

## Evaluation of Natural Tissue Reinforcement of Inguinal canal For Inguinal Hernia Repair (Desarda Inguinal Herniorraphy)

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### Abstract

**Background:** Inguinal hernia repair is one of the cornerstones of a general surgery practice and is one of the most commonly performed procedures. Although there are no exact figures totaling the number of inguinal hernia repairs performed annually, it has been estimated that approximately 800,000 cases were performed annually in 2003, not including recurrent or bilateral hernias. **Aim:** To report our experience in recording and evaluating the short-term outcome of inguinal hernia repairs with Desarda's technique. **Patients and Methods:** A total of 20 adult male patients with primary inguinal hernias were randomly allocated intraoperatively to undergo Desarda inguinal herniorraphy. **Results:** According to our scale evaluating outcome, Desarda technique is effective and safe with least post-operative complications regarding inguinal hernia repair. **Conclusion:** Desarda repair is easy to perform and has shown to take shorter operative time. Also, there is no need of mesh with less suture material requirement. So, this method proves cost effective than the Lichtenstein method. Desarda hernia repair was found to be superior to Lichtenstein repair in terms of post-operative pain and foreign body sensation. It can be recommended for younger patients.

**Keywords:** Inguinal Hernia, Desarda

### Introduction

Widespread and easily tolerated, the inguinal hernia is seen as a minor disorder. Because hernia surgery may be performed easily and successfully in both in-and out-patient environments it is too often dismissed as a trivial complaint. On the other hand, in many countries it is considered a specialization. Unless inguinal hernia is treated properly, in fact, it may turn out to be very disabling. Inguinal hernia is a frequent case to come across in the outpatient clinic as well as in emergency. Because of its frequency, it remains a common, yet an important medical problem. For men, there is a 27% lifetime risk to develop inguinal hernia, while in women it remains at 3%<sup>(1)</sup>.

Several techniques of tissue and mesh repair for inguinal hernia have been developed over the last decades but still drawbacks are present. Although European Hernia Society promotes Lichtenstein repair to deal with this frequent clinical case, Shouldice repair is also being popularized<sup>(2)</sup>.

Desarda, who has used a new technique since 1990, seeks to get over the challenges faced with the use of the tissue repair and mesh repair techniques. It is based on the concept of providing a strong, mobile and physiologically dynamic posterior inguinal wall. The technique is simple, easy to learn and do. It does not

require complicated dissection or suturing. There is no tension on the suture line. 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<sup>(3)</sup>.

Desarda technique is a recently introduced tissue based repair that addresses physiology of the inguinal canal as well as the anatomy. Tissue-based repairs like Bassini and Desarda confer an advantage of using less prosthetic material. Desarda technique, like Lichtenstein, is a tension free repair with less recurrence rates comparable to Lichtenstein, and requires less per-operative time<sup>(4)</sup>.

The effectiveness of the Desarda technique has not been well investigated. There are no sufficiently large data from randomised comparative studies to consult. There are reports of its excellent results from the ongoing clinical trials in Poland, Cuba, South Korea, Albania and India<sup>(5)</sup>.

Factors that are said to prevent herniation are not restored in the traditional techniques of inguinal hernia repair and yet 70-98% of patients are cured<sup>(3)</sup>.

The problem of our age is to find an operation that is simple, does not require implantation of a foreign body like a mesh, has

a recurrence rate of less than 1-2% and does not produce major complications during or after surgery in the hands of non-consultant staff. In Desarda's repair the newly formed posterior wall is kept physiologically dynamic by the additional muscle strength provided by external oblique muscle to the weakened muscles of the muscle arch. This new method of inguinal hernia repair is based on physiological principles<sup>(3)</sup>.

The cost of the treatment for this disease, when mesh technique is used, becomes real issue in the modern era and though the cost of inguinal hernia treatment is not insignificant when considered as a fraction but in the developing countries of Africa or Asia, it does. Thus the advantage of Desarda repair in it being of relatively low cost, and speaks for the fact that many recently published articles demonstrated an increasing interest in the Desarda repair<sup>(6)</sup>.

