



RESEARCH ARTICLE

Tension Free Inguinal Hernia Repair Comparing Open Mesh with Darn

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Abstract

Back ground: The inguinal hernia is the most common general surgical procedure performed nowadays. there are multiple types of hernia repair for inguinal hernia but no one chosen to be the standard.

Aim of the study: Is to compare two tension-free techniques of inguinal hernia repair, the Moloney darn repair (MDR) and Lichtenstein mesh hernioplasty (LMH) in respect to operative time, hospital stay, and post-operative analgesia, complication and recurrence rate. **Patients and Methods:** A total of 120 patients with primary inguinal hernia were selected from January 2019 to January 2021. The patients were distributed in to two types of tension free hernia repair. 60 patients were treated with Moloney darn repair and categorized as a group A. 60 patients were treated with Lichtenstein hernioplasty and categorized as a group B. **Results:** One hundred twenty patients were included, 114 males and 6 females. There was significant difference in mean operative time, as in group A was 55 min. and in group B was 46 min. In mean hospital stay, there is no significant difference, as in group A was 35 hours and in group B was 33 hours. Post-operative analgesia used in 82/120 (68.3%) patients, with 50/60 (83.3%) patients in group A and 32/60 (53.3%) patients in group B. Post-operative complications occurred in 27/120 (22.5%) patients, 15/60 (25%) Patients in group A and 12/60 (20%) patients in group B. Recurrence occurred in 4/120 (3.3%) patients all of them in group A (6.6%), and no recurrence in group B. **Conclusion:** From data analysis we confirm that open mesh repair for primary inguinal hernia are associated with less complications and less or sometimes no recurrence rate, also with less operative time and hospital Stay, as compared with darn.

Key word: inguinal hernia repair

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1 | INTRODUCTION

Of all abdominal wall hernia 75% occur in the groin, of them 95% are inguinal and only 5% are femoral, ratio of indirect to direct hernia about 2:1[1]. Right sided groin hernia are more common than those on the left side, with male to female ratio is 7:1. May be attributed to that a much more tendinous round ligament of the uterus in the female make it strong, hence the inguinal canal is intrinsically weaker in male. [2]. The inguinal canal, which is about 4 cm in length, run obliquely through the muscles, aponeuroses and fascia of the abdominal wall above the medial part of the inguinal ligament. Its internal end is the deep inguinal ring, an opening in the transversalis fascia, 1 cm above the mid-point of the inguinal ligament and lateral to the inferior epigastric vessels. Its external end is the superficial inguinal ring, a triangular aperture in the external oblique aponeurosis above the pubic tubercle. [2] Bounded anteriorly by the external oblique aponeurosis, lateral third by internal oblique aponeurosis, posteriorly by transversalis fascia and medially by conjoint tendon, the roof is formed by lower border of internal oblique and transverses, the floor is by inguinal ligament and lacunar ligament. [1, 3] There is clear association between age and inguinal hernia, after an initial peak in the infant, groin hernia become more prevalent with advanced age [4]. Many classification systems have been developed to assist in the proper diagnosis and management of the inguinal hernia. Hernia can be categorized into congenital and acquired, the vast majority of inguinal hernia are congenital in nature, acquired hernia can develop after interfering with normal tissue of the abdominal wall, or any condition that leads to abdominal wall weakness such as after abdominal surgery or groin surgery or after nerve injury as in appendectomy (ilioinguinal nerve injury), This means that majority of inguinal hernias are primary or congenital in nature and acquired hernia are rare. [12, 15].

Inguinal hernia further divided by anatomical location into direct and indirect hernia, in relation to the inferior epigastric vessels which make the lateral border of hesselbach's triangle [5]. A hernia that developed lateral to inferior epigastric vessels are termed indirect inguinal hernia and hernia that developed medial to the vessels are termed direct inguinal hernia. [5] Actually the cause of being the inguinal hernia more common in the right side is unknown, but it may be attributed in case of indirect hernia to the fact that a delay in the atrophy of processus vaginalis following normal descend of

right testis may be the cause for hernia development. [7, 8].

