

The value of combining both Guarnieri and Desarda nonmesh repair of inguinal hernia: A novel technique

Original
Article

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ABSTRACT

Purpose: To evaluate the feasibility and effectiveness of combining Guarnieri and Desarda techniques as a new modification of nonmesh repair.

Patients and Methods: This prospective cohort study was performed on 50 adult patients, aged more than 18 with noncomplicated, nonrecurrent inguinal or inguinoscrotal hernia, who presented to the General Surgery Department at Kasr Al Ainy Hospital, Cairo, Egypt. All patients were subjected to combined modified Guarnieri and Desarda techniques (nonmesh repair). Operations were carried out under spinal or under general anesthesia in a supine posture.

Results: Regarding determining postoperative pain by visual analog scale (VAS), the median early postoperative VAS (within 24 h) was 4, the median 2-week postoperative VAS was 1.5, and the median 1-month postoperative VAS was 1. The 2-week and 1-month postoperative VAS were significantly lower compared to early postoperative VAS (within 24 h) ($P < 0.001$ and 0.001), and the 1-month postoperative VAS was significantly diminished in contrast to the 2-week postoperative VAS (within 24 h) ($P = 0.003$).

Conclusion: Combining both Guarnieri and Desarda nonmesh repair of inguinal hernia is an effective technique with significantly lower postoperative pain, rapid return to basic daily activity and work activity, and less incidence of complications with no reported foreign body sensation or hernia recurrence.

Key Words: Desarda technique, guarnieri technique, inguinal hernia, nonmesh repair.

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INTRODUCTION

Inguinal hernia is one of the most major topics investigated in abdominal wall surgery. Due to their heightened occurrence and difficulties, inguinal hernias continue to provide a surgical challenge, with males experiencing a 27% incidence rate and females a 3% incidence rate. Its administration is well codified^[1].

There have been several advancements in the treatment of inguinal hernias throughout the past century. Recent global recommendations are controversial despite being founded on meta-analyses and randomized controlled trials^[2]. Mesh-based repair and minimally invasive techniques are highly recommended, although it has become difficult to conduct a mesh-free (pure tissue) technique in cases of primary inguinal hernia, irrespective of age, sex, or other variables^[3].

Foreign body sensation, scrotal edema, and an increased risk of infection have been described as complications of mesh repair, notwithstanding the advice of the guidelines. These complications further prolong the hospital stay. Subsequent surgeries may be further complicated by

complications such as mesh migration and infection resulting from an extensive inflammatory response surrounding the mesh^[4,5]. Furthermore, there have been reports of sexual dysfunction following mesh inguinal hernia repair^[6].

Guarnieri *et al.*^[7] developed inguinal hernia repair via the Guarnieri method. This approach is predicated on modifying the morphology of the inguinal canal, where the hernia occurs, without affecting its physiology. The procedure can be executed using mesh or without mesh; however, the objective of this technique should be to execute the inguinal canal physiology while avoiding the use of mesh. This method's primary objective is the repair of pure tissue.

Desarda approach is a nonmesh technology that was initially introduced in 2001. Its fundamental principle is to generate a robust, dynamic, and physiologically active posterior wall^[8]. Instead of a mesh, this surgical approach uses a flap of the external oblique aponeurosis (EOA). It is distinguished by its low cost, lack of mesh implementation, and limited dissection area. Since the ageing process in tendons and aponeurosis is limited, Desarda stated that a

strip of EOA is the superior alternative to both mesh and the Shouldice repair^[9].

We hypothesized that combination Desarda with Guarnieri will take the benefits of both and avoid the limitations of both.

Our study sought to assess the feasibility and effectiveness of combining Guarnieri and Desarda techniques as new modification nonmesh repair.

PATIENTS AND METHODS:

This prospective cohort study was performed on 50 adult patients, aged more than 18 with noncomplicated, nonrecurrent inguinal or inguinoscrotal hernia, who presented to the General Surgery Department at Kasr Al Ainy Hospital, Cairo, Egypt. The ethical committee at Kasr Al Ainy Hospital in Cairo, Egypt, granted approval for the study spanning from December 2020 to December 2022. Every single patient provided documented informed consent. All subsequent changes to the Helsinki Declaration of 1964 were adhered to during the course of this research.