#### **Aim of the work:**

The aim of this study is to record and evaluate the short-term outcome of inguinal hernia repair with Desarda's technique.

#### **Patients and Methods:**

This prospective study included 30 cases scheduled for inguinal hernia repair at Al-Azhar University, department of Surgery, who met the inclusion criteria.

#### **Study population**

All adult patients who presented to the outpatient clinic with a primary, reducible inguinal or inguinoscrotal hernia.

#### **Inclusion criteria:**

- 1- Participants with a primary, uncomplicated inguinal hernia, adult males.
- 2- Signed informed consent.
- 3- Good condition of external oblique aponeurosis (assessed during the operation).

#### **Exclusion criteria:**

- 1- Age less than 18 years, impaired mental state.
- 2- Complicated inguinal hernia, recurrent inguinal hernia.
- 3- Patients at high risk of anesthesia class 4 and 5 according to (ASA) American society of Anesthesiologists
- 4- History of psychiatric illness or drug abuse and, suicidal attempt.

**All patients will be subjected to the following**

Preoperative Management:

A- Full history taking and Clinical examination:

- With stress on the general parameters, height, weight and BMI.
- Local abdominal examination including assessment of the hernia defect, site, size, number, reducibility, and previous scars.

B- Investigations:

- Routine laboratory investigations required for preoperative assessment as CBC, random blood sugar, AST, ALT, total bilirubin albumin, kidney function tests.
- Abdominal and pelvic ultrasound, ECG and chest X-ray when required.
- Pulmonary function tests especially for those patients with history of pulmonary disorders.

C- Preoperative management of the general condition:

- Control of concomitant illness, like DM and hypertension.
- Cessation of smoking.

D- Antibiotic prophylaxis:

- All patients will receive broad spectrum antibiotic as 3rd generation cephalosporin cefotaxime (cefotaxime) 1gm by intravenous drip one dose preoperative and another dose after 2-hours postoperative.

E- Anti-thromboembolic measures:

- Low dose of low molecular weight heparin, enoxaparin sodium (Clexane 1mg/kg s.c. preoperative) especially for high risk patients.

F- Optimum skin hygiene:

- Including showers with hexachlorophene soap and on table shaving of the anterior abdominal wall hair.
- Trophic skin ulcers are treated with local antibiotic ointment (Fucidin) dressing until it is eliminated.

#### **Postoperative management:**

All patients will be subjected to the following:

- 1- Smooth recovery from anesthesia without pain or irritability to avoid any stress on the suture line which may lead to separation of the sutures. Therefore, analgesia and mild sedative are important in the immediate postoperative period.
- 2- All patients will be nursed in semi-sitting position in bed.

- 3- Immediate ambulation is recommended for patients to get out of bed, the first day postoperative.
- 4- Wound suction will be discontinued if the drainage ceases (minimal amount 20 - 30 cc / day, at least 6 - 7 days postoperative.
- 5- Skin clips or sutures are taken out the 10th - 12th day postoperative.

**Follow up:**

All patients were followed up during hospital stay and after discharge at interval of 3; 6 months postoperative in the outpatient clinic of general surgery.

**Data management:**

Data was collected as regard to operative time, technical difficulties, surgeon satisfaction, patient satisfaction and complications such as seroma, hematoma, wound infection, , foreign body sensation, orchitis, testicular atrophy, pain and recurrence.

The demographic data, operative information, and postoperative complications and interventions were recorded, tabulated and analyzed using the proper statistical method.

**Results**

There were a total of 20 patients in our study comprising Baseline characteristics, including demographics, co-morbidities, and occupation.

