

Efficacy of Desarda's in Comparison to Lichtenstien's Techniques for Primary Inguinal Hernia Repair Regarding to Operative and Post-operative Parameters

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Abstract: Background: The aim was to assess the efficacy and safety of Desarda's no-mesh repair in comparison to Lichtenstein's tension -free mesh repair in treatment of primary inguinal hernia. Methods: a prospective study of 80 patients suffering from unilateral primary inguinal hernia who underwent elective operation for hernia repair. The patients were of both males and females their age ranged from 20 - 60 years. They were divided into two groups (A and B). Group A: 40 patients were subjected to Desarda's no mesh repair. Group B: 40 patients were subjected to Lichtenstein's tension free mesh repair. The data were collected within one year including sociodemographic data, general and local examination, co-morbidities, type and duration of inguinal hernia, type of operation, intra- and post -operative parameters, hospital stay and recurrence. Results: Demographic parameters, general examination, duration, type of hernia and co-morbidities in the two intervention arms were similar and shows insignificant difference. 35.5 minutes was the operative time in Desarda's group and 46 minutes in Lichtenstein's group which was highly significant ($p < 0.0001$). Post-operative pain, loss of sensation over groin, chronic inguinal pain (> 1 month), hospital stay duration and return to normal activity were significantly decreased in Desarda's group in comparison to Lichtenstein's group ($P < 0.0001$ & $P < 0.01$ & $P < 0.01$ & $P < 0.0001$, $P < 0.001$, respectively). Foreign body sensation and reaction, abdominal wall stiffness and migration of mesh occurs only in Lichtenstein's group. Hematoma, seroma, scrotal edema, surgical site infection and fever shows insignificant deference between the studied groups but more prevalent in Lichtenstein's group than Desarda's group ($P = 0.49$ & $P = 0.26$ & $P = 0.21$ & $P = 0.09$ and $P = 0.67$, respectively). No recurrences of hernia in both studded groups through 1- year follow-up. Conclusion: This study has shown that Desarda's repair for primary inguinal hernia gives better results when compared with the Lichtenstein's repair. It is easy to learn and it is physiologically sound. It is associated with less operative duration and mesh related complications. It can be used in a contaminated surgical field, in young individuals and in cases of financial constraints.

Keywords: Desarda's Technique, Lichtenstein's Technique, Primary Inguinal Hernia

1. Introduction

A hernia is defined as protrusion of whole or a part of a viscous through the wall that contains it [1]. Hernia is the most commonly seen condition in the outpatient departments in most parts of the world. Better understanding of the anatomy and physiology of the inguinal canal and improvements in surgical techniques have significantly

improved outcomes for many patients [2]. Successful surgical repair of inguinal hernia depends on a tension-free closure of hernia defect to attain the lowest possible recurrence rate [3]. Several techniques have been employed in the treatment of inguinal hernias, since Bassini first described his method from tissue repairs such as modified Bassini, Shouldice,, Halsted-Tanner, McVay and Nylon-Darn to the tension-free hernioplasty that involves the use of a mesh implant over the past 20 years.

surgery of hernia has become increasingly more complex not only due to the introduction of novel endoscopic but also conventional techniques [4]. The ideal method for modern hernia surgery should be simple, safe, tension free, permanent and cost effective, however, The choice of a method depends on the surgeon [5]. Despite the various modalities available for treatment of this common condition, no surgeon has ideal results. Complications like postoperative pain, nerve injury, infection, and recurrence continue to pose a challenge, this necessitates the introduction of a new technique for repair of hernia with reduced complication rates [6]. The Desarda's technique for repair of inguinal hernia is an improvement as it overcomes the challenges faced with the use of tension tissue-repair and mesh repair techniques. It is based on the concept of providing a strong, tension-free and physiologically dynamic posterior inguinal wall [5].

The aim of this study was to compare the Desarda's no-mesh repair with Lichtenstein's tension-free mesh repair in treatment of primary inguinal hernia.

2. Patients and Methods

This prospective observational study of 80 patients suffering from unilateral primary inguinal hernia who were admitted to the department of general surgery in Sohag University Hospitals – Egypt. In a period from 1st of June 2019 to 30th March 2020. The diagnosis based on history, clinical examination and sonar. Those patients were from both sexes (male and female) and their age ranged from 20 to 60 years suffering from unilateral reducible primary inguinal hernia.

2.1. Inclusion Criteria

- a. Aged 20 – 60 years.
- b. Patient with unilateral reducible primary inguinal hernia.

2.2. Exclusion Criteria

- a. Associated surgical pathologies where the patient was getting operated for both conditions at the same time.
- b. Old age with thinned out external oblique aponeurosis.
- c. Pregnancy.
- d. Children.
- e. Morbid obesity
- f. Recurrent inguinal hernia.
- g. Complicated inguinal hernia.
- h. Uncontrolled diabetes or hypertension.
- i. Patients with bleeding disorders.

Patients were randomly subjected to Desarda's no-mesh repair and Lichtenstein's tension-free mesh repair after obtaining informed written consent which was taken from each patient after receiving an explanation of the study protocol, including the methods of operations. All patients were divided into 2 groups:

Group A: 40 patients who underwent Desarda's repair.

