Desarda vs lichtenstein technique for the treatment of primary inguinal hernia

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Background
The Lichtenstein technique (LT) is currently the most popular open mesh repair method with recurrence rates of around 4% in long-term follow-up, but the cost of the mesh may be a barrier in developing and underdeveloped countries. Also, the presence of an infection can prevent implantation of a mesh. In these settings, it is good to have the option of a simple, mesh-free repair. Desarda, in 2001, has described a new method that seems to satisfy the above criteria. Desarda technique (DT) appeared as a promising tissue-based repair that provided low incidence of recurrence without the need for complicated dissection, suturing or implanting prosthetic or foreign materials in the inguinal canal. The aim of this study was to test the hypothesis that the DT is as effective as the standard LT, allowing successful hernia repair without mesh.
Materials and methods
A total of 80 cases were allocated into two groups. The Desarda group (D group) had 40 patients and the Lichtenstein group (L group) had 40 patients. The primary outcome measures were the recurrence of inguinal hernia and chronic groin. Secondary outcome measures included operating time (min), time to return to normal gait and to work, foreign body sensation in the groin, and postoperative complications such as testicular edema, groin discomfort, seroma, and surgical site infections. Statistical analysis was carried out using Statistical Package for the Social Sciences.
Results
There was significantly shorter operating time and earlier return to normal gait in favor of Desarda repair. Complication rates were nearly similar in the two study arms.
Conclusion
Both DT and LT provided satisfactory treatment for primary inguinal hernia with low recurrence rates and acceptable rates of complications that were significantly less after DT. The DT may potentially increase the number of tissue-based methods available for treating groin hernias. More well-designed RCTs with longer follow-up are required for further validation of the DT.

Keywords:
Desarda technique, inguinal hernia, Lichtenstein technique, tissue-based repair

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Introduction

Inguinal hernia is defined as a protrusion of the contents of the abdominal cavity or preperitoneal fat through a hernia defect in the inguinal area, irrespective of whether this is preformed [1].

An inguinal hernia is one of the most commonly encountered conditions in surgical practice with an estimated incidence of around 15% of the adult population [2].

The estimated lifetime risk for inguinal hernia is 27% for men and 3% for women [3].

Mesh-based Lichtenstein technique (LT) was strongly recommended (level IA) by the European Hernia Society for treatment of primary inguinal hernia in adult men after a thorough analysis of the results of several clinical trials [1].

LT, introduced in 1984, is widely used and is often touted as the gold standard of different open mesh techniques, probably owing to its ease of application, resultant tension-free repairs, and lower recurrence rates [1].

Disadvantages of the LT include the cost of the mesh and the problems associated with implantation of prosthetic material in the groin as the risk of seroma

formation, surgical site infection, chronic groin pain or foreign body sensation, mesh migration, and impairment of testicular or sexual functions [4].

Furthermore, the placement of a synthetic mesh in the inguinal canal was thought to make it lose its dynamic nature, turning it into a static entity [5].

Most of the conventional tissue-based repairs aim to construct the posterior abdominal wall using patient's deep abdominal wall muscular tissue and fascia, and especially, the transversalis fascia gained much attention [6], such as the Shouldice procedure.

In 1887, Edoardo Bassini [7] first proposed repairing the inguinal canal with silk stitches suturing the conjoined transversus abdominis and internal oblique with the transversal is fascia to the inguinal ligament, which is the first sound technique for the repair of inguinal hernia.

Since that time, more than 70 derivations of tissue-based repairs are described in the literature [8].

Although the Shouldice method has been considered the best tissue-based repair with recurrence rates of less than 1%, its technically demanding nature can potentially increase the incidence of recurrence of up to 15% with the less experienced and less trained hands [9].

In 2001, Desarda proposed a solution that using part of the external oblique aponeurosis (EOA) as a patch for repair, which may reduce the complications compared with meshes. Moreover, the technique requires no complicated dissection or suturing, and is easy to learn as its developer claimed [10].

It does not require any foreign material and does not use weakened muscles or transversalis fascia for repair. The results are superior to those previously published in the field of hernia surgery [11].

