

Is the Cost of Laparoscopic Ventral Hernia Repair Justified by Better Wound Results and Early Return to Work

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ABSTRACT

Introduction: Ventral hernias are a common condition in a younger working population. These are currently treated by either the open method or by laparoscopic repair. The commonly used open procedure is the onlay mesh which is accompanied by a high rate of wound complications and also requires the placement of a closed suction drain for a variable period of time, during which the patient cannot return to work. The tissue separating mesh used in the laparoscopic procedure involves a several-fold increased cost but does not involve the placement of drains and is accompanied by fewer wound complications. This study was carried out to compare these two methods with respect to wound complications, post-operative pain and specially, early return to work.

Material and Methods: Data from laparoscopic repair and open repair for ventral hernias conducted at a large teaching hospital over a 3 year period was collected and analysed. 23 patients underwent laparoscopic repair, 25 patients were subjected to open surgery and 2 patients were converted from laparoscopic to open surgery. The groups were compared for operating time, post-operative pain, analgesic requirement, wound complications, duration of hospital stay, return to normal activities and return to work.

Results: The laparoscopic method showed a significant, early return to normal activities and early return to work as compared with the open technique.

Conclusion: The laparoscopic method of ventral hernia repair has better outcomes in terms of wound healing and early return to work, potentially justifying, in selected cases the increased costs.

Keywords: Ventral Hernia Repair, laparoscopic hernia repair, open ventral hernia, tissue separating mesh.

normal work, as also a reduction in the incidence of wound complications, which could justify the use of the laparoscopic method in spite of the high cost involved.

MATERIAL AND METHODS

Data from 50 patients undergoing ventral hernia surgery at BYL Nair Charitable hospital and the associated TN Medical College, a major tertiary care teaching Institution in Mumbai, was collected. In the duration of the study, between May 2011 to May 2013, 25 consecutive patients undergoing laparoscopic repair and 25 consecutive patients undergoing open repair were included in the study based on inclusion exclusion criteria. Ethical clearance from the institutional ethical board and informed consent from the patients were taken before the start of the study.

Inclusion criteria: All patients with ventral hernia in the age group 18-70 years who were to be operated on an elective basis were included in the study.

Exclusion criteria: All patients below 18 years and above 70 years of age were excluded. Patients who had infection related to the hernia site were excluded from the study. Those patients undergoing open surgery who had been deemed unfit for General Anaesthesia and laparoscopy were also excluded from the study. This exclusion would make the two groups matched as regards respiratory status of the patients.

Patients with size of hernia defect >10cm were excluded as this would preclude laparoscopic repair and a matching patient in the laparoscopy group would not be found. The size of 10cm was based on available evidence in the literature.⁴⁻⁵

Patients with intra-abdominal sepsis and peritonitis were excluded.

Patients with ascites, patients with systemic disease like renal failure, liver failure, uncontrolled diabetes mellitus and neuropathies and patients with history of radiotherapy, pregnancy or severe cardio pulmonary disease were excluded. Patients undergoing emergency surgery for Incarcerated or strangulated hernias were excluded.

Patients were worked up as outpatient and admitted one day prior to surgery. All patients were kept nil orally for 6 hours preceding surgery. Urinary catheter was passed before starting surgery in all laparoscopic repair cases and this was optional for open repairs. Urinary catheter was removed at the conclusion of

INTRODUCTION

The term ventral hernia commonly refers to hernias of the anterior abdominal wall which may be umbilical, paraumbilical, epigastric or following surgery, when they are called incisional hernias. Parastomal, Spigelian, Lumbar and traumatic hernias are also sometimes included in this group, but the present study does not include these latter forms of ventral hernia.¹ The incidence of these hernias has been increasing, occurring in younger patients leading an active working lifestyle and they constitute a large burden on the healthcare system.²⁻³

The advantages of laparoscopic surgery which include decreased postoperative pain, better wound healing and early return to work are well documented for all procedures where the laparoscopic approach can be used.

In the case of ventral hernias, however, there is more to this comparison. The cost of a laparoscopic mesh repair for ventral hernias exceeds that of open repair by several fold. This is due to the cost of the tissue separating mesh and tacking device which need to be used in the repair.

