Mesh V/s Non Mesh Hernia Repair: Comparison of Cost Effectiveness and Return to Work Among Agricultural Labourers

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Introduction:
Hernia repair is by large the most common operative procedure carried out by Surgeons all over the world. While conventional suture repairs like Modified Bassini’s remain the main method used, they are associated with considerable pain and tension on the suture line. Tension free mesh repair has been touted to be superior to conventional repair, however the cost effectiveness in low socio economic strata remains to be evaluated.

Materials and Methods: A comparative single blinded study was carried out in a teaching hospital. Demographic profile including the socio economic status of patients evaluated. Patients were randomized to undergo either mesh or non mesh repair and followed up for post operative complications, duration of hospital stay, interval between surgery and return to work and loss of work days due to post operative complication.

Results: There were 16 patients each in the mesh and non mesh repair groups. The groups were matched for age, BMI, daily average income, size of dependent family. The time taken for surgery was significantly higher in non mesh group (average 60.3 minutes) compared to mesh repair group (45.6 minutes) with p= 0.000003. The duration of hospital stay after non mesh repair (5.4 days) was significantly higher than after mesh repair (3.8 days; p= 0.003). The post operative complication rates were comparable in the two groups, however the economic loss due to days lost at work was higher in the non mesh group.

Conclusion: Mesh repair appears to offer long term benefits in terms of lower operative time, duration of post operative hospital stay, recurrence rate as well as cost effectiveness

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surgery imposes a great economical burden. The duration of hospital stay and post operative pain is also reported to be low with mesh repair. It becomes more important for the daily wage agricultural workers to return to work early as also to have low post operative problem rate. In this study we have tried to compare the interval from surgery to return to work and cost effectiveness of hernia repair with or without mesh in this class of patients.

Materials and Methods:
This is a comparative single blinded study carried out with approval of Institutional Ethical Committee. Thirty two patients were included in the study from January 2012 to October 2013. Only male patients who were agricultural labourers by profession, with inguinal hernia were included in this study. A written informed consent was obtained from each patient participating in the study. Patients who having bilateral hernias, recurrent hernias and with serious comorbidity were excluded from the study. A detailed proforma was filled for each patient documenting the patients age, site of hernia, BMI (body mass index), duration and type of hernia, daily income from working on agricultural farm, size of family, alternate source of income. Then the patients were randomly allocated to one of the two surgical groups; one group of those undergoing modified Bassini’s repair (Group B) and the second group of those undergoing Lichtenstein repair (with mesh) (Group L). All the patients received standard pre operative preparation and care. During surgery, anaesthesia was given according to protocols. Surgery was performed by consultants with adequate experience of performing hernia repair. For group B, hernia repair was carried out by the standard Modified Bassini procedure using prolene suture. For the group L, hernia repair was done using synthetic prolene mesh fixed by prolene suture. Then duration of surgery was noted for each of the surgery. The cost of surgery including anesthesia, surgical materials and one day of antibiotic doses were documented for each patient.

Post operative evaluation of patient was done by another investigator who was blinded to the type of repair the patient had undergone. Early and late post operative complications, duration of hospital stay, interval between surgery and return to normal work, days lost due to post operative pain and/or complications were documented for each patient. The patients were followed up to one year post surgery to record incidence of recurrence.

Data was analyzed using SPSS (Statistical Package for Social Sciences) version 16. P value was calculated for demographic data by using Student’s t test. For comparison of complication rate among the two groups Fisher’s exact test was used. A value of p< 0.05 was considered to be statistically significant.

Result:
A total of 32 patients were included in the study. This cohort was randomly allocated to Group B (modified Bassini repair) and Group L (mesh repair) with 16 patients in each group. The demographic analysis of both the groups is depicted in table 1.

The patient age ranged between 29 years to 45 years with average of 36.62 years in Group B which was comparable with average age of 37 years (range 30 years to 48 years) in Group L. The average BMI (body mass index) of patients in Group B was 23.4 kg/m2 closely compared to an average of 23.9 kg/m2 in Group L (table1). Socio economic evaluation of the two groups revealed that the daily income per patient in Group B was an average of Rupees 253 and that in Group L was Rupees 246; the difference was not significant with a p value of 0.24. In group B, 6 out of 16 had an alternate source of income (vegetable vending). In group L, 7 out of 16 patients had an alternate source of income. The size of dependent family on the patient per head was an average of 6.1 members in group B and 5.8 members average per head in group L, with a p value of 0.25 hence not significant (Table 1). Hence the two groups were matched in demographic and socio economic profile.
A comparison of the characteristics of hernia in the two groups is depicted in (Table 2). The operative time in mesh repair was significantly lower than in non mesh repair group. It was observed that the average duration of surgery in group B was 60.6 minutes compared to 45.6 minutes in group L with a highly significant p value of 0.000003. (Table 3)

Table 3 shows the occurrence of post operative complications both early and late in the two groups. The overall incidence of complication rate was low in this study and the p value by Fisher’s exact test was not significant at 0.21 for the comparison of complications between the two groups.

We also evaluated the cost of surgical procedure and hospital stay required post operatively in the two groups. The average duration of hospital stay after non mesh repair was 5.4 days compared with 3.8 days after mesh repair yielding a significant p value of 0.003. The higher average hospital stay after surgery after modified Bassini repair was probably because of higher incidence of post operative pain in this group. The average cost of surgery in mesh hernia repair was Rupees 3500 which was significantly higher than that of non mesh repair in which the patient incurred a cost of Rupees 2000 on an average for the surgery. However when it is compared with the number of days lost post surgery due to persistent pain and inability to get back to normal work, we observed that the patients in non mesh repair group B lost about 20 days more, amounting to approximately Rupees 5000 of extra economic burden (Table 4).