Surgeons are trained that all inguinal hernias should be repaired at diagnosis, even if asymptomatic to prevent the complications such as irreducibility or strangulation. [4]. the principal of surgery for inguinal hernia consist of identification of the hernia sac and excision for indirect hernia and push it back for direct one. Reinforcement of transversalis fascia and then further strengthening of the posterior hernia wall by nylon stitches or mesh hernioplasty. This reinforcement needed only in patients older than 14 years old [1, 2, 6]. It's apparent that the abdominal wall doesn't always heal satisfactorily after primary closure under tension. So the reasonable solution is the use of a structure that can bridge a defect without tension. [9, 13] Nowadays successful surgical repair of a hernia depend on a tension-free closure of the hernia defect. To attain a lower possible recurrence rate. [10]. Darn repair are described by Moloney et al. which depend on tension –free , continuous, reinforcement of posterior inguinal wall by non-absorbable stitch. It's non-expensive, easily performed and effective way of repair with recurrence rate reported to be (0.8_2%). [11, 24] Following the introduction of prosthetic biomaterial for hernia repair in the 1950th, and the description by Lichtenstein of their use in groin hernias in the 1980th, their use has become popular worldwide. There is doubt that they often make hernia surgery quicker, easier and with reducing recurrence rate (0_1%). [3, 24,].

There are now many materials for mesh available, with several factors influencing their choice and use. Which include (strength/stiffness, flexibility/elasticity, size, shape, expense, adhesion, infection. [23] Recurrence following repair is a significant problem for both the surgeon, the patient and also for the community. There is evidence that a defect in metabolism of collagen is involved in the pathology of inguinal hernia in adults, leading to a

Supplementary information: *The online version of this article (<https://doi.org/10.52845/rrarjmcs/2022/8-11-5>) Contains supplementary material, which is available to authorized users.*

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weakness of the transversalis fascia. Obviously the use of such a weakened tissue is problematic for hernia repair. [23] In an attempt to reduce the incidence of recurrence and to reinforce the plastic reconstruction various techniques have been used, including autologous tissue technique and a variety of prosthetic materials. During the last decade a marked interest in the use of prosthetic materials was indent. [11, 22]

2 | PATIENTS AND METHODS

This prospective study was performed at the first surgical unit of Baghdad teaching hospital from January 2019 to January 2021. In this study we used a two type of tension-free hernia repair the Moloney Darn repair and Lichtenstein mesh hernioplasty.

The diagnosis of hernia based on clinical history (felling of dragging pain, groin swelling, etc...) and physical examination. Investigation was done (Hb%, PCV, RBS, B.urea, S.creatinin, ECG and CXR) as surgical and anesthetic preparation. Inclusion criteria were all patients age more than 14 years old with primary inguinal hernia. Exclusion criteria which used were age less than 14 years old, obstructed hernia irreducibility, strangulation, coagulation abnormalities and anticoagulation treatment. All Patients received single dose of ceftriaxon 1gm at time of induction and then post-operative 2 doses at 8 hours interval. Anesthesia used were general, spinal or regional according to patient's general condition and experience of the anesthetist. Surgery begins with an inguinal incision of approximately 6-8cm, positioned one to two finger breadths above inguinal ligament in the medial 2/3. Dissection is carried down through the subcutaneous and scarpas" fascia, the external aponeurosis is identified inferomedially. Being careful to avoid injury to iliohypogastric and ilioinguinal nerves. The aponeurosis is incised about an inch above the inguinal ligament to give a space for subsequent closure and then opened along its length through the external ring with fine scissors.

The soft tissue is cleared off the posterior surface of the aponeurosis on both sides then the spermatic cord is mobilized. Using both blunt and sharp

dissection, the cremastic muscle fibers are separated from the cord and the cord itself is isolated. At this point it's possible to accurately define the anatomy of the hernia. A direct inguinal hernia will present medial to the inferior epigastric vessels as a weakness in the floor of the canal posterior to the cord which pushed back inside the abdomen with multiple stitches in the transversalis fascia over it. An indirect hernia will present with a sac attached to the cord in an anteromedial position, extended superiorly through the internal ring, which always isolated and opened to check its content and then ligated at its neck near the deep ring by vicryl 1, then excised it one cm distal to ligation. The transversalis fascia strenghted by 2/0 loosely applied interrupted absorbable sutures. In the darn method, 1 monofilament nylon suture was used. Starting with fixation of suture to periosteum of pubic tubercle then a strong bite of the conjoin tendon, the loosely interwoven bites continue laterally and back forming two rows of continuous stitches were placed in a staggered manner to spread the tension between the fibers of the inguinal ligament. An Aberdeen knot was used to avoid thick nylon knot. At the end no significant gapes should left between the fibers. The darn should be loosely laid and must not draw the tissue together. (Figure 1)

