Desarda Inguinal Herniorrhaphy

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Abstract: *Background:* Although tension free repair of inguinal hernia with a mesh is the standard technique in many countries with high standard of living, its use remains low in countries with low standard of living due to the initial high cost of the polypropylene mesh. The tissue-dependent techniques (herniorrhaphy) are still acknowledged to be acceptable for the repair of primary inguinal hernia (European Hernia Society guidelines). Shouldice and Modified Bassini repairs are well known tissue repairs of inguinal hernia in Egypt. Desarda's technique, is an original hernia repair technique which use undetached segment of external oblique aponeurosis to strength the posterior wall of the inguinal canal. Desarda's repair of inguinal hernia is not well-known in Egypt. This study will record and evaluate the short-term outcome of inguinal hernia repair with Desarda's technique. *Patients and Methods:* One hundred and eighty patients presented with unilateral, uncomplicated, primary inguinal hernia (direct, indirect, and/or bantallon) were recruited through the surgical department. Postoperative pain was evaluated using a visual analogue scale 3 hours after the operation, on the 3rd and 7th post-operative days. The primary outcomes measured were postoperative early recurrence, and wound complications. Foreign body feeling, and return to daily activities were examined in hospital and at 7 days, 1, 6, and 12months post-operatively. *Results:*Of the 180male patients underwent surgery, three patients were lost in the follow up period and one patient died. During the follow-up of the remaining 176 patients, only two recurrences recorded after one year post-operatively (1.1%). Chronic pain was recorded in5 cases (2.8%). Most patients (92%) returned to normal activity on the third week. There was small number of the patients with wound complications. *Conclusion:* Results of primary inguinal hernia repair with Desarda's techniqueis compatible after the end of one-year of follow-up to other recorded early postoperative complications of Lichtenstein hernioplasty, and modified Bassini and Shouldice herniorrhaphy. The technique may adda new technique of pure tissue-based repair available for treating inguinal hernias.

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1. Introduction

Inguinal hernias are the most common types of hernias met with in most parts of the world. Because of their frequency, inguinal hernias remain an important health problem. The expected risk for inguinal hernia is 27% for males and 3% for females [1]. Complication rate per year all over the world vary from 100 to 300 per 100,000 citizens [2]. There was no consensus about surgical guidelines for inguinal hernia repair until late 2009, where recommendations based on review of literature and the outcome of clinical trials of the European Hernia Society (EHS) were published. In the European Hernia Society guidelines, hernioplasty techniques, the Lichtenstein technique in particular, and endoscopic methods were recommended for the surgical management of symptomatic inguinal hernia in adult men. In contrary to this firm opinion presented by the EHS, the Shouldice herniorrhaphy method has been acknowledged to be acceptable as well [3]. Schumpe lick emphasized the efficiency of Should ice repair during his presentation at the 2011 European Hernia Society meeting. Some questions were asked considering these facts: Is the Should ice technique the only non-mesh method that ensures good clinical results? Is there any other pure tissue repair effective in inguinal hernia repair if performed correctly?

The choice of the method of repair depends mainly on the experience of the surgeon; however, the ideal accepted method for modern hernia repair should be simple, safe, cost effective, tension free, with very low incidence of recurrence. The Lichtenstein tension free mesh repair to a great extent achieves all these goals [4,5]. The Lichtenstein polypropylene mesh, however has its shortcomings which include; its high cost, not present in many parts of the undeveloped world, tendency to crumple or to fold, and movement that may lead to mesh failure as the groin is a very mobile area, and chronic groin sepsis, that may require mesh removal [6].

The synthetic prostheses used to repair inguinal herniamay create new clinical complications, such as

abnormal sensation in the groin (e.g. foreign body), discomfort, and abdominal wall stiffness, which may influence everyday activities of the patient [7].

