Nerve(S) Sparing In Mesh Repair Of Inguinal Hernia
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Abstract
Context: Groin hernias are the most common major surgical procedures performed by general surgeons. Two superficial nerves are encountered during this repair, the ilioinguinal and the iliohypogastric nerve. Controversy exists on if these nerves should be preserved or sacrificed. Aim: To study the effect of preservation or division of both ilioinguinal and iliohypogastric nerves on postoperative symptoms and signs following mesh repair of inguinal hernia. Materials and Method: Patients in the study group were randomly divided into group A (38) in whom both nerves were preserved, group B (27) in whom both nerves were severed and group C (6) in whom only one nerve was found which was preserved. These patients were followed up on the 8th day, after 1 month and after 6 months. They were asked for pain and other symptoms, tested for numbness, loss of pain and touch sensation. Results were analyzed. Results: There was no significant difference in postoperative pain and numbness in both groups whereas group B patients showed a significantly higher chance of loss of pain and touch sensation compared to group A. Results of group C patients could not be analyzed because of small sample size and dropouts. Conclusions: Preservation or division of ilioinguinal and iliohypogastric nerves do not affect occurrence of postoperative pain but their division causes significant loss of pain and touch sensation.

INTRODUCTION
One of the commonly performed surgeries for inguinal hernias is tension-free mesh repair (Lichtenstein Mesh Repair). It is also the procedure with the credit of the least recurrence rate.1

Two superficial nerves are encountered during this repair namely

- Ilioinguinal nerve
- Iliohypogastric nerve

A. Iliohypogastric nerve: It pierces the internal oblique muscle from deep to superficial about 1 inch in front of the anterior superior iliac spine (ASIS), runs downwards, forwards and medially superficial to the internal oblique muscle. It becomes subcutaneous by piercing the external oblique muscle 1 inch above the superficial inguinal ring. It supplies the skin over the suprapubic region.2

B. Ilioinguinal nerve: It pierces the internal oblique muscle from deep to superficial just below and medial to the iliohypogastric nerve and runs downwards, forwards and medially. In some patients, it is superficial to the internal oblique muscle under its covering fascia, but in others, it is 1-2mm deep to the surface of the internal oblique muscle under the cover of few muscle fibres. Then it runs along the spermatic cord and emerges through the superficial inguinal ring. It supplies the upper part of the medial side of the thigh, the root of the penis and the upper anterior aspect of the scrotum.2

Controversy exists on if these nerves should be preserved or sacrificed. On review of literature, some authors opine that these nerves should be preserved to prevent postoperative pain and numbness3 and some are of the opinion that these should be sacrificed to prevent postoperative neuropathic pain.4,5 This is a comparative prospective study done to assess the effect of preservation and division of these nerves on postoperative symptoms.

AIM
To study the effect of preservation or division of both ilioinguinal and iliohypogastric nerves over postoperative symptoms (pain) and signs (numbness, loss of pain sensation and loss of touch sensation) following mesh repair of inguinal hernia.
MATERIALS AND METHODS

This study was conducted from September 2009 to August 2010 including a follow-up period of 6 months. All patients undergoing mesh repair for inguinal hernia were included in the study. Patients with recurrent hernias were excluded. The study was designed in a double blinded manner. All patients in the study group were randomly divided into 3 groups based on operative findings and procedure.

Group A in whom both ilioinguinal and iliohypogastric nerves were present and were preserved

Group B in whom both the nerves were present and they were severed

Group C in whom only one nerve could be traced, which was preserved.

Preoperatively, patients were explained about the procedure and informed written consents were taken. Surgeries were done under spinal anaesthesia. During surgery, both ilioinguinal and iliohypogastric nerves were identified. Using blunt as well as sharp dissection, they were separated from the level of the pubic crest to well lateral to the level of the deep inguinal ring (Photo 1). Few muscle fibres of the internal oblique muscle were split aiding in dissection of the ilioinguinal nerve. These split muscle fibres were approximated with intermittent prolene stitches. Care was taken not to damage these nerves during dissection. These nerves were placed away from harm’s way. In patients of group B, they were severed laterally near their exit from the muscles.

