

Comparative Evaluation Of Preservation Versus Elective Division Of The Ilioinguinal Nerve In Open Mesh Repair Of Inguinal Hernias

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Citation

A Bansal., S Rabha, M Griwan, Y Karthikeyan. *Comparative Evaluation Of Preservation Versus Elective Division Of The Ilioinguinal Nerve In Open Mesh Repair Of Inguinal Hernias*. The Internet Journal of Surgery. 2013 Volume 30 Number 1.

Abstract

Chronic neuralgia is the most serious and debilitating long-term complication after mesh repair of a groin hernia. The ilioinguinal nerve is the most commonly involved. Patients and Methods: Fifty patients of inguinal hernia divided into nerve excision (group I) and nerve preservation group (group II) were studied for presence and severity of pain, paresthesia and loss of sensation at 1, 3 and 6 months. Observation: Pain was not a significant complaint at 1 month. At 6 months, 1 (4%) patient had mild pain and 2 (8%) patients moderate pain in group II and none had pain in group I. Numbness was higher in group I (12 patients) than in group II (9 patients) (48% versus 36%) after 1 month of follow-up. Conclusion: Routine identification and elective excision of ilioinguinal nerve during open mesh repair of inguinal hernia decreases the incidence of chronic neuralgia, but this was not statistically significant.

INTRODUCTION

The radical cure of inguinal hernias, as envisioned by Billroth, became a reality in the late 1950s and early 1960s, when Francis C. Usher introduced polyethylene (later replaced by polypropylene) for hernioplasty.¹ Recurrent hernia and chronic pain remain the most serious long-term complications following inguinal hernia repair. After the widespread use of tension-free mesh repair, the risk of recurrence has lowered leaving chronic pain as the primary complication of inguinal hernia repair. With thousands of hernia surgeries performed each year, even a small incidence of 1% to 2% can result in a large number of patients with chronic pain. Considering the devastating influence of severe pain, especially on daily activities, it is more important to decrease the pain than the risk of recurrence as a complication after inguinal hernia repair. Pain and burning sensation in the inguinal region that occurs immediately after surgery is easily treated with analgesics and gradually subsides as the wound heals. But chronic neuralgia is the most serious and debilitating long-term complication that can occur after repair of a groin hernia. It represents a substantial diagnostic and therapeutic challenge.² Neuropathic pain is usually caused by actual involvement of any of these three nerves: ilioinguinal nerve, iliohypogastric nerve and the genital branches of the genitofemoral nerve, of which the ilioinguinal nerve is involved most commonly.

The main causes of injury are inadequate dissection, failure to visualize and protect the nerve during the hernia repair and failure to recognize the aberrant location and anatomic variations of the nerve.³

The ilioinguinal nerve is also the most commonly involved nerve in perineural fibrosis. It has the highest risk for entrapment because it lies immediately beneath the divided external oblique fascia and can be included in sutures used for hernia repair or to reapproximate the external oblique fascia. Mesh placed atop the internal oblique fascia/muscle can adhere to the ilioinguinal and/or iliohypogastric nerves during healing.^{4,5} This study was conducted to evaluate the effect of preservation or elective division of the ilioinguinal nerve on chronic inguinal pain and other postoperative symptoms like numbness and loss of touch sensation after open inguinal hernia repair with mesh.

PATIENTS AND METHODS

This study was conducted on 50 patients of inguinal hernia (either direct or indirect) from February 2009 to August 2010 admitted in the surgical ward of Pt.B.D.Sharma Post Graduate Institute of Medical Sciences, Rohtak. The institutional ethics committee approved the study. Prior to admission, proper screening along with detailed clinical evaluation of each patient was carried out in the following form:

Only male patients were included in the study.

The following patients were excluded from the present study: age <14 years, obstructed inguinal hernia, strangulated inguinal hernia, recurrent inguinal hernia and hernia cases admitted through the emergency department. The patients were divided into a study (group I) and a control group (group II) of twenty-five patients each by computer-generated simple randomization. Patients in both groups were operated in elective list and following observations were made during follow-up visits at 1 month, 3 months and 6 months for the presence and severity of pain in the distribution of the ilioinguinal nerve. The presence and severity of paresthesia in the distribution of the ilioinguinal nerve in the form of numbness, loss of touch sensation and loss of pain sensation were also assessed.