Exclusion criteria were patients' refusal, patients under 18, all complicated hernias, patients with recurrent inguinal hernias and those with weak and thin EOA (intraoperative findings).

Each and every patient underwent combined modified Guarnieri and Desarda technique (nonmesh repair).

Surgical techniques

Operations were executed under spinal or under general anesthesia in supine posture. Inguinal transverse skin incision followed by opening of camper's fascia and Scarpa's fascia. The EOA was incised along the axis of its fibers. The inguinal canal was opened, ilioinguinal nerve was identified and retracted. The cord was then dissected and hanged with tape. The cord was opened, and its structures (vas deferens, spermatic vessels) were separated from the cremasteric muscle and fascia. The sac was identified, dissected till its proper neck at the deep inguinal ring, identified as the narrowest part of the sac and by presence of pre peritoneal fat and then herniotomy was done.

Modified Guarnieri technique

The elements of the spermatic cord were separated from the proximal tract of the internal spermatic fascia and cremasteric muscle and then isolated. Then we performed a modified Guarnieri technique as follows; starting on the deep ring and moving medially and cranially, a 2-cm incision was made on the transversalis fascia and transversus aponeurosis. After bringing the spermatic cord's components to the incision's medial angle, Prolene 2/0 was utilized to begin the first layer of the suture. The thread generated a fresh, readily calibrated deep ring on its first

passage. After that, the incision was sutured shut, sealing the original ring. The cremaster and internal spermatic fascia of the first layer were covered by a second layer that was made in the opposite direction using the same suture. Now, the new internal ring was located deep in the fleshy medial fibers of the conjoint tendon to augment the shutter mechanism of the inguinal canal, also, the medialization of the spermatic cord contents acted in a valve manner, which guards against recurrence. Here we did not proceed to the rest of the Guarnieri technique as it is much sophisticated, and we replaced it with Desarda technique to reinforce the posterior wall (Fig. 1).



Fig. 1: Intraoperative steps.

Modified Desarda technique

An EOA splitting incision was made to form a 2 cm width strip of EOA extending from symphysis pubis to 1–2 cm beyond the internal ring laterally. Suturing the lower border of the EOA strip to the inguinal ligament's reflection (iliopubic tract) starting from the lacunar ligament till a point lateral to the occluded internal ring utilizing proline 2/0 running suture. Then an incision was made in the EOA, 2 cm above the previous sutured line, leaving a flap of EOA in the floor of the inguinal canal. Utilizing continuous proline 2/0 suture, the top border of the EOA slit was sutured to the aponeurotic portion of the conjoint tendon. Now we calibrated the newly formed internal ring to admit the little finger's tip and ensure that the new internal ring does not compress the contents of the spermatic cord. The last stage involved sewing the upper border of the EOA's lower leaf to the lower border of its higher leaf. Interrupted absorbable sutures were utilized to close the scarpas fascia. Finally, the skin was sealed (Fig. 2).

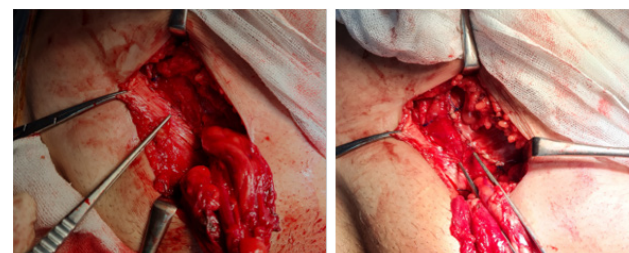


Fig. 2: Modified Desarda technique.

The operative time was recorded from the beginning of the skin incision until the closure. On the first postoperative day, patients were released, with follow-ups scheduled for 2 weeks, 1 month, 3 months, and 6 months to evaluate early and late pain scores, complications, and return to normal activity and recurrence.

