shutter mechanism following a low cosmetic appendectomy incision is uncommon but well known cause of inguinal hernia[2].

Both direct and indirect inguinal hernias occur more commonly on right side, this may attributed to a delay in atrophy of processus vaginalis following normal descent of right testis to the scrotum during fetal development[2].

It is customary to operate on most inguinal hernias. the reasons not to operate are; trivial direct inguinal hernia in elderly patient, inactive or terminally ill patient[4].

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The principles of operation consist of excision of hernial sac, repair of stretched internal inguinal ring, along with transversalis fascia and further reinforcement of the posterior wall of inguinal canal[5], which is mandatory in adult patient[2]. The repair must be done without tension and various techniques exist to achieve this, e.g. Maloney nylon darn and polypropylene mesh implant. High recurrence rate due to suturing under tension promoted the development of minimally tension nylon darn and polypropylene mesh to reinforce the posterior wall of inguinal canal during hernia repair [5].

Nylon darn originally described by Moloney et al, is a cheep and effective way of repair. the recurrence rate reported from original series was 0.8% [6]. More recently the use of polypropylene mesh has become popular, largely because of excellent results reported by Lichtenstein et al. the recurrence rate with this procedure was reported as nil in Lichtenstein personal series but about 1% in other series[6].

Lichtenstein tension free hernioplasty is reported to be less painful, allow rapid return to normal activity and carries low incidence of recurrence. The morbidity is low and hospital stay is short with this technique[7,8].

This study was carried out to compare the number of postoperative complications, mean operative time, mean hospital stay and early recurrence between Lichtenstein tension free hernioplasty and darn repair, for inguinal hernia.

PATIENTS AND METHODS:

The prospective study was conducted in department of surgery in Al- Sadur teaching hospital in An- Najaf, from 1st august 2007 to 1st august 2008. the sample consist of 104 patients (51 cases were managed by Lichtenstein tension free hernioplasty(mesh) and 53 cases were managed by nylon darn repair).

Patients of 16-72 years of age with primary inguinal hernia were included in the study. Patients with recurrent, obstructed or strangulated inguinal hernias, were excluded from the study.

The diagnosis was based on detailed clinical history and physical examination. Base line and specific investigations for preaneasthesia assessment were carried out.

The patients were randomized into two groups according to the technique of posterior wall repair;
group A : in this group posterior wall repair was done by mesh repair.
Group B : in this group posterior wall repair was done by Moloney nylon darn.

The repair procedures were explained to all patients and duly signed, informed consent was obtained from them.

All patients received a single dose of intravenous njection of ceftriaxon(1000 mg) at onset of anaesthesia, followed by two postoperative doses. The anaesthesia was either general ,spinal or regional.

A skin crease approach following Langer's line was adopted in all cases. The incision was deepened, tackling subcutaneous neuro-vascular structures as usual till the external oblique aponeurosis was reached. The resulting slit was about an inch above the inguinal ligament, which provided a large lower leaf for optimal closure. A gentle sweeping action with the index finger under the aponeurosis helps to open this plane widely for an adequate darn or mesh insertion. The cremasteric fascia was always incised which helped mobilize the cord structures properly. A direct sac was always pushed back and an indirect sac ligated at its neck by absorbable (dexon) no;1 suture and then excised 1 cm distal to the ligature, and the fascia transversalis repaired with 2-0 loosely wound continuous prolene sutures.

In the "mesh" group, a sheet of polypropylene mesh (11 x 6 cm) was trimmed to fit the adequately dissected out space, with a slit cut laterally to accommodate the spermatic cord. The mesh overlapped the pubic tubercle by 1-2 cm medially and superiorly extended over the conjoint tendon to lie 2-3 cm lateral to the internal ring. The mesh was then fixed in position by interrupted 2-0 prolene sutures starting along the internal surface of the inguinal ligament infero-medially and continuing laterally as far as the incision would allow. Three to four interrupted stitches helped fix the mesh superiorly. The two tails were now overlapped lateral to the internal ring and secured by two to three interrupted sutures making sure that the cord was not constricted;figure 1.

Figure 1: -Drawing of Lichtenstein mesh [6]

In the "darn" group, a 1-0 monofilament (nylon) suture was used to reconstruct the inguinal bed with a tension-free darn starting with a good strong bite of the tough tendinous structures near the pubic tubercle and emerging out through the lateral edge of the rectus sheath with a bulky bite in between. The loosely interwoven bites continued laterally and the back-forming two rows of continuous stitches were placed in a staggered manner to spread the tension between the fibres of the inguinal ligament. The recurrence hotspot, "the critical medial angle", was repaired meticulously in each case. The Aberdeen knot was used to avoid a thick nylon knot at the end. A gap of 0.5-1 cm was maintained between the stitches to obtain a closely knit darn;figure 2

