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POSTOPERATIVE PAIN;

COMPARISON AFTER PRESERVATION AND ELECTIVE DIVISION OF ILIOINGUINAL NERVE IN INGUINAL HERNIOPLASTY

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ABSTRACT.. Introduction: Postoperative inguinal pain is one of the most significant complications following inguinal hernia repair. Routine ilioinguinal nerve excision has been proposed as a means to avoid this complication. **Objectives:** To compare the postoperative pain after preservation and elective division of ilioinguinal nerve during inguinal hernioplasty. **Methods:** This was a Randomized Controlled Trial conducted at the department of general surgery at KVSS Site Hospital for a period of 6 months from Jun 2011 to Nov 2011. 84 patients who underwent mesh hernioplasty for unilateral inguinal hernia, were randomly assigned into two groups (A and B), 42 in each group. Ilioinguinal nerve was preserved in group A patients, whereas elective division was carried out in patients of group B. Mean postoperative pain scores were recorded using numerical analogue scale on first and third postoperative day, and one month after surgery. The SPSS version 16 was applied to the data. **Results:** Mean±SD age was 38.46±14.36 years. Seventy four (88.1%) patients were male whereas ten (11.9%) were female, with male to female ratio being 7:1. Using the numerical analogue scale to detect pain severity on postsurgical day 1 and 3, mean scores±SD in the nerve-preservation and nerve-excision groups were 2.88±0.43 versus 2.04±0.39, and 1.95±0.39 versus 1.43±0.44, respectively ($p<0.05$). At 1 month after surgery, these scores were 1.73±0.62 versus 0.98±0.25, respectively ($p<0.05$). **Conclusions:** Postoperative pain after inguinal hernioplasty significantly decreases in elective division of ilioinguinal nerve as compared to nerve preservation.

Key words: Ilioinguinal nerve, Hernioplasty, Inguinal hernia

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INTRODUCTION

Inguinal hernia is the most frequent clinical entity requiring surgical procedure for its cure; and accounts for approximately 75% of all forms of hernia[1]. It is more common in males than in females[2]. The first successful repair of inguinal hernia was performed by Bassini in 1884[3]. Since then, marked revolution of operative procedures in the field of hernia surgery has taken place. Various techniques have been reported in literature like Lotheissen, McVay, Shouldice,[4] but dramatic change appeared when Lichtenstein first introduced mesh for tension-less reconstruction of hernia defect which later became the gold standard[5].

Following open inguinal hernia repair, groin pain is a significant problem with reported incidence varying from 18% to 63%,[6] and can significantly interfere with normal daily activities[7]. Moreover, the condition can sometimes be annoying and treatment is often difficult and challenging.6 Factors proposed as predictors of post operative pain are damage to inguinal nerves,[8] entrapment of ilioinguinal nerve during suturing,[9] fibrosis of the placed material as well as that of surrounding area, mesh implantation[10], partial division and neuroma formation[11].

Elective division of the ilioinguinal nerve has been proposed by some authors to reduce the risk of

postoperative pain[12]. Initially, it was recommended that nerve preservation minimizes the incidence of chronic pain[13]. Later, some studies highlighted the significance of elective nerve division to reduce the postoperative pain[6]. A research reports that post operative pain reduces to 0.7 ± 0.7 (mean pain score ± SD) with elective nerve division as compared to 1.5 ± 0.7 in nerve preservation group ($p < 0.001$).14 Still there is no final consensus about the optimal method. Therefore, this study was designed to compare the postoperative pain scores after preservation and elective division of ilioinguinal nerve in inguinal hernioplasty on the basis of numerical analogue scoring system so that a better alternative would be opted to minimize the pain after hernioplasty.

METHODOLOGY

This was a Randomized Controlled Trial conducted at the department of general surgery at KVSS Site Hospital for a period of 6 months from 1ST June1ST June 2011 to 30th Nov 2011.

Eighty four patients who underwent mesh hernioplasty for unilateral inguinal hernia were selected during study period on the basis of pre-determined criteria and were randomly assigned into two groups (A and B), 42 in each group, by random allocation software version 1.0.0. Ilioinguinal nerve was preserved in group A, whereas elective division was carried out in group B. The sample size was calculated using G-power 3.01 statistical software with 95% power of the test and 95% confidence interval. Sample was collected via non-probability purposive sampling after informed consent. Approval of ethical committee was sought. Mean postoperative pain scores were recorded using numerical analogue scale on first and third postoperative day, and one month after surgery.

The data of all patients was entered on a proforma designed for the study which contained demographic information (age and gender), hospital registration number, site of hernia (right or left), type of hernia (direct, indirect or both), size of hernia (bubonocele, funicular or complete), duration of hernia (<5 years or >5 years), postoperative pain score (on first and third postoperative days, and one month after surgery), and final outcome (i.e. pain score after one month of surgery).