Group B: 40 patients who underwent Lichtenstein's repair.

Data for each patient was collected by us and our residents in department of general surgery. The collected data includes *socio-demographic data*:- age, sex, marital status, occupation or job, special habits and residence, *Duration of hernia* [in months], *Type of hernia* [Indirect or Direct]. Date of admission, date of discharge and duration of hospital stay, *General examination and Vital signs* [Pulse, blood pressure, temperature, Respiratory rate], Co- morbidities [Hypertension, Diabetes, COPD, CRF, BMI>30 Kg/m² and Smoking], *Intra-operative Parameters* [Type of anesthesia, duration of surgery (in minutes) and intra-operative complications], *Post-operative Parameters*: [Groin pain (in days) according to V A S, hematoma, seroma, scrotal edema, fever, surgical site infection according to CDC classification and grading, foreign body sensation, abdominal wall stiffness, foreign body reaction (Meshoma), fistula formation, loss of sensation over the groin, chronic inguinal pain (>1month), testicular atrophy, return to normal activity, migration of mesh and follow up for recurrence (at 3 months, at 6 months and at 1 year) after operation]. All surgeries were done by experienced surgical team, so surgical performance not varied in this series.

2.3. Surgical Procedure

All patients were given one shot of antimicrobial prophylaxis (1g 1st generation cephalosporin IV 30 min. before surgery). All operations were carried out under spinal anesthesia.

2.3.1. Desarda's No Mesh Repair

- a. This is a relatively new method based on the concept of providing a strong, mobile and physiologically active posterior inguinal wall [6].
- b. This method was introduced by Dr. Mohan P. Desarda at Poona Hospital and Research Centre, Pune.
 - 1) Anesthesia: Spinal anesthesia.
 - 2) Desarda's repair was performed as it was originally described in 2001 [6].
 - 3) Incision: Oblique inguinal incision made about 1.5 cm above and parallel to the medial two thirds of the inguinal ligament.
 - 4) Steps: The external oblique Aponeurosis (EOA) is incised along its fibers, the inguinal canal is opened. Suturing of The medial leaf of the EOA to the inguinal ligament from the pubic tubercle to the deep ring by continuous non-absorbable suture (2/0 Prolene). Sutures are taken to narrow the deep ring, but care should be taken not to constrict the spermatic cord. A splitting incision is made in the sutured medial leaf and is extended medially up to the rectus sheath and laterally 1-2 cm beyond the deep ring. The width of the strip 1.5-2cm. The medial insertion and lateral continuation of this strip is kept intact through which it gets its blood supply. The upper free border of the strip is sutured to the conjoint tendon with 2/0 prolene (polypropylene) interrupted sutures. The strip of EOA is placed behind the cord to form a new posterior wall of the inguinal

canal. The newly formed medial leaf of the EOA is sutured to the lateral leaf of the EOA in front of the cord. Approximation of the newly formed medial leaf to the lateral leaf without tension by undermining on both surfaces of the newly medial leaf. Then closure of the wound (superficial fascia and the skin) as usual.

2.3.2. Mechanism of Action

External Oblique Muscle contraction produces a lateral tension in the strip, whereas internal oblique/conjoined muscle contraction results in a supero-lateral tension, this making the strip like a shield which prevents herniation. When there is a blow to the abdomen, there is a strong contraction of the abdominal muscles. This gets translated into an increased tension in the external oblique aponeurosis strip which protects from herniation. Advantages are no suture line tension, no foreign material, simple and easy to do and learn [5].



Figure 1. External oblique aponeurosis appearance before splitting.



Figure 2. Upper medial leaves of external oblique aponeurosis.



Figure 3. Lower lateral leave of external oblique aponeurosis.



Figure 4. Trasfixation of the sac at its neck for excision.

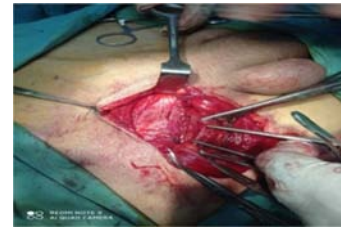


Figure 5. Medial leaf sutured to inguinal ligament.



Figure 6. Upper border of EOA strip sutured to conjoint tendon.



Figure 7. Desarda's repair final appearance.

2.3.3. The Lichtenstein Tension-free Mesh Repair

The Lichtenstein repair was performed as described by Amid [7].

In Lichtenstein's hernioplasty, an 8×12 cm polypropylene mesh (Prolene; Ethicon) was used for all patients, mesh was trimmed to a foot-like shape to fit the inguinal floor. The fixation of mesh starting medially at the pubic bone. Ensure that medially the mesh covers the pubic bone by at least 2 cm because this is where most recurrences are seen [The medial most stitch fixed the mesh 2 cm medial to the pubic tubercle, where the anterior rectus sheath inserts into the pubic bone]. Then anchor the mesh on the inguinal ligament with a non-absorbable continuous Polypropylene 2/0 (Prolene; Ethicon) suture up to the deep inguinal ring, it is important not leave any gaps along the inguinal ligament since this heightens the risk of recurrence. At the deep inguinal ring place the superior tail of mesh over the inferior tail with a non-absorbable suture, first suture both tails together and then anchor both tails on the inguinal ligament. Cranially using an absorbable suture (2/0 Maxon; Covidien) to anchor the superior part of the mesh on the internal oblique. The nerve was preserved in all cases.