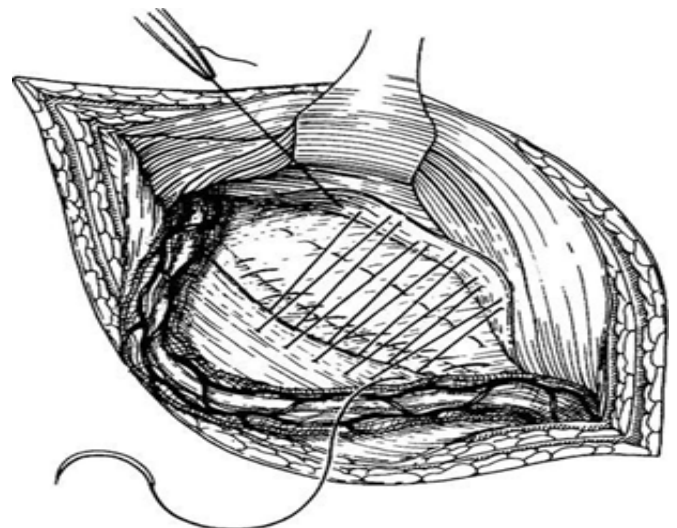


Figure 1: Darn hernia repair (Moloney)

In the mesh method 7.5*15 cm poly propylene prosthetic mesh were used the mesh is tailored or trimmed to fit along the inguinal canal floor which placed so that the curved end lies directly on top of the pubic tubercle, the mesh patch extend

underneath the cord until the spermatic cord and the tails of the mesh patch meet laterally. An incision is made in the mesh and the cord is inserted between the tails of the mesh thereby creating a new tighter and more medial internal ring. The tail is sutured together with one non-absorbable stitch just proximal to the attachment of the cord. The mesh is then sutured in a continuous or interrupted fashion with prolene 2/0 or 3/0 to the pubic tubercle inferiorly, the conjoint tendon medially and the inguinal ligament laterally. (Figure 2)

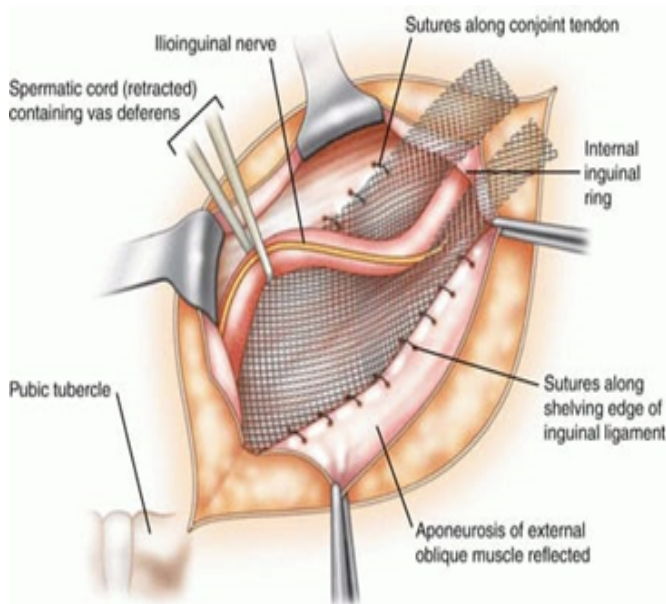


Figure 2: open mesh hernioplast

After that careful checking for homeostasis in both groups, then replacing the ilioinguinal nerve and spermatic cord in its position. Then sutured the external oblique aponeurosis with 1/0 continuous vicryl suture. Skin closed with 2/0 silk in simple interrupted manner then dressing. Operative time taken from first incision to last skin suture. Post-operative analgesia (pethidin, tramadol) used in need. Discharging criteria are start oral intake, pass urine, no or slight pain. Follow up started post operatively and after discharge, the patient visit the hospital after 7-10 days for stitch removal so check for any complication (especially infection). Then follow up by phone call for one year in three months interval for any recurrence.