Surgical-site infections, often with clinical symptoms delayed for long time, are more frequent after insertion of mesh in the inguinal canal [8]. Migration of the mesh from the original site of implantation between the abdominal wall layers is one of the most dangerous complications [9]. Massive progressive chronic inflammatory process typically associated with foreign body reactions around the fibers of the prosthesis may produce inguinal stiffness and bulge, the management of them became a challenging new surgical dilemma [10]. Additionally, reproduction and sexual function were reported to be seriously affected after surgical hernia treatment with mesh [11].

The predictors of mid and long term prognosis are determined not only by the hernia characteristics, including presence of a tumescence at the time of presentation and the diameters of the inguinal defect, but also the immediate and postoperative pain and the time taken to resume work or usual duties [12].

Thus, inguinal hernia specialists are still far from accomplishing everything in the surgical secrets of hernia repair field, and postoperative morbidity remain the major clinical problem.

The observed complication rates and dysfunction following surgery have affected many surgeons to look for new hernia repair techniques or to modify successful old repair. An important example of new modification is the Desarda's technique, which introduced in the beginning of the current century and proved to be a new standard surgical option for tissue-based groin hernia repair (herniorrhaphy) [13,14]. Desarda described his genuine technique that satisfy the criteria mentioned above and does not require a prosthetic mesh and does not use weakened muscles or fascia transversalis for tissue repair. It has low cost with minimal incidence of complications [15,16].

Inguinal hernia surgery considered to be one of the commonest operations done in Al-Azhar University hospitals. The most commonly used method is the Modified Bassini repair, because it is easier to learn and cheaper as regards costs. The present study was performed to evaluate the short-term outcome of Desarda's repair of inguinal hernias in Al-Azhar University Hospitals in comparison to the well-known Lichtenstein tension free repair, modified Bassini technique, and Should ice method.

2. Patients and methods

Patients

The present study conducted on 180 patients at Al-Azhar University hospitals. The study design was a single blinded, single centered controlled trial. A total of 180 patients with primary reducible inguinal hernias (pubonocele, funicular, and complete), attending the general surgical out-patient clinics were included into the study. Patients with bilateral hernias were also included, but only one side was operated upon. The final inclusion criterion was the assessment of the condition of the external oblique aponeurosis. Patients with thin, divided, or weak aponeurotic fibers were excluded from the study. Patients with recurrent or strangulated hernias or mental diseases were also excluded from the study. Patients participating in other studies, and those of scale 3 on the American Society of Anesthesiologists (ASA) were also excluded from the study. Patients with history of forced hernia reduction with subsequent hospitalization, inguinal skin infection, or the presence of any scar in the inguinal area were excluded from the study.

The participants were given detailed information on the trial and surgery. They each agreed to be followed up for one year to evaluate the technique used, and each participant signed an informed consent form. The details of the protocol were discussed with the study members, and the proposed surgical procedure was practiced to achieve standardization. Patients were followed for a minimum of one year.

Method

All patients underwent Desarda's repair of inguinal hernia. Using a standard protocol, all patients were given one shot of antimicrobial prophylaxis (1.0 g cephalosporin IV 30 min before surgery). The operations were all done under spinal anesthesia via a regular oblique inguinal incision made 2cm above and parallel to the medial two thirds of the inguinal ligament. The standard inguinal procedure of layered opening of the inguinal canal and subsequent herniotomy was followed for all patients. The difference occurred only during hernia repair. The technique was not chosen until after the dissection and evaluation of the external oblique aponeurosis had been completed because the quality of the aponeurosis considered to be the last condition in inclusion criteria. After opening of the inguinal canal, the hernias were classified according to Gilbert-modified Robbins–Rutkow classification system: class 1, indirect hernia with normal internal ring; class 2, indirect hernia with enlarged internal ring but <4 cm; class 3, indirect hernia with enlarged internal ring >4 cm; class 4, direct hernia with poor posterior wall of the inguinal canal; class 5, direct hernia with defect next to the pubic tubercle; class 6, pantaloon hernia; class 7, femoral hernia [17].