The Visual Analog Scale (VAS) was used as a standard scale for rating pain. The reliability and validity of this scale among other pain scales has been acceptable.

Group I (Study group): included patients in whom the ilioinguinal nerve was excised after its identification.

Group II (Control group): The ilioinguinal nerve was identified during surgery and preserved.

All the surgeries in both groups were performed by the same surgeon with vast experience in open meshplasty for inguinal hernia. In the study group, the ilioinguinal nerve was identified after carefully opening the external oblique fascia. The nerve was seen following the spermatic cord lying over the ventral surface of the cremasteric sheath and exiting through the external ring. After adequate exposure of the nerve, it was cut sharply with a blade/scissor about 1cm lateral to the internal inguinal ring and the distal segment of the nerve was resected up to the superficial inguinal ring. The proximal end of the nerve was then allowed to retract back into the internal oblique muscle layer. Neither electrocautery nor suture material was used in dividing the nerve. The excised segment of the nerve which was 3cm to 4cm in most cases was sent for routine histopathological examination. Hernia repair was carried out by the Lichtenstein tension-free mesh repair method. A polypropylene mesh was used in both groups and fixed with 2-0 prolene suture.

In the control group, the ilioinguinal nerve was identified and all possible care was taken to keep it intact till the end of procedure. Any effort leading to injury/transection of the nerve excluded the patient from the study. After identification of the nerve, the hernia repair was carried out in the same manner as in group I.

Presence and severity of pain in the distribution of the

ilioinguinal nerve was assessed on a visual analog scale (VAS) of 0-10 during follow-up visits at one, three and six months. A score of 0 to 1, 1 to 5 and greater than 5 was graded as mild, moderate and severe pain (according to Page and associates).⁶

Severity of paresthesia in the distribution of the ilioinguinal nerve was described as presence or absence of numbness, touch sensation and pain sensation. The patient was assessed on a 4-point scale (no pain, mild, moderate and severe pain with scores of 0, 1, 2 and 3, respectively). Presence of numbness and its severity was self-assessed by the patient. Presence and severity of loss of touch sensation was assessed using a non-toothed forceps and examined by the same observer at follow-up visits. The distribution area of the ilioinguinal nerve in the groin of the patient was touched with the tip of the non-toothed forceps and the patient was asked for loss of touch sensation.

Regarding assessment of presence and severity of loss of pain sensation, a toothed forceps was used and the skin was pinched in the distribution area of the ilioinguinal nerve in the groin and the patients were asked for presence or absence of pain sensation.

All the observations on the patients were made by the same surgeon blinded to the procedure done to the patient.

OBSERVATIONS

The mean age of patients in group I was 62.04 ± 4.62 (range 55-75) years, whereas in group II it was 50.52 ± 16.57 (range 19-70) years.

Tissue specimens of the excised nerve segment of group I subjects were routinely sent for histopathological examination in a formalin container. Reports of all 25 specimens were consistent with a nerve segment.

At one month after surgery, pain was absent in 5 (20%) patients and 10 (40%) patients, mild in 11 (44%) and 5 (20%) and moderate in 9 (36%) and 10 (40%), in groups I and II respectively. None of the patients in both groups had severe pain at 1 month. The p-value at 1 month was 0.122, which was insignificant (>0.05).

Pain was absent in 23 (92%) patients and mild in 2 (8%) in both groups at 3-month follow-up. None of the patients had moderate or severe pain. So both groups had an equal number of patients (2) with a mild degree (VAS=1) of chronic pain. The p-value was 1 (insignificant).

At six months, both patients in group I who had mild pain at 3 months showed improvement without any treatment and thus no patients were left with pain in this group. In group II, out of the two patients who had mild pain at 3-month follow-

up, one patient persisted with mild pain and another complained of increased severity of pain with a visual analog score of 2 (moderate pain). Another patient emerged with newly diagnosed pain, who had been completely symptom-free at one and three-month follow-up, but started complaining of moderate pain at 6-month follow-up. Both these patients (moderate pain) complained of pain at the groin region only while twisting around the waist, cycling for around 10 minutes or while doing strenuous work, but had no pain at rest. So at the end of six-month follow-up we had 1 (4%) patient with mild pain and 2 (8%) patients with moderate pain in group II. The p-value at 6 months was 0.07, hence insignificant.