Figure 8. Lichtenstein's repair final appearance.

3. Ethical Consideration

A written informed consent was taken from all participants patients or their legal guardians. Ethical approval was obtained from the medical research ethics committee under IBR Registration number: S20-158.

4. Statistical Analysis

Data was analyzed using STATA version 14.2 (Stata Statistical Software: Release 14.2 College Station, TX: StataCorp LP.). Quantitative data was represented as mean, standard deviation, median and range. Data was analyzed using student t-test to compare means of two groups. When the data was not normally distributed Mann-Whitney test was used. Qualitative data was presented as number and percentage and compared using either Chi square test or fisher exact test. Graphs were produced by using Excel or STATA program. P value was considered significant if it was less than 0.05.

5. Results

This prospective study represents one year follow-up of two groups of patients. Group A: 40 patients who underwent Desarda's repair, they include 36 (90%) males and 4 (10%) females. Group B: 40 patients who underwent Lichtenstein's repair, they include 34 (85%) males and 6 (15%) females. Regarding to socio-demographic data:- Gender, social status and special habits were shown insignificant difference between the two studied groups, also there were more men than women (70 males vs 10 females) in both studied cohorts., as shown in table 1.

5.1. Age Incidence

The age of patients ranged from 20 to 60 years in both studied groups. Regarding to group A: 14 (35%) patients between age 36-45 and 12 (30%) patients between age group 20-25. While 10 (25%) patients between age 26-35 and also 10 (25%) patients between age group 46-55 in group B. The mean age of group A was 38.2 ± 13.34 years versus 39.95 ± 13.57 years in group B. There were significant difference ($P=0.04$) regarding to age groups between both studied cohorts, as shown in table 1.

Table 1. Comparison between the Desarda's no mesh repair and Lichtenstein's mesh repair as regard to personal characteristics.

Variable	Desarda's no mesh repair N=40	Lichtenstein's mesh repair N=40	P value
Age/years			
Mean \pm SD	38.2 \pm 13.34	39.95 \pm 13.57	0.46
Median (range)	40 (20:60)	44.5 (20:60)	
Age group			
Up to 25	12 (30.00%)	8 (20.00%)	
26-35	2 (5.00%)	10 (25.00%)	
36-45	14 (35.00%)	6 (15.00%)	0.04
46-55	8 (20.00%)	10 (25.00%)	
>55	4 (10.00%)	6 (15.00%)	
Sex			
Female	4 (10.00%)	6 (15.00%)	0.50
Male	36 (90.00%)	34 (85.00%)	
Social status			
Married	28 (70.00%)	26 (65.00%)	
Single	10 (25.00%)	10 (25.00%)	0.11
Widow	0	4 (10.00%)	
Divorced	2 (5.00%)	0	
Special habit			
Cigarettes smoker			
Absent	24 (60.00%)	24 (60.00%)	1.00
Present	16 (40.00%)	16 (40.00%)	
Goza			
Absent	34 (85.00%)	34 (85.00%)	1.00
Present	6 (15.00%)	6 (15.00%)	
Others			
Absent	34 (85.00%)	32 (80.00%)	0.56
Present	6 (15.00%)	8 (20.00%)	

5.2. General Examination

Regarding to pulse rate, systolic and diastolic blood pressure, temperature and respiratory rate, there were insignificant difference between both studied groups, as shown in table 2.

Table 2. Comparison between the Desarda's no mesh repair and Lichtenstein's mesh repair regarding to general examination.

Variable	Desarda's no mesh repair N=40	Lichtenstein's mesh repair N=40	P value
Pulse rate			
Mean±SD	74.45±3.99	74.4±4.76	0.96
Median (range)	75 (68:81)	75 (65:85)	
Systolic blood pressure			
Mean±SD	118.75±13.07	118±12.07	0.79
Median (range)	115 (100:140)	117.5 (100:140)	
Diastolic blood pressure			
Mean±SD	74±9.26	75±8.58	0.61
Median (range)	70 (60:90)	75 (60:90)	
Temperature			
Mean±SD	37±0	37±0	1.00
Median (range)	37 (37:37)	37 (37:37)	
Respiratory rate			
Mean±SD	17.2±1.44	17.35±1.30	0.62
Median (range)	17 (15:20)	17 (16:20)	

5.3. Types of Hernia

32 (80%) patients had indirect hernia and 8 (20%) patients had direct hernia in patients who underwent Desarda's repair. While 30 (75%) patients had indirect hernia and 10 (25%) patients had direct hernia in patients who underwent Lichtenstein's repair. So there were insignificant difference regarding to type of hernia ($P=0.59$) between the two studied

groups, as shown in table 3.

5.4. Duration of Hernia

8 months were the average duration of hernia in patients subjected to Desarda's repair, whereas in those who subjected to Lichtenstein's repair were 11 months. Hence, there were insignificant difference ($P=0.13$) regarding to the duration of hernia between both studied groups, as shown in table 3.

Table 3. Comparison between the Desarda's no mesh repair and Lichtenstein's mesh repair regarding to type and duration of hernia.

