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Original Research Article

Desarda's versus Lichtenstein technique of inguinal hernia repair: a comparative study

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ABSTRACT

Background: Inguinal hernias rank among the commonest of all hernias and surgery is the only definitive treatment. We analyzed the outcomes of desarda tissue based repair in comparison with the standard Lichtenstein tension free mesh repair of primary inguinal hernia.
Methods: A total of 164 patients were randomly allocated into two groups, Desarda (group D) or Lichtenstein (group L) (80 VS 84, respectively). The primary outcome measures were chronic groin pain and recurrence during the follow up period. Secondary outcome measures included operating time, post-operative pain scores, duration of post-operative hospital stay, time to return to basic physical activity and to work, foreign body sensation, and post-operative complications.
Results: During two year follow up, no recurrence was detected in each group. Operative time was significantly less in the Desarda group (28.91±5.82 min as compared to 34.07±8.63 min in the Lichtenstein group). Postoperative day 1, day 3 and day 7 groin pain was more in the Desarda as compared to the Lichtenstein group. Basic physical activity, chronic groin pain, cost, seroma formation, foreign body sensation, were also significantly less in the Desarda group.
Conclusions: The successful primary inguinal hernia repair without mesh implantation can be achieved using Desarda tissue based repair, as it is effective as the standard Lichtenstein tension free mesh repair. Shorter operative time, early return to basic physical activity, lower cost, less chronic groin pain, less foreign body sensation are potential benefits of Desarda repair and can be preferred for inguinal hernia repair.

Keywords: Inguinal hernia, Chronic groin pain, Desarda repair, Lichtenstein repair, Recurrence

INTRODUCTION

An inguinal hernia is a protrusion of a viscous or content of the abdominal cavity or peritoneal fat through an abnormal opening in the wall of its containing cavity in the inguinal area.[1] The estimated life time risk for inguinal hernia during his/her life is quite high, 27% for men and 3% in women.[2]

According to European Hernia Society (EHS) guidelines for primary inguinal hernia treatment published in 2009, meshed based techniques, particularly the Lichtenstein tension free technique and endoscopic methods are recommended for treatment of symptomatic primary inguinal hernia in adult men while shouldice tissue based hernia repair technique is considered the best non-mesh repair method (strength of recommendation IA). In experienced hands, the outcomes of the shouldice technique are very good with a recurrence rate 0.7% to 1.7% but in general practice, the recurrence rates increases up to 15%, because of complexity involved in the tissue dissection and repair.[3,4]

The synthetic mesh implantation in the inguinal area can create new clinical problems, such as foreign body sensation in the inguinal region, groin discomfort, abdominal wall stiffness, which may affect the everyday basic physical activity of the patient.[5] Migration of the mesh from primary site of implantation to the peritoneal cavity, intestine, urinary bladder, femoral vein and the scrotum has been reported after mesh repair.[6-9]

In 2001, Dr. Desarda reported a new technique of tissue based inguinal hernia repair with very less recurrence rates in his hands. Desarda repair is based on concept of providing strong, mobile, and physiologically dynamic posterior inguinal wall without use of any mesh. Here in place of mesh, an undetected strip of external oblique aponeurosis stitched to posterior wall to strengthen it. The technique requires no complicated dissection or suturing, no mesh is needed and is easy to learn.[10-12] The aim of this prospective randomized clinical study is to compare the clinical outcomes of the tissue-based Desarda method with the standard open mesh-based Lichtenstein method for the treatment of primary inguinal hernia among adult Indian people.

METHODS

This prospective randomized clinical study was conducted at Surgery Department of Jawaharlal Nehru medical college and Hospital, Aligarh Muslim University, Aligarh, from October 2016 to April 2019 after approval from the local ethical committee. Obtaining written and informed consent from all patients was included in the study after detailed explanation of the purpose of the study.

All male patients between 18 years and 80 years of age with primary unilateral or bilateral inguinal or inguinoscrotal hernia were included for the study. Exclusion criteria were patients under 18 years and above 80 years, obese patients (BMI>30), patients with strangulated or obstructed inguinal hernia, recurrent or giant inguinoscrotal hernia, patients not fit for surgery, immunocompromised patients, history of forced hernia reduction with subsequent hospitalization, patients with uncontrolled DM, chronic cough, uncontrolled HTN, COPD, obstructive uropathy and patients who were lost during follow-up.