**Table (1):** Comparison baseline characteristics, including demographics, co-morbidities, and occupation

| Characteristic  | Desarda (n=20) |
|-----------------|----------------|
| Gender mean(SD) | 39.6(14.9)     |
| ASA Score       | 1(1-3)         |
| HTN             | 2(10%)         |
| DM              | 3(15%)         |
| IHD             | 2(10%)         |
| Smoking         | 11(55%)        |
| BMI>30kg/m2     | 4(20%)         |

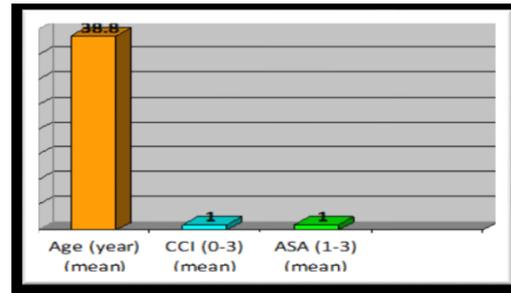
ASA: American Society of Anesthesiologists.

DM: Diabetes Mellitus.

HTN: Hypertension. IHD: Ischemic Heart Disease. BMI: Body Mass Index

**Table (2):** Occupation of the patients

| Occupation     |        |
|----------------|--------|
| Student        | 3(15%) |
| Non physical   | 6(30%) |
| Light physical | 5(25%) |
| Heavy physical | 3(15%) |
| Retired        | 2(10%) |



**Fig. (1):** Health status characteristics of the patients

Hernia characteristics are recognized and intraoperative variables (i.e., nerve excision, lipoma, opening of the hernia sac, among others) were also included.

**Table (3):** Characteristic of operated hernias by operative methods.

| Characteristic                                  | Desarda   |
|---|-----------|
| Bilateral hernia(n)                             | 1(5%)     |
| Right side operation(n)                         | 14(70%)   |
| Left side operation (n)                         | 5(25%)    |
| Duration of hernia(months)                      | 15 (6-60) |
| Hernia type by robins and Rutkow classification |           |
| Median and range of types                       |           |
| 1   | 9(45%)    |
| 2   | 6(30%)    |
| 3   | 2(10%)    |
| 4   | 1(5%)     |
| 5   | 1(5%)     |
| 6   | 1(5%)     |

The 20 patients operated on, all were examined at the 7-day, 30-day, 6-months, 12 months, 18 months and 24 months follow-up visits.

**Table (4):** Outcomes and early postoperative complications,

| Parameter                  | Desarda (n=20) |
|----------------------------|----------------|
| Testicular edema(no)       |                |
| 7days                      | 2(10%)         |
| 30days                     | 1(5%)          |
| Testicular atrophy         | 0              |
| Inguinal hematoma          | 2(10%)         |
| Hematomas needing drainage | 0              |
| Ecchymosis                 | 1(5%)          |
| Seroma                     |                |
| 7days                      | 1(5%)          |
| 30days                     | 0              |
| Surgical site infection    | 1(5%)          |
| Return to basic activity   | 1(1-7)         |
| Return to home activity    | 7(2-10)        |
| Return to work activity    | 21(7-25)       |

The types of the 20 hernias were: 4 direct;16 indirect hernias. The mean age of the patients

was 38.8 years (range: 18-62 years). All patients were operated upon under spinal anesthesia. Intra-operative complications were not recorded.

A total of 17 patients (85%) were ambulatory within the first 12 hours post-operatively and were freely mobile at the end of the first 24 hours post-operatively. A total of 14 patients (70%) went home on the first post-operatively day. The rest of the patients [6 (30%)] stayed in the hospital for 2-5 days; the mean hospital stay duration of the patients was 1.86 days. Pain in fully ambulant patients was recorded as mild to moderate but tolerable by 17 patients (85%) on first post-operative day. The degree of pain decreased significantly during the first post-operative week. None of the patients had pain or discomfort after the second post-operative week.

Two patients developed edema of the wound that subsided conservatively. Only patients had seroma which was treated by drainage and antibiotics. On the long run up to one year post-operatively, there were 2 cases of chronic groin pain (10%), and no cases of recurrence of the hernia (0%).