The Desarda's repair was performed as it was originally described [13, 14] and presented in Fig. 1. In Desarda's technique, the upper-medial edge of the external oblique aponeurosis was sutured to the inguinal ligament from the pubic tubercle medially to

the internal ring laterally using polypropylene (2/0 Prolene; Ethicon) continuous sutures. Particular attention was considered to identify and preserve the nerves related to the inguinal region. When this was not possible, nerves were sacrificed. All intraoperative important variables were recorded for comparison.

The first suture was taken in the inguinal ligament adjacent to the pubic tubercle to approximate it to the anterior rectus sheath. The last suture should narrow the abdominal ring sufficiently without constricting the spermatic cord. Sutures passed through the inguinal ligament, transversal is fascia, and external oblique. The index finger of the left hand used to protect the underlying femoral vessels and retract cord structures laterally while taking lateral sutures. An incision was made in this sutured upper-medial leaf, separating a strip of the external oblique aponeurosis about 2 cmin width equivalent to the weak area of the posterior wall of the inguinal canal between the conjoint arch and the inguinal ligament but not more than 2 cm. This splitting incision was then extended medially to the level of pubic symphysis and laterally 1–2 cm beyond the internal ring. The medial insertion and lateral extension of this external oblique aponeurosis segment were kept intact and act as a biological segment. A segment of the external oblique, was created, its lower border was already sutured to the inguinal ligament. Its upper free border was then sutured to the internal oblique or conjoined muscle/tendon lying close to it with interrupted sutures (2/0 polypropylene) throughout its length.

The aponeurotic part of the internal oblique muscle was used for fixation to this strip wherever and whenever possible to prevent undue tension. The spermatic cord returned to the inguinal canal and the lateral leaflet of the external oblique aponeurosis was sutured to the newly formed medial leaflet of the external oblique in front of the cord, as usual, again using 2/0 polypropylene interrupted sutures. Undermining of the upper-medial leaf on its both surfaces was carefully performed to facilitate its downward displacement and approximation to the lateral leaf. The first suture was inserted between the lateral angle of the splitting incision and lateral leaf of the external oblique aponeurosis. At the end of the technique, the skin was closed with continuous non-absorbable suture. Patients were encouraged postoperatively to resume their normal activities as early as possible.

Follow-up

Patients received inject able non-steroidal anti-inflammatory analgesics after the operation then a course orally for three to five days. The first follow up was done 3 hours after the end of the operation, where pain was assessed using a visual analog scale (VAS), ranged from 0 (no pain) up to 100 (intolerable pain). Additionally, pain was assessed using Sheffield scale: score 0, no pain; score 1, no pain at rest but it appears during movement; score 2, temporary pain at rest and moderate during movement; score 3, constant pain at rest and severe during movements. Pain assessed at home on the second or third postoperative day using a VAS similar to the one used for initial assessment. It was recorded before taking the medicines in the morning of that day. The third recording performed on the 7th postoperative day, where pain evaluation and gait assessment were done. The investigator who was performing the follow-up physical examinations and patient evaluation was a surgeon who did not perform the surgeries in the present study.

The gait assessment was done by asking the patient to tell the surgeon on which day he was able to walk as he used to walk before surgery. Pain scoring was done again using a visual analogue score similar to the one used in the initial assessment. Literal patients instructed to report back verbally. Pain evaluation was based on pain felt when walking. Those who had not regained their normal gait on the 7th postoperative day were told to report back on the 14th postoperative day to reassess the gait.

Recurrences and other complications were recorded. Return to normal activity was defined as the patient's ability to undergo elementary activities (basic activity) [i.e., dressing, walking, bathing]; usual activities at home (home activity) [i.e., preparing food, cleaning house]; and returning to all previously performed activities (job activity).