The main advantages of Desarda technique (DT) were absence of recurrence and postoperative neuralgia is a simple procedure that does not require placement of any foreign body nor complicated dissection of the inguinal floor, and it can be used in contaminated surgical fields as in cases of strangulated hernia. All of these advantages concur with the criteria of the ideal repair for inguinal hernia [5].

The most frequently reported complications were hematoma, seroma, surgical-site infection, chronic pain, and recurrence [12].

Aim

The aim of this prospective, randomized clinical study is to compare DT with the standard LT for the treatment of primary inguinal hernia among adult Egyptian people in terms of operative time, day of return to normal gait, and complications such as pain, hematoma formation, and recurrence.

Materials and methods

This prospective, observational, randomized study was conducted at the Surgery Department of Zagazig University Hospitals in Egypt during the period from March 2016 to March 2019. The study includes 40 patients of primary inguinal or inguinoscrotal hernia. The patients were divided into two equal groups (40 patients for each group): Lichtenstein mesh-based repair (L group) or Desarda tissue-based repair (D group). Randomization was achieved using computer-generated allotments that were disclosed to the surgeon through a sealed envelope.

All patients were subjected to preoperative evaluation including history taking, clinical examination, and basic laboratory investigations. Elderly patients were subjected to further investigations as part of the preanesthetic workup and looked for any complications.

Written informed consent was obtained from all patients included in the study after a detailed explanation of the technique used until 2 years following the date of surgery.

The most evident indications for use of the DT include use in contaminated surgical fields, in patients with strangulated hernias, in the presence of financial constraints, or if a patient disagrees with the use of mesh. Although the mesh has many advantages, it can be a source of infection or other complications in cases of irreducible or strangulated hernias, so we intended to not use the mesh in these cases to discuss the outcomes of DT.

The exclusion criteria were patients under the age of 18 years, patients with scar in the inguinal region, patients with recurrent or giant inguinoscrotal hernia, patients with poorly controlled DM, chronic cough and chronic obstructive pulmonary disease, patients found to have thin, weak, or divided EOA intraoperatively and patients that were lost to follow-up within 2 years of the hernia repair.

Preparation

All operations were performed as elective day cases. The patients were given one shot of antimicrobial prophylaxis (1.0 g Ceftriaxone intravenously 30 min before surgery). Spinal anesthesia or less commonly general anesthesia was used according to the patient's preference or anesthetist's opinion. The surgical site was prepared using chlorhexidine solution. The operations were performed by staff surgeons and surgeons in training, with equal proportions in both groups.

The oblique inguinal incision was used in all procedures measuring about 7.5 cm, starting 2 cm above and medial to the pubic tubercle. The standard procedure of opening in layers (skin, fascia, EOA) and subsequent herniotomy was followed for all patients. Dissection and assessment of the strength of the EOA were done. Repair of the posterior wall of the inguinal canal was then embarked on.

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 which counted from the beginning of a particular repair technique (after herniotomy has been performed) and ending when the last stitch of the repair is knotted, before closing the other layers of the wound.

Interventions

The surgical procedures were carried out based on the techniques as described by Lichtenstein and Desarda.

Lichtenstein technique

The Lichtenstein tension-free mesh repair was performed as described by Amid [13]. A 6×11 cm polypropylene mesh (Prolene mesh; Ethicon, Inc., Skillman, New Jersey) was fashioned to fit the inguinal floor. A 2 cm slit was made in the mesh to accommodate the cord, the two tails of which are sutured to the shelving edge of the inguinal ligament to create a new deep ring. The mesh was sutured to the fibroperiosteum of the pubic bone, the inguinal ligament and internal oblique with Prolene 2/0.

Finally, the cord is allowed to fall back on the strengthened posterior wall of the canal, the aponeurosis of the external oblique repaired with interrupted Proline 3/0 suture and the superficial ring reconstructed to fit snugly around the cord. The inguinal canal closed by suturing the two edges of EOA. This is followed by the closure of the superficial fascia and skin as usual and the wound is then dressed.