Statistical analysis

Utilizing SPSS v28, statistical analysis was performed (IBM Inc., Armonk, New York, USA). The normality of the data distribution was assessed by using Shapiro–Wilks test and histograms. The mean and SD of quantitative parametric values were displayed. The median and interquartile range were used to present quantitative nonparametric data. Frequency and percentage (%) were utilized to display the qualitative factors. In cases where two samples are correlated, the paired sample t test is a statistical method used to contrast the means of the two populations. For statistical significance, a two-tailed *P* value less than 0.05 was used.

RESULTS:

We included 50 patients; their mean age was 36.2±14.2 years. Regarding the risk factors, five (10.0%) patients had diabetes mellitus, six (12.0%) patients had hypertension, three (6.0%) patients had ischemic heart disease, and 35 (70.0%) patients were smokers (Table 1).

Table 2 shows that the mean operation duration was 49.0±7.4 min.

The level of hernia was bubonocoele in eight (16.0%) patients, inguinal in eight (16.0%) patients, and inguinoscrotal in 34 (68.0%) patients. Among the studied patients, 10 (20.0%) patients had a direct hernia, and 40 (80.0%) patients had an indirect hernia. Only six patients had an irreducible but not obstructed or strangulated hernia (Table 3).

Table 4 shows that among the studied patients, 18 patients had intraoperative findings including lipoma of the cord in 10 (55.6%) patients, sliding sigmoid/cecum/bladder in five (27.8%) patients, pantaloon hernia in two (11.1%) patients, and hydrocele in one (5.6%) patients.

Regarding evaluating postoperative pain by visual analog scale (VAS), the median early postoperative VAS (within 24 h) was 4, the median 2-week postoperative VAS was 1.5 and the median 1-month postoperative VAS was 1. The 2-week and 1-month postoperative VAS were significantly lower compared to early postoperative VAS (within 24 h) ($P<0.001$ and 0.001), and the 1-month postoperative VAS was significantly reduced in contrast to the 2-week postoperative VAS (within 24 h) ($P=0.003$) (Table 5, Fig. 3).

Regarding the outcome, the mean hospitalization was 15.0±4.60 h, the mean return to basic daily activity was

2.20±1.10 days and the mean return to work activity was 5.00±1.80 days. Superficial skin infection occurred in three (6%) patients, seroma occurred in six (12%) patients, cord induration occurred in six (12%) patients, hematoma (scrotal hematoma) occurred in six (12%) patients, and complications occurred in 13 (26.0%) patients. Foreign body sensation was not reported in any patient in the current study (Table 6).

Table 7 shows the incidence of early and late recurrence not reported by any patient in our study.

Table 1: Demographic data and risk factors of the studied patients

| | Total (N=50) |
|--------------|--------------|
| Age (years) | 36.2±14.2 |
| Risk factors | |
| DM | 5 (10.0) |
| HTN | 6 (12.0) |
| IHD | 3 (6.0) |
| Smoking | 35 (70.0) |

Data presented as mean±SD or frequency (%).
DM, diabetes mellitus; HTN, hypertension; IHD, ischemic heart disease.

Table 2: Operation duration of the studied patients

| | Total (N=50) |
|--------------------------|--------------|
| Operation duration (min) | 49.0±7.4 |

Data presented as mean±SD.

Table 3: Clinical data of hernia of the studied patients

| | Total (N=50) |
|------------------------------------|--------------|
| Level of hernia | |
| Pubonocoele | 8 (16.0) |
| Inguinal | 8 (16.0) |
| Inguinoscrotal | 34 (68.0) |
| Type of hernia | |
| Direct | 10 (20.0) |
| Indirect | 40 (80.0) |
| Pre-operative hernia complications | 6 (12.0) |

Data presented as frequency (%).

