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Mohamed Arafat Abd-ElMaksoud
Department of General Surgery, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt

Mohamed Gamal El-Sayed Shams
Department of General Surgery, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt, msshamspro22@gmail.com

Mahmoud Hassib Morsi Badawy
Department of General Surgery, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt

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ORIGINAL ARTICLE

Comparative Study of Preservation Versus Elective Division of Ilioinguinal Nerve in Inguinal Hernioplasty in Male

Mohamed A. Abd-ElMaksoud, Mohamed G. E. Shams *, Mahmoud H. M. Badawy

Department of General Surgery, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt

Abstract

Background: ***Although there are other methods for treating inguinal hernias, Lichtenstein tension-free mesh surgery is the most effective.***

Aim: ***To compare the effect of ilioinguinal neurectomy versus nerve preservation on the incidence and severity of chronic groin pain following hernioplasty for inguinal hernias in males.***

Patients and methods: ***A hundred inguinal hernia individuals who were recruited to have hernioplasty procedures were divided into Group (A) fifty individuals who had their ilioinguinal nerve preserved, and Group (B) fifty patients who had ilioinguinal neurectomy.***

Results: ***Significant differences were observed in the severity of postoperative inguinal pain during mild exercise between groups A and B, particularly at follow-up at 1, 3, and 6 months (p=0.013, 0.033, 0.018), respectively. The mean duration for which patients required analgesia was significantly different in both groups (p<0.001*). NRS during the test and after minor exercise differed significantly (p<0.0001*). Patients who had simple forms of inguinal hernia (direct or incomplete oblique inguinal hernia) experienced less pain score than those patients who had inguinoscrotal hernias during rest as well as after minor exercise at all follow-up periods (p<0.0001*). There was a significant decrease in postoperative incidence of numbness/hypoesthesia after six months (p<0.001).***

Conclusion: ***After the excision of the ilioinguinal nerve, chronic postoperative pain following the Lichtenstein tension-free hernioplasty was dramatically reduced. In patients receiving Lichtenstein tension-free mesh hernioplasty for inguinal hernias, routine IIN excision was necessary.***

Keywords: Surgery; Preservation; Inguinal Hernioplasty; Ilioinguinal Nerve; Elective Division

1. Introduction

A hernia occurs when a viscus or portion of a viscus protrudes through a weakness in the walls of the abdomen. Groin hernias account for 75% of all abdominal hernias; of these, 95% are inguinal hernias, and 5% are femoral hernias. Males are nine times more likely than females to have inguinal hernias .[1,2]

Although there are several methods for treating inguinal hernias, including Shouldice, Bassini, Cooper ligament or McVay and Lotheissen repairs, Lichtenstein tension-free mesh repair remains the most effective. A groine ache following a hernioplasty that lasts longer than three months is known as chronic post-hernioplasty groine pain .[3] It happens due to nerve damage or entrapment. The ilioinguinal nerve is most frequently affected .[4,5]

To try to lower the incidence of chronic groine discomfort after open mesh hernia repair, elective ilioinguinal nerve detachment was advised. Some researchers have emphasized the significance of elective nerve detachment as a means of reducing postoperative pain, viewing ilioinguinal neurectomy as a standard surgical procedure. It has been noted that adequate preoperative planning for ilioinguinal nerve excision reduces the rate of postoperative pain. This easy method lowers a significant cause of morbidity .[6] The purpose of this study was to assess the incidence and intensity of persistent groine pain after hernioplasty for male inguinal hernias between ilioinguinal neurectomy and nerve preservation.

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* Corresponding author at: General Surgery, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt.
E-mail address: msshamspro22@gmail.com (M. G. E. Shams).

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2. Patients and methods

Study Design and Study Population

One hundred patients with inguinal hernias receiving hernioplasty were included in this comparative analysis. Two groups were created out of the recruited participants; Group (A) - (ilioinguinal nerve preservation group): fifty individuals who had inguinal hernias in whom the entire ilioinguinal nerve was meticulously shielded, While Group (B) - (ilioinguinal neurectomy group): fifty individuals who had inguinal hernias at the general surgery department of Al-Azhar University Hospitals, where the ilioinguinal nerve was excised and the severed ends were left unattached without being inserted into the muscle or tied.

Patients Criteria

Inclusion criteria:

Male patients with a unilateral inguinal hernia undergoing hernioplasty, fit for surgery, non-complicated inguinal hernia, patients older than 20 years old, free of neurological problems and non-recurrent inguinal hernia.

Exclusion criteria:

All male patients under 20 years old, unfit for surgery, patients with complicated inguinal hernia, female patients with inguinal hernia, associated neurological problems and recurrent inguinal hernia.

Ethical Approval

Every patient received complete information regarding the process and specifics of the surgery. Signed informed consent was collected for each included patient, and agreement from the Al-Azhar University Institutional Ethical Committee was granted.

Preoperative Assessment

Before surgery, all included patients were subjected to the following:

History taking, which included patient's demographics, socioeconomic data, medical history, co-morbidities (diabetes mellitus, hypertension, ischemic heart diseases, allergies), medications, substance abuse, history of predisposing and precipitating factors such as benign prostatic hyperplasia (BPH), chronic constipation, pulmonary diseases, or any medical problems causing straining and surgical history. A general examination of the head and neck, chest, abdomen, and per rectal examination was performed. An assessment of the characteristics of the hernia (direct or indirect) was performed. Routine preoperative laboratory investigations (including CBC, liver function tests, and serum creatinine) were done. Pelvi-abdominal ultrasonography.

Anaesthesia and preoperative care:

Prior to surgery, the pubic hair was cut off right away. It was recommended that all patients fast for six to eight hours. Anesthesia, either spinal or general, was utilized. Following a sensitivity test, all patients received an intravenous antibiotic and received anaesthesia.

Surgical technique

Hernioplasty using tension-free mesh in Lichtenstein.

The participants in the group (A) maintained IIN. Group (B) underwent IIN cutting. Every step occurred under either spinal or general anaesthesia.

The surgeon was on the identical side of the hernia as the patient, who was resting supine.

Step 1: Initial Incision: After prepping the groine, a 5–7 cm inguinal skin incision was made within Langer's lines, between the inner and outer inguinal rings, 1 centimetre above and parallel to the inguinal ligament(Figure 1).

The external inguinal ring was then used to access the external oblique aponeurosis Figure 2.

The lower leaf of the external oblique aponeurosis released the superior flap of the spermatic cord, which was freed from the anterior rectus sheath medially and the internal oblique muscle laterally. The ilioinguinal nerve was subsequently identified(Figures 3 and 4).

Step 2: Mobilization of Cord Structures: For approximately 2 centimetres beyond the pubic tubercle, the cord with its cremasteric covering was isolated from both the inguinal canal floor and the pubic bone. In group (A), The IIN was preserved (Figure 6). In group (B)the IIN was excised (Figure 5). The cremasteric sheath was then incised longitudinally.

Step 3: Dissection of hernial sac: Opening the sac at the fundus and transfixion ligation at the neck followed by transection was done.

Step 4: Placement of Prosthesis: Monofilament polypropylene mesh measuring six by 11 centimetres was utilized. Once the pubic tubercle was covered for at least two centimetres, the mesh was fashioned with its medial end rounded to match the medial end of the inguinal canal. A slit was made at its lateral border, creating two tails; an upper-side one and a lower-narrow one. The medial end of the slit was fashioned as a ring to fit around the cord.

IIN was excised from group (B), and the mesh was positioned as shown in Figure 7. After pulling the cord back up, the rounded corner was sewn to the aponeurotic tissues above the pubic bone with a running proline 2.0 stitch, covering the bone by 1.5-2 centimetres. Using prolene 2.0, a few interrupted sutures were made from the upper edge of the mesh to the conjoint tendon, preventing damage or entrapment of the IIN.

A few interrupted subcutaneous vicryl 3.0 sutures were taken. No drainage was required in any of our cases. The subcuticular closure of the skin was done with Prolene 3.0. (Figure 8).

After two hours, the patient resumed taking

oral fluids, and six hours later, a modest diet was initiated. During his hospital stay, the patient was given an IV antibiotic; after five days, paracetamol 500 mg for eight hours to patients who had recovered from general anaesthesia and the analgesic impact of spinal anaesthesia.

The Numerical Rating Pain Scale (NRS) was used in the first POD to measure pain during rest and following brief exercises like ten minutes of walking. During just rest, sensory alterations were evaluated using the 4-point verbal rating scale (0 = absent and 1 = present). Ten is the maximum amount of pain that may be experienced, and zero denotes a lack of pain.

Respondents were asked to indicate on a line where they felt their pain was in order to gauge the degree of the pain. For severe pain, the NRS cut-off values were >6; for moderate pain, 4-6; and for mild pain, 1-3.

The second POD saw the final departure of every patient. Patients were invited to the outpatient clinic for follow-up appointments at one, three, and six months.

Statistical Analysis

IBM SPSS (version 26.0) program was utilized to modify, edit, and analyze data. The allowed margin of error was defined at five percent, and differences between postoperative measures were reported as mean differences with a 95% confidence interval. To ascertain if the distinctions were statistically significant, the paired t-test was performed. The qualitative data was compared between the groups using the chi-square test. P-values below 0.05 were considered significant.

3. Results

Group A's mean age was 35±3.70 years old, with a range of 20 to 48 years old, while group B's mean age was 31.25±4.51 years old, with a range of 21 to 50 years old. Splenomegaly accounts for 6% of group (A) and 8% of group (B), while BPH comprises 8% of group (A). Light manual labour constitutes 22% of group (A) and 38% of group (B) (Table 1).

Group A showed a statistically significant difference from group B, particularly at follow-ups at one, three, and six months (p=0.013, 0.033, and 0.018, respectively) Table 2.

Regarding analgesia requirements 1st post operative 24 hours and 7th POD (patients controlled non-analgesia, patients controlled by-oral paracetamol and patients controlled by injection ketorolac) was significant differences in both groups (<0.011*; 0.002) respectively. Mean duration for which patients required analgesia was highly significant differences in both groups (<0.001*) Table 3.

Individuals in group B experienced a statistically significant greater difference in the type and duration of analgesia compared to individuals in group A (p<0.05) Table 3.

Regarding incidence of postoperative numbness/hypoesthesia:

In 1st POD: The percentage of numbness 0% and hypoesthesia 10% of group (A) and numbness 24% and hypoesthesia 30% of group (B), there were significant differences in both groups (Table 4).

In 7th POD: The percentage of numbness 0% and hypoesthesia 4% of group (A) and numbness 18% and hypoesthesia 20% of group (B), there were significant differences in both groups (Table 4).

In 1 month: The percentage of numbness 10% and hypoesthesia 14% of group (A) and numbness 14% and hypoesthesia 34% of group (B), there were significant differences in both groups (Table 4).

In 3 months: The percentage of numbness 10% and hypoesthesia 0% of group (A) and numbness 20% and hypoesthesia 10% of group (B), there were significant differences in both groups (Table 4).

In 6 months: The percentage of numbness 10% and hypoesthesia 0% of group (A) and numbness 14% and hypoesthesia 0% of group (B), there were non-significant differences in both groups (Table 4).

Table 1. Patients Characteristics Data

DEMOGRAPHIC DATA	GROUP (A) N=50	GROUP (B) N = 50
AGE		
MEAN ± SD	35.±3.70	31.25±4.51
MIN - MAX (MEDIAN)	20 - 48	21 – 50
PATIENT CHARACTERISTICS		
SMOKERS	18 (36%)	15 (30%)
NON-SMOKERS	12 (24%)	15 (30%)
BPH	4 (8%)	3 (6%)
SPLENOMEGALY	3 (6%)	4 (8%)
LIGHT MANUAL WORK	11 (22%)	19 (38%)
STUDENTS AND EMPLOYEE	19 (38%)	20 (40%)
NOT WORKING	11 (22%)	10 (20%)
HEAVY MANUAL	19 (38%)	11 (22%)

Group (A): ilioinguinal nerve preservation, Group (B): ilioinguinal neurectomy, Data are presented as mean ± SD. SD: Standard Deviation; S: Significant Differences.

Table 2. Assessment of the two groups' postoperative inguinal pain severity with light exercise.

		GROUP A (N=50)		GROUP B (N=50)		X^2	P-VALUE
		N	%	N	%		
1STPOD	-No Pain	0	0	0	0	15.692*	<0.001*
	-Mild Pain ≤3	0	0	28	56		
	-Mod pain(4-6)	30	60	10	20		

	-Severe Pain>6	20	40	12	24		
7THPOD	-No Pain	21	42	2	4	5.988	MCP=0.046*
	-Mild Pain ≤3	10	20	25	50		
	-Mod pain(4-6)	33	66	23	46		
	-Severe Pain > 6	5	10	0	0		
1 MONTH	-No Pain	10	20	33	66	8.464*	MCP=0.013*
	-Mild Pain ≤3	28	56	15	30		
	-Mod pain(4-6)	12	24	2	4		
	-Severe Pain >6	0	0	0	0		
3 MONTHS	-No Pain	22	44	40	80	6.423*	MCP=0.033*
	-Mild Pain ≤3	18	36	10	20		
	-Mod pain(4-6)	10	20	0	0		
	-Severe Pain>6	0	0	0	0		
6 MONTHS	-No Pain	35	70	50	100	6.371	MCP=0.018*
	-Mild Pain ≤3	10	20	0	0		
	-Mod pain(4-6)	5	10	0	0		
	-SEVERE PAIN>6	0	0	0	0		

P is the p-value used to compare Group A and Group B; * denotes statistical significance at p ≤0.05; FE is for Fisher Exact; and MC stands for the Monte Carlo method, x2: Chi square test.

Table 3. Analgesia Requirements

		GROUP A (N=50)		GROUP B (N=50)		X^2	P-VALUE
PATIENTS REQUIRED ANALGESIA		N	%	N	%		
		50	100	50	100		
1^{ST} POST-OPERATIVE 24HRS.	No analgesia	0	0	0	0	$\chi2$=6.465*	0.011*
	Oral paracetamol	12	24	33	66		
	Inj.Ketorolac	38	76	17	34		
7^{TH} POD	No analgesia	23	46	50	100	$\chi2$=11.503*	MCP=0.002*
	Oral paracetamol	18	36	0	0		
	Inj.Ketorolac	5	10	0	0		
MEAN OF DURATION FOR WHICH PATIENTS REQUIRED ANALGESIA		9.8		3.45		t=38.371*	<0.001*
STANDARD DEVIATION		0.67121		0.3118			
RANGE		5-14DAYS		2-6 DAYS			

P is the p-value used to compare Group A and Group B; * denotes statistical significance at p ≤0.05; FE is for Fisher Exact; and MC stands for the Monte Carlo method, x2: Chi square test.

Table 4. Comparison of the incidence of postoperative hypoesthesia and numbness in the two groups.

		GROUP (A) N=50		GROUP (B) N = 50		X^2	P
		N	%	N	%		
1^{ST} POD	Numbness	0	0	12	24	5.714*	
	Hypoesthesia	5	10	15	30	2.500	0.047*
7^{TH} POD	Numbness	0	0	12	24	5.714*	
	Hypoesthesia	2	4	10	20	2.057	0.047*
1 MONTH	Numbness	5	10	7	14	0.229	
	Hypoesthesia	7	14	17	34	2.133	0.05
3 MONTHS	Numbness	5	10	10	20	0.173	0.05
	Hypoesthesia	0	0	5	10	2.105	
6 MONTHS	Numbness	5	10	7	14	0.229	1.000
HYPOESTHESIA		0	0	0	0	-	

P is the p-value used to compare Group A and Group B; * denotes statistical significance at p ≤0.05; FE is for Fisher Exact, MC: Monte Carlo, x2: Chi square test.

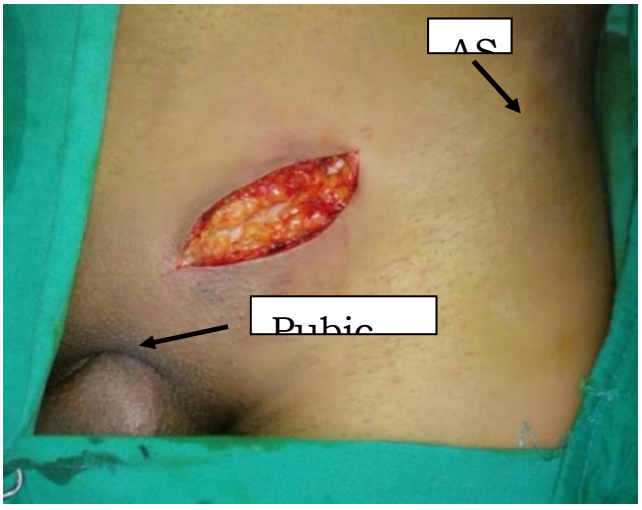

Figure 1. Inguinal skin incision approximately 7cm long, 1 cm above and parallel to the inguinal ligament.

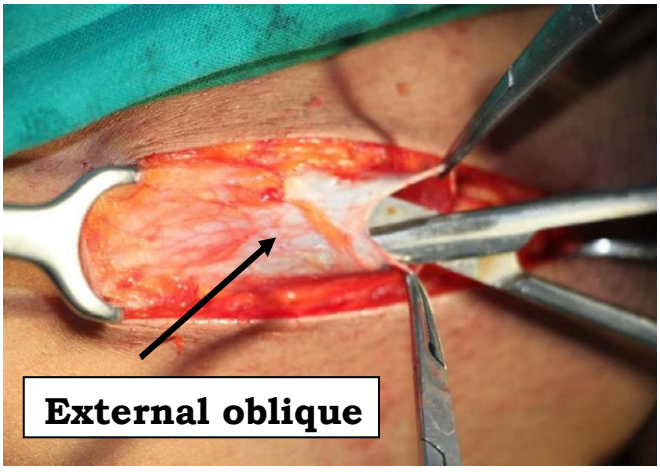

Figure 2. Opening of external oblique aponeurosis in the same direction.

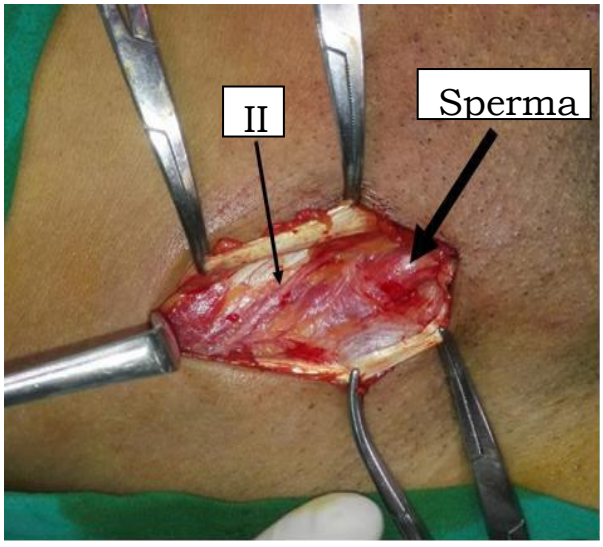

Figure 3. Elevation of external oblique aponeurosis flaps and identifying contents of inguinal canal. *thick arrow = spermatic cord. *thin arrow = IIN

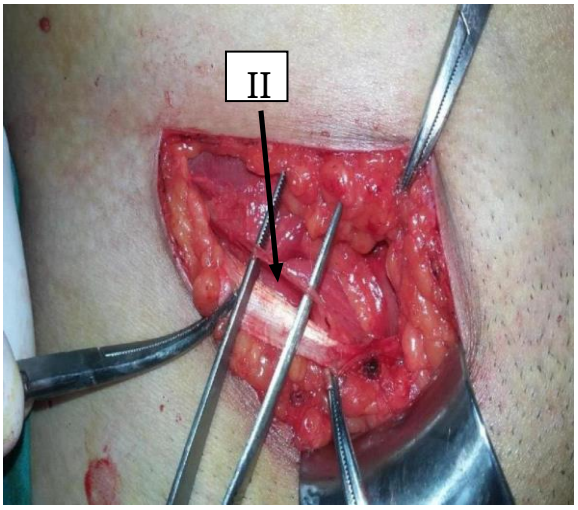

Figure 4. IIN running over spermatic cord and its coverings within inguinal canal

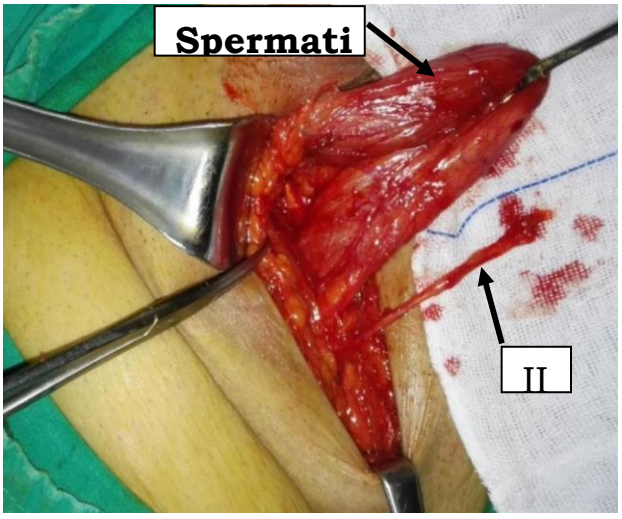

Figure 5. In group B; IIN nerve was cut medially and dissected laterally with mobilization of spermatic cord.

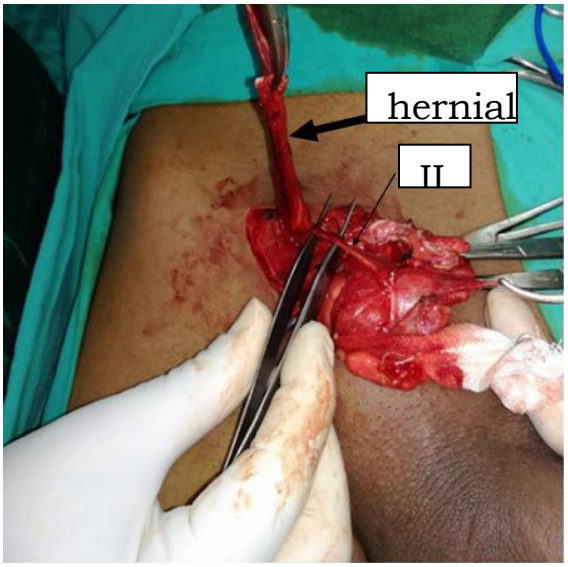

Figure 6. In group A; IIN was preserved after dissection of indirect hernial sac. thick arrow = indirect hernial sac after its dissection from cord

structures. thin arrow = IIN.

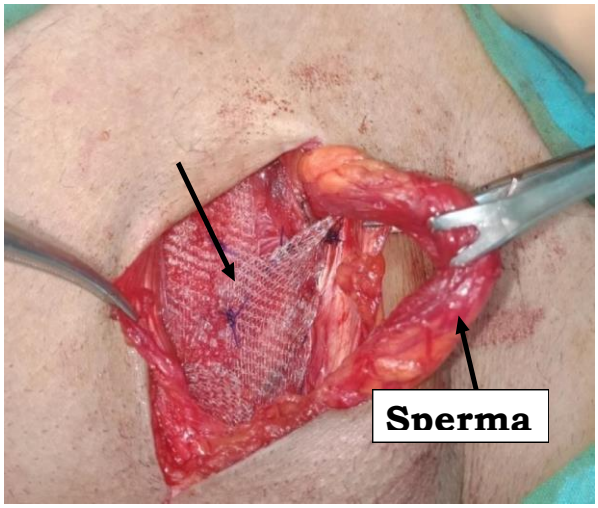

Figure 7. IIN was excised and mesh was placed (group B).

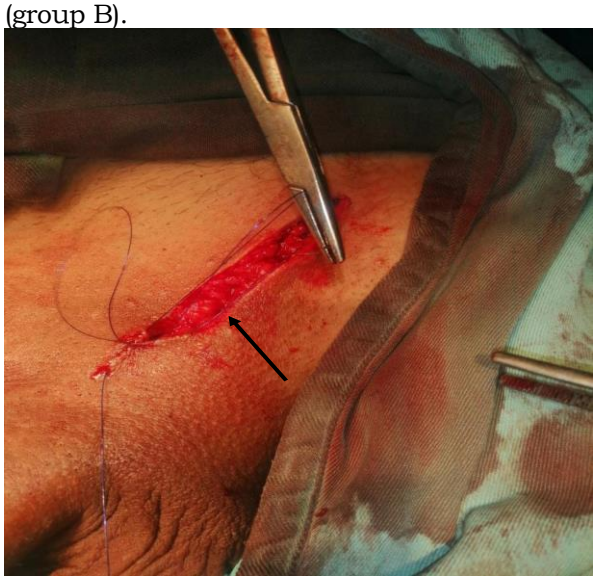

Figure 8. Subcuticular closure of skin incision was done with prolene 3.0

4. Discussion

Conventional surgical methods stipulate that the ilioinguinal nerve must be maintained during the entire healing process due to the potential for morbidity related to cutaneous sensory loss and persistent groine discomfort after nerve damage.[7]

The current results revealed that; there were significant differences in both groups for the first postoperative 24 hours and the 7th POD (patients managed non-analgesia, patients administered oral paracetamol, and patients managed by injectable ketorolac) ($p<0.011$*; =0.002) respectively. In both groups, there was a significant difference in the mean duration for which patients needed analgesia ($p<0.001$*).

In a study by Aguiar-Santos et al., at 12 h in group A, 18 (90%) patients were relieved by regular analgesia consisting of NSAIDs only, and two (10%) patients needed opioid analgesia. In group B, 17 (85%) patients were relieved by regular analgesia and three (15%) patients needed opioid analgesia. At 24 h, 16 (80%) patients needed regular analgesia in both groups, and only one patient needed opioid analgesia in group B. On the 7th day, three (15%) patients in Group A and two (10%) patients in Group B needed regular analgesia. Analgesic needs at seven days were significantly lower than those at 12 and 24 hours .[8]

The current results revealed that, regarding postoperative groin pain, the difference between both groups was statistically significantly lower in group B than in group A ($p<0.05$).

In a previous study by Dittrick, et al., researchers found that The preservation group experienced statistically significantly higher pain than the elective neurectomy group at one month postoperatively (21% vs 5%) and at six and twelve months (3 vs 26%) and (3 vs 25%), respectively .[9]

The current study revealed that, after six months, there was a noticeable drop in the incidence of postoperative numbness and hypoesthesia.

However, Gupton and Varacallo stated that follow-up of individuals in both groups after six months revealed that there were no statistically significant variations between the two groups regarding postoperative pain after six months at rest ($P = 0.152$); however, there were statistically significant variations after cycling for 10 minutes, walking up three flights of stairs, and coughing ten times, as group B had 30% and group A had 5% postoperative pain ($P < 0.05$) .[10]

After six months, Mellick et al. found hat patients who underwent elective neurectomy after open inguinal hernia surgery had a considerably reduced incidence of chronic groine discomfort (3 vs 2.5%) compared to the control group. They did not measure groine numbness or pain following different activities like the current study did .[11]

The current results revealed that; 18 patients developed mild edema. 12 of them (24%) were in group A and only 3 patients (6%) in group B, which was explained by the associated varicocelectomy and the higher number of inguino-scrotal hernias in group A.

The two groups' combined rate of postoperative complications in the Gupton and Varacallo research was 20%. The most common, detected in 10% of cases in both group A and group B, was superficial wound infection. The second most frequent complication, inguinal hematoma, occurred in 5% of instances in both groups .[10]

Limitations: Even though the study sample was smaller, and the follow-up duration was shorter than other investigators had reported, postoperative neuralgia reduction was still beneficial with little impact on other morbidities.

Recommendation: For patients having

Lichtenstein tension-free mesh hernioplasty for an inguinal hernia, routine IIN excision was necessary.

4. Conclusion

After the Lichtenstein tension-free hernioplasty, there was a marked decrease in chronic postoperative pain following ilioinguinal nerve excision. Moreover, there are no extra morbidities related to localized cutaneous neurosensory impairments or declines in quality of life that are linked to the treatment. It is advisable to see ilioinguinal neurectomy as a standard surgical procedure while performing open mesh hernioplasty.

Disclosure

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Authorship

All authors have a substantial contribution to the article

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Conflicts of interest

There are no conflicts of interest.

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