Variable	Desarda's no mesh repair N=40	Lichtenstein's mesh repair N=40	P value
Type of hernia			
Indirect	32 (80.00%)	30 (75.00%)	0.59
Direct	8 (20.00%)	10 (25.00%)	
Duration of hernia (ms)			
Mean±SD	9.00±4.10	11.95±7.18	0.13
Median (range)	8 (4:18)	11 (4:31)	

Table 4. Comparison between the Desarda's no mesh repair and Lichtenstein's mesh repair as regard to co-morbidities.

Variable	Desarda's no mesh repair N=40	Lichtenstein's mesh repair N=40	P value
Hypertension			
Absent	34 (85.00%)	30 (75.00%)	0.26
Present	6 (15.00%)	10 (25.00%)	
Diabetes			
Absent	32 (80.00%)	38 (95.00%)	0.09
Present	8 (20.00%)	2 (5.00%)	
COPD			
Absent	38 (95.00%)	38 (95.00%)	1.00
Present	2 (5.00%)	2 (5.00%)	
Smoking			
Absent	22 (55.00%)	22 (55.00%)	1.00
Present	18 (45.00%)	18 (45.00%)	
CRF			
Absent	40 (100%)	40 (100%)	1.00
Present	0	0	
BMI>30 Kg/m ²			
Absent	32 (80.00%)	32 (80.00%)	1.00
Present	8 (20.00%)	8 (20.00%)	

5.5. Co-morbidities

Regarding to co-morbidities, there were insignificant difference between the two studied groups, as shown in table 4.

5.6. Intra-operative Parameters

5.6.1. Type of Anesthesia

Both groups underwent surgery under spinal anesthesia, so

there were insignificant difference ($P=1.0$) regarding to anesthesia between the two studied cohorts, as shown in table 5.

5.6.2. Duration of Surgery

The average duration of surgery for Desarda's repair was 35.5 minutes, while for Lichtenstein's repair was 46 minutes. So, there was highly significant ($P<0.0001$) decrease in

duration of surgery in Desarda's repair in comparison to Lichtenstein's repair, as shown in table 5 and figure 9.

5.6.3. Intraoperative Complications

Regarding to intraoperative complications, there were insignificant difference ($P=1.0$) between the two studied groups, as shown in table 5.

Table 5. Comparison between the Desarda's no mesh repair and Lichtenstein's mesh repair regarding to intraoperative parameters.

Variable	Desarda's no mesh repair N=40	Lichtenstein's mesh repair N=40	P value
Type of anesthesia			
Spinal	40 (100%)	40 (100%)	1.00
Duration of surgery (min)			
Mean \pm SD	35.75 \pm 5.01	47.45 \pm 6.30	<0.0001
Median (range)	35.5 (28:45)	46 (38:60)	
Intraoperative complication			
Absent	40 (100%)	40 (100%)	1.00
Present	0	0	

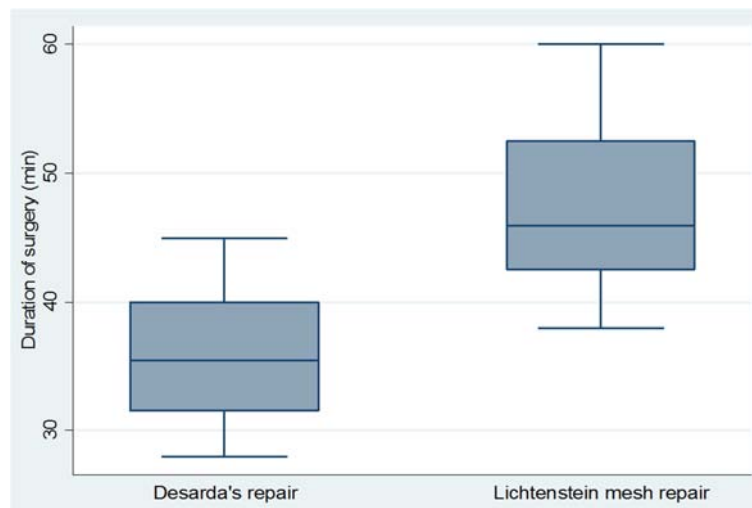


Figure 9. Duration of surgery in each group.

5.7. Postoperative Parameters

Table 6. Comparison between the Desarda's no mesh repair and Lichtenstein's mesh repair regarding to Post-operative parameters.

Variable	Desarda's no mesh repair N=40	Lichtenstein's mesh repair N=40	P value
Groin pain			
<3 days	24 (60.00%)	6 (15.00%)	<0.0001
3-5 days	12 (30.00%)	22 (55.00%)	
>7 days	4 (10.00%)	12 (30.00%)	
Hematoma			
Absent	40 (100%)	38 (95.00%)	0.49
Present	0	2 (5.00%)	
Seroma			
Absent	38 (95.00%)	34 (85.00%)	0.26
Present	2 (5.00%)	6 (15.00%)	
Scrotal edema			
Absent	36 (90.00%)	32 (80.00%)	0.21
Present	4 (10.00%)	8 (20.00%)	
Fever			
Absent	38 (95.00%)	36 (90.00%)	0.67
Present	2 (5.00%)	4 (10.00%)	
Surgical site infection			
Absent	38 (95.00%)	32 (80.00%)	0.09
Present	2 (5.00%)	8 (20.00%)	
Foreign body sensation			0.001

