

## ORIGINAL RESEARCH

# Comparison of Postoperative Morbidity Between Two Tension-Free Hernioplasty Techniques: With Mesh versus Without Mesh


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## Abstract

**Introduction.** Although inguinal hernia surgery is the most common surgical procedure worldwide, the best surgical method is still not universally accepted. The Lichtenstein technique is considered the gold standard, although it also has its limitations. Therefore, there is still a need for new techniques, such as the Desarda technique. The aim of this article is to evaluate and compare the postoperative morbidity of two tension-free techniques for inguinal canal plastic surgery with and without the use of mesh.

**Methods.** This prospective randomized clinical study was conducted at the Clinic for General and Abdominal Surgery of the Clinical Center of the University of Sarajevo from January 2017 to December 2022. The study included 60 patients with primary inguinal hernia who met the predefined inclusion and exclusion criteria and were randomly allocated into two equal groups: 30 patients operated on by the Desarda technique and 30 patients operated on by the Lichtenstein technique.

**Results:** The following parameters showed a statistically significant difference in favor of the Desarda operative technique: shorter hospitalization, lower level of postoperative pain, faster achievement of early physical activity, lesser amount of analgesic consumption, earlier return to regular daily and work activities, and absence of chronic inguinal pain. Postoperative morbidity was more frequent in the Lichtenstein group, but likely due to the small sample size, this difference remained statistically insignificant.

**Conclusion:** Patients operated on by the Desarda method exhibited significantly lower levels and frequencies of postoperative pain, faster postoperative recovery, and return to usual daily and work activities.

**Keywords:** hernia, inguinal, treatment, prognosis.

## INTRODUCTION

The development of inguinal hernia surgery (1). The era of modern tension-free hernioplasty extends from the mid-20th century to the present day (1,2). Lichtenstein was

among the pioneers who popularized tension-free hernioplasty with prosthetic material, achieving exceptionally good results in terms of morbidity and recurrence (3). Until the Desarda technique, tissue repair techniques were tension-based along the suture line, resulting in pain and recurrences (4). Advances in surgical techniques have led to the quality of life and postoperative chronic inguinal pain becoming the most important considerations in hernia repair. Revision surgery rates, postoperative morbidity, including chronic inguinal pain, are key indicators used to evaluate the success of hernia repair treatment. Despite various techniques, there is still a need for new techniques to reduce recurrence rates and improve patient quality of life (4). The Lichtenstein technique of inguinal canal plastic surgery has become one of the most popular and common surgical procedures, but postoperative morbidity continues to burden this technique (4). There is a high incidence of chronic inguinal pain associated with the Lichtenstein technique, ranging from 28.7% to 43.3% (2-4). Chronic surgical site infection after repair with prosthetic mesh requires complete removal of the mesh to treat the infection (4). Possible damage to the elements of the spermatic cord and nerve entrapment due to extensive fibrosis raise concerns about the use of this technique. Inguinal hernia surgery is the most common surgical procedure worldwide (4). The quest for the ideal surgical technique without the use of alloplastic material, which will provide excellent results even when performed by less experienced general surgeons, continues. In the Desarda operative technique, there is no displacement of muscles and the sutures are tension-free during muscle contraction (4). The aim of the article is to evaluate and compare the postoperative morbidity of two tension-free inguinal canal plastic surgery techniques with and without the use of mesh and to assess the advantages and disadvantages of these methods regarding postoperative morbidity and their true indication area.

## METHODS

### Patients and Study Design

This study was prospective-retrospective, and was conducted at the Clinic for General and Abdominal Surgery, Clinical Center of the University of Sarajevo, from January 2017 to December 2022. It aimed to compare the outcomes of two tension-free surgical techniques for treating primary inguinal hernias: the traditional Lichtenstein technique and the newer Desarda technique. The study involved 60 patients, aged 18 to 65 years, of both genders. Patients were randomly assigned to one of the two techniques by drawing sealed envelopes containing the name of the surgical method. Demographic data were collected throughout the study. Ethical approval was granted by the Ethical Committee of the Clinical Center of the University of Sarajevo.