Desarda technique

The Desarda repair was performed as it was originally described in 2001 [14]. A splitting incision was taken in EOA, partially separating and creating a 2 cm strip whose medial leaf is sutured to the inguinal ligament laterally from the pubic tubercle to the deep inguinal ring by a continuous nonabsorbable suture (2/0 Prolene). The upper free border of the EOA strip was sutured to internal oblique or conjoint muscles with Prolene 2/0. The strip extended from the symphysis pubis till 1–2 cm beyond the internal ring. The resultant strip of EOA placed behind the cord formed a new posterior wall of the inguinal canal. The spermatic cord placed in the inguinal canal and the lateral leaf of EOA is sutured to the newly formed medial leaf of EOA in front of the cord using Prolene 2/0 sutures. The superficial fascia and skin were closed as usual. Particular attention was paid to identify and preserve the nerves of the inguinal area. Unlike mesh repairs, the strip of EOA that replaces the mesh is more physiological and when put under tension when straining by abdominal wall muscular contraction creates lateral tension while contraction of the internal oblique/conjoined muscle creates tension above and laterally, making the EOA strip a shield to prevent any herniation. This fascial strip also gives additional strength to the weakened internal oblique and transverse abdominal muscle. For both techniques, the skin was closed with continuous nonabsorbable sutures. All intraoperative variables were recorded and compared.

Postoperative care and follow-up

After skin closure, Diclofenac 75 mg was injected intramuscularly and the patient discharged on the following drugs and instructions:

(1) Tabs Diclofenac Sodium 50 mg 8 hourly for 5 days (to be taken after meals). Capsules Amoxycillin 500 mg 6 hourly for 5 days.
(2) Instructions not to open up the wound dressing nor wet it when bathing.
(3) Instructions to report back immediately in the event of excessive pain at the incision site, bleeding or wound discharge.
(4) The patients were allowed drinks as soon as they felt like after the operation (normally 3–4 h after).
(5) All patients were instructed not to restrict their normal activities and they could start routine nonstrenuous work from 3–4 days after surgery.
(6) Patients were told not to drive until 3–4 days after surgery as the foot reaction time does not return to normal until then.

Inpatient records were assessed for postoperative complications such as pain, sepsis, and hematoma formation. The total duration of follow-up was 2 years for recurrence. Patients were followed up at 1–2 h, 7th, 2 weeks postoperatively by examining the patient in the outpatient clinic and data were collected during an interview by an independent observer unaware of the surgical details. Follow-up was completed later at 3, 6, 12, and 24 months postoperatively. On follow-up visits, hernia recurrence and postoperative complications involved in both procedures were assessed by physical and instrumental examinations.

Return to normal activity was described as the patient's ability to perform elementary activities [i.e. dressing, walking, bathing (basic activity)]; usual activities at home [i.e. preparing food, cleaning the house (home activity)]; and returning to all previously performed activities (work activity).

Outcomes

The primary outcome measures included operating time (min), time to return to normal gait and to work, foreign body sensation in the groin, and postoperative complications such as testicular edema, groin discomfort, seroma, and surgical site infections. Secondary outcome measures were a recurrence of inguinal hernia and chronic groin pain defined as pain lasting more than 6 months after surgery.

Statistical analysis

Normally distributed (quantitative) data were tested with the *t*-test and described by the mean and SD. For categorical (qualitative) data, number and percentage were reported and the differences between groups were assessed by the Pearson's χ^2-test or by Fisher's exact test. Differences were considered statistically significant at a *P* value of less than 0.05. All the statistical calculations were done using the Statistical Package for the Social Sciences program Science for Windows Version 20.0 (SPSS Inc., Chicago, Illinois, USA).

Results

In the present study, 80 patients were included in this randomized, prospective observational trial. In each study groups (glue vs sutures), there were 40 patients. The baseline patient characteristics between the compared groups in this study are presented in Table 1. Characteristics of operated hernias are shown in Table 2. Intraoperative data and postoperative complications are outlined in Table 3.