Variable	Desarda's no mesh repair N=40	Lichtenstein's mesh repair N=40	P value
Absent	40 (100%)	30 (75.00%)	0.005
Present	0	10 (25.00%)	
Abdominal wall stiffness			0.005
Absent	40 (100%)	32 (80.00%)	
Present	0	8 (20.00%)	0.12
Foreign body reaction			
Absent	40 (100%)	36 (90.00%)	0.12
Present	0	4 (10.00%)	
Fistula formation			1.00
Absent	40 (100%)	40 (100%)	
Present	0	0	0.01
Loss of sensation over groin			
Absent	38 (95.00%)	30 (75.00%)	0.01
Present	2 (5.00%)	10 (25.00%)	
Chronic inguinal pain (>1 ms)			0.01
Absent	38 (95.00%)	30 (75.00%)	
Present	2 (5.00%)	10 (25.00%)	1.00
Testicular atrophy			
Absent	40 (100%)	40 (100%)	1.00
Present	0	0	

5.7.1. Groin Pain (in Days)

There was highly significant ($P<0.0001$) decrease in groin pain in Desarda's repair in comparison to Lichtenstein's repair, as shown in table 6 and figure 10.

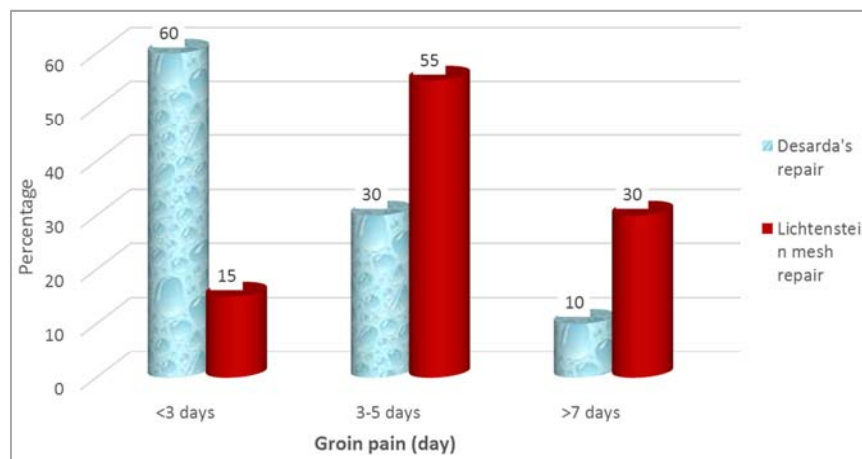


Figure 10. Incidence of groin pain in each group.

5.7.2. Hematoma

Of the 40 patients who underwent Desarda's repair no patients had developed hematoma, while 2 of 40 patients who underwent Lichtenstein's repair had developed hematoma, with $P=0.49$ (insignificant difference) between the two studied groups, as shown in table 6.

5.7.3. Seroma

In spite of insignificant difference ($P=0.26$) between the two studied groups regarding to seroma, it was more prevalent in patients who underwent Lichtenstein's repair (6 patients 15%) than those who underwent Desarda's repair (2 patients 5%), as shown in table 6.

5.7.4. Scrotal Edema

Regarding to scrotal edema there was insignificant difference ($P=0.21$) between both studied groups, but it was more prevalent in patients who underwent Lichtenstein's

repair (8 patients 20%) than those who underwent Desarda's repair (4 patients 10%), as shown in table 6.

5.7.5. Fever

It was shown insignificant difference ($P=0.67$) between both groups, but it was more common in patients who underwent Lichtenstein's repair (4 patients 10%) than those who underwent Desarda's repair (2 patients 5%), as shown in table 6. It was mostly due to chest infection.

5.7.6. Surgical Site Infection

During the postoperative period patients who had surgical site infections were identified and graded as grade I according to CDC classification. 2 (5%) patients in the Desarda group had surgical site infections, whereas 8 patients (20%) had surgical site infections in the Lichtenstein group. But, insignificant difference ($P=0.09$) between the two groups were observed, as shown in table 6 and figure 11.

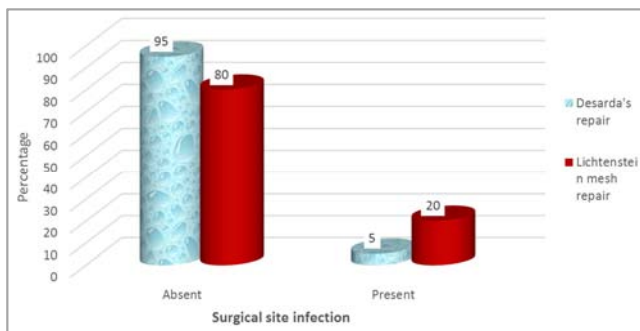


Figure 11. Incidence of surgical site infection in each group.

5.7.7. Foreign Body Sensation

10 (25%) patients had foreign body sensation among patients who underwent hernia repair by Lichtenstein's technique compared to Desarda's technique where there were no such incidence. There was significant ($P<0.001$) increase in foreign body sensation in Lichtenstein's technique in comparison to Desarda's technique, as shown in table 6 and figure 12.