### Methods

The source of data was the medical records of patients operated on at the Clinic for General and Abdominal Surgery of the University Clinical Center. Basic laboratory tests were performed preoperatively on all patients as part of routine preparation for surgery. Additional laboratory tests were conducted during the postoperative course of patients, as needed. Preoperatively, all patients underwent chest X-ray, electrocardiogram, and internal medicine examination. Patients were advised to resume routine activities on the third postoperative day. Data were collected intrahospital and then on an outpatient basis on the eighth day, first month, and six months after surgery. All surgical procedures were performed under general endotracheal anesthesia. In patients of the Lichtenstein group, a Vypro II (polypropylene + polyglactin) semi-resorbable mesh measuring 6x11 cm was placed and secured with Vicryl (polyglactin 910) 2.0 sutures, while in patients of the Desarda group, PDS 1 (polydioxanone) suture was used for hernioplasty. Antibiotic prophylaxis was administered to all participants, including

preoperative administration of intravenous 2 grams of Cefazolin 30 to 60 minutes before incision. Prophylactic anticoagulant therapy was prescribed subcutaneously in a single evening dose to all patients during hospitalization. Parenteral analgesia was administered to all patients in the 24 hours after surgery, followed by oral or parenteral analgesia only as needed. Patients were encouraged to mobilize 4-6 hours after surgery and to be discharged from the hospital when they could go to the toilet independently. Six months after the treatment, pain was assessed using the Visual Analog Scale (VAS).

## Statistical Methods

Standard descriptive and inferential statistical methods were employed. Data were presented based on their nature: absolute numbers, percentages, arithmetic means with standard deviations for normally distributed data, and medians with interquartile ranges for non-normally distributed data. The normality of continuous numerical variables was assessed using the Shapiro-Wilk test, and comparisons were made using the non-parametric Mann-Whitney U test due to the lack of normal distribution. Categorical variables were compared using the chi-square test, with Fisher's exact test applied for 2x2 tables and Yates' correction used for small sample sizes. A significance level of 95% ( $p < 0.05$ ) was set for all tests. Results were reported both textually and through tables and graphs.

## Results

At the Clinic for General and Abdominal Surgery, Clinical Center of the University of Sarajevo, a prospective-retrospective randomized study was conducted from January 2017 to January 2022, involving a group of 60 patients who underwent surgery for primary inguinal hernia. Patients were randomized into two equal groups. In the first group were patients operated on using the Desarda technique, while in the second, the

control group, patients were operated on using the Lichtenstein technique. Analysis of the results revealed a significantly higher prevalence of inguinal hernia among male patients (93.3%), and both groups had an equal representation of male patients (28 or 93.3% of cases each) and female patients (2 or 6.7% of cases each).

Analysis of the age structure of patients in relation to the examined groups shows certain variations, but they are not statistically significant ( $p > 0.05$ ). According to the average age, the examined groups of patients did not differ significantly ( $p = 0.599$ ).

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## Postoperative morbidity

Surgical site infection was diagnosed in 4 (13.3%) patients from the Lichtenstein group and in 1 (3.3%) patient from the Desarda group. Surgical site infections were managed with local wound treatment and parenteral antibiotic administration, and removal of the prosthetic material was not necessary. Seroma occurred in 3 (10.0%) patients from the Lichtenstein group, while there were no seromas in the Desarda group. Hematoma occurred in 2 (6.6%) patients from the Lichtenstein group, while there were no hematomas in the Desarda group. Scrotal swelling occurred in 5 (16.6%) patients from the Lichtenstein group and in 1 (3.3%) patient from the Desarda group. Although postoperative morbidity is more common with the Lichtenstein technique, it is presumed that due to the small sample size, the differences were not statistically significant. Urinary tract infections and urinary retention were not observed in any patient.

## Postoperative Recovery Rate

Postoperative recovery, or the time to return to usual daily activities after a surgi-

cal procedure, was statistically significantly shorter in the group treated with the Desarda technique compared to the Lichtenstein technique ( $p = 0.0156$ ). The mean time to return to daily activities was statistically significantly shorter in the Desarda group ( $4.13 \pm 1.85$  days) compared to the Lichtenstein group ( $6.90 \pm 3.39$  days) ( $p < 0.001$ ) (Table 1).

**Table 1. Return to daily activities**

Return to daily activities /days/	Desarda technique (n=30)		Lichtenstein technique (n=30)		Total	
	Number of Patients	%	Number of Patients	%	Number of Patients	%
<4 days	14	46.7	10	33.3	24	40.0
5-7 days	15	50.0	8	26.7	23	38.3
8-10 days	1	3.3	8	26.7	9	15.0
11-13 days	0	0.0	3	10.0	3	5.0
14-16 days	0	0.0	1	3.3	1	1.7
>17 days	0	0.0	0	0.0	0	0.0
Total	30	50.0	30	50.0	60	100.0
$\bar{X} \pm SD$	$4.13 \pm 1.85$		$6.90 \pm 3.39$		$5.52 \pm 3.05$	