3 | RESULTS

One hundred twenty patients were involved, 114(95%) were males and 6(5%) were females, with male to female ratio was 19:1. (Figure 3)

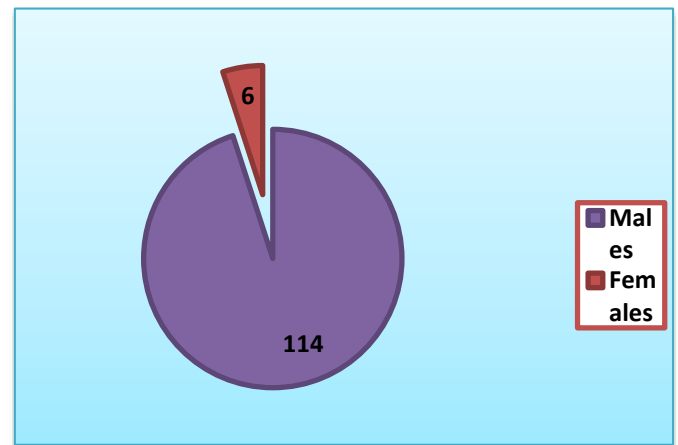


Figure 3: males to females' ratio

The patients were presented in 14-80 years old age group. Two peaks were noted, in 20-30 years old and in 50-60 years old. We randomly distribute the patient in respect to their age, type of hernia, site of hernia, between the two groups and tried to be in equal manner. General anesthesia used in 96/120(80%) patients, 50/60(83.3%) in group A and 46/60(76.6%) in Group B. Spinal anesthesia used in 18/120 (15%) patients, 8/60(13.3%) in group A and 10/60(16.6%) in group B Local anesthesia used in 6/120(5%) patients, 2/60(3%) in group A and 4/60(7%) in group B. there was no significant difference statistically between the two groups. (Figure 4)

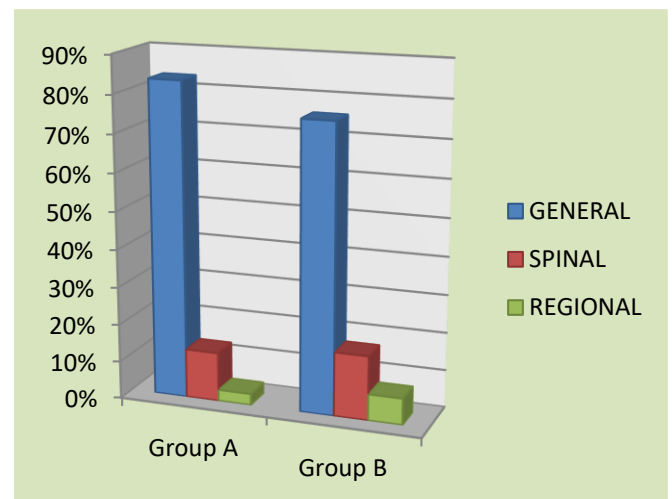


Figure 4: types & percents of anesthesia

Right sided hernia found in 73/120(60.8%) patients with 38/60(63.3%) in group A and 35/120(58.3%) in group B, while 47(39.1%) patients had left sided hernia, 22/60(36.7%) in group A and 25/60(41.6%) in group B. there was no significant difference statistically between the two groups. (Figure 5)