All patients were subjected to preoperative evaluation including proper history taking, clinical examination, and basic laboratory investigations. Patients were randomized in to two study groups by lottery system to undergo one of two repairs, Desarda tissue-based repair (group D) OR lichenstein tension free mesh based repair (group L).

Patients were kept nil per oral for 6 hours. All operations were performed as elective day cases and single shot inj. Amoxicillin-Clavulanate (1.2 g) intravenously was administered as pre-op antibiotic. All cases were performed under spinal anaesthesia.

Desarda repair

The Desarda repair was done according to its original description.[10-12] External oblique aponeurosis was divided in line with the upper crux of superficial inguinal ring. Cremasteric muscle fibers was incised and the hernia sac was dealt with (either herniotomy or reduction inversion). Upper leaf of EOA was sutured to inguinal ligament from pubic tubercle to deep inguinal ring using prolene 2-0 RB in continuous fashion. The first 1-2 sutures are taken in the anterior rectus sheath. The last suture is taken so as to narrow the deep ring sufficiently without constricting the spermatic cord.

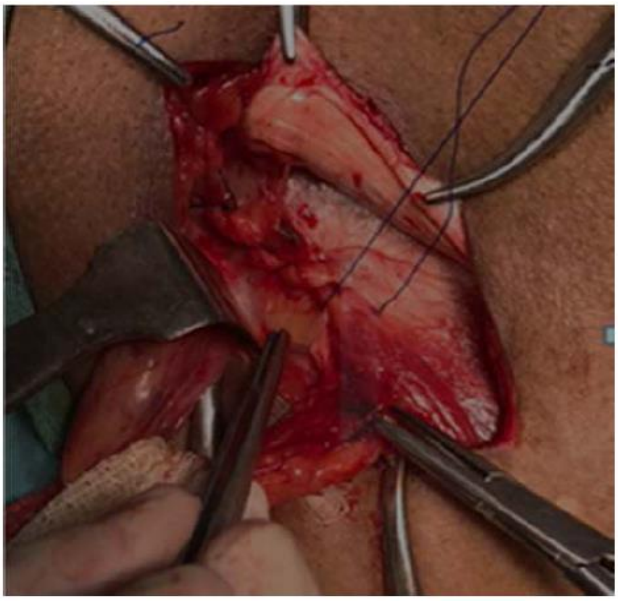

Figure 1: The medial leaf of EOA IS sutured to the inguinal ligament from the pubic tubercle to the deep inguinal ring.

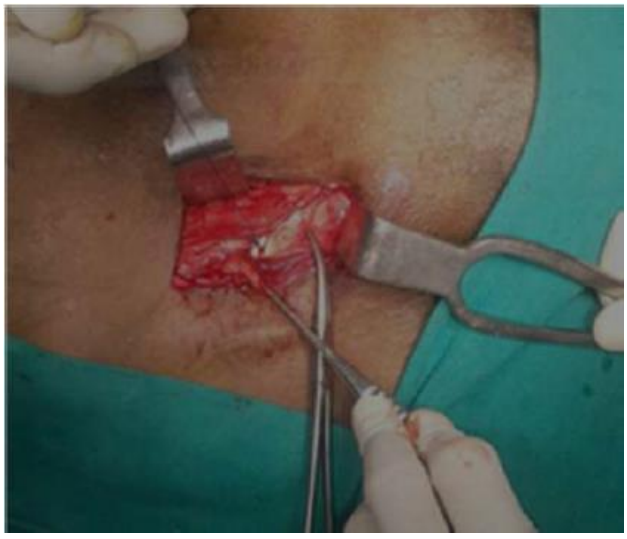

Figure 2: Lateral leaf of external oblique is surured to the newly formed medial leaf of the external oblique in front of the cord.