Outcomes

The present study aims to test the hypothesis that the Desarda's repair is equal to the standard inguinal hernia repair procedures, allowing successful hernia repair without mesh prosthesis. The main outcomes were recurrence of the hernia and chronic pain, defined as moderate pain (VAS=30–50) (Sheffield scale=2) or strong pain (VAS>50) (Sheffield scale=3) persisting more than six months postoperatively.

The general and local complications were the secondary outcomes, including time needed to return to everyday activity, foreign body sensation, and abdominal wall stiffness in the inguinal region.

Statistical analysis

The study was designed with a sample of at least 160 hernias, a power of 0.8, and an error of0.05. The loss of patients available for evaluation after one-year of follow up was 8%; therefore, a group of at least 180 patients was planned to been rolled for the study. Patients who were lost during follow-up (4) were excluded from the analysis; only the patients who completed the study (176) were included. SPSS version 17.0 (SPSS, Chicago, IL, USA) software was used for statistical analysis.

3. Results

The types of the 180 hernias were: 38 direct, 120 indirect, and 22 pantaloons 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 158 patients (87.8%) 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 118 patients (65.6%) went home on the first post-operatively day. The rest of the patients [62 (34.4%)] 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 142patients (78.9%) 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.

Three patients developed edema of the wound that subsided conservatively. Four patients had superficial wound sepsis. Two were treated with antibiotics only and two needed drainages of infected seroma.

On the long run up to one year post-operatively, 3 patients were lost and one patient died. In the remaining 176 patients there were 5cases of chronic groin pain (2.8), and two cases of recurrence of the hernia (1.1%).

The patient characteristics recorded were age, co-morbidities (Charlson Co-Morbidity Index [18], ASA [19]), and employment status (Figures 2-4). Hernia characteristics are given in Table 1. Outcomes and postoperative complications and return to normal activity are given in tables 2, 3 respectively.

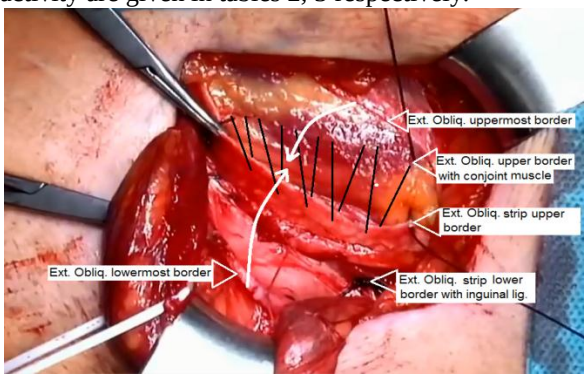

Fig. 1 Undetached strip of the external oblique aponeurosis forming the new posterior wall of inguinal canal. The upper border of the strip will be sutured to the conjoint muscle. The uppermost and lowermost borders of the external oblique aponeurosis will be sutured over the repair and spermatic cord.

Table 1. Characteristics of the hernias

Characteristic	Desarda repair (*n* = 180, 100%)
Right side operation (no.)	108 (60%)
Left side operation (no.)	72(40%)
Bilateral hernia (no.)	0 (0%)
Duration of hernia (months)	10 (6–60)
Non-reducible hernia (no.)	4 (2.2%)
Preoperative VAS pain score	23 (0–70)
Diameter of hernia orifice (cm)	2.2 (1–6)
Hernia type by Robins–Rutkow classification (no.)	
Type 1	42 (23.3%)
Type 2	94 (52.2%)
Type 3	31 (17.2%)
Type 4	10 (5.5%)
Type 5	2(1.2%)
Type 6	1 (0.6%)