Figure 1
Photo 1: Ilioinguinal and iliohypogastric nerves dissected

Following placement and tension-free fixation of the polypropylene mesh, the internal oblique and transversus abdominis muscles were approximated with the inguinal ligament using prolene (Photo 2). Care was taken to avoid tension. This step was performed to prevent contact of preserved nerves with the prosthesis. Cord structures (and preserved nerves in group A) were placed in front of approximated layer (Photo 3) and the external oblique tendon was sutured taking care not to involve nerves in bites. Hemostasis was maintained throughout the procedure.

Figure 2
Photo 2: Approximation of conjoint muscle and inguinal ligament in front of the mesh

Figure 3
Photo 3: Ilioinguinal and iliohypogastric nerves in situ after repair

These patients were followed up on the 8th day, after 1 month and after 6 months. During each visit they were asked
for pain and other symptoms, tested for numbness, loss of pain and touch sensation. Results were tabulated and analyzed using Chi-Square Test / Fisher Exact Test (p - probability) and Odds Ratio (OR).

**OBSERVATION AND RESULTS**

A total of 78 inguinal hernia patients were admitted during the study period. Among these, 7 were recurrent hernias and hence were excluded from study. These patients were divided into three groups based on the operative procedure.

- **Group A** (38 patients) in whom both ilioinguinal and iliohypogastric nerves were present and were preserved
- **Group B** (27 patients) in whom both the nerves were present and were severed
- **Group C** (6 patients) in whom only one nerve could be traced, which was preserved.

The general characteristics of all groups were as shown in table 1.

**Figure 4**

<table>
<thead>
<tr>
<th>Table 1: General Characteristics</th>
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<tbody>
<tr>
<td>Mean Age</td>
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<tr>
<td>Group A (38)</td>
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<tr>
<td>Group B (27)</td>
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<td>Group C (6)</td>
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<tr>
<td>Right Sided Hernia</td>
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<td>Group A (38)</td>
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<td>Group B (27)</td>
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<td>Group C (6)</td>
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<tr>
<td>Presenting Symptoms</td>
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<td>Group A (38)</td>
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<td>Group B (27)</td>
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<td>Group C (6)</td>
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<td>Pain</td>
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<td>Group A (38)</td>
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<td>Group B (27)</td>
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<td>Group C (6)</td>
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<td>Postoperative Complications</td>
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<td>Group A (38)</td>
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<td>Group B (27)</td>
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<td>Group C (6)</td>
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The postoperative period was uneventful in both groups except that 3 patients (7.8%) of group A and 2 (7.4%) of group B had developed scrotal edema which decreased gradually over 3 weeks.

The clinical findings of all patients during the 8th postoperative day follow-up were as shown in table 2. On comparing both groups, no significant difference in pain (p = 0.591) and numbness (p = 0.54) was noted, but significant loss of pain sensation (p = 0.001, OR 6.75) and loss of touch sensation (p < 0.001, OR 8) was noted in group B compared to group A. One patient in group B complained of impotence. He had difficulty in both erection and ejaculation.

**Figure 5**

Table 2: Postoperative Symptoms (pain) and signs (numbness, loss of touch and pain sensation) among patients of group A (both nerves preserved), group B (both nerves cut) and group C (single nerve found which was preserved) [Numbers in bracket indicates percentage values]

During 1st -month follow-up, among group A, 34 patients (89.47%) had come for follow-up with a drop rate of 10.53 % (4 patients). In group B, 24 patients (88.88%) had come for follow-up. Their symptoms and examination findings were as in table 2. There was a significant reduction in pain [5 patients (13.15%) in group A and 6 (22.22%) in group B] in both groups compared to earlier follow-up. On comparing with each other, difference in pain was insignificant (p = 0.726) and numbness was marginally significant (p = 0.055, OR 5.33) in group B. Loss of pain sensation (p < 0.001, OR 7.89) and touch sensation (p<0.001, OR 10.5) was significantly higher in group B compared to group A. One patient in group B who had impotence still had the problem.