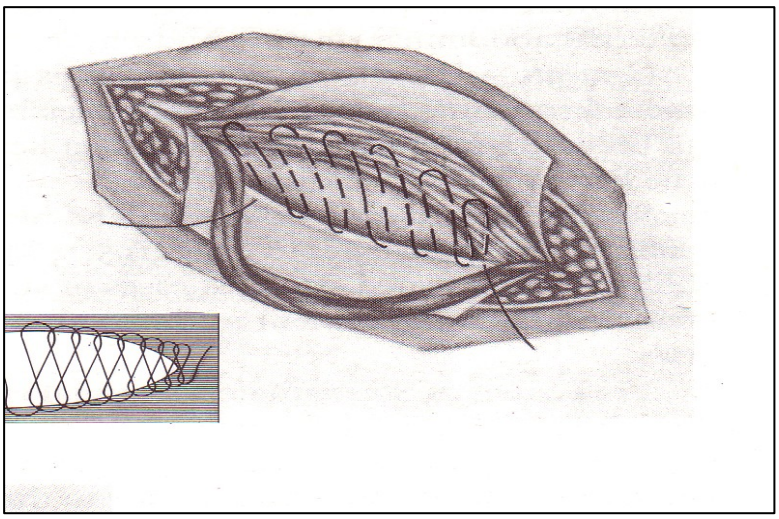


Figure 2 :Drawing of Moloney darn [5]

In both the groups, having checked for haemostasis meticulously and after replacing the safeguarded iliohypogastric nerve and the cord structures, the external oblique aponeurosis was closed with 1-0 continuous prolene sutures. The skin was apposed using 3-0 simple interrupted mersilk sutures.

Operative time taken from skin incision to skin closure was recorded in all cases of both groups

Patients of both groups were routinely given systemic analgesic in the 1st 24 hr, which was

diclofenac sodium i.m inj. 75 mg,if pain was not relieved tramadol i.m inj. 100 mg was given. They were advised to continue on oral analgesics for 72 h into the postoperative period. All patients were observed for 24 hours and were discharged only when they emptied their bladders and felt comfortable and confident with themselves.

Only a few had to stay for another night. The first reviews on the patients of both groups were carried out on the 7th postoperative day. Detailed records were kept concerning their pain profile, return to normal activities and early postoperative complications in the form of superficial surgical site infections, scrotal indurations, testicular atrophy, neuralgia, mesh/darn infection requiring withdrawal and recurrence. Stitches were removed on the 7th post-operative day for all ,except those who experienced early wound complications.

Patients were followed up at (3-12) months postoperation and evaluated for any residual complications and recurrences. Statistical analysis was performed using the 'T' test , 'exact Fisher analysis'and 'p' probability were calculated.

RESULTS:

104 patients were evaluated. Forty one (39.5%) patients presented in 40-60 years age group. 2nd peak was observed in 20-40 years age with 37 (35.5%) patients in this group. There was no significant difference between the two groups (p> 0.05).Figure (3)

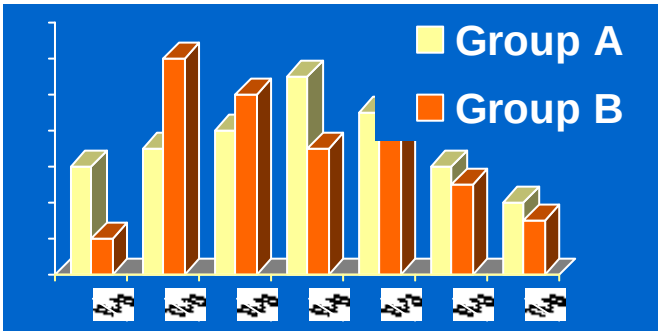
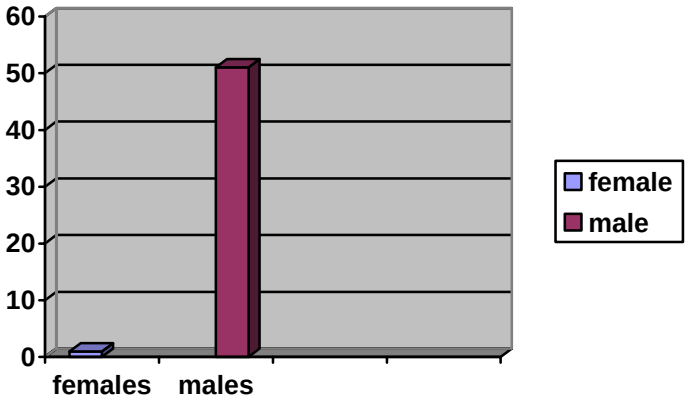


Figure (3): Age incidence

Out of 104 patients, 102 (98.1 %) were males and 2 (1.92%) were females, with male to female ratio of 51:1.Figure.(4)



Figure(4):Female to male ratio

61(58.65%)patients had right sided, 43(41.31%) patients had left sided. There was no significant difference between the two groups (p> 0.05),table1.