SD standard deviation  $\bar{X}=12.242$ ;  $p=0.0156$

The time required to return to daily activities was significantly shorter for patients treated with the Desarda technique compared to those treated with the Lichtenstein technique ( $p < 0.05$ ) (Table 2). All patients were evaluated for the time taken to resume work, measured by the number of days needed to recover sufficiently. Patients in the Desarda group had a shorter recovery period before returning to work, typically ran-

**Table 2. Return of patients to work activities**

Return to work activities /days/	Desarda technique (n=30)		Lichtenstein technique (n=30)		Total	
	Number of Patients	%	Number of Patients	%	Number of Patients	%
<14 days	14	46.7	8	26.7	22	36.7
15-30 days	12	40.0	10	33.3	22	36.7
31-45 days	3	10.0	5	16.7	8	13.3
46-50 days	1	3.3	5	16.7	6	10.0
>60 days	0	0.0	1	3.3	1	1.7
>80 days	0	0.0	1	3.3	1	1.7
Total	30	50.0	30	50.0	60	100.0
$\bar{X} \pm SD$	$17.13 \pm 10.06$		$32.73 \pm 22.49$		$24.93 \pm 18.98$	

SD standard deviation  $\bar{X}=16.985$ ;  $p=0.0221$

ging from two to four weeks. A statistically significant difference was found between the two groups ( $p = 0.0221$ ). However, these results should not be viewed as absolute, as not all patients are equally motivated to return to work and some may choose to use the full duration of sick leave provided by their health fund.

Return to work activities was statistically significantly shorter in the group treated with the Desarda technique compared to the Lichtenstein technique ( $p < 0.05$ ).

## Chronic Inguinal Pain

Neuralgic postoperative pain in the inguinal region was present one month after the surgery in 16 (53.3%) patients in the Lichtenstein group, with the highest frequency of pain intensity being 6 in 6 (20.0%) patients, while 3 (10.0%) patients had pain intensity of 8, which they described descriptively as disturbing and severe. In the Desarda group, as many as 26 (86.6%) patients were without any postoperative neuralgia, while in 4 (13.3%) patients, there was some discomfort, which they described descriptively as discomfort during prolonged standing and walking.

Statistical analysis shows that the frequency and intensity of postoperative neuralgia on the 30th postoperative day are statistically significantly lower in the group treated with the Desarda technique compared to the Lichtenstein technique ( $p = 0.006$ ).

The average level of postoperative neuralgia one month after the surgical procedure was statistically significantly lower in the Desarda group ( $0.40 \pm 1.07$ ) compared to the Lichtenstein group ( $3.00 \pm 3.05$ ),  $p < 0.001$ .

The rate of postoperative neuralgia was significantly lower in patients treated with the Desarda technique compared to those who underwent the Lichtenstein technique ( $p < 0.05$ ). One month after surgery, the average level of postoperative neuralgia was markedly lower in the Desarda group ( $0.40 \pm 1.07$ ) compared to the Lichtenstein group

( $3.00 \pm 3.05$ ), with a p-value of  $<0.001$ . Six months post-surgery, no patients (0%) in the Desarda group experienced postoperative neuralgia, whereas 10 patients (33.3%) in the Lichtenstein group reported neuralgia, with 6 (20.0%) finding it bothersome during physical activities and 2 (6.6%) describing it as severe, constant pain with a VAS score of 8. Statistical analysis revealed a significant difference in the occurrence of chronic inguinal pain between the two groups ( $p = 0.017$ ) (Table 3).

**Table 3. Chronic inguinal pain six months after surgery**

Chronic inguinal pain six months after surgery	Desarda technique (n=30)		Lichtenstein technique (n=30)		Total	
	Number of Patients	%	Number of Patients	%	Number of Patients	%
0	30	100.0	20	66.7	50	83.3
4	0	0.0	2	6.7	2	3.3
5	0	0.0	3	10.0	3	5.0
6	0	0.0	3	10.0	3	5.0
8	0	0.0	2	6.7	2	3.3
Total	30	50.0	30	50.0	60	100.0
$\bar{X} \pm SD$	$0.00 \pm 0.00$		$1.90 \pm 2.85$		$0.95 \pm 2.21$	

SD standard deviation  $\bar{X}=12.000$ ;  $p=0.017$

## DISCUSSION

Inguinal hernias are the most common surgical condition, with an average lifetime risk of 27% in males and 3% in females (5). Before 2009, there were no established protocols for treating inguinal hernias. That year, the European Hernia Society (EHS) released recommendations based on literature reviews and clinical study outcomes. According to the EHS guidelines, the Lichtenstein technique and endoscopic mesh placement are considered the gold standard treatments (6).