During 6th -month follow-up, 26 patients (68.42%) of group A and 18 (66.66%) of group B had come for follow-up. No statistically significant difference was noted in pain (p>0.05) and numbness (p = 0.558, OR 3.13). The chance of loss of pain sensation in group B was 6.87 (OR) times higher (p = 0.005) than in group A. Group B also had a 9.6 (OR) times higher chance of loss of touch sensation (p = 0.008) compared to group A (table 3). The patient with impotence said that his performance was better though it was not the same as before surgery.

Group C: Among these 6 patients, in 4 of them the ilioinguinal nerve was present and in 2 patients, the iliohypogastric nerve was found. Follow-up findings of these patients were as in table 2. Due to limited sample size and
dropouts, no significant conclusion could be drawn in these patients.

Graphs 1, 2 and 3 show graphical representation of follow-up data with their p (OR) values.

DISCUSSION

Comparative analysis of results of our study with two other studies done by Marcello Picchio et al.⁶ and Ravichandran et al.⁷ are shown in table 4. There was significantly low incidence of pain in both groups and high incidence of loss of touch and pain sensation in group B in our study compared to the other studies. But a point to be noted is that both above studies were trials involving the ilioinguinal nerve only with no reference made on the iliohypogastric nerve. But this nerve is also important as it usually gets injured while elevating the upper layer of the external oblique muscle and interferes with fixation of the mesh to the upper muscle layer.

Chronic postoperative pain in patients following hernia repair is due to contraction of mesh, nerve entrapment while suturing the external oblique muscle, contact of cut end of nerves with mesh or inguinal ligament and rarely from neuromas arising from damaged nerves⁴. Contact of nerve and cord structures with prosthetic material appears to be an important factor associated with postoperative pain. In our
study, approximation of conjoint muscle to inguinal ligament was done to prevent contact of nerves and cord structures with mesh. In 56 patients (78.87%) approximation of these two layers was possible without tension. In the remaining 15 patients, this step was not done as there was atrophy of conjoint tendon and approximation without tension was not possible. Postoperative follow-up of symptoms in these patients was similar to the patients in whom muscle and inguinal ligaments were approximated.

Triple neurectomy has been advised to prevent postoperative pain\(^4\),\(^5\), but there is no significant association between nerve preservation or division and postoperative pain as proved by our study. The basic principle behind all surgeries is to preserve physiology. This purpose will not be served if nerves are severed. The concept of “No Nerve No Pain” is to be questioned.

Sometimes these nerves, especially the ilioinguinal nerve, interfere with placement and fixation of mesh by virtue of its abnormal course. In this situation, extra care must be taken to avoid fixing over the nerve.

Though severing the nerves does not show much alteration in postoperative pain, it significantly increases patients with sensory loss, which is not accepted, as it does not have any extra added benefit. Hence every attempt should be made to identify and preserve these nerves in all patients undergoing mesh repair, taking care not to damage them and not to include them in stitches.

Impotence following the mesh repair appears mainly to be psychogenic but certain factors which have to be considered are

Loss of sensation over a wide region involving root of penis, scrotum, suprapubic skin and medial aspect of thigh Damage to the genital branch of the genitofemoral nerve is associated with ejaculatory dysfunction\(^8\)

Dysejaculation syndrome\(^9\)

**CONCLUSION**

Preservation or division of ilioinguinal and iliohypogastric nerves do not affect occurrence of postoperative pain (p>0.05 at 6 months)

Division of these nerves causes significant loss of pain (p<0.005 at 6 months) and touch sensation (p<0.008 at 6 months). Hence these nerves should be preserved.

**References**

Author Information

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