Table 4: Intraoperative findings of the studied patients

| | N=18 |
|-------------------------------|-----------|
| Intraoperative findings | |
| Lipoma of the cord | 10 (55.6) |
| Sliding sigmoid/cecum/bladder | 5 (27.8) |
| Pantaloon hernia | 2 (11.1) |
| Hydrocele | 1 (5.6) |

Table 5: Assessment of postoperative pain by visual analog scale of the studied patients

| | Total (N=50) | P value | Pairwise |
|---------------------------------------|--------------|---------|-----------|
| Early postoperative VAS (within 24 h) | 4 (3–5) | | P1<0.001* |
| 2-week postoperative VAS | 1.5 (1–3) | <0.001* | P2<0.001* |
| 1-month postoperative VAS | 1 (1–1) | | P3=0.003* |

VAS, visual analog scale.

P1: P value between early postoperative and 2 weeks postoperative VAS.

P2: P value between early postoperative and 1-month postoperative VAS.

P3: P value between 2 weeks postoperative and 1-month postoperative VAS.

*Statistically significant as P value less than 0.05.



Fig. 3: Postoperative pain score of the studied patients.

Table 6: Outcome of the studied patients

| | Total (N=50) |
|---------------------------------------|--------------|
| Hospital stay (h) | 15.0±4.60 |
| Return to basic daily activity (days) | 2.20±1.10 |
| Return to work activity (days) | 5.00±1.80 |
| Infection | |
| No infection | 47 (94) |
| Superficial skin infection | 3 (6) |
| Seroma | 6 (12) |
| Cord induration | 6 (12) |
| Hematoma (scrotal hematoma) | 6 (12) |
| FB sensation | 0 |
| Complications | 13 (26.0) |

Data displayed as mean±SD or frequency (%).

FB, foreign body.

Table 7: Incidence of recurrence of the studied patients

| | Total (N=50) |
|------------------------------------|--------------|
| Early recurrence (6 months) (N=50) | |
| No recurrence | 50 (100) |
| Late recurrence (1–3 years) (N=44) | |
| No recurrence | 44 (100) |

Data presented as frequency (%).

DISCUSSION

One of the conditions that requires surgery most frequently is an inguinal hernia. Numerous methods for repairing it have been devised^[10]. Guarnieri repair is too sophisticated technique and hard to reproduce. Also, it may need a mesh to support the posterior wall^[7].

We discovered a growing interest in mesh-free methods. Nonmesh repair of hernia has numerous advantages, the most significant of which is removing the side effect of foreign material in the body and minimal risk of short-term and long-term complications of mesh involved repair as chronic groin pain, surgical site infections, mesh migration, and mesh rejection. A potential concern pertains to the uniformity and standardization of the surgical methodology, which continues to be the primary cause of failure in mesh-free inguinal hernia repair^[11]. Despite the tissue-based nature of Desarda repair as an inguinal hernia repair approach, numerous criticisms have been previously expressed. An issue arose while attempting the Desarda repair for an inguinal hernia; weakness was observed directly to the internal ring laterally, which could lead to a recurrence. Achieving minimal recurrence is critical for successful surgical repair of an inguinal hernia, necessitating tension-free closure of the defect^[12].

We hypothesized that Guarnieri and Desarda techniques are nonmesh hernia repair methods using the golden law of a tension-free repair. As in Guarnieri's technique, the transposition of the internal ring in a medial and cranial fashion is easily reproducible. Additionally, Guarnieri repair augments two mechanisms that guard against inguinal hernia occurrence, which are the valve mechanism as the contents of the spermatic cord will pass in a path in a calve-like manner after medialization of the internal ring, and the shutter mechanism of the conjoint tendon as it brings the internal ring in a medial and cranial position deep to the arching fibers of the conjoint tendon^[13]. Also, Desarda repair adds too much strength to the posterior using a local tissue flap derived from the EOA in a tension-free manner^[14].

To strengthen the posterior wall, Guarneri recommended using a synthetic mesh, but we replaced it with the EOA slit of Desarda repair, with consideration of the point of fashioning the external ring at the medial part of the slit to avoid compression of the contents of the spermatic cord. According to our information, this is the initial study that used combination of the Guarneri method and Desarda to repair of inguinal hernia.