Table 1 Baseline demographic data of the study patients

Demographic data	Desarda group (*N*=40)	Lichtenstein group (*N*=40)	*P* value
Age (years)			
Mean±SD	32.8±7.9	34.65±8.12	0.25
Range	20–40	20–45	
BMI (kg/m^2) [*n* (%)]			
Normal (20–25)	16 (40.0)	19 (47.5)	0.78
Overweight (26–30)	22 (55.0)	19 (47.5)	
Obese (31–35)	2 (5.0)	2 (5.0)	

$P<0.05$ is significant.

Table 2 Characteristics of operated hernias

Parameters	Desarda group (*N*=40) [*n* (%)]	Lichtenstein group (*N*=40) [*n* (%)]	*P* value
Hernia type			
Indirect	23 (57.5)	21 (52.5)	0.65
Direct	17 (42.5)	19 (47.5)	
Size of hernia orifice (cm)			
<1.5 (type 1)	14 (35.0)	20 (50.0)	0.38
1.5–3.0 (type 2)	19 (47.5)	14 (35.0)	
>3.0 (type 3)	7 (17.5)	6 (15.0)	
Side of hernia			
Left	32 (80.0)	27 (67.5)	0.22
Right	8 (20.0)	13 (32.5)	
Duration of hernia (months)			
Mean±SD	30.8±2.89	30.12±4.89	0.87
Range	24–35	24–35	
Nonreducible hernia	9 (22.5)	0	

$P<0.05$ is significant.

The operative time was shorter in the D group than in the L group with highly significant difference (range: 45–71 vs 49–93 min; $P<0.001$). This study shows that there was a highly significant difference regarding the return to basic activity that is reduced in the D group (mean±SD: 3.74±1.2 vs 4.55±1.1; $P<0.001$). There was significant difference regarding the return to work activity between the study groups that is reduced in the D group (7.5 vs 15%) (mean±SD: 19.74±4.54 vs 23.5±5.87; $P=0.002$). We have also demonstrated that seroma was reduced in D group (2.5 vs 7.5% at 7 days; $P=0.11$) and at 30 day the *P* value is equal to 0.0004 (Figs 1–8).

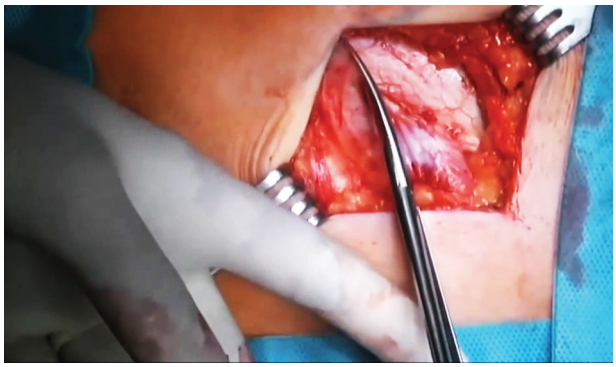
Recurrence was recorded during that short-term follow-up and was two patients in the D group versus one patient in LT. Chronic groin pain and numbness were reduced in the D group (5.0 vs 10.0%; $P=0.39$).We have also demonstrated that hematoma of the surgical wound and surgical-site infection are reduced in the D group (5 vs 7.5%, 0.0