Numbness was higher in group I (12 patients) than in group II (9 patients) (48% versus 36%) after 1 month of follow-up. The p-value was 0.390 (>0.05).

At 3 months, 1 (4%) patient in group I and 2 (8%) patients in group II complained of numbness. The p-value was 0.551 (insignificant).

At 6 months of follow-up, only 1 patient had persistent numbness in group I, whereas none of the patients complained of numbness in group II. The p-value was 0.312, hence insignificant.

These data show that, although numbness decreased in both groups with time, it still persisted in one patient of group I. All patients who complained of numbness had only a mild form of the symptom with a score of 1. None of the patients considered the symptoms incapacitating

At 1-month follow-up 8 (32%) patients in group I and 6 (24%) patients in group II had loss of touch sensation. But after 3 months of follow-up, only 2 (8%) patients in group I and 1 (4%) patient in group II had loss of touch sensation. None in both groups had any complaints at 6 months. The p-values at 1 month and at 6 months were 0.528 and 0.551, respectively (hence statistically insignificant).

This shows that, although initially there was a higher number of patients in both the groups who had loss of touch sensation, over the period of time, particularly in group I, they completely improved.

None of the patients in both groups had loss of pain sensation at the follow-up visits at 1 month, 3 months and 6 months.

DISCUSSION

The term 'chronic post-herniorrhaphy pain' has a wide variety of interpretations in the literature. The Committee of the International Association for the Study of Pain defined chronic pain as any pain reported by the patient at or beyond

3 months postoperatively.⁷

After the publication of several retrospective and prospective studies that showed an incidence of 0.78% to 62.9% for post-herniorrhaphy inguinal pain^{8,9}, many investigators and pioneers started to establish algorithms for management of this chronic pain syndromes.^{3,4,10,11,12,13,14}. Others tried to define a method to prevent this complication rather than treat it.

With the use of synthetic mesh for hernia repair, an inflammatory response may last a couple of months as a result of a reaction against the foreign material. Therefore, this study tempted us to include chronic pain criteria at 6 months (end point) after hernia surgery.

The mean age of patients in group I was 62.04±4.62 (range 55-75) years, whereas in group II it was 50.52±16.57 (range 19-70) years. All the patients in both groups were male.

The incidence of chronic pain at 1 month after surgery is being compared between study and control group and no significant difference was found between the two groups. A randomized controlled trial was done by Picchio et al. in 2004 to evaluate the effect of preservation (408 patients) or elective division (405 patients) of the ilioinguinal nerve on pain after open inguinal hernia repair with mesh, showing that 51.5% of patients in the nerve excision group suffered from pain at 1 month, which was much lower than our result (80%). But the result of our study was comparable to Mui et al., where pain at one month in the nerve excision group was 78.7%. The incidence of pain in the nerve preservation group in studies by Picchio et al. and Mui et al. were 50% and 78.7%, respectively, which was almost comparable to our study, but it was in variance to the study conducted by Dittrick et al., who showed that only 21% had pain at 1 month following surgery.

The incidence of chronic pain at 6 months after surgery is being compared between the present series and other studies, where ilioinguinal nerve division or preservation was done (table I).

Table 1

Comparison of pain after ilioinguinal nerve division or preservation at 6 months.

Author(s)	Nerve-division group I		Nerve-preservation group II	
	No. of patients	No. of patients with pain (%)	No. of patients	No. of patients with pain (%)
Ravichandran et al. ¹⁵	20	1 (5%)	20	1 (5%)
Picchio et al. ⁵	358	120 (33.5%)	354	132 (37%)
Dittrick et al. ²	65	2 (3%)	23	6 (26%)
Mui et al. ¹⁶	50	4 (8%)	49	14 (28.6%)
Malekpour et al. ¹⁷	50	3 (6%)	50	10 (21%)
Holkam ¹⁸	26	2 (7.7%)	26	7 (26.9%)
Present Series	25	0	25	3 (12%)

Although there were differences in data regarding the incidence of pain, all these studies show that pain incidence was higher in the nerve-preservation group which was in harmony with the findings of our study. On the contrary, the study by Ravichandran et al., who was the first to assess the effect of division of the ilioinguinal nerve in a randomized setting in 2000, found no evidence to support the benefit of ilioinguinal nerve division at 6 months after surgery with respect to postoperative pain within the limitation of a small sample size.