**Table (5): Patients' assessment of the operated area at the 6,12,18,24-months follow-up.**

| Parameters                  | Desarda (n-20) |
|-----------------------------|----------------|
| <b>6-month follow up</b>    |                |
| Recurrence                  | 0              |
| Loss or change in sensation | 4(20%)         |
| Abdominal wall stiffness    | 3(15%)         |
| F.B sensation               | 2(10%)         |
| Testicular atrophy          | 0              |
| <b>12-month follow up</b>   |                |
| Recurrence                  | 0              |
| Loss or change in sensation | 4(20%)         |
| Abdominal wall stiffness    | 3(15%)         |
| F.B sensation               | 2(10%)         |
| Testicular atrophy          | 0              |
| <b>18-months follow up</b>  |                |
| Recurrence                  | 0              |
| Loss or change in sensation | 4(20%)         |
| Abdominal wall stiffness    | 3(15%)         |
| F.B sensation               | 2(10%)         |
| Testicular atrophy          | 0              |
| <b>24-months follow up</b>  |                |
| Recurrence                  | 0              |
| Loss or change in sensation | 4(20%)         |
| Abdominal wall stiffness    | 5(25%)         |
| F.B sensation               | 3(15%)         |
| Testicular atrophy          | 0              |

There were only four cases who have change in sensation over 24 month follow up,

four cases who have abdominal wall stiffness over 24 month follow-up and only three cases have F.B sensation which is not annoying to them at all also there were no recurrence or testicular atrophy at all.

**Discussion**

Evolution in the treatment of inguinal hernias has paralleled technologic developments in the field. The most significant advances to impact inguinal hernia repair have been the addition of prosthetic materials to conventional repairs and the introduction of laparoscopy to general surgical procedures. Early management of inguinal hernias involved a conservative approach using trusses. As a consequence of the primitiveness of the techniques, the treatment was often worse than the disease itself. Surgery often involved routine excision of the testicle, and wounds were closed with cauterization or left to granulate on their own. Recurrence of the hernia was commonplace<sup>(7)</sup>.

Desarda developed his technique depending on the physiological principle that affords dynamic posterior wall for repair of inguinal hernia. The author published results of his first series in 2001. The second series published in 2006 with follow-up for 7 years. An undetached segment of the upper leaflet of the external oblique is sutured below to the inguinal ligament and above to the conjoint arch, behind the spermatic cord, to add a new posterior wall to the inguinal canal. This strip is physiologically dynamic as it is attached to the external oblique muscle. It gives strength to the weakened conjoint muscle arch<sup>(4)</sup>.

Open no-mesh repairs of inguinal hernia use non-absorbable interrupted or continuous sutures. Interrupted sutures used to distribute the tension equally on the tissue to avoid splitting of the weak tissue by the contraction of the displaced muscles which may lead to recurrence of the hernia. Non-absorbable sutures are used to bring those structures together forever and make them blend and gain appropriate strength<sup>(2)</sup>.

In Desarda technique, there is no displacement of the posterior inguinal wall muscles (internal oblique and transverses abdominis). Displacement of the new posterior inguinal wall (strip of external oblique aponeurosis) is minimal because

internal oblique and external oblique aponeurosis are adjacent structures. Sutures does not expose to extra-tension during muscles contraction because internal oblique muscle and fibers of the external oblique aponeurosis strip run parallel to each other in this area of the inguinal canal. Desarda take trial of repairs with absorbable and continuous sutures. No recurrence seen in his trial for a mean of 24.28 months of follow-up period. This was sufficient to draw conclusion because this follow-up period is a much longer period than what is needed for sutured tissues and for suture line to fuse and gain adequate strength<sup>(5)</sup>.

Desarda postulates that it is the aponeurotic fibers given from aponeurotic arch of the transversus abdominis, which participate in the posterior wall strength and prevent herniations. These extensions from the transversus abdominis aponeurotic arch are absent or deficient in 53% of the population. So, strong musculo-aponeurotic tissues around the inguinal canal can give sufficient protection to prevent herniation in these individuals. This protection is disturbed if those muscles were weak<sup>(8)</sup>.