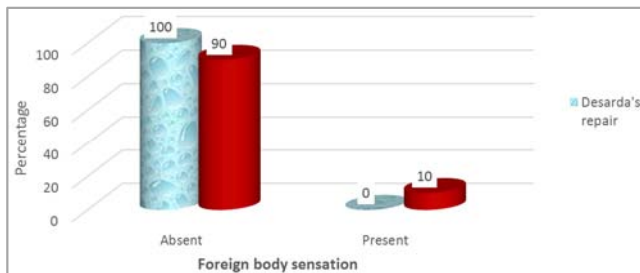


Figure 12. Incidence of foreign body sensation in each group.

5.7.8. Abdominal Wall Stiffness

None of the 40 patients who underwent Desarda's repair had abdominal wall stiffness, while 8 (20%) of the 40 patients who underwent Lichtenstein's repair were complaining of abdominal wall stiffness. This was statistically significant ($P<0.005$), as shown in table 6 and figure 13.

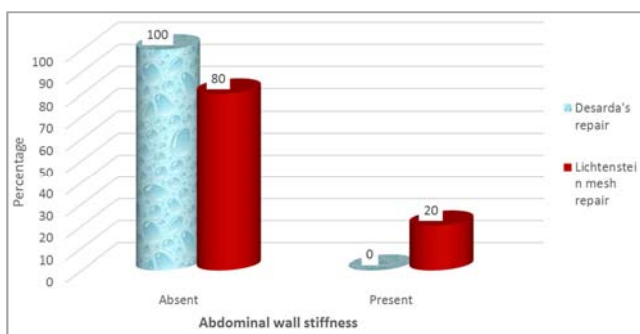


Figure 13. Incidence of abdominal wall stiffness in each group.

5.7.9. Foreign Body Reaction

None of the 40 patients who underwent Desarda's repair had foreign body reaction, while 4 (10%) of the 40 patients who underwent Lichtenstein's repair were complaining of foreign body reaction. This was statistically insignificant

($P<0.12$), as shown in table 6.

5.7.10. Loss of Sensation over Groin

2 (5%) of the 40 patients who underwent Desarda's repair were complaining of Loss of sensation over the groin, while 10 (25%) of the 40 patients who underwent Lichtenstein's repair were complaining of Loss of sensation over groin. This was statistically significant ($P<0.01$), as shown in table 6. figure 14.

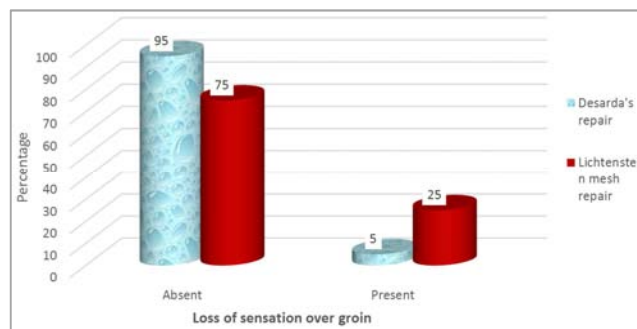


Figure 14. Incidence of loss of sensation over groin in each group.

5.7.11. Chronic Inguinal Pain (>1 Month)

Of the 40 patients who underwent Desarda's repair 2 (5%) patients had chronic inguinal pain (>1 month), while 10 (25%) of the 40 patients who underwent Lichtenstein's repair had chronic inguinal pain (>1 month). This was statistically significant ($P<0.01$), as shown in table 6.

5.7.12. Testicular Atrophy and Fistula Formation

None of both studied groups suffering from testicular atrophy and Fistula formation. This were statistically insignificant ($P=1.0$ for each), as shown in table 6.

5.7.13. Duration of Hospital Stay (Day)

The average duration of hospital stay was 2 days in case of Desarda's technique and 4 days in Lichtenstein's technique with a $P<0.0001$ (highly significant), as shown in table 7 and figure 15.

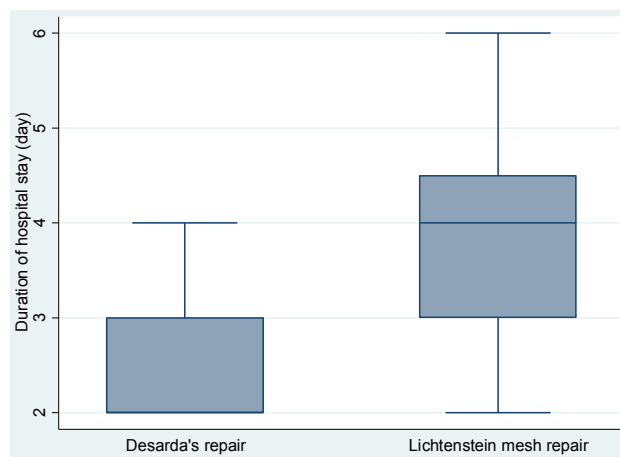


Figure 15. Duration of hospital stay (day) in each group.