<table>
<thead>
<tr>
<th>Character</th>
<th>Non Mesh repair (Bassini’s) Group B (n=16)</th>
<th>Mesh Repair (Lichtensteins’) Group L (n=16)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years</td>
<td>29 - 45 (average 36.6)</td>
<td>30 - 48 (average 37)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>BMI kg/m²</td>
<td>20 - 28 (average 23.4)</td>
<td>21 - 30 (average 23.93)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Daily income in Indian Rupees</td>
<td>253.12</td>
<td>246</td>
<td>0.24</td>
</tr>
<tr>
<td>Alternate source of income present</td>
<td>6</td>
<td>7</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Size of dependent family</td>
<td>6.1 (average)</td>
<td>5.8 (average)</td>
<td>0.25</td>
</tr>
</tbody>
</table>
Table 2: Comparison of characteristics of hernia

<table>
<thead>
<tr>
<th>Character of hernia</th>
<th>Non Mesh repair (Bassini’s) Group B (n=16(%))</th>
<th>Mesh Repair (Lichtensteins’) Group L (n=16(%))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>13 (81.25%)</td>
<td>11 (68.75%)</td>
</tr>
<tr>
<td>Left</td>
<td>3 (18.75%)</td>
<td>5 (31.25%)</td>
</tr>
<tr>
<td>Duration of hernia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 weeks to 1 year</td>
<td>8 (50%)</td>
<td>9 (56.25%)</td>
</tr>
<tr>
<td>&gt; 1 year</td>
<td>8 (50%)</td>
<td>7 (43.75%)</td>
</tr>
<tr>
<td>Direct</td>
<td>11 (68.75%)</td>
<td>12 (75%)</td>
</tr>
<tr>
<td>Indirect</td>
<td>4 (25%)</td>
<td>4 (25%)</td>
</tr>
<tr>
<td>Irreducible</td>
<td>1 (6.25%)</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 3: Comparison of operative time and post operative complications

<table>
<thead>
<tr>
<th>Character</th>
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<th>Mesh Repair (Lichtensteins’) Group L (n=16)</th>
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<tbody>
<tr>
<td>Time taken for surgery in minutes</td>
<td>60.6 (average)</td>
<td>45.6 (average)*</td>
</tr>
<tr>
<td><strong>Early complications:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retention of urine</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Wound infection</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Hematoma</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Late complications:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persistent pain</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Recurrence of hernia</td>
<td>2</td>
<td>0</td>
</tr>
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* * p = 0.000003 (Student’s t test)
** p = 0.21 (Fisher’s exact test) for comparison of complication rates between the two group
Table 4: Comparison of economic burden

<table>
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<tr>
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<th>Mesh Repair (Lichtensteins’) Group L (n=16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of surgery in Indian Rupees</td>
<td>2000 (average)</td>
<td>3500 (average)</td>
</tr>
<tr>
<td>*Duration of hospital stay in days</td>
<td>5.4 (average)</td>
<td>3.8 (average)</td>
</tr>
<tr>
<td>**Return to work in days</td>
<td>42 (average)</td>
<td>30 (average)</td>
</tr>
<tr>
<td>**Days lost to pain/discomfort</td>
<td>12 (average)</td>
<td>4 (average)</td>
</tr>
</tbody>
</table>

* p = 0.003

** overall 20 days more lost in non mesh repair group on an average. Taking into account the average wage per day it would amount to Rs 5000/- extra economic burden.

Discussion:
Repair of inguinal hernia remains the oldest and commonest operations performed by general surgeons all over the world. Various conventional methods like Bassini’s and Shouldice repair using suture material are in practice. Tissue based suture repair by different techniques (Bassini’s, Shouldice etc.) has remained the most conventional surgical treatment of inguinal hernia. These techniques had in common excessive tension on the suture line as well as the neighbouring tissues, a lot of dissection, trauma and undue operative time. These factors were found to be responsible for a number of recurrences, persistent pain after surgery and morbidity leading to an undue economical Burdon on the patient. This led to the introduction of mesh repair in the late 1980’s with the concept of tension free repair of hernias. Despite promising results in mesh repair claimed by many authors, the non-mesh repair still continues and the best method of repair is yet to be decided. This study compares and demonstrates the efficacy and cost effectiveness of mesh repair (Lichtenstein) over non mesh repair (Modified Bassini). The operative time is significantly less in mesh repair compared to non mesh repair (p = 0.000003) thereby saving on surgeon cost as well as anesthesia cost. The average duration of hospital stay after mesh repair was also significantly lower at 3.8 days than after non mesh repair at 5.4 days (p=0.003). These findings are consistent with other similar studies. Recurrence rate of hernia following mesh repair was nil in this study with only two cases reported after non mesh repair. This may be because of lesser number of cases recruited for this study and a follow up period limited to about 20 months at the maximum. Further follow up of these patients is required to note any new recurrence. Bisgaard T et al and Butters claimed a recurrence rate of 2% with Lichtenstein repair
and found mesh repair superior to suture repair for inguinal hernia. Though the complication rates were comparable in the two groups, complications worthy of note were chronic pain, numbness along medial side of thigh and discomfort which were more in non mesh repair group. These observations in our study have also been reported by Arshad et al\textsuperscript{12}. A strength of this study was the evaluation of economic burden of hernia on the patient. For the agricultural labourer class that almost wholly depends on daily wages for their livelihood, coupled with low per capita income, it was imperative that we know which type of hernia repair serves them best. At the outset it may appear that mesh repair incurs higher cost to patient, largely due to cost of synthetic proline mesh at the time of surgery. However when we further evaluated the cost incurred due to loss of days at work owing to post operative pain and discomfort, we found that those who had undergone non mesh repair incurred higher economic loss.

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**References:**