Table 3 Intraoperative data and postoperative complications

Parameters	Desarda group (*N*=40) [*n* (%)]	Lichtenstein group (*N*=40) [*n* (%)]	*P* value
Return to basic activity (days)			
Mean±SD	3.74±1.2	4.55±1.1	<0.001***
Range	1–7	2–7	
Return to work activity (days)			
Mean±SD	19.74±4.54	23.5±5.87	0.002*
Range	11–29	14–33	
Duration of operation (min)			
Mean±SD	57.4±7.6	68.78±11.9	<0.001**
Range	45–71	49–93	
Pain during first month postoperatively (mean±SD)			
7th day	1.5±0.5	1.6±0.45	0.36
14th day	0.1±0.4	0.11±0.2	0.88
Chronic groin pain and numbness (nerve entrapment)			
Absent	38 (95.0)	36 (90.0)	0.39
Present	2 (5.0)	4 (10.0)	
Recurrence			
Absent	38 (95.0)	39 (97.5)	0.55
Present	2 (5.0)	1 (2.5)	
Testicular edema			
7 days	2 (5.0)	5 (12.5)	0.07
30 days	1 (2.5)	3 (7.5)	0.11
6 months	0	0	
Seroma			
7 days	1 (2.5)	3 (7.5)	0.11
30 days	0	5 (12.5)	0.0004**
Hematoma of the surgical wound			
Absent	38 (95)	37 (92.5)	
Present	2 (5)	3 (7.5)	
Surgical-site infection			
Absent	40 (100.0)	39 (97.5)	0.83
Present	0 (0.0)	1 (2.5)	0.34
Testicular atrophy	0 (0.0)	0 (0.0)	
Orchitis	1 (2.5)	1 (2.5)	

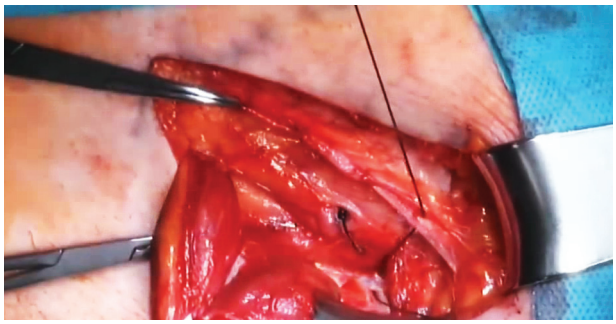
***P* value is highly significant. **P* value is significant.

Figure 1



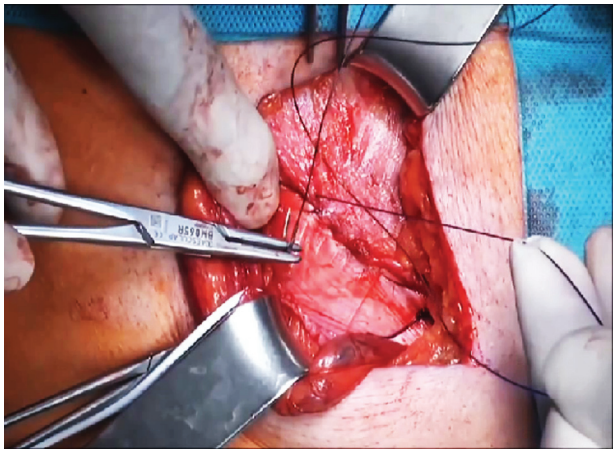
A splitting incision was taken in external oblique aponeurosis.

Figure 2



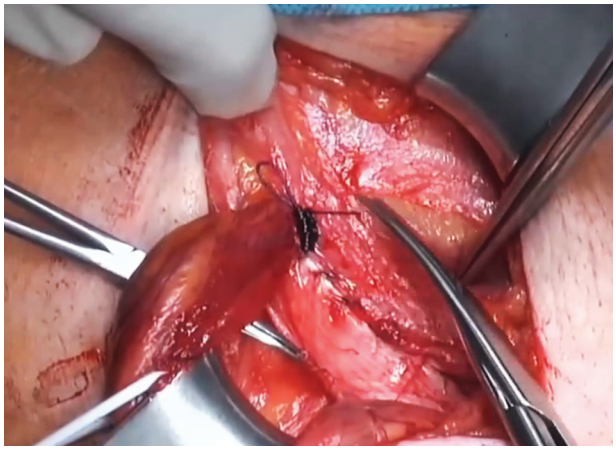
Suturing the medial leaf of external oblique aponeurosis strip to the inguinal ligament starting from the pubic tubercle.

