

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

S P Sinha¹, Siddharth Sinha²

1 M.S., Professor & Head, Department of General Surgery, Teerthanker Mahaveer Medical College & Research Centre, Moradabad, India. 2 7TH Semester MBBS student, Rama Medical College & Research Centre, Kanpur

Abstract

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

Key Words: Bassini's repair, Linchtenstein reapiir, Cost effectiveness

Introduction:

Hernia has plagued humans throughout recorded history and descriptions of hernia reduction date back to Hammurabi of Babylon and the Egyptian papyrus. Much of modern surgical technique results from the contributions of early surgeons, but it was not until the late 19th century that hernia surgeon Edoardo Bassini (who is considered the father of modern day hernia surgery) experienced any measurable degree of success in repairing hernias. Bassini's aggressive approach was to perform "a radical cure of inguinal hernia," and his operation epitomized the essential

steps of an ideal tissue repair¹. There have been numerous modifications of Bassini's original technique. However, suture repair is associated with a considerable tension on the suture line. This is likely to cause ischemia of the tissues and ultimate failure of repair leading to recurrence²⁻⁴. The concept of tension free hernia repair by using a synthetic proline mesh was first proposed by Lichtenstein and Schulman⁵. A number of studies claimed improved results of tension free mesh repair in terms of rate of recurrence compared to conventional suture repairs⁶⁻¹¹. This decreased recurrence is highly desirable as the failure of

surgery imposes a great economical burden. The duration of hospital stay and post operative pain is also reported to be low with mesh repair¹². 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 proline suture. For the group L, hernia repair was done using synthetic proline mesh fixed by proline 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 (table 1).

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 1: Demographic profile of study groups

Character	Non Mesh repair (Bassini's) Group B (n=16)	Mesh Repair (Lichtensteins') Group L (n=16)	p Value
Age in years	29 - 45 (average 36.6)	30 - 48 (average 37)	>0.05
BMI kg/m ²	20 - 28 (average 23.4)	21 - 30 (average 23.93)	>0.05
Daily income in Indian Rupees	253.12	246	0.24
Alternate source of income present	6	7	>0.05
Size of dependent family	6.1 (average)	5.8 (average)	0.25

Table 2: Comparison of characteristics of hernia

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

Table 3: Comparison of operative time and post operative complications

Character	Non Mesh repair (Bassini's) Group B (n=16)	Mesh Repair (Lichtensteins') Group L (n=16)
Time taken for surgery in minutes	60.6 (average)	45.6 (average)*
**Early complications: Retention of urine Wound infection Hematoma	1 1 2	1 2 1
**Late complications: Persistent pain Recurrence of hernia	6 2	2 0

* $p = 0.000003$ (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

Character	Non Mesh repair (Bassini's) Group B (n=16)	Mesh Repair (Lichtensteins') Group L (n=16)
Cost of surgery in Indian Rupees	2000 (average)	3500 (average)
*Duration of hospital stay in days	5.4 (average)	3.8 (average)
**Return to work in days	42 (average)	30 (average)
**Days lost to pain/ discomfort	12 (average)	4 (average)

* $p = 0.003$

** 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 practice¹². 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 patient¹³. This led to the introduction of mesh repair in the late 1980's with the concept of tension free repair of hernias¹⁴. 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 decided¹⁵. 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 studies¹⁶⁻²⁰. 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. Bisgaar T et al²¹ and Butters²² 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 al¹². 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.

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.

References:

1. Read RC. The centenary of Bassini's contribution to inguinal herniorrhaphy. *Am J Surg.* 1987;153:324-326.
2. Paul A, Troidl H, Williams JL, Rixen D, Langen R. Randomized trial of modified Bassini versus Shouldice inguinal hernia repair. The cologne Hernia study group. *Br J Surg* 1994;81:1531-4.
3. Beets GL, Oosterhuis KJ, Go PM, Baeten CG, Kootstra G. Long term follow up (10–15 years) of a randomized controlled trial comparing Bassini-stetten, shouldice and high ligation with narrowing of internal ring for primary inguinal hernia repair. *J Am Coll Surg* 1997;185:352–7.
4. Simon MP, Kleijnen J, Van Geldere D, Hoitsma HF, Obertop H. Role of Shouldice technique in inguinal hernia repair; a systematic review of controlled trials and a meta-analysis. *Br J Surg* 1996;83:734-8.
5. Lichtenstein IL, Schulman AG. Ambulatory outpatient hernia surgery. Including a new concept: Introducing tension-free repair. *Int Surg* 1986;71:1–4.
6. Bendavid R. The need for mesh. In Bendavid R. ed. *Prosthesis and abdominal wall hernias*. Austin, Texas: RG Lendas, 1994;116–22.
7. Vrijland WW, van den Tol MP, Luijendijk RW, Hop WC, Busschbach JJ, de Lange DC, et al. Randomized clinical trial of non-mesh versus mesh repair of primary inguinal hernia. *Br J Surg* 2002;89(3):293–7.
8. Gianella E, Cuneo S, Vitale B, Camerini G, Marini P, Stella M. Anterior tension free repair of recurrent inguinal hernia under local anesthesia: a 7 year experience in a teaching hospital. *Ann Surg* 2000;231:132–6.
9. Holzheimer RG. Low recurrence rate in hernia repair-results in 300 patients with open mesh repair of primary inguinal hernia. *Eur J Med Res* 2007;31:12(1):1–5.
10. Grant AM, EU Hernia trialist collaboration. Open mesh versus non-mesh repair of groin hernias: Meta analysis of randomized trials based on individual patient data. *Fernia* 2002;6(3):130–6.
11. Collaboration EH. Mesh compared with non-mesh methods of open groin hernia repair. Systematic review of randomized control trials. *Br J Surg* 2000;87:854–9
12. Malik A M, Khan A, Jawaid A, Laghari A A, Talpur K A H. A Comparative analysis between Non Mesh (Bassini's) and Mesh (Lichtenstein) Repair of Primary Inguinal Hernia. *J Ayub Med Coll Abbottabad* 2009;21(1)
13. Liem MS, Halsema JA, van der Graaf Y, Schrijvers AJ, van Vroonhoven TJ. Cost-effectiveness of extraperitoneal laparoscopic inguinal hernia repair: a randomized comparison

with conventional herniorrhaphy. Coala trial group. *Ann Surg* 1997;226:668–76

14. Nathan JD, Pappas TN. Inguinal hernis: an old condition with new solutions. *Ann Surg* 2003;238(6 suppl):148–57.

15. Barth RJ Jr, Burchard KW, Tostenson A, Sutton JE Jr, Collachio TA, Henriques HF et al. Short term outcome after mesh or Shouldice herniorrhaphy: a randomized, prospective study. *Surgery* 1998;123:121–6.

16. Vale L, Grant A, Mc Cormac, Scott NW, EU Hernia Trialist collaboration. Cost effectiveness of alternative methods of surgical repair of inguinal hernia. *Int J Technol Assess Health Care* 2004;20(2):192–200.

17. Milic DJ, Pejic MA. Tension free procedures in the surgical treatment of groin hernias. *Spr Arh Cleok Lek* 2003;131(1-2):82–91.

18. Scott NW, McCormac K, Graham P, Go PM, Ross SJ, Grant AM. Open mesh versus non-mesh for repair of femoral and inguinal hernia. *Cochrane Database Syst Rev* 2002;(2):CD002197.

19. Van Veen RN, Wijsmuller AR, Vrijland WW, Hop WC, Lange JF, Jeekel J. Long term follow up of a randomized clinical trial of non-mesh versus mesh repair of primary inguinal hernia. *Br J Surg* 2007;94:506-10.

20. Nordin P, Bartelmess P, Jansson C, Svensson C, Edlund G. Randomized trial of Lichtenstein versus shouldice hernia repair in general surgical practice. *Br J Surg* 2002;89:45–9.

21. Bisgaard T, Bay-Nielson M, Christensen IJ, Kehlet H. Risk of recurrence 5 years or more after primary Lichtenstein mesh and sutured inguinal hernia repair. *Br J Surg* 2007;94:1038–40.

22. Butters M, Redecke J, Koninger J. Long term results of randomized clinical trial of Shouldice, Lichtenstein and transabdominal preperitoneal hernia repairs. *Br J Surg* 2007;94(5):562–5.

Corresponding Author

Dr. S. P Sinha

Department of General Surgery,
Professor & Head, Teerthanker Mahaveer
Medical College & Research Centre,
Moradabad.

Email id- shankerprasadsinha1950@gmail.com