The strip of external oblique aponeurosis in this new repair provides new aponeurotic element to the fascia transversalis of the posterior wall of the inguinal canal. Abdominal muscles contractions pull external oblique aponeurosis strip upward and laterally, increasing tone in it and making it act as a shield to prevent herniation through the posterior wall. This strip gives a new insertion to the weak transversus abdominis and internal oblique muscles. This improves contractile strength of the transverses and internal oblique muscles. The additional tissue strength given by the external oblique muscle to the weak muscles of the conjoint arch through increased tone in the strip surly prevents herniation. The increase in strip tone is graded in response to the force of muscle contraction. Increased intra-abdominal pressure as a result of stronger contraction of abdominal muscles results in increased tone in this strip to give more protection against increased intra-abdominal pressure. This strip lacks tension during rest (as other abdominal muscles), thus, a physiologically dynamic posterior wall is created in this operation<sup>(9)</sup>.

Steps of Desarda technique are simple and fixed, so, there is very little chance for

modification by other surgeons. Hence, this technique proved to be very effective even in the hands of junior general surgeons. The excellent results seen with this repair technique in many centers all over the world confirm its success and efficacy<sup>(10)</sup>.

As regards to cost effectiveness, absence of mesh costs, lost working hours affecting the national productivity, and treating recurrences or re-exploration for complications in mesh based inguinal hernia repairs.

In the present series of Desarda repair, there was no recurrences, no mesh used, continuous non-absorbable sutures were used and saved a packet of suture material and of course time, and leaves no foreign materials inside the patient. No costly equipments were used and the technique can be done easily on an outpatient basis that saves hospital beds. It is routinely done under spinal anesthesia and the patients are back to their works within 1-2 weeks, thereby decreasing sick leaves from 4-6 weeks to 1-2 weeks. This makes this technique highly cost-effective. This surgery can be safely done by non-consultant staff leaving consultants for more difficult operations.

Also, in a study belongs to **Szopinski and his colleagues** found no significant differences in 208 adult male patients with primary inguinal hernia operated on with either Lichtenstein or Desarda technique. Parameters of clinical outcomes were observed for 3-year follow-up, the frequency of complications including seroma formation was similar for the two groups<sup>(9)</sup>.

Currently, results of inguinal hernia treatment, vary from good to excellent. The recurrence rate for Lichtenstein procedure is about 1% in hernia-specialized centers but can be higher in non-specialized hospitals (about 4%), and recurrence rate even reaches 18% in some articles<sup>(11)</sup>. The published data for other mesh based techniques vary from 0 to 4.2% recurrences for Prolene Hernia System<sup>(13)</sup>, 0 to 4% for Rutkow<sup>(13)</sup>, and 1.6 to 19.0% for the Tran abdominal Pre-Peritoneal inguinal hernia repair (TAPP)<sup>(11)</sup>.

The Desarda method for inguinal hernia repair is a new tissue-based technique. Despite the objections stated by **Losanoff and Millis**<sup>(4)</sup>, the use of the external oblique aponeurosis in the form of an undetached strip to strengthen

the posterior wall of the inguinal canal has been documented as a new concept in tissue-based hernia repair. The technique is new, and different from the methods using the external oblique aponeurosis, proposed by **McArthur *et al.*** <sup>(15)</sup>.

This newly repair method satisfies the principles of —no tension introduced by Lichtenstein. The aponeurotic strip of external oblique is displaced from its anterior wall position to the posterior wall of the inguinal canal with no additional tension on the posterior wall. The concept of an undetached, movable aponeurotic strip that —physiologically enforces the posterior wall of the inguinal canal is original and interesting <sup>(15)</sup>.

Desarda technique considered his technique as dynamic enforcement of the inguinal canal's posterior wall, and Lichtenstein method as prosthetic enforcement. Desarda hypothesizes that a naturally displaced and movable aponeurotic strip is more physiological than the fibrous tissue deposited around a synthetic prosthesis for creation of a mechanism against reherniation.