Figure 3



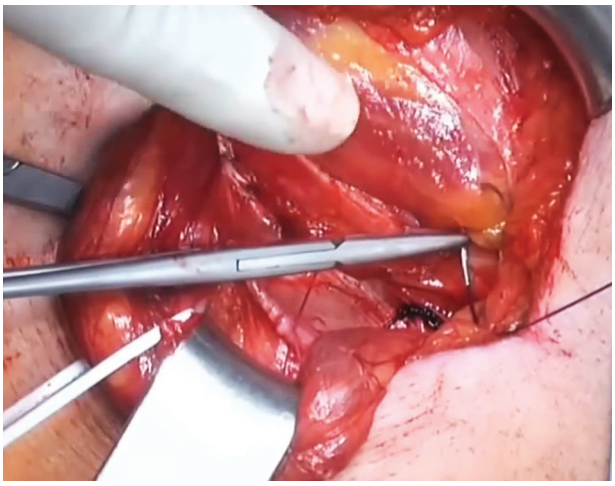
Suturing the medial leaf of external oblique aponeurosis strip to the inguinal ligament from the pubic tubercle to the deep inguinal ring by continuous 2/0 Prolene suture.

Figure 4



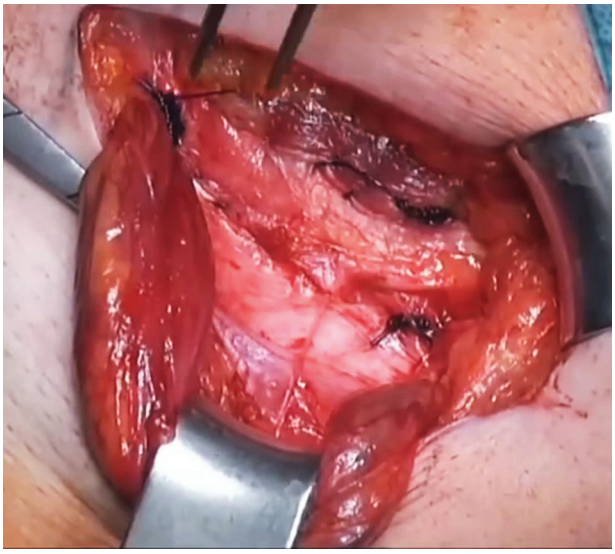
Splitting the upper part of external oblique aponeurosis to form new strips.

Figure 5



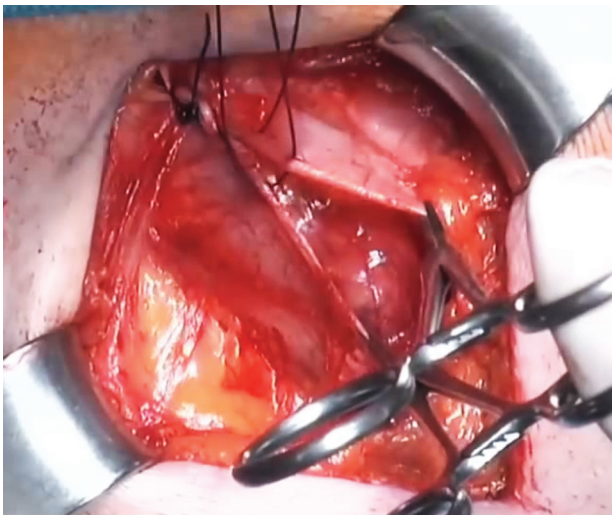
The upper free border of external oblique aponeurosis strip was sutured to internal oblique or conjoint muscles with Prolene 2/0.

Figure 6



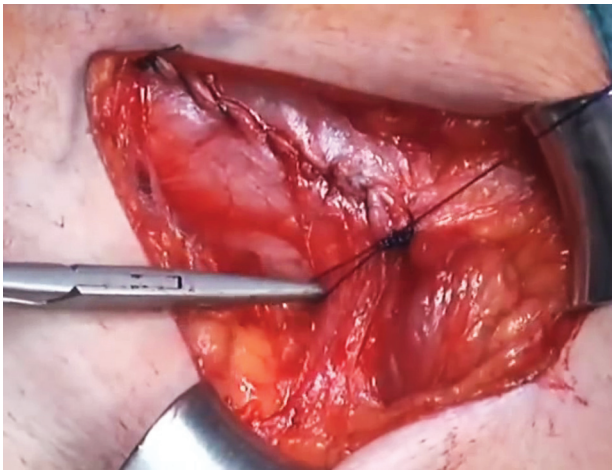
The resultant strip of external oblique aponeurosis placed behind the cord formed a new posterior wall of inguinal canal.