Besides the potential advantage of reducing chronic inguinal pain, ilioinguinal nerve excision also has the possibility of morbidity associated with sensory loss over the groin region as well as its impact on quality of life. The current study demonstrates that numbness at 1 month (with 48% numbness in the nerve-excision group and 36% in the nerve-preservation group) improved (4% in the nerve-excision group and 8% in the nerve-preservation group) at 3 months follow-up. And at the end of 6 months, numbness persisted in only 1 patient (4%) in the nerve-excision group.

The incidence of paresthesia at 6 months after surgery is being compared between the present series and other studies, where ilioinguinal nerve division or preservation was done, in Table II.

Another parameter evaluated in the present study was loss of touch sensation. In our study, although initially there was some degree of loss of touch sensation (32% in the nerve-excision group and 24% in the nerve-preservation group) at 1 month, at the end of 6 months all patients of both groups showed complete improvement. On the contrary, studies by Ravichandran et al., Picchio et al. and Mui et al. had found that, although the patients suffering from loss of touch sensation gradually improved with time, still the number of

patients suffering from loss of touch sensation was higher in nerve excision group than in the nerve-preservation group at 6 months after surgery.

Table 2

Comparison of paresthesia after ilioinguinal nerve division or preservation at 6 months.

Author(s)	Nerve-division group I		Nerve-preservation group II	
	No. of patients	No. of patients with paresthesia (%)	No. of patients	No. of patients with paresthesia (%)
Ravichandran et al. ¹⁵	20	2 (10%)	20	0%
Picchio et al. ⁵	358	18 (5%)	354	12 (3%)
Dittrick et al. ²	65	12 (18%)	23	1 (4%)
Mui et al. ¹⁶	50	13 (26%)	26	9 (18.4%)
Malekpour et al. ¹⁷	50	1 (2%)	50	1 (2%)
Holkam ¹⁸	26	2 (7.7%)	26	1 (3.8%)
Present Series	25	1 (4%)	25	0%

In the present study, none of the patients in either group had loss of pain sensation in the groin at 1 month, 3 months and 6 months after surgery. Studies by Ravichandran et al. and Picchio et al. show that, although patients suffering from loss of pain sensation gradually recovered with time, still a higher number of patients in the nerve-excision group had loss of pain sensation than in the nerve-preservation group at 6 months after surgery.

In the present series, the number of patients who complained of numbness and loss of touch sensation was higher in the nerve-division group than the nerve-preservation group after surgery and it is thought that nerve division may lead to higher proportions of patients with sensory disturbances, but the findings in both groups gradually improved with time. Thus, concerns regarding postoperative numbness, loss of touch and pain sensation are of secondary importance as progressive compensation from adjacent sensory nerves seems to improve these neurosensory disturbances.

Though the small data in the present study shows that pain after inguinal hernia repair with mesh is a relevant problem and that it is reduced by elective ilioinguinal nerve division, the difference in our results between the neurectomized and non-neurectomized group does not reach statistical significance. Moreover, our study reveals that elective ilioinguinal nerve excision is not associated with additional morbidities in terms of persistent postoperative paresthesia or other neurosensory disturbances in the area of distribution of the nerve. In the meantime, routine excision of the ilioinguinal nerve during inguinal hernia repair may be a reasonable option, particularly keeping in mind that the same

is usually associated with post-hernioplasty chronic groin pain.

CONCLUSION

Chronic pain is a common complication after meshplasty for hernia repair causing significant morbidity to patients. The results of this trial demonstrate that routine identification and elective excision of ilioinguinal nerve during open mesh repair of inguinal hernia decreases the incidence of chronic pain after surgery, but this was not statistically significant. Furthermore, the procedure can be performed safely and is well tolerated by patients without any significant local cutaneous neurosensory disturbances. Each surgeon has his or her own preference for open hernia surgery and dealing with the nerve encountered during surgery. Therefore, it may be suggested that routine identification and elective excision of the ilioinguinal nerve may be a reasonable option without any significant added morbidity to prevent the chronic pain in inguinal hernia repair with mesh. But a larger prospective randomized study is still required to confirm the benefits of routine ilioinguinal neurectomy while doing open inguinal hernia repair with mesh.

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