Table 1: Site of hernia

Site of hernia	Rt	Lt
Group A Mesh N=51	29(56.86%)	22(43.09%)
Group b Darning N=53	32(60.38%)	21(39.62%)
Total N=104	61(58.65%)	43(41.31%)

*p>0.05

79 (75.96%) patients had indirect inguinal hernia, 25 (23.76 %) patients direct inguinal hernia . There was no significant difference between the two groups (p> 0.05). table 2.

Table 2 : Types of hernia

Type of hernia	direct	Indirect
Group A Mesh N=51	11(21.57%)	40(78.43%)
Group B Darning N=53	14(26.42%)	39(73.58%)
Total N=104	25(23.76%)	79(75.96%)

p>0,05

The mean operative time was 44.7(+_SE 0.89) minutes in group A and 50.9(+_SE 0.56) minutes in group B. there was statistically significant difference between the two groups (p< 0.05),table 3.

Table 3: Mean operative time

	Mean operative time (min) ±S.E.	P value
Group A Mesh	44.7± 0.89	0.0001 (<0.05)
Group B Darning	50.9± 0.56	

The mean hospital stay was 37.18(+_ SE 1.97)hours in group A and 47.17(+_SE 1.79) hours in group B. there was statistically significant difference between the two groups (p< 0.05). table 4.

Table 4: Mean hospital stay

	Mean hospital stay(hours) ±S.E	P value
Group A Mesh	37.18 ± 1.97	<0.05
Group B Darning	47.17 ± 1.79	

The postoperative analgesia by diclofenac sodium inj. was given to 66(63.46%) patients, 31(60.78%) patients from group A and 35(66.04%) patients from group B, while tramadol inj. was given to 38(36.54%) patients, 20(39.23 %) patients from group A and 18(33.96%) patients from group B. there was no significant difference in postoperative analgesia between the two groups.(p >0.05).table 5

Table 5: Post-operative analgesia

Type of analgesia	Diclofenac sodium 75 mg	Tramadol 100mg +diclofenac sodium 75mg
Group **A** Mesh	31(60.78%)	20(39.22%)
Group **B** Darn	35(66.04%)	18(33.96%)
Total	66(63.46%)	38(36.53%)

p>0.05

The total number of postoperative complications was 36, with 15 (29.42%) complications occurring in group A and 21(39.62%) in group B, figure(5).

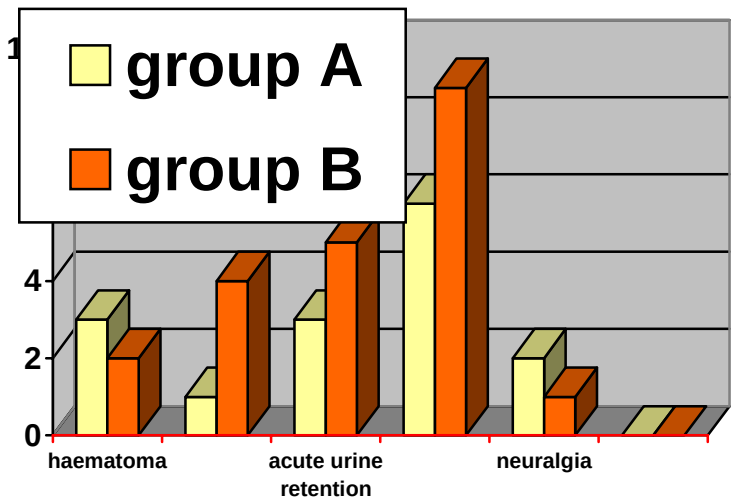


Figure 5: Post-operative complication

On comparative basis (chi-square and Independent samples t-test) postoperative complication rate in group B was high as compared to group A ,but that was not significant (P > 0.05). At the end of 12 months of follow up, no recurrence developed in both Lichtenstein tension free hernioplasty group and in darn repair group .

The following were the main complications:-

Scrotal swelling &oedema

This was the most common postoperative complication. It was common in patients with giant long standing hernias. 15 (14.43%) patients, with 6 (11.77%) in group A and 9 (16.98%) patients in group B developed postoperative **Scrotal swelling** . All these cases were treated conservatively.

Urinary Retention

Eight (7.7%) patients developed urinary retention, with 3 (5.88%) from group A and 5 (9.43%) patients from group B. They needed catheterization to empty the bladder for one day.

Haematoma

Five(4.8%) patients developed postoperative haematoma, with 3(5.88%) from group A and 2 (3.77%) patients from group B. it was common in patients with large indirect hernia of complete type. All these cases were treated conservatively except one old male patient who need re-exploration.