A splitting incision is then made in this sutured upper leaf and a strip of width 1.5-2 cm was separated. This splitting incision was extended medially up to rectus sheath and laterally 1-2 cm beyond the deep ring. The medial insertion and lateral continuation of this strip was kept intact. Free border of the strip was then sutured to internal oblique or muscle arch lying close to it with prolene 2-0 round body in continuous fashion throughout its length. Then asked the patient to cough and increase the tension in strip was confirmed. Then spermatic cord was placed in the newly formed inguinal canal and then lower leaf of EOA was sutured to newly form upper leaf of EOA in front of the cord by prolene 2-0 RB in continuous fashion. Then skin was closed by nylon suture and dressing was applied.

Lichtenstein mesh repair

The Lichtenstein tension-free mesh repair was performed as described by Amid.[4] An 8×12 cm polypropylene mesh (Prolene; Ethicon, Somerville, NJ, USA) was trimmed to fit the inguinal floor. The mesh was sutured to the ligament of Poupart using a non-absorbable continuous 2/0 suture (Prolene; Ethicon) and secured cranially using an absorbable 2/0 suture.

Follow-up

Patients were prescribed intravenous fluids and inj diclofenac 75 mg IV 8 hourly on same day. Patients allowed oral feeds 6 hours later and shifted from parenteral to oral analgesics after 12 hours. Pain assessment was based on visual analogue scale and cheeked dressing on 2nd day and was evaluated for any seroma formation, hematoma formation or wound infection. Patients was discharged on 2nd to 3rd day when were able to walk comfortably. The patients were followed up at 1st, 7th POD and 14th POD and follow up data was recorded. Then further follow up was done on patients visit for minimum 6 month.

Preoperative variables were examined: chief complaints, age, occupation, BMI, addiction, associated illness, type of hernia, reducibility, associated with scrotal swelling, any acute presentation, method of inguinal hernia repair (non mesh-Desarda and mesh-Lichtenstein), intra-operative complications (injury to vas, nerves or vessels), time taken to return to normal physical activity (days), outcome variables like operative time (min), cost of surgery, postoperative pain score on VAS (at 1st, 7th, 1 month, and at 3 months), cord indurations, foreign body sensation, local neurological deficit, chronic groin pain and recurrence were recorded.

Collected data were entered and analysed in IBM SPSS version 20 (SPSS Inc., Armonk, NY). For continuous variables, mean and standard deviation were calculated. Comparison of outcomes was performed by $\chi 2$ (Chi-square) test. $P<0.05$ was considered as statistically significant.

RESULTS

The study flow chart is shown in Figure 3. Of the 184 patients with primary inguinal or inguinoscrotal hernia seen during the study period, 184 patients were eligible and included in the study were randomly allocated into two groups. The analyzed patients were 80 patients in the Desarda repair group and 84 patients in the Lichtenstein group. All patients were following up during post op period and after discharged by regular visits, or by telephone contact. Total 184 patients (168 unilateral, 16 bilateral) were observed and data was analysed. In 184 patients 66 Desarda repair and 84 Lichtenstein repairs was done.

Randomization of patients was done into the Desarda and Lichtenstein groups, both group had similar characteristics. Operative time was 26.91±5.82 min in the Desarda group (group D) and 36.07±8.63 min in the Lichtenstein group (Group L) which was statistically significant ($p=0.0001$). The difference in operative time was due to no mesh needed and continuous suturing done in the Desarda technique. Apart from the operation time, the cost of surgery was also significantly less in Desarda group in comparison to Lichtenstein group ($p<0.0001$).

The mean age of the patients in the Desarda group was 44.1 years while in the Lichtenstein it was 45.3 years. There was no significant difference in the age and co morbid condition in the two study groups ($p>0.05$). There were no intraoperative complications. There was statistically significant difference between the D and L group in regard to duration of surgery. There was no statistically significant difference was observed in regard to post-operative complications like urinary retention, fever, and wound infection.