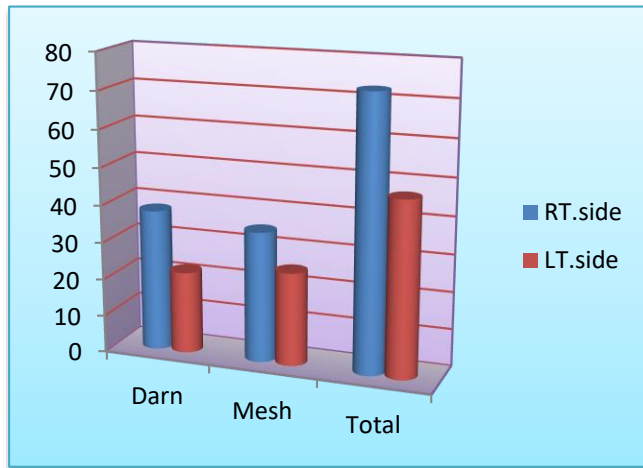


Figure 5: shows percents of hernia according to site

Indirect inguinal hernia presented in 86/120(72.7%) patients, 44/60(73.3%) in group A and 42/60(70%) in group B, with 34/120(28.3%) patients had direct inguinal hernia, 16/60(26.7%) in group A and 18/60(30%) in group B. there was no significant difference statistically between the two groups. (Figure 6)

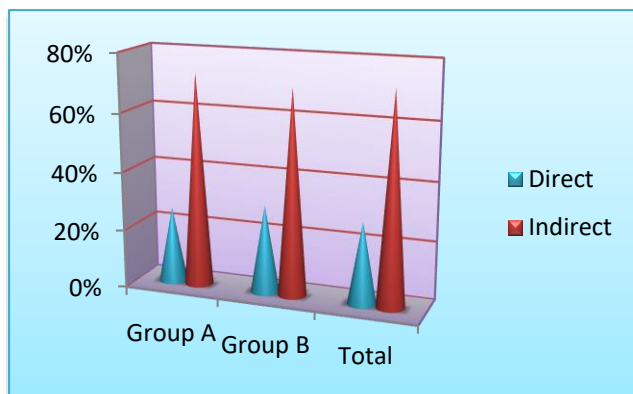


Figure 6: shows percent of hernia according to type

The mean operative time was 55 min in group A and 46 min in group B. there was a significant difference statistically between the two groups. (Table 1)

Table 1: Mean operative time

Groups	Mean operative time in minuets	P value
Group A (Darn)	55 min.	P value = 0.03%
Group B (Mesh)	46 min.	

Mean hospital stay in group A was 35.3 hours ranging from 24-72 hours and in group B was 33.8 hours ranging from 24-48 hours. There was no

significant difference statistically between the two groups. (Table 2)

Table 2: mean hospital stay

Groups	Mean hospital stay in hours	P value
Group A (Darn)	35 hours	Not significant
Group B (Mesh)	33 hours	

Post-operative analgesia in form of pethidine or tramadol were used in 82/120(68.3%) patients, of them 50/60(83.3%) patients in group A and 32/60(53.3%) patients in group B. From all 82 patients only 26/82(21.6%) patients' needs more than one dose of analgesia, 20/60(40%) in group A and 6/60(18%) in group B. There was a significant difference in using analgesia between the two groups. (Table 3, Figure 7)

Table 3: post-operative analgesia

Group	Pethidin	Tramadol	Total
Group A (Darn)	18	32	50(83.3%)
Group B (Mesh)	15	17	32(53.3%)
total	33	49	82(68.3%)

P value = 0.01%

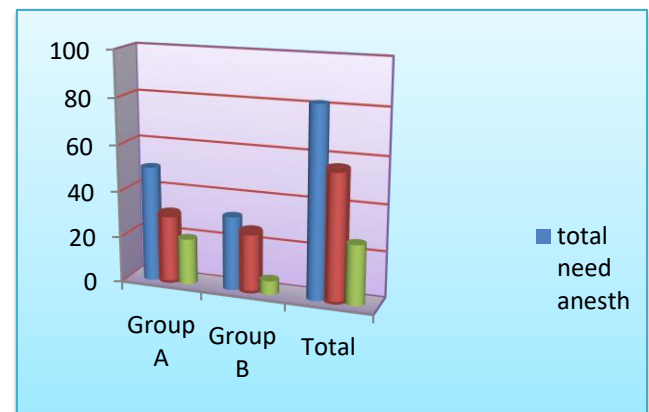


Figure 7: percent of analgesia used in the post-operative

With respect to the post-operative complication there was no late complication apart from recurrence, which occurs in only four patients out of 120 patients (3.3%) all of them were in group A the recurrence occurs in patients with direct hernia and no recurrence found in patient with indirect hernia. The early post-operative complications

occurred in 27/120(22.5%) patients, 15/60(25%) in group A and 12/60(20%) in group B. (Figure 8)