5.7.14. Return to Normal Activity

In Desarda's group, the duration to return to normal

activity was <7 days in 24 (60%) patients, 7-15 days in 10 (25%) patients, >15 days in 6 (15%) patients. Whereas in Lichtenstein's group, the duration to return to normal activity was <7 days in 8 (20%) patients, 7-15 days in 20 (50%) patients, >15 days in 12 (30%) patients. So that the periods of return to normal activity had highly significant ($P<0.001$) decrease in Desarda's group in comparison to Lichtenstein's group, as shown in table 7 and figure 16.

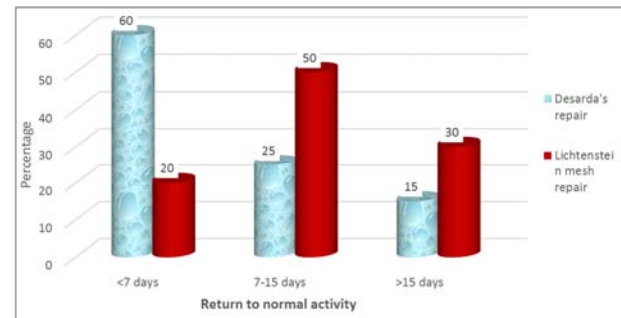


Figure 16. Return to normal activity in each group.

Table 7. Comparison between the Desarda's no mesh repair and Lichtenstein's mesh repair as regards outcome of operation.

Variable	Desarda's no mesh repair N=40	Lichtenstein's mesh repair N=40	P value
Duration of hospital stay (day)			
Mean±SD	2.55±0.76	3.8±1.01	<0.0001
Median (range)	2 (2:4)	4 (2:6)	
Return to normal activity			
<7 days	24 (60.00%)	8 (20.00%)	0.001
7-15 days	10 (25.00%)	20 (50.00%)	
>15 days	6 (15.00%)	12 (30.00%)	
Recurrence			
At 3 months	0	0	0.49
At 6 months	0	0	
At 1 year	0	0	
Migration of mesh			
Absent	40 (100%)	38 (95.00%)	0.49
Present	0	2 (5.00%)	

5.7.15. Migration of Mesh

None of the 40 patients who underwent Desarda's repair had Migration of mesh, while 2 (5%) of the 40 patients who underwent Lichtenstein's repair had migration of mesh, This was statistically insignificant ($P<0.49$), as shown in table 7.

5.7.16. Recurrence

No recurrence in both studied groups during one year follow up, as shown in table 7.

6. Discussion

Inguinal hernia is a very common condition affecting mankind [8]. The main cause of inguinal hernia in most of the patients is the physiological weakness of posterior inguinal canal wall. Hence the main goal of hernia repair should be focused at providing mobile, strong and physiologically active posterior wall of the inguinal canal [9].

The distribution of demographic parameters, general examination, duration and type of hernia, co-morbidities and clinical findings in the two intervention arms of this research was similar and shows insignificant difference. This implies that the process of randomization was accurate and that any influence of these variables on the key outcomes of surgery was similarly distributed in the two study groups.

Regarding to patients age and duration of hernia, other studies found that, the incidence of inguinal hernia was highest in the 4th decade with a mean age of 48 years. The average

duration of hernia in Desarda's technique was 7 months whereas in Lichtenstein's technique it was 11 months [10]. In our study, the incidence of inguinal hernia was highest in the 3rd and 4th decades. The average duration of hernia in Desarda's technique was 8 months whereas in Lichtenstein's technique it was 11 months.

As regard to duration of surgery, study conducted by Mitura and Romańczuk suggested that. The Desarda and Lichtenstein techniques are similar in respect of surgery time [11]. Various studies show that Desarda's technique is associated with lesser duration of surgery [6]. Youssef et al, report that, Desarda repair had Shorter operating time [12], other studies showed that the Desarda repair takes a significantly shorter operative time [6]. Gupta A et al, reported that, Mean operative time for Desarda repair was shorter (42.08±3.42 min) compared to Lichtenstein repair (49.01±4.77min) [13]. This concurs with our results, the Desarda's repair takes significantly shorter operative time than Lichtenstein's repair ($P<0.0001$).

Mesh repair is now commonly used and is most often referred to as the gold standard technique. But this surgery is associated with more complications like chronic groin pain, hematoma, seroma, testicular atrophy etc., mostly in the hands of less experienced junior consultants. Mesh is also costly and is not available in many parts of the world. Though mesh acts like a mechanical barrier, it does not provide a mobile and dynamic posterior wall [8]. This concurs with our results, in which post-operative complications were more prevalent among patients underwent Lichtenstein repair than those who underwent Desarda's repair.

Groin pain has been found to be due to fibrous reaction to foreign body in case of mesh repair, leading to spermatic cord and nerve entrapment, which affects the quality of life of the patient [8]. Comparing with other studies such as Rodriguez *et al.*, it showed the same result that there was insignificant difference regarding pain [6]. Also the study that has been conducted by Szopinski *et al.*, showed insignificant difference in chronic pain that experienced by 4.8 and 2.9% of patients from Desarda and Lichtenstein groups, respectively ($p=0.464$) [5]. Other investigators found that, the early post-operative pain (day 1 and day 7) was significantly lower in Desarda group but showed insignificant difference between both groups after 6 months [5]. Other studies reported that, early post-operative pain was lower in Desarda group however, it not reach significant level [14]. In contrast to Szopinski *et al.* who reported that, early post-operative pain was higher in Desarda group however in another publication by them they reported no significant difference [15]. In our study we observed that, There was significant decrease in groin pain at <3 days, 3-5 days and >7 days in Desarda's repair in comparison to Lichtenstein repair ($P<0.0001$), also there was significant decrease in Desarda's repair in comparison to Lichtenstein's repair regarding to chronic inguinal pain (>1 month) ($P<0.01$).