The present study's mean operation duration was 49.0 ± 7.4 min. A study by Guarneri *et al.*^[7] showed that the mean operating time was 35 min.

Khairy *et al.*^[15] enrolled 100 patients who had Desarda nonmesh tissue repair and provided information regarding the mean duration of the operation (45.25 ± 12.55 min).

Arafa *et al.*^[16] 80 cases were enrolled and split into two groups. There were 40 patients in the Desarda group (D group) and 40 in the Lichtenstein group (L group). They stated that the D group's operation took less time than the L group's with highly significant variation (range: 45–71 vs. 49–93 min; $P < 0.001$). The reduced duration of the Desarda group's operation in contrast to the mesh group was attributed to the necessity for increased traction during mesh fixation. In certain instances, particularly at the lateral extent of the repair, time is required to fashion and position the mesh around the cord.

We found that the 2-week and 1-month postoperative VAS were significantly reduced in contrast to early postoperative VAS (within 24 h) ($P < 0.001$ and 0.001), and the 1-month postoperative VAS was significantly lower compared to the 2-week postoperative VAS (within 24 h) ($P = 0.003$).

Khairy *et al.*^[15] showed a VAS score for postoperative discomfort on day 2 was 3.12. The mean VAS values were 1.28 and 0.12, respectively, after 1 week and 1 month. Following this repair, no patient experienced discomfort for more than 15 days.

Moghe *et al.*^[17] performed an observational study on 50 patients allocated in Lichtenstein's and Desarda's groups and found that the postoperative discomfort/pain was evaluated utilizing a VAS score. At postoperative day 1, VAS ratings ranging from 0 to 3 were obtained by 17 patients in Lichtenstein's group and 16 in group Desarda, whereas three patients in each group obtained VAS scores between 4 and 7. At postoperative day 10 and 6 months, every patient in the Lichtenstein's and Desarda group received a VAS score between 0 and 3, and the groups had a comparable mean VAS score (1.30 ± 0.66 vs. 1.20 ± 0.52).

The research was carried out by Youssef *et al.*^[18]; 168 patients who presented with inguinal and inguinoscrotal hernias that were uncomplicated and primary were randomly assigned to either Desarda's group (85 patients) or Lichtenstein's group (83 patients) and were observed for 2 years. The mean postoperative VAS values for chronic groin discomfort, foreign body sensation, and pain did not differ significantly. In the Arafa *et al.*^[16] study, postoperative pain was significantly diminished in the Desarda group compared to the Lichtenstein group. There are numerous confounding variables that could account for the pain, including intraoperative manipulation, ilioinguinal nerve traction, and tissue handling.

We observed that the mean hospital stay was 15.0 ± 4.60 h, the mean return to basic daily activity was 2.20 ± 1.10 days and the mean return to work activity was 5.00 ± 1.80 days. Superficial skin infection occurred in three (6%) patients, seroma occurred in six (12%) patients, cord induration occurred in six (12%) patients, hematoma (scrotal hematoma) occurred in six (12%) patients, and complications occurred in 13 (26.0%) patients. Foreign body sensation was not reported in any patient in the current study.

Recurrence has been the only criterion evaluated for a considerable period when assessing the effectiveness of a hernia surgical treatment. Regardless of whether the repair is pure tissue, the Desarda approach is notably linked to a minimal likelihood of recurrence. Indeed, this methodology fortifies the primary anatomical component that inhibits the development of hernias – the aponeurotic extension in the posterior wall of the inguinal canal – as stated by the author^[19].

Prior research demonstrated that no patient experienced difficulty for 15 days following this surgery. The absence of persistent pain, foreign body sensation, or recurrence was noted. Patients were mobile again within 18–24 h following surgery. The mean stay in the hospital was 1.87 ± 0.78 days. Patients resumed their routine activities within 6–14 (mean: 8.62 days)^[15].