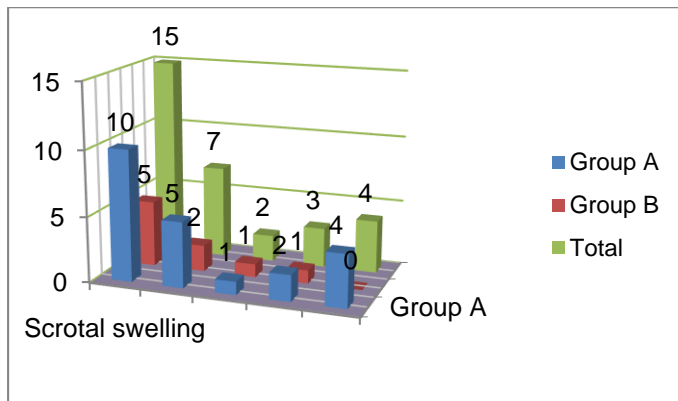


Figure 8: post-operative complications

There is no significant difference in post-operative complication between the two groups. In the other hand there is significant difference statistically in recurrence between the two groups. (**P value = 0.00%**)

The most common complication was:

Scrotal swelling in form of hematoma and seroma, occur in 15/120(12.5%) patients. In group A 10/60(16.7%) patients and in group B 5/60(8.3%) patients. Large number occurs in patients with big hernia or chronic long standing hernia. Treatment was by reassurance and scrotal elevation and sometimes with aspiration of seroma.

Urine retention occurs in 7/120(5.8%) patients, 5/60(8.3%) patients in group A and 2/60(3.3%) patients in group B. Treated by catheterization then removal of the catheter in the next day.

Wound infection less common which occur in 3/120(2.5%) patients, 2/60(3.3%) patients in group A and 1/60(1.6%) patient in group B. treated by removal of stitches and evacuation of pus collection if present, change of dressing and covering antibiotics.

Neuralgia occurs in 2/120(1.6%) patients, 1/60 (1.6%) in each group treated by analgesia, both patients resolved after two weeks.

Table 4: Summary of the results

TOTAL/120	GROUP B/60	GROUP A/60		
114 (95%)	58 (96.6%)	56 (93.3%)	Male	SEX
6 (5%)	2 (3.3%)	4 (66%)	Female	
96 (80%)	46 (76%)	50 (83%)	G.A	
18 (15%)	10 (16.6%)	8 (13.3%)	Spinal	ANESTHESIA
6 (5%)	4 (6.6%)	2 (3.3%)	Local	
73 (60.8%)	35 (58.3%)	38 (63.3%)	Right	
47 (39.1%)	25 (41.6%)	22 (36.7%)	Left	
34 (28.3%)	18 (30%)	16 (26.7%)	Direct	TYPE of hernia
86 (72.7%)	42 (70%)	44 (73.3%)	Indirect	
	46 min.	55 min.	Mean operative time	
	33 hours	35 hours	Hospital stay	
82 (68.3%)	32 (53.3%)	50 (83.3%)	Post op. analgesia	Analgesia
26 (21.6%)	6 (18%)	20 (40%)	Multiple doses used	
15 (12.6%)	5 (8.3%)	10 (16.7%)	Scrotal swelling	Post-operative complications
7 (5.8%)	2 (3.3%)	5 (8.3%)	Urine retention	
2 (1.6%)	1 (1.6%)	1 (1.6%)	Neuralgia	
3 (2.5%)	1 (1.6%)	2 (3.3%)	Wound infection	
4 (3.3%)	zero	4 (6.6%)	Recurrence	

4 | DISCUSSION

Females were 6 (5%), the males were 114 (95%). With male to female ratio was (19:1) which is closed to the trial conducted by W.W.Vrijland et al [3] which reported a males to females ratio 17:1

and Memon As et al [16] reported the ratio 26:1, in other trials it was not close to our study as in Kaynak B et al [2] who reported the ratio to be 7:1. Right sided hernias are the common site, 73/120(60.8%) patients, with 38/60(63.3%) in

group A and 35/60(58.3%) in group B. While 47/120(39.1%) patients had left sided hernia with group A to group B was respectively [22/60(36.7%) vs 25/60(41.6%)], these results were comparable to the results of other studies like Kaynak B et al [2] who reported right sided hernia to left respectively 57.2% to 40% with the rest was bilateral hernia and Professor A. Grant [4] who reported right to left sided hernia was 62% to 38% respectively.