Seroma was higher after use of the Lichtenstein method and this can be explained by the influence of the synthetic mesh on surrounding tissues. This consistent with other studies and the known influence of polypropylene on tissue [16]. This concurs with our study, inspite of insignificant difference ($P=0.26$) between the two studied groups regarding to Seroma, it is more common in patients who underwent Lichtenstein's repair (6 patients=15%) than those who underwent Desarda's repair (2 patients=5%).

Other investigators reported that, foreign body sensation and abdominal wall stiffness were expressed by 12 to 16% of the Desarda group and 17 to 22% of the Lichtenstein group of patients at different time points. Other authors reported that, the results were within the range from 4.5–43.8% for mesh techniques [17]. In our study, there were significant increase in incidence of foreign body sensation and abdominal wall stiffness in Lichtenstein group in comparison to Desarda group ($P<0.001$ & <0.005 respectively).

Regarding to surgical site infection, other researches observed that, surgical site infection was higher in mesh repair (10%) when compared to Desarda's technique (0%) [10]. Other studies reported that, after surgery in the Lichtenstein group there were 8 mesh infections. Partial excision of the mesh were required in two cases and total excision in one case. Desarda technique has lower morbidity as compared to mesh hernioplasty [5]. This concurs with our study, 2 (5%) patients in the Desarda group had surgical site infections, whereas 8 (20%) patients in the Lichtenstein group. But, there was insignificant difference ($P=0.09$) between the two studied groups.

Regarding to loss of sensation over the groin, others reported that loss of sensation was present only in

Lichtenstein's repair group [10]. In our presentation we found that, there was significant increase in incidence of Loss of sensation over groin in Lichtenstein group in comparison to Desarda group ($P<0.01$).

Regarding to scrotal edema and testicular atrophy, other studies reported that, none of the patients who underwent Desarda's repair had scrotal edema or testicular atrophy while 6 (20%) patients in the Lichtenstein's mesh repair group had scrotal edema and 1 (3.3%) patient had testicular atrophy. The P value was highly significant [10]. In our study we observed that, 8 (20%) patients who underwent Lichtenstein's mesh repair were suffering from scrotal edema but only 4 (10%) patients who underwent Desarda's repair were suffering from scrotal edema (statistically insignificant, $P=0.21$). None of both studied groups suffering from testicular atrophy (statistically insignificant, $P=1.0$).

None of the 40 patients who underwent Desarda's repair had foreign body reaction or migration of mesh, while 4 (10%) of the 40 patients who underwent Lichtenstein's repair had foreign body reaction and also 2 (5%) patients had migration of mesh. They were statistically insignificant ($P=0.12$ & $P=0.49$, respectively).

Regarding to duration of hospital stay, Various studies show that Desarda's technique is associated with lesser duration of hospital stay and time to return to normal activity [5]. Post-operative stay after surgery was also significantly in favour of the Desarda group [6]. This concurs with our results, The average duration of hospital stay was 2 days in case of Desarda's technique and 4 days in Lichtenstein's technique with a $P<0.0001$ (highly significant).

Various studies show that Desarda's technique is associated with lesser time to return to normal activity [5]. Other studies reported that, the mean period required for the patients to return to work in the Desarda group was 8.26 days while it was 12.58 days in the Lichtenstein group, this was statistically significant [6]. This concurs with our presentation, there was significant decrease ($P<0.001$) in a period required for the patients to return to work in the Desarda group in comparison to Lichtenstein group.

Regarding to recurrence of hernia, other researches showed a recurrence of 1.97%, but it was observed during a 10-year follow-up [18]. But other studies, found that both groups had no recurrences during 2-year follow-up [10]. In our presentation, there were no recurrence of hernia in both groups during one year follow up.

7. Conclusion and Recommendations

This study has shown that Desarda's no mesh repair for primary inguinal hernia gives better results when compared with the Lichtenstein's Mesh repair. It is technically simpler than the other no mesh repairs like Shouldice repair. It is easy to learn and it is physiologically sound. It is associated with less duration of surgery, early return to normal activity and less mesh related complications in the postoperative period e.g.:- pain, surgical site infection, foreign body sensation, foreign body reaction, migration of mesh.... etc. It can be used in a

contaminated surgical field, in young individuals and in cases of financial constraints.

Hence, Desarda's no mesh repair is favorably comparable with Lichtenstein's mesh repair. When compared to Lichtenstein's mesh repair produces better results.

1. So that we strongly recommend that all the surgeons get acquainted with this Desarda's technique.
2. Large scale and Long term follow up may be required to identify the recurrent cases if any.

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Conflicts of Interest

There are no conflicts of interest.

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