Wound Infection

Only one (1.96 %) patient from group A developed superficial wound infection, who was complaining from postoperative haematoma, while 4(7.55 %) patient from group B developed wound infection, all were minor and treated by proper antibiotics and wound care.

Neuralgia

Three (2.88%) patients had scar pain or acute neuralgia, with 2 (3.92%) patient from group A and 1 (1.89%) patients from group B.

Early recurrence

Their was no reported case of recurrence during the period of follow up.

DISCUSSION:

Operations for hernias constitute approximately 10-15% of all surgical procedures performed in a general surgical unit and about 80% of these operations are performed for inguinal hernias [7]. It is the most common surgical procedure after appendicectomy [8]. Its peak incidence is seen at the two extremes of life [9]. In our study most of the patients were in 4th and 5th decade of their life, which corresponds with other reports : Koukourou(2001)[6], Asif (2002) [8] ,Davies(1994) [9] .

The male to female ratio in present study was 51:1, which is approximately nearer to the studies conducted in Pakistan, with male to female ratio of 49:1, 66:1 and 37:1 reported by Zafar(1993) [7], Memon(1993) [10] and Khan(1989) [11] respectively. These ratios are higher than 18:1 reported by Davies(1994) [9], a UK based study. The reason for this difference seems to be due to conservative social background.

Right-sided inguinal hernia has been shown to be the commonest site (58.65%) and indirect inguinal hernia being the commonest type (75.96%).

There are many ways of repairing an inguinal hernia, with over 80 operative techniques described since 1887 when Bassini reported his method. Extensive clinical research has been undertaken to assess outcome following inguinal hernia repair [12].

The basic defect lies in the anterior abdominal wall that allows hernia in relation to a deficiency in fascia transversalis. So repair of hernia must include restoration of this layer, which constitutes the posterior wall repair [13]. Various methods have been described for reconstruction of posterior wall of inguinal canal. It is the type of technique, experience and skill of the surgeon that determine the final outcome. The early recurrence develops within 1 year of operation is due to tension in the suture line or poor surgical technique. The late recurrence develops many years after initial operation and is due to disorder of collagen metabolism, particularly affecting the fascia trasversalis [13].

Recently the use of polypropylene mesh has become popular, largely because of the excellent results reported by Lichtenstein et al [6]. The polypropylene mesh is strong, monofilament and readily available [7]. Another advantage of mesh repair is that it can be employed for repair of bilateral hernias as a single procedure. Insertion of mesh is relatively easy to learn, can be performed satisfactorily by junior surgeons and is more adaptable to a non-specialized center [9].

In group A, 51 patients underwent Lichtenstein tension free hernioplasty. The mean operative time was 44.7 minutes and mean hospital stay was 37.18 hours, which is more than reported by Faisal (1998)(1.3 days) [13]. In group B, 53 patients underwent darn repair. The mean operative time was 50.9 minutes and mean hospital stay was 47.17 hours, with 20 patients admitted for 3 days. This figure corresponds well to series reported by Asif (2002) [8] and Burak k. et al (2007) [14]. In our study average hospital stay was 12-72 hours. Most of the patients were discharged on the first postoperative day. This prolonged average hospital stay was because of the fact that most the patients received general anesthesia. Procedure under local anesthesia may result in an early discharge from hospital [15].

In group A, total number of complications was 15 (29.42%) while in group B, it was 21 (39.62%). Complications recorded in our study are comparable to other series reported by Asif (2002)[8], Koukourou (2001) [6], Faisal (1998) [13], Zafar(1993) [7].

On comparative basis postoperative complication rate in group B was not significantly high as compared to group A ($P > 0.05$). The reason being that darn repair consumes more time and there are more chances of injury to inferior epigastric vessels and ilioinguinal nerve as compared to Lichtenstein repair and thus there are more chances of postoperative complications [16],[17]. Tension on suture line in darn repair causes temporary obstruction of venous and lymphatic flow at deep inguinal ring and obliteration of the inguinal canal in the long run, thus increasing the chances of scrotal edema, stasis, infection, orchitis and testicular atrophy [18].

There were no recurrences noted till date in any of the two groups under study. Our finding compare well with 0.8% recurrence rates of Moloney in

1958[19] and Abrahamson in 1997 [18]. More recently, Omer Farooq (2005) [20] reported 0.6% recurrence rates with darn repair. Mills (1998) [21] similarly recorded no recurrences with mesh repair. A significant difference was reported by Koukourou (2001) [6], Faisal (1998)[13], Davies(1994) [9] , Zafar (1993) [7], and Hussain A.et al(2007) [22].

CONCLUSION:

Open inguinal hernia repair with a nylon darn was equivalent to polypropylene mesh with respect to early measures of postoperative outcome and recurrence at 1 year.

The mesh was superior to darn in regard to operative time and hospital stay.

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