Figure 7



Suturing the lateral leaf of external oblique aponeurosis to the newly formed medial leaf of external oblique aponeurosis in front of the cord using Prolene 2/0 sutures.

Figure 8



Final view with the spermatic cord placed in the inguinal canal.

vs 2.5%, respectively). Patients' subjective assessment of the operated area at 12, 24, and 36-month follow-ups are presented in Table 4.

Discussion

Surgical repair of inguinal hernia is the most common general surgery procedure performed today [15].

Successful surgical repair of inguinal hernia depends on a tension-free closure of hernia defect to attain the lowest possible recurrence rate [16].

LT was deemed the gold standard for repair of inguinal hernia in adults by the American College of Surgeons [13]. The scientific work of optimizing hernia surgery and lowering the number of complications is still in progress.

The DT is original, new, and different from the historical methods using the EOA, proposed initially by McArthur [17] and Ravitch and Hitzrot [18].

One indisputable advantage of DT is its low cost. That is why many published articles recently demonstrated

Table 4 Patients' subjective assessment of the operated area at 12month, 24month, and 36-month follow-up

Parameters	Desarda group (*N*=40) [*n* (%)]	Lichtenstein group (*N*=40) [*n* (%)]	*P* value
12-month follow-up			
Foreign body sensation	5 (12.5)	7 (17.5)	0.41
Abdominal wall stiffness	6 (15.0)	9 (22.5)	0.24
Altered sensation in the operated areas group	16 (40.0)	19 (47.5)	0.45
24-month follow-up			
Foreign body sensation	6 (15.0)	7 (17.5)	0.72
Abdominal wall stiffness	7 (17.5)	8 (20.0)	0.62
Altered sensation in the operated areas group	17 (42.5)	18 (45.0)	0.74
36-month follow-up			
Foreign body sensation	4 (10.0)	6 (15.0)	0.31
Abdominal wall stiffness	4 (10.0)	10 (25.0)	0.01*
Altered sensation in the operated areas group	14 (35.0)	16 (40.0)	0.56

**P* value is significant.

an interest in the technique [19]. The cost of the Desarda operation is low because a synthetic prosthesis is not needed.

Desarda presumed that when the muscles contract, this aponeurotic strip will act as a shield that strengthens the weakened muscles and prevents recurrence of hernia [20].

Surgeons [21] who are against the DT claim that hernia is due to abnormalities in collagen metabolism and connective tissue quality with a defect in matrix metalloproteinases and their inhibitors which leads to a decrease in type I: III collagen ratio.

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 [9].

Ghosh and Desarda [11] observed rates of complications of about three times higher in the Lichtenstein mesh repair than in his novel technique.

The DT has been compared with the LT and has been consistently shown to have a better outcome with regard to complications and reexplorations for sepsis, quicker return to normal work, a significantly shorter operative time, and early resumption of normal gait and freedom from pain [22].

Some have therefore concluded that the Desarda repair has the potential to become the new gold standard particularly in low-income and middle-income countries [11].

The Desarda method appears to save costs due to shorter hospital stays, reduced operating times, and the avoidance of the use of a mesh.

No remarkable differences in the degree of early postoperative pain were reported by the trials except one study. Ahmad *et al.* [23] that reported a lower degree of pain in favor of the DT.

The incidence of chronic groin pain after LT varies from 28.7 to 43.3%; this high incidence is probably caused by nerve entrapment syndrome secondary to excessive fibrosis around the mesh [24].

Postoperative pain in our study was significantly less in the Desarda group compared with the Lichtenstein group. The reason for that pain may be due to many confounding factors like tissue handling, ilioinguinal nerve traction, and manipulation intraoperatively.

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 is taken to fashion the mesh and position it around the cord.

The mean recurrence rate for the standard Lichtenstein procedure is about 1% in hernia specialized centers but can be much higher in community hospitals (about 4%), and the reported rate even reaches 18% in some articles [25].