This study was undertaken to see whether there is a sufficient reduction in the time taken to resume normal activities and

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surgery. For post operative pain charting, Visual Analogue Scale (VAS) pain scoring chart was explained and discussed with the patients pre-operatively.⁶

In case of Umbilical and paraumbilical hernias, a midline incision skirting the umbilical scar was made. In case of Incisional hernias, the scar of previous surgery was excised to the extent required. This was followed by careful dissection to identify the hernial sac. The hernial sac was separated circumferentially from the surrounding fat. The Hernial sac was then opened and in case of incisional hernias, with a finger inserted into the peritoneal cavity, the anterior abdominal wall adjoining the defect was palpated to exclude any more defects. If these were present, the skin incision was appropriately increased in length and further dissection carried out. The redundant hernial sac was then excised. When possible, an anatomical closure of the rectus sheath was performed using non-absorbable polyamide sutures (0-Ethilon, Johnson and Johnson, New Brunswick, New Jersey). When anatomical closure was found to involve excessive tension, the hernial sac was closed using absorbable polyglactin sutures (2-0 vicryl, Johnson and Johnson).

The wound edges were then lifted up and a space was created between the subcutaneous tissue and the rectus sheath for placement of the mesh, ensuring at least a 5 cm. overlap of the mesh over the defect. The mesh was then placed as an 'onlay' over the external oblique aponeurosis. It was held in place by sutures of polypropylene. A suction drain was placed. Subcutaneous tissue and skin were closed.

In patients undergoing laparoscopic repair, the procedure was begun by insertion of a 10 mm trocar at palmer's point, using the open technique. This was followed by insertion, under vision of another 10 mm trocar in the flanks at the level of the umbilicus. A third, 5mm trocar was inserted at an appropriate site, as required. After visualization of the anterior abdominal wall, hernial contents were reduced into the peritoneal cavity. Any adhesions between the contents and the sac were divided using sharp dissection. The falciform ligament, as also the fat around the urachus and inferior umbilical arteries was cleared so as to create a uniform surface for placement of the mesh. PROCEED (Johnson and Johnson New Brunswick, New Jersey) mesh of appropriate size was used for the repair. 4 to 6 sutures of non-absorbable polypropylene (Prolene Johnson and Johnson) were taken on the mesh and left long. The mesh was then inserted into the abdomen through one of the 10 mm trocars. Small (1-2mm) incisions were made on the skin and the long prolene sutures were drawn out using a suture passer. The sutures were then loosely tied. The mesh was made flush with the anterior abdominal wall using PROTAC (Medtronic Dublin, Republic of Ireland) tackers, as required. The 10 mm trocar port sites were closed with transfascial sutures.

All patients were administered Injection Diclofenac 50 mg intramuscularly on demand during first 24 hours. Following that the patient was advised to take Tablet Diclofenac 50 mg orally whenever the patient felt significant pain and to record the same in the chart provided. Patients were advised to perform day-to-day activities immediately after recovering from the effects of anaesthesia. VAS pain score chart was filled by each patient as explained at 24 hours, 48 hours and 72 hours after surgery.

The study included a careful record of the following in the operating room:

Operating Time: This was the time between incision and closure of skin.

Intra operative complications: Trocar injury, Bladder or Bowel injury.

The post-operative record included:

Any Post-operative urinary retention/Ileus beyond 24 hours with vomiting, time taken for oral feeding, time to Ambulation and duration of post-operative stay in the hospital.

Patients were followed up in the outpatient department for presence of Fever, Wound infection, Periumbilical and rectus sheath hematoma, Neuralgia, stitch granulomas and port site hernias.

All patients undergoing open surgery were discharged with the closed suction system. This was removed at follow-up visits, if the drainage was minimal.

Time taken to return to daily activity and Time taken for return to work were noted. In the open repair group, the time taken for drain removal was noted. Follow up examination, to note recurrence of hernia at 1 month, 3 months and 6 months was carried out.

STATISTICAL ANALYSIS

Statistical testing was conducted with the statistical package for the social science system version SPSS 17.0 (Chicago, IL, USA). Results are expressed as mean \pm SD, median (min-max) or numbers and percentages. The comparison of normally distributed continuous variables between the groups was performed using Student's t test. VAS scores between the groups were compared using Mann Whitney U test.

RESULTS

The study included 23 patients with laparoscopic hernia repair and 25 patients undergoing open hernia. The two groups were well matched with respect to the age and sex distribution and size of the defect.

The mean age in the laparoscopy group was 41.6 yrs and in the open surgery group was 44.7 years.

The mean operating time in the laparoscopy group was 89 minutes whereas in the open group was 60 minutes. This was statistically significant ($P < 0.001$). However, the increased operative time was attributed to the use of 4 to 6 transfascial sutures being used to fix the mesh.

Pain and analgesic requirement were significantly higher at 24 and 48 hrs. in the post-op. period in the open group as compared to the laparoscopic group ($P = 0.003