The pain reported via the VAS score on 1st post-operative day was 3.64±0.60 in the Desarda group while it was 3.43±0.86 in the Lichtenstein group. The mean VAS score for pain on 7th post-operative day was 1.36±0.49 in the Desarda group while it was 1.24±0.43 in the Lichtenstein group. There was no statistically significant difference between the Desarda and Lichtenstein group in regard to pain reported via the mean VAS score. In Desarda technique the mean hospital stay was 2.42±0.60 days while it was 3.84±0.80 days in the Lichtenstein group. The difference in mean hospital stay was statistically significant ($p<0.05$). The mean time to return to basic and home activities in the Desarda group was 18.39±3.09 days while it was 21.24±3.47 days in the Lichtenstein group. This difference was found to be statistically significant ($p<0.0004$). There were no recurrences reported in either group. The incidence of chronic groin pain (>3 month) was 12.1% in the Desarda group while it was 33.3% in the Lichtenstein group. This difference was found to be statistically significant. There were no foreign body sensation was reported in the Desarda group while 21.4% patients complained of foreign body sensation in Lichtenstein group. There were no post-operative deaths in either group.

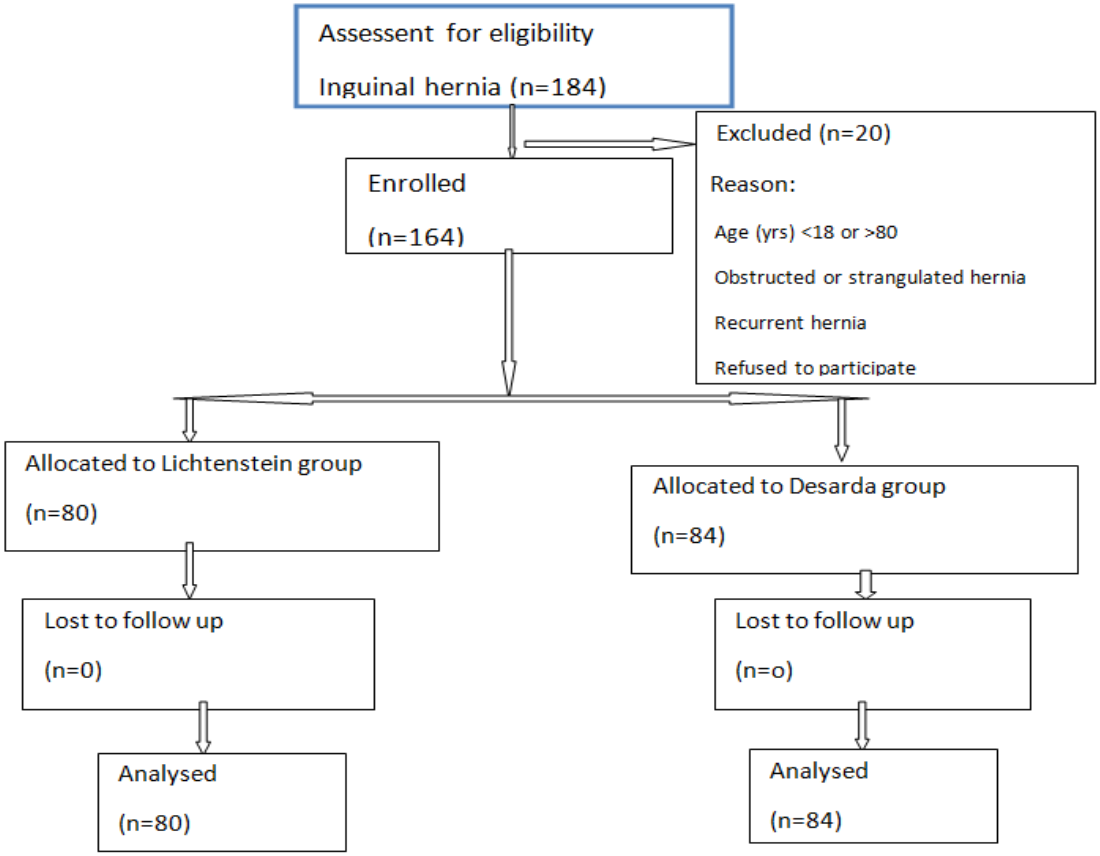

Figure 3: Flow diagram of the progress through the phases of a randomised trial.

Table 1: Patients demographics and comorbidities.