In a retrospective study, Ghosh and Desarda [11] reported zero recurrences after DT versus a recurrence rate of 1.97% after LT. Complication rates after DT and LT were 1.85 and 7%, respectively.

Another study by Mitura and Romańczuk [26] reported a shorter operation time and less severe postoperative pain after DT; nonetheless, no recurrence was recorded after either technique.

In the Lichtenstein group, the recurrence was near the pubic tubercle and in the Desarda group, it was near the deep ring. Desarda, in a clinical trial in a small district hospital in India, comparing his technique to Lichtenstein repair reported no recurrence in his technique versus 1.9% recurrences in the mesh group [27]. Szopinski *et al.* [28] had 1.9% recurrence in the Lichtenstein and 1.94% in the Desarda group. Similar *P* values were obtained in studies by Youssef *et al.* [5], Abbas *et al.* [29], Rodriguez *et al.* [30], and Mitura and Romańczuk [26].

In our study, there were two cases of recurrence in the Desarda group. In one case, the recurrence was obviously the result of a technical error, where the aponeurotic strip created was too long, resulting in a large newly formed deep inguinal ring and reherniation. In the second case of recurrence, weakening of the entire posterior wall was found during reoperation, but no typical reherniation was seen.

Previously, Mitura and Romańczuk [26] have published the results of a 6-month follow-up study of the Desarda and Lichtenstein approaches. They observed no recurrence, and pain after 6 months was comparable in the two groups (visual analog scale scores were 8 vs 11 in the Desarda and Lichtenstein groups, respectively; P=0.691).

Other results, published by Desarda and his group, were based on a comparison of his technique and the LT [11]. They reported no recurrence among the 269 Desarda group patients and 1.97% recurrence among the 225 mesh group patients; 6.49% of patients from the mesh group and no patients in the Desarda group reported chronic pain at 1 year after surgery.Time taken to return to basic activities was reduced in the DT (mean±SD was 3.74±1.2 vs. 4.55±1.1; P<0.001), suggesting patients operated with DT get ambulatory sooner and return to the basic and home activities before the patients operated with Lichtenstein repair.

In a retrospective study by Ghosh and Desarda [11], the mean time to return to work was 8.48±2.43 days with his technique and 12.462.1±1 days in the mesh group. In another study by Desarda [10], 98.25% of patients were ambulatory with limited movement up to the bathroom within 6–8 h, whereas 97.6% experienced free movement within 18–24 h.

Early return to home activity in DT may be attributed to less tissue handling, fewer dissections and less postoperative pain. Youssef *et al.* [5], Abbas *et al.* [29], Mitura and Romańczuk [26] and Desarda [14] reported similar results.

The higher ratio of seromas after use of the Lichtenstein method can be explained by the influence of the synthetic mesh on surrounding tissues. This is consistent with other studies and the known influence of polypropylene on tissue [31].

Foreign body sensation and abdominal wall stiffness were expressed by 12–16% of the Desarda group patients and 17–22% of the Lichtenstein group patients at different time points, and the results are within the range 4.5–43.8% reported by other authors for mesh techniques [32]. In our study, Table 4 shows the difference in foreign body sensation and abdominal wall stiffness at 12, 24, 36-month follow-up.

The main comparison between DT and LT in our study was in cases of gross contamination (e.g. strangulated hernia) where the mesh (although it is cheap) can be a source of infection, seroma, foreign body sensation, and groin discomfort, so DT was done in these cases with good results.

Conclusion

Our random, controlled trial confirmed that the results of inguinal hernia treatment with the DT are similar to the results after standard LT over a 2-year time period. Looking at the advantages and drawbacks of each procedure, DT can become a valid alternative to LT especially in cases of gross contamination. The main concern in hernia surgery is to avoid recurrence. Our study offers short-term follow-up to show mainly primary outcomes of DT in addition to recurrence. This study is devoid of enough time for follow-up, so more well-designed RCTs with longer follow-up are required to provide more reliable evidence.

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Conflicts of interest

There are no conflicts of interest.

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