If there is a need to deviate from the tension-free technique using mesh, the Shouldice tissue repair technique is considered the preferred alternative. It is important to note that protocols should remain open to innovations, and further research is necessary to evaluate new methods. Additionally, the potential influence of the pharmaceutical industry, which often favors mesh procedures, should

be taken into account. Consequently, the strong recommendation of the EHS protocol for mesh use needs re-evaluation. Although the Lichtenstein technique is regarded as the gold standard, it has limitations, including sensations of a foreign body, surgical site infections, spermatic cord fibrosis, and chronic postoperative pain. Surgical site infections with symptoms persisting for years are more common with mesh use. The intense chronic inflammatory response to the foreign body reaction around the mesh can lead to the formation of meshomas or pseudo-tumors. Moreover, using mesh increases surgical costs. There are also reports that reproduction and sexual function can be significantly affected when mesh is used in the surgical treatment of inguinal hernias. Robinson and colleagues have documented 252 complications, including infection (42%), postoperative pain (9%), foreign body reactions (8%), intestinal complications (7%), adhesions (6%), seroma (4%), erosion (2%), and other issues (4%) (7). Mesh repair may lead to male infertility and sexual dysfunction (8). Additionally, it can result in chronic inguinal pain due to nerve entrapment (9). These postoperative complications have prompted many researchers to explore new techniques. An example of such efforts is the Desarda surgical technique, which was presented in 2001 and became the first tension-free tissue-based method for repairing inguinal hernias. In recent years, the focus of inguinal repair has shifted rapidly to chronic postoperative pain. New studies have shown that the Lichtenstein technique may be associated with postoperative pain. The Desarda technique provides a physiologically dynamic posterior wall of the inguinal canal (10). The aging process in the body is minimal in tendons and aponeuroses, so the strip segment, which is tendon-aponeurotic, is the best alternative to mesh (11). Desarda published the results of the first study in 2001, which included 400 patients (12). The results were excellent, with only one recurrence and one postoperative complication in terms of hydrocele. In 2006, the author published the results of a second study involving 860 patients, which also yielded outstanding



results, with no recurrences or postoperative neuralgia (12). In our study, homogeneity was observed among the investigated groups in terms of age and gender distribution, associated diseases, as well as local findings related to the type, localization, and classification of hernias. Patients in the Desarda group had better physical activity, reflected in earlier and easier mobilization. Although postoperative morbidity was more present in the Lichtenstein method, it is presumed that due to the small sample size, the differences were not statistically significant. Complete postoperative recovery was significantly shorter in the Desarda group. We also found a significant difference in the persistence of neuralgic pain. After six months, none of the patients (100%) in the Desarda group had chronic inguinal pain. Postoperative neuralgia was present in 10 patients (33.3%) in the Lichtenstein group, with 6 patients (20.0%) reporting pain during physical activities, while 2 patients (6.6%) experienced constant severe pain independent of activity. Chronic pain diminishes and impairs quality of life.

The Desarda surgical technique could soon be recognized not only as an alternative to the Shouldice technique but also as a substitute for current protocols that favor open and laparoscopic mesh techniques. Research generally suggests that the Desarda technique is at least comparable to the Shouldice technique in terms of recurrence rates and postoperative pain (13-18). Due to the simplicity of the procedure, which does not require foreign material or complex dissection of the inguinal canal floor, the learning curve for the Desarda technique is shorter than that of the Shouldice technique. It has demonstrated excellent results, with virtually no recurrences (13-15). The Desarda surgical technique is a physiological repair that primarily restores the normal physiology of the inguinal canal. The Desarda technique is safe and effective even for large defects and cases with a compromised posterior wall of the inguinal canal. It is easy to perform, has a short learning curve, and is cost-effective. Compared to the Desarda technique, the Lichtenstein surgical method is associated with significantly higher post-

operative pain, a greater incidence of surgical site infections, hematomas, and seromas, as well as scrotal swelling. These complications are likely due to the direct contact of the mesh with the spermatic cord and nerve branches, leading to tissue edema and extensive fibrosis. The results of this study suggest that the Desarda technique could increase the overall proportion of tissue-based repairs of the inguinal canal in the future.

## CONCLUSION

Patients who undergo the Desarda technique experience significantly lower postoperative pain, faster recovery times, and quicker return to daily and work activities. The use of the Desarda technique helps to avoid complications associated with mesh repairs, such as chronic inguinal pain and foreign body sensation. This technique is particularly advantageous for younger patients and those with infected or strangulated inguinal hernias.

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