Variables	Desarda repair (Group D) (n=80)	Lichtenstein repair (Group L) (n=84)
	N (%)	N (%)
Age (years) (mean±SD)	44.63±2.12	45.34±1.98
Complaint		
Pain	10 (12.5)	8 (9.5)
Swelling	20 (25)	24 (28.5)
Pain and Swelling	50 (62.5)	52 (61.9)
Co-morbidities		
Heavy duties	32 (40)	42 (50)
Moderate duties	22 (27.5)	24 (28.5)
Light duties	10 (12.5)	18 (21.4)

Table 2. Comparison of intra-operative characteristics between the two groups.

Variables	Desarda group (n=80)	Lichtenstein group (n=84)	P value
	N (%)	N (%)	
Site			
Right	52 (65)	48 (57.1)	0.302***
Left	22 (27.5)	30 (35.7)	0.258***
Bilateral	6 (7.5)	6 (7.1)	0.944***
Type			
Direct	34 (42.5)	28 (33.3)	0.0226*
Indirect	46 (57.5)	50 (59.5)	0.792*

Continued.

Variables	Desarda group (n=80)	Lichtenstein group (n=84)	P value
	N (%)	N (%)	
Reducibility			
Reducible	66 (82.5)	64 (76.1)	0.319*
Irreducible	14 (16.6)	20 (23.8)	0.319*
Content of hernia sac			
Omentum	52 (65)	50 (59.5)	0.469
Bowel	8 (10)	14 (16.6)	0.170
Lipoma of cord with omentum	20 (25)	16 (19)	0.400
Duration of surgery (min) (mean ± SD)	26.91 ± 5.82	36.07 ±8.63	0.0001**

*χ2 test, ** Fisher's exact test, *** Mann-Whitney U test.

Table 3: Outcome variables in both groups.

Variables	Desarda group (n=80)	Lichtenstein group (n=84)	P value
Cost of surgery (in US dollar) (mean ± SD)	28.72±1.84	60.77±4.81	< 0.0001**
Pain by VAS			
POD 1 (mean±SD)	3.64±0.60	3.43±0.86	0.2423**
POD 3	1.91±0.72	1.61±0.60	0.1581**
POD 7	1.36±0.49	1.24±0.43	0.2416**
1 month	0.76±0.18	0.92±0.54	0.3012**
Post- operative complications			
Hematoma	1	4 (4.7%)	0.191*
Seroma	8 (9%)	15 (24.1%)	0.147*
Cord indurations	6 (6%)	12 (14.2%)	0.164*
Wound infection	6 (9%)	10 (11.9%)	0.342*
Duration of hospital stay (days) (mean±SD)	2.42±0.60	3.84±0.80	0.0001***
Return to normal physical activity (days) (mean±SD)	18.39±3.09	21.24±3.47	0.0004***
Chronic groin pain (>3 month)	8 (12.1%)	28 (33.3%)	0.0003*
Foreign body sensation	0	18 (21.4%)	0.004*
Testicular atrophy	Nil	NIL	
Recuerrence			
At 3 months	Nil	Nil	
6 months	Nil	Nil	
1 year	Nil	Nil	

*χ2 test, ** Fisher's exact test, *** Mann-Whitney U test.

DISCUSSION

No significant differences in clinical outcomes were observed during a 2 year follow up of adult male patients with a inguinal hernia operated on with either the Desarda repair or the Lichtenstein repair. Excluding foreign body sensation, seroma formation, chronic groin pain, the frequency of complications was similar for the either groups. Currently, the result of hernia treatment, even those that have taken into account according to European Hernia Society (EHS) guidelines published in 2009, vary from moderate to excellent. The mean recurrence rate for the standard Lichtenstein repair is about 1% in hernia specialised centres but can be higher in community hospitals (about 4%) and in some articles the reported rate even reaches to 18%.[13] The data for recurrence rate published so far other mesh techniques vary, 0 to 4.2% for prolene hernia system (PHS), 0 to 4% for Rutkow, 1.6 TO 19% for the trans-abdominal pre-peritoneal (TAPP) repair.[13-15] The most frequently reported complications were hematoma, seroma, surgical site wound infection, foreign body sensation, chronic groin pain and recurrence.[16] Death and major worsening of the treated patients were rare but also reported.[16,17] In a large multicentral controlled trial, recurrence rates of 8.6% in Bassini repair and 11% in McVay repairs were reported.[18] Shouldice repair, which started more htan 30 years ago, is considered the best tissue based primary inguinal hernia repair but it needs long lerning curve with recurrence rates less than 1% at Shouldice hospital and up to 15% in general surgical practice.[19,20] There were high recurrence rates in non-specialist centres supports the view that the Shouldice repair does not fulfil the requirements of a universal surgical technique for primary inguinal hernia repair. The idea of using prosthetic materials is largely adopted by many surgeons