In **Szopinski *et al.*** <sup>(9)</sup> study, there were no statistically significant differences between the patients randomized to the Lichtenstein and Desarda groups. The recurrence rate was similar in both groups (two cases in each group). In one case in the Desarda patients, recurrence resulted from technical error. The external oblique aponeurotic strip was too long, resulting in a wide newly formed deep inguinal ring and recurrence. In the second case, weakening of the whole posterior wall was found during reoperation, but no typical herniation was seen. In the Lichtenstein patients, recurrences were typical. This additionally supports the idea that proper and meticulous surgical technique is mandatory for a good final result <sup>(9)</sup>.

The International Association for the Study of Pain defined chronic pain as lasting >3 months postoperatively <sup>(16)</sup>, due to the use of synthetic grafts for hernia repair and taking into account that inflammatory response to implanted foreign material may last longer. At the early postoperative time (7 and 30 days) pain score points, pain was mild in the Desarda technique; but statistically never reached significant. After the visual analogue scale and Sheffield scale were transferred to verbal rating

scale, no statistically significance was observed at any follow-up time up to 6 months<sup>(17)</sup>.

The low incidence of seromas [only one case (5%)] after Desarda method can be explained by the absence of the effect of synthetic mesh on surrounding tissues. This is consistent with other studies and the known influence of polypropylene on tissue <sup>(18)</sup>. Foreign body sensation and abdominal wall stiffness were minimal after Desarda operation. It ranges from 10% to 25% as reported in our study.

To the best of our knowledge, **Szopinski *et al.*** <sup>(9)</sup> reported randomized clinical trial comparing Lichtenstein and Desarda techniques <sup>(10)</sup>. Previously, Mitura and Romanczuk published their results of a 6-month follow-up study of the Lichtenstein and Desarda approaches <sup>(19)</sup>. They observed no recurrence, and long-term pain after 6 months was comparable in both groups. Situma *et al.* recorded their short-term results of modified Bassini versus Desarda inguinal hernia repair. They concluded that there were no differences between these two techniques as regard to long-term pain and return to normal activity <sup>(6)</sup>.

Other results, published by Desarda and his colleagues, were based on a comparison of his original technique and Lichtenstein method <sup>(4)</sup>.

They reported no recurrence in the 269 patients of Desarda group and 1.97% recurrence in the 225 patients of mesh group. No patients in the Desarda group reported chronic pain but 6.49% of patients from the mesh group reported pain after 1 year of surgery.

In the modern era the cost of the medical and surgical treatments becomes the real issue. The cost of inguinal hernia surgery, a small fraction of all health expenses, is not insignificant, especially in developing countries in Africa and Asia. One advantage of Desarda operation is its low cost. That is obvious in many recently published articles represents an interest in the technique<sup>(8)</sup>.

The cost of the Desarda technique is low because prosthesis is not used. The cost of heavy polypropylene meshes or even composite meshes, could be of prime importance in developing countries. Even inguinoscrotal hernias, which are frequently present in Asian

and African countries, can be successfully managed with Desarda technique.

Economic factors not the only considerations: The use of synthetic prosthesis is still debatable in young patients. The effect of polypropylene or other synthetic mesh implantation inside the human body for life is still unknown. Also, suspected sexual impairment after mesh implantation make many surgeons to avoid mesh prostheses for hernia repair in young patients. Also, Desarda method, a pure tissue-based technique, can be used in a potentially contaminated surgical field, as operations for strangulated inguinal hernias<sup>(8)</sup>.

### Conclusion

Desarda repair is easy to perform and has shown to take shorter operative time. Also, there is no need of mesh with less suture material requirement. So, this method proves cost effective than the Lichtenstein method. Desarda hernia repair was found to be superior to Lichtenstein repair in terms of post-operative pain and foreign body sensation. It can be recommended for younger patients. This study has shown that the efficacy of Desarda repair in respect to influencing long term outcomes in patients is comparable to Lichtenstein repair. So, it can be safely used as an alternative to conventional method. In infected and strangulated cases, Desarda repair can be used effectively, as risk of mesh infection is eliminated. Also, this technique can eliminate the fear of mesh infection in diabetic patients.

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