A prior investigation demonstrated that the mean duration required to regain ADL was 1.90 ± 1.02 days in Lichtenstein's group and 1.53 ± 0.84 days in Desarda's group. Notably, there was no disparity in the incidence of wound infections between patients who underwent inguinal hernia repair using Desarda's technique versus Lichtenstein's technique^[17]. In a randomized controlled trial by Szopinski *et al.*^[4], no statistically significant disparity was identified in the clinical results of adult male patients who had Desarda's or Lichtenstein's procedure for primary inguinal hernia surgery throughout a 3-year follow-up. Except seroma

development, the frequency of complications was comparable across the two groups; the Desarda group saw a recurrence rate of 1.94%.

A study was carried out by Desarda^[20] contrasting this method with mesh-based repairs; he noted that patients who underwent the author's method experienced a reduced number of problems, a shorter duration of hospitalization, and more time to return to work. Manyilira *et al.*^[21] also compared Desarda's repair to Lichtenstein's repair in a case-control study and demonstrated that the incidence of wound infections was comparable in both repairs. Moghe *et al.*^[17] found no recurrences observed in either group throughout the follow-up study.

In retrospective research, Desarda and Ghosh^[22] reported no recurrences during Desarda technique, compared to a 1.97% recurrence rate following Lichtenstein technique. The rates of complications following Desarda technique and Lichtenstein technique were 1.85 and 7, respectively. In another study by Mitura and Romańczuk^[23] Desarda technique was associated with a reduced surgical time and less severe postoperative discomfort; nevertheless, neither approach produced any recurrences.

Research by Mitura and Romańczuk^[23] contrasted Desarda's and Lichtenstein's techniques and reported mean VAS scores of 3.3 and 3.8 for Desarda's and Lichtenstein's techniques, respectively, on the third postoperative day. In Dhar *et al.*^[24] research, the mean length of hospitalization for the Desarda group was 2.21 days, while for the Lichtenstein group, it was 2.65 days. Similarly, Mitura and Romańczuk^[23] patients who underwent surgery using Desarda's technique were discharged on the fourth day after the procedure, whereas those who underwent surgery using Lichtenstein's technique were discharged on the fifth day. Desarda's group returned to basic physical activity in a mean of 4.74 days, while Lichtenstein's group did so in 7.00 days.

An additional investigation revealed that patients in the Lichtenstein group (17–22%) and the Desarda group (12–16%) reported experiencing abdominal wall stiffness and foreign body sensation at various times. These outcomes fall within the range of 4.5–43.8% that other authors have reported for mesh techniques^[16,25].

In a large study (2225 patients) by Rodriguez *et al.*^[26], Desarda's group assessed with a favorable outcome regarding the duration of hospitalization and the time needed to resume regular work following the procedure. Compared to Desarda's group, which comprised just five patients, 62 cases in the Lichtenstein

group necessitated hospital stays exceeding 3 days. Further, Desarda's group observed four instances of recurrences. They hypothesized that the failure to conduct the recommended internal ring narrowing and correct cord lateralization as Desarda recommended, was the cause.

Our observation indicates that this approach is straightforward to execute, as it does not necessitate a prosthesis or intricate dissection of the inguinal canal, in contrast to Bassini and Shouldice. Alternatives to other widely utilized techniques include the Desarda+Guarnieri method.

Our research was subject to certain limitations due to its single-center design and rather small sample size. Moreover, a little period of follow-up. Due to the observational character of our study and the fact that the majority of hernias were indirect in origin, it is impossible to comment on the durability of this treatment for direct hernias with a flexible posterior wall. Further randomized multicentre studies are needed to validate our findings and also, for evaluation of this method in cases of complicated or recurrent hernia.

CONCLUSION

Combining both Guarnieri and Desarda nonmesh repair of inguinal hernia is an effective technique with significantly lower postoperative pain, rapid return to basic daily activity and work activity, and less incidence of complications with no reported foreign body sensation.

CONFLICT OF INTEREST

There are no conflicts of interest.

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