which may be open, laparoscopic, or minimally invasive non laparoscopic (Kugels repair).[21,22] There were many advances in the prosthetic materials have emerged; biosynthetic mesh will gain more ground for treatment of inguinal hernia. The idea of using various types of mesh to induce fibrosis and avoiding use of the weakened tissue of the locality, is interesting but it has its drawbacks such as; cost of surgery, infection, and making a scientific entity rather a dynamic one, in addition data are rising about the possible impairment of testicular and sexual function after mesh implantation.[23] So, search still continues for the optimum surgery for inguinal hernia which should introduce a technique with low cost, low rates of recurrence and other complications even in the hands of general surgeon at smaller or district level hospitals, easy to learn, does not entail a high expensive sophisticated technology, and also enables early return to every day basic physical activity. We believe that the Desarda tissue repair may be a step in the right track for such an ideal technique. The present randomized study compared the Desarda's technique versus the Lichtenstein technique for the treatment of inguinal hernia in regards to early and late post-operative outcomes.

In the present trial, no recurrence was found in the form of any swelling on cough impulse on the operated side in any of the group during follow up of 18 months. In the literature, similar recurrence rates were reported.[24] However, Desarda technique, in a clinical trial in small district hospital in India, comparing his technique to the Lichtenstein repair reported no recurrence was found in Desarda technique versus 4 recurrences in the mesh group.[25] Regarding the site for recurrence, it was the classic site for recurrence (near the pubic tubercle) in the mesh group and at the newly reconstructed deep internal ring in the Desarda's group. Unlike the trial performed by Szopinski et al, we had no generalized weakness of the newly reconstructed posterior wall of the inguinal canal mostly due to exclusion of patients with weak, stretched or thin EOA.[24]

The influence of different surgical techniques on chronic groin pain after hernia surgery remains unclear. The cause of such pain is still obscure; however, several risk factors have been identified, such as recurrence, patient's age and resection of the cremasteric muscle, experience of the surgeon and the presence of preoperative pain.[26-28] Although chronic pain defined by international association for the study of pain as lasting for more than 3 months, we extended the period in our study for more than 6 months taking into consideration the long time needed for fibrosis by the mesh; an approach that has also been recommended in a recent publication.[29,30] Chronic groin pain after hernia repair with mesh was reported to range from 28.7% to 43.3%.[28] Desarda, in a previous study comparing his technique with that of Lichtenstein, reported that extensive fibrosis due to mesh implantation was responsible for nerve entrapment and chronic groin pain which was statistically significantly higher in the mesh group up to the extent to warrant re-exploration in some cases. However, a much less incidence was recorded in our series 8 (12.1%) vs. 28 (33.3%) patients in the Desarda's and Lichtenstein groups respectively (p=0.03); with no patients suffering from severe chronic groin pain in both study arms. Postoperative pain experienced by the included patients in the two study groups was more in the Desarda's technique at the four time points assessed (1st, 3rd, 7th days and 1 month postoperatively). Although lower pain scores were reported among patients in the Lichtenstein group, no significant statistical difference could be found. This is comparable to the scores reported by Desarda, Manyilirah et al, Lau and Lee, and Situma et al.[25,31-33] The insignificant difference in the early post-operative pain scores in both study groups assure that the Desarda technique involves no tension on the tissues involved in the repair. In the present study, a peak of pain scores was recorded at 24 h postoperatively, followed by a marked decline on the 7th postoperative day. This is unlike to Manyilirah et al and Situma et al who reported a peak of pain scores at the 3rd postoperative day and attributed this to the peak of inflammatory process at that time.[31,33] We think that there may be other contributing factors such as tissue handling, degree of traction, previous stretch of the ilioinguinal nerve by the hernia and manipulation of the nerve intra-operatively. In our study the operating time was shorter in the Desarda's group (26.91±5.82 min) than that in the Lichtenstein group (36.07±8.06 min) and this difference was found to be statistically significant (p<0.001). Duration of operation is a surgeon dependant variable which reflects the ease of an operation. These results were also reported by Manyilirah et al.[31] It should be taken into consideration that in the present study, operating time was calculated from the skin incision till skin closure unlike other studies calculating the time needed only for the repair. The shorter operating time in the Desarda group compared with the mesh group could be attributed to the need for more traction in fixing the mesh in some cases especially at the lateral extent of the repair, time taken to fashion the mesh and position it around the cord and lastly, although all the surgical procedures have been performed by the same surgical team, the possibility of personal bias cannot be totally overruled. Regarding intra- and post-operative complications, there were no statistically significant differences between the two study groups. Szopinski et al reported a high incidence of seroma formation in the mesh group.[24] Desarda in his study reported a complication rates 3 times higher among the mesh group compared with his technique and the differences were statistically significant, however, there are some questions regarding the methodology of this study.[25] The most frequent complications encountered in the present study were: scrotal edema and hydrocoele formation and they were managed conservatively. There was significantly earlier return to normal physical activity in Desarda group (18.39±3.09 days) than in Lichtenstein group (21.24±3.47 days). This difference was found to be statistically significant (p<0.004). Our findings are in