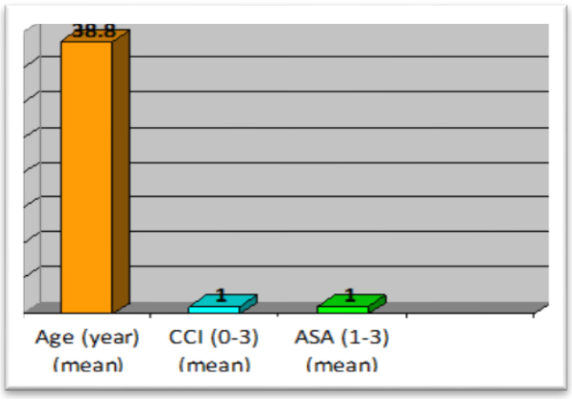

Fig 2. Health status characteristics of the patients

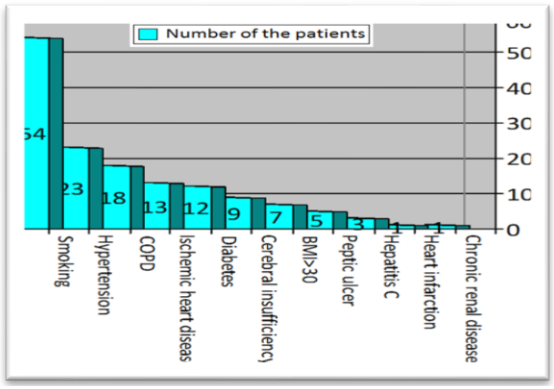

Fig 3 Health co-morbidities of the patients

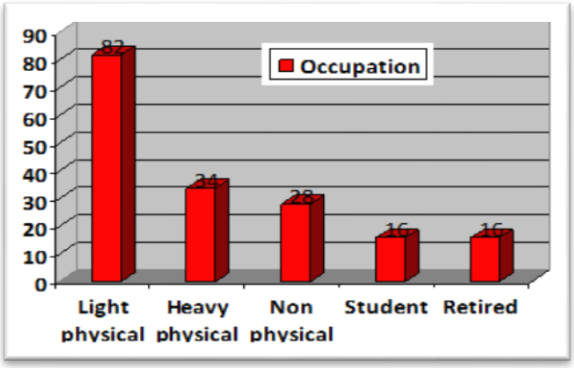

Fig 4 Jobs of the patients

Table 2: Outcomes and early postoperative complications

Parameter	Desarda repair (n = 180, 100%)
Wound edema (no.)	3
Testicular edema (no.)	7
Ecchymosis (no.)	4
Inguinal hematoma (no.)	2
Hematomas needing drainage (no.)	0
Seroma (no.)	1
Surgical-site infection (no.)	4
Testicular atrophy (no.)	0

Table 3. Return to normal activity

Parameter	Desarda repair (n = 180, 100%)
Basic activity (days)	1 (1-5)
Home activity (days)	5 (2-10)
Work activity (days)	14 (8-21)

4. Discussion

The Lichtenstein repair of inguinal hernia and its modifications become one of the most commonly performed surgeries. Complications and recurrence continue to curse this repair technique. There is increased incidence of chronic inguinal pain following Lichtenstein hernia repair, ranged from 28.7 to 43.3%. The smallest movement of the mesh from its sutured margins is the commonest cause of mesh repair failure of inguinal hernias. Chronic sepsis after inguinal mesh repair requires removal of the mesh to definitively treat sepsis. The possible entrapment of the spermatic cord and ilioinguinal nerve following inguinal mesh repair due to excessive fibrosis are also morbidities related to this technique. [20]

Laparoscopic repair of inguinal hernia increase costs, technically complex and need a long-learning curve. Pure tissue repair techniques also have limitations. Shouldice technique considered to be the gold standard in no-mesh techniques. It has recurrence rates of 1-4% in highly specialized centers. The long-learning curve, the presence of well-formed fascia transversalis, the difficult dissection of the floor of the inguinal canal, and lack of sufficient experience make this technique unattainable for the surgeon practicing in non-specialized centers. [21]

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. [16]

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. [22]

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 obliqueaponeurosis) 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. [16]

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. [15]

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 results of stronger contractionof 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. [23]

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.[16]

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 were2 recurrences only (1.1%), 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. The authors of this paper believes that great savings can be clenched every year if this simple and efficient technique is evaluated and considered.

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. [23]

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. [24] The published data for other mesh based techniques vary from 0 to 4.2% recurrences for Prolene Hernia System [25], 0 to 4% for Rutkow [26], and 1.6 to 19.0% for the Tran abdominal Pre-Peritoneal inguinal hernia repair (TAPP) [24].

The frequency of postoperative morbidity reported in the literature is between 15 and 28% [27]. When postoperative monitoring is applied by the surgical team, the frequency can even reach 50% [24]. The most reported complications were seroma, hematoma, surgical-wound infection, chronic pain, and recurrence of hernia [28]. Major worsening of the patients' quality of life is rare but also reported [28, 29]. The previous data suggests the need for further evaluation of this clinical problem.

An intense international effort to improve the results of inguinal hernia surgery is ongoing. Lightweight polypropylene meshes are now commercially available, composite meshes, and many biologic mesh prostheses are being tested. The continuous scientific effort of optimizing hernia surgery and lowering complications is still in progress. Surgeons of the present study are on the side that support tissue-based repairs. They should be considered in this field.

The Desarda method for inguinal hernia repair is a new tissue-based technique. Despite the objections stated by some authors [30], 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, Zimmermann, and Andrews [31].

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 [15, 16]. 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.

What can be taken against Desarda technique is that the postulated unhealthy tissue of the patient is used for repair. The coincidence of aortic aneurysm, hernia and other diseases in which the pathology originates from connective tissue abnormalities is well known. There is evidence supporting the role of connective tissue matrix metalloproteinases and their inhibitors in connective tissue degeneration leading to abdominal wall hernia formation.

Primary hernia formation and recurrence is associated with decreased type I: III collagen ratio. Shouldice repair, which still accepted worldwide, is pure tissue-based technique as well. Till know, there is no comparative study on the aponeurotic tissue and the transversalis fascia. The properties of inguinal

connective tissue are mainly from studies on fascia transversalis. It should be mentioned that the genetic and biochemical changes of inguinal connective tissue are found in only 25% of patients with hernias.

Supposing that there are 20% recurrences after some pure tissue-based repairs, 80% of patients survive without hernia recurrence for their lives. There is a population of inguinal hernia patients (most of the patients) in whom pure tissue-based repairs could be used safely. So, the future challenge in inguinal hernia is finding a pre-operative method to identify this population.

In Szopinski *et al.* 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. [23]

The International Association for the Study of Pain defined chronic pain as lasting >3 months postoperatively [32], 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 high 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. In a recent publication early postoperative pain after the Desarda and Lichtenstein operations showed no significant differences [33].

The low incidence of seromas 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 [34]. Foreign body sensation and abdominal wall stiffness were minimal after Desarda operation. It ranges from 4.5 to 43.8% as reported by other authors for mesh techniques. These mesh-related sensations were experienced and did not changed even after 2 years of follow-up [35].

To the best of our knowledge, Szopinski *et al.* reported randomized clinical trial comparing Lichtenstein and Desarda techniques [23]. Previously, Mitura and Romanczuk published their results of a 6-month follow-up study of the Lichtenstein and Desarda approaches [36]. 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 [37]. Other results, published by Desarda and his colleagues, were based on a comparison of his original technique and Lichtenstein method [38]. 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 [37, 39, 40]. 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 factories not the only considerations. The use of synthetic prosthesis is still debatable in young patients. The effect of polyproplylene 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.

Conclusion

The results of this new technique of inguinal hernia repair using continuous sutures appears promising. This technique does not use any prosthesis and has small incidence of complications with no recurrence or chronic inguinal pain. The continuous suturing saves time and suture material. The dream of every surgeon for recurrence-free inguinal hernia repair without leaving any prosthesis inside may become a reality in the future. The most important indications for Desarda technique include young patients, presence of financial limitations, or if the patient refuse the use of mesh. Despite some

methodologic inadequacies in the present article, Desarda repair deserve more attention and further evaluation by other authors.

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