Indirect hernias was the commonest type which found in 86/120(72.7%) patients, with group A to B was respectively [44/60(73.3%) vs 42/60(70%)].the direct hernia found in 34/120(28.3%) patients, with group A to B was [16/60(26.7%) vs 18/60(30%)] which is closed to the result in study conducted by Chakraborty swarup[6] who reported an indirect hernia was 74.4% and direct hernia 24.3 and bilateral hernia was 1.3%, and in Sakovsafas GH et al [9] trial they reported a high number of indirect hernia comparing with direct one which was the indirect hernia 55%, direct hernia 30% and pantaloon type was 15%. The mean operative time was shorter in mesh group (46 min) while in darn group was (55 min) this results was not the same result found in trial of Kaynak B et al [2] who reported the mean operative time was shorter in darn group, in trial of W.W.Vrijland et al [3] he found that the operative time was comparable between both groups. Hospital stay is comparable in the two groups (35 hours in group a vs 33 hours in group B) as had shown in previous trial conducted by W.W.Vrijland et al [3] who reported that the hospital stay was comparable between the two groups.

Also Barth et al, [7] report a significant long duration of surgery in non-mesh group the trial of Kaynak B et al[2] reported hospital stay was shorter in darn group.With time the duration of operation for mesh became shorter which mean it's easily to learn and simpler than darn. [7, 17].

The incidence of early complication did not differ significantly between the two groups, similar to the result of other randomized trials comparing mesh and non-mesh repair as in the trials of Kaynak B et al [2], W.W.Vrijland et al [3] and Amid PK [10] who's reported anon significant difference between

the two groups. Scrotal swelling was significantly high in darn group [10/60(16.7%) from total 15/120(12.5%)], which may be attributed to increased risk of vascular injury and oozing due to multiple stitching [16]. Urine retention also high in group A as compare with group B [5/60(8.3%) to 2/60(3.3%)] respectively, there is no much difference between two groups in the other complications. This result is closed to trials of Taylor SG [18] and Callesen T [19] who's reported that a urine retention was comparable in both groups and it's due to post-operative pain. Post-operative pain are significantly differ between the two groups, as its less common in mesh group [32/60(53.3%) in group B with 50/60(83.3%) in group A] this result was the same result reported by Kaynak B et al [2] who found mesh group required less analgesia than darn group in first 24 hours. but W.W.Vrijland et al [3] found no significant difference in post-operative pain and analgesia required between the two groups. Recurrence rate in mesh group is zero and 4 in darn group (6.6%), which is closed to the trials of Rose K et al [5] which reported no recurrence in mesh group, also Sakovsafas GH et al[9] found the recurrence rate in mesh group was 0.2%, Amid PK[10] reported that recurrence rate was 1.4% in mesh group and 4.4% in non-mesh group, W.W.Vrijland et al [3] found after three years follow up that the recurrence rate in mesh group was 1% and in non-mesh was 7%, but in Kaynak B et al found the recurrence rate in mesh group higher than darn which was 0.8% to 0.3% respectively.

5 | CONCLUSION

Mesh inguinal hernia repair was associated with lower recurrence rate than darn repair and zero recurrence can be reached. Mesh group associated with less operative time than darn group. Also mesh repair associated with less post-operative pain and less analgesia required. No significant difference was found in hospital stay and post-operative complication. Mesh repair is easily learned & trainee surgeons can produce a good result with nil or exceptionally low recurrence rate

6 | RECOMMENDATION

1. Tension free inguinal hernia repair is a good operative procedure for patients with inguinal hernia.
2. Open mesh is the method of choice for primary inguinal hernia repair in respect to recurrence & post-operative pain.

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How to cite this article: DR. Saad Hasan Talib ET AL. Tension Free Inguinal Hernia Repair Comparing Open Mesh with Darn Advance Research Journal of medical and clinical science. 2022; 1054–1062. <https://doi.org/10.52845/rrarjmcs/2022/8-11-5>