contrast to that reported in previous two studies that there were no significant differences in day to return to normal gait, basic physical activity or home activity when both groups were compared.[24,25] These differences may be due to the differences in the definition of day to return to normal gait that was not standardized from one study to another, in addition there are other factors which may affect return to normal gait such as patient age and the effect of postoperative pain.

Surgeons who are against the Desarda technique claim that the hernia is due to abnormalities in collagen metabolism and connective tissue quality with a defect in matrix metallopreitnase (MMPS) and their inhibitors (TIMPS) which leads to a decrease in type I: III collagen ratio.[34] However, the fact that the Shouldice repair is still practiced with acceptable results in spite of being a pure tissue repair stands against their argument. It is not accurately known the exact percentage of these abnormalities among hernia patients and assuming that they approach 20%, this leaves about 80% of hernia patients fit for tissue repair.[19,20] We think that the challenge is to accurately identify these patients at their first surgery and not offering them a pure tissue repair, as usually these patients are only diagnosed through multiple recurrences. In the present era of lightweight polypropylene meshes, composite meshes, and the various types of biologic prostheses that are being evaluated, we think that pure tissue repair like the Desarda repair are not out of the field. Obviously the cost is less for Desarda technique as no mesh is needed, but this is not the only issue as mesh prosthesis has its drawbacks. Mesh works as mechanical barrier. It does not give mobile and physiologically dynamic posterior wall. The author of the original technique postulated that the aging process is minimal in the tendons and aponeurosis, therefore the use of a strip of EOA, which is tendo-aponeurotic in nature, is the best alternative to a mesh or Shouldice.[10-12] This undetached, mobile, aponeurotic strip enforces the posterior wall of the inguinal canal in a physiologic manner. In other words, the use of a naturally displaced and mobile aponeurotic strip is far more "physiological" than the scar tissue produced around a synthetic prosthesis for creating a mechanism against re-herniation.

Some limitation of the present study should be mentioned. There is no objective assessment supporting the Desarda technique of being tension free and dynamic. The assessment of the EOA suitability for repair is rather a subjective decision and the exclusion of patients with weak EOA may have an impact on our results.

CONCLUSION

Successful primary inguinal hernia treatment without mesh implantation can be achieved using the Desarda's repair as it is effective as the standard Lichtenstein repair. Desarda repair is a simple and straightforward procedure with no complexity involved in the tissue dissection and repair. Shorter operating time, early return to normal gait and lower cost (no mesh), shorter hospital stays and less post-operative pain are potential benefits of Desarda repair. The result of our study supports the use of Desserda repair in developing countries due to low cost and recurrence rate, Simple repair as well as limited resources.

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