The inclusion criteria comprised of male and female patients, more than 20 years of age, having unilateral inguinal hernia of any duration and type. Confounding variables were controlled by excluding those who had recurrent, bilateral inguinal hernias, and those who had complicated hernias like irreducible, obstructed, and/or strangulated. Stratification was also performed with regard to age, gender, site of hernia, type of hernia, size and duration of hernia to control confounders. To minimized bias, all procedures were performed by senior residents (postgraduate trainee 3-4 years) under supervision of consultant by standard technique, similar postoperative treatment given to every patient and all data were filled by independent observer who was trained to fill the pro-forma beforehand and unaware of study.

Data were analyzed by using SPSS version 16.0. Mean and standard deviation were computed for numerical variables like age and mean pain scores; whereas frequency and percentages were employed to assess the categorical variable like gender, site and type of hernia. Stratification was done with regard to age, gender, site, type, size and duration of hernia to control the effect modifier. Unpaired student t-test was used to compare the mean postoperative pain scores between the groups. Statistical significance was taken at $p<0.05$.

The inclusion criteria comprised of male and female patients, more than 20 years of age, having unilateral inguinal hernia of any duration and type.

Pre-operative Assessment

After admission in ward, all patients underwent preoperative evaluation. These included detailed history and physical examination followed by base line investigations including complete blood count, blood sedimentation rate, serum urea, serum creatinine, serum electrolytes, urinalysis

and chest X-rays; ECG was also performed in patients more than 40 years of age. All patients were then also evaluated by anesthesia department for fitness and were put on operative list. They were advised to take a bath a day before the procedure and not to ingest anything orally midnight onwards, on the night before surgery.

Operative technique

On the day of surgery, all patients underwent shaving of their operative area on operation table and received their prophylactic dose of Injection Co-amoxiclav 1.2 gram intravenously before induction of anesthesia. A postgraduate trainee (3/4 years) started the case under the supervision of a consultant. Following usual protocol of antisepsis, a 5–6 cm skin incision was placed 2 cm above the medial 2/3rd of inguinal ligament from the pubic tubercle and extended laterally within the Langerhan's line. Then subcutaneous tissue was dissected in the line of incision securing hemostasis by ligating superficial epigastric, superficial pudendal and circumflex iliac vessels. External oblique aponeurosis was opened also in the line of incision; upper leaf of which was separated from conjoint tendon and lower leaf was freed from the spermatic cord up to the level of inguinal ligament via blunt dissection technique. Then spermatic cord was lifted from the pubic tubercle and meticulously separated from the posterior inguinal wall up to the level of deep ring. While lifting the cord, the ilioinguinal nerve was identified. In group A patients, the ilioinguinal nerve was carefully dissected and protected with extreme care throughout the procedure, while in group B patients, the whole nerve was excised as far lateral to the deep ring as possible. The cut ends were left alone without implantation into muscle or ligation.

Then, coverings of the spermatic cord (including cremastric and internal spermatic fascia) were incised transversely or longitudinally at the level of deep ring. Indirect hernial sac was visualized as pearly white structure and was freed from the cord to a point beyond the neck of the sac, transfixed and dissected then. In the event of direct hernias, if large, the direct sac was inverted with an absorbable suture material. A sheet of 6 × 11 cm of monofilament polypropylene mesh was utilized. The mesh was tailored to its standard shape, with a lower sharper angle to fit into the angle between the inguinal ligament and the rectus sheath and an upper wider angle to spread over the rectus sheath. With the cord retracted upward, the sharper corner was sutured with a non-absorbable monofilament suture material to the insertion of the rectus sheath to the pubic bone and overlapping the bone by 1 to 2 cm. This suture was continued to attach the lower edge of the patch to the inguinal ligament up to a point just lateral to the internal ring. A slit was made at the lateral end of the mesh, creating two tails, a wide one (two-thirds) above and a narrower one (one-third) below. The wider upper tail was grasped with forceps and passed underneath the spermatic cord; this positions the cord between the two tails of the mesh. The wider upper tail was crossed and placed over the narrower one and held with a hemostat. With the cord retracted downward and the upper leaf of the external oblique aponeurosis retracted upward, the upper edge of the patch was sutured in place with two interrupted absorbable sutures; one to the rectus sheath and the other to the internal oblique aponeurosis, just lateral to the internal ring. Using a single non-absorbable monofilament suture, the lower edges of each of the two tails were fixed to the inguinal ligament just lateral to the completion knot of the lower running suture. This created a new internal ring made of mesh. The excess patch on the lateral side was trimmed, leaving at least 5 cm of mesh beyond the internal ring. This was tucked underneath the external oblique aponeurosis, which was then closed over the cord with an absorbable suture. Subcutaneous fat stitched intermittently with absorbable suture. Skin approximated with silk suture interrupted stitches. Aseptic dressing was done. Patients were shifted to recovery department and then shifted to the ward after assessment of recovery doctor and staff nurse.

Postoperative course and follow-up

Postoperatively, patients received parenteral non-steroidal anti-inflammatory drugs (diclofenac sodium) twelve hourly for first two days followed by

oral non-opioid analgesics up to discharge along with oral Co-amoxiclav (625 mg eight hourly). Pain was assessed by numerical analogue scoring system on first and third postoperative days, and one month after surgery by senior resident (postgraduate trainee 3/4 years). Patient was asked to point the value on the scale according to the severity of pain perceived. Those who lost to follow up in outpatient department after one month of surgery were excluded from the study and similar numbers of patients were recruited.

RESULTS

Age Distribution

The range of age of patients was between 21 to 78 years. Majority of the patients (33.3%) were between 20 to 30 years of age. Twenty five cases (29.8%) were between 31 to 40 years of age. Fifteen (17.9%) were between 41 to 50 years, seven (8.3%) between 51 to 60 years, five (5.9%) between 61 to 70 and four (4.8%) between 71 to 80 years of age group. Overall mean age ± SD was 38.46 ± 14.36 years. In group A, mean age± SD was 37.17 ± 14.32 years while in group B, it was 39.76 ± 14.46 years.

Gender Distribution

Seventy four (88.1%) patients in this study were males, out of which 36 (48.6%) were in group A and 38 (51.4%) were in group B. Ten (11.9%) were female, 6 (60%) were in group A and 04 (40%) were in group B. Male to female ratio was 7:1.

Type of Hernia

Forty one patients (48.8%) had an indirect inguinal hernia, 22 (26.2%) had direct inguinal hernia and 21 (25%) had both varieties. Table I shows further details.

Site of Hernia

Right inguinal hernia was encountered in 55 (65.5%) patients while 29 (34.5%) patients had their hernia on left side. Out of 55, 30 (54.5%) patients belonged to group A while 25(45.5%) in group B. 12 (41.4%) patients with left inguinal hernia belonged to Group A while 17 (58.6%) belonged to Group B.

Size of Hernia

Thirty one (36.9%) patients had their inguinal hernia of bubonocele variety, 28 (33.3%) had funicular and 25 (29.8%) had complete inguinal hernia. Out of 31 cases having bubonocele variety, 14 (45.2%) were found in group A while 17 (54.8%) patients were in group B. Funicular variety was encountered equally in both groups.

Duration of Hernia

Majority of patients (69%) had history of their inguinal hernia of more than 5 years, whereas 26(31%) patients had history of less than 5 years. Those who had history more than 5 years of duration, 28(48.3%) were in group A and 30(51.7%) patients were belonged to group B (Fig-1).

Post-operative Pain

Mean±SD postoperative scores on first and second postoperative day and one month after surgery are shown in Table II.

Type of Hernia	Group A (Nerve Preservation)	Group B (Nerve Division)	Total			
	(n = 42)	%	(n = 42)	%	(n = 84)	%
Direct	08	36.4	14	63.6	22	26.2
Indirect	21	51.2	20	48.8	41	48.8
Both	13	61.9	08	38.1	21	25

Table-I. Type of Inguinal Hernia

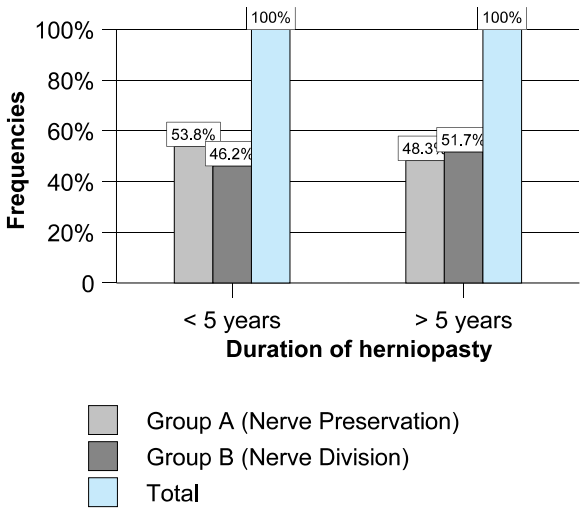

Fig-1

	Group A (Nerve Preservation) (n=42)	Group B (Nerve Division) (n=42)
Mean pain scores ± SD on 1st post-op day	2.88±0.39	2.04±0.39
Mean pain scores ± SD on 2nd post-op day	1.95±0.39	1.43±0.44
Mean pain scores ± SD one month after surgery	1.73±0.62	0.98±0.25

Table-II. Mean Post-operative scores on 1st and 3rd post-operative days and one month after surgery

p-value < 0.05

DISCUSSION

The results of current study showed a significant difference in mean pain scores one month after surgery in elective ilioinguinal nerve division group as compared to nerve preservation group in inguinal hernioplasty.

The age incidence was distributed in all decades of life. This study revealed that most (33.3%) of the cases of inguinal hernia were between 20-30 years of age group with mean age of 38.46 years, as previously observed by Sanjay and Woodward[15] in their case series of 153 inguinal hernia patients. Contrary to this, Haq et al[16] noticed predominantly older age group in their study. Thus, inguinal hernia is a disease of all age group. Prolonged straining and heavy lifting are mostly the causes in younger patients while urinary problems are chief etiology in older ages as a result of benign prostatic hyperplasia[17,18].

Inguinal hernia is more frequent in males. Paajanen and Varjo[19] observed 97% of males and 3% of females in their ten-year audit of Lichtenstein repair of 281 patients. Alfieri et al[11] also encountered major proportion of male patients in their prospective case study. This study demonstrated 88.1% male patients as compared to 11.9% females having inguinal hernia.

In this study, 65.5% of cases had right inguinal hernia; majority of them had indirect variety (48.8%). Desarda[20] mentioned 49% of indirect type of inguinal hernia in his study of 256 patients, which is nearly comparable to this study. Critical analysis of cases of this study further revealed that most of them (69%) had history of their inguinal hernia of more than 5 years. This delay is because of illiteracy and financial constraints among peoples of developing countries. Alam et al[21] also noticed patients having longer duration of history in their case series.

Among various complications of mesh hernioplasty, pain is a significant and incapacitating problem that represents an important diagnostic and therapeutic challenge. Normal postoperative pain affects patients' immediately after surgery and gradually subsides within a few days. Some patients experience chronic debilitating pain that is often unresponsive to medical treatment, including non-steroidal anti-inflammatory drugs and opiates. The exact cause of this pain is unknown. One of the mechanisms responsible for this chronic pain may be the damage to the ilioinguinal nerve passing through the inguinal region[22]. It may be traumatized during surgery and/or entrapped in scar tissue or mesh[17-19].

The standard attempts at pain resolution include medications such as gabapentin, psychotropic

drugs, analgesics of various classes, physical therapy, biofeedback, and percutaneous treatment with local anesthetics, steroids, phenol, alcohol and radiofrequency destruction. However, there are no reliable long-term reports of the results of such treatments[23]. Although, surgical revision and neurectomy is considered to be the treatment of choice in chronic groin pain but merely 60% of patients were cured with this modality and favorable prognosis was encountered only with removal of mesh[24].

As a consequence of difficult management and variable results of neurectomy, prophylactic elective division of ilioinguinal nerve became rationalized. In pilot study of 20 primary bilateral inguinal hernias that underwent open-tension free mesh repair, Ravichandran et al[25] showed no significant increase in postoperative symptoms after elective division of ilioinguinal nerve. Afterward, various randomized controlled trials on large sample size proved the efficacy of this technique[14,26].

Smed and associates[26] prospectively divided 525 patients of Lichtenstein hernioplasty into elective preservation and division groups. They concluded that nerve resection strategy with the consequent removal of nerves 'at risk' gives a significantly better outcome in Lichtenstein hernioplasty.

Crea and Pata[27] randomized ninety-seven consecutive patients into nerve division and preservation groups. They found reduced intensity of mild to moderate chronic groin pain after six months in prophylactic nerve division group as compared to preservation group.

Dittrick and co-workers[28] retrospectively reviewed the outcome of nerve excision or preservation in ninety patients underwent mesh hernioplasty. They encountered significantly lower incidence of neuralgia in neurectomy group versus nerve preservation group (3% versus 26%, $p<0.001$). Tsakayannis and colleagues[29] observed no persistent groin pain in their prospective trial of ilioinguinal and iliohypogastric neurectomy after hernia surgery. They concluded that elective neurectomy is safe to perform, well tolerated by patients, and is not associated with chronic postoperative inguinal pain.

Prophylactic ilioinguinal neurectomy is associated with significant reduction in postoperative groin pain. In this study, mean pain scores assessed by numerical analogue scale was 1.73 in patients of nerve preservation group as compared to 0.98 in ilioinguinal neurectomy group patients ($p<0.05$), which is nearly comparable to the study conducted by Malekpour et al[14].

CONCLUSIONS AND RECOMMENDATIONS

The result obtained from this study suggests that postoperative pain after inguinal hernioplasty significantly decreases in elective division of ilioinguinal nerve as compared to nerve preservation. Therefore, this management strategy should be routinely practiced in reducing postoperative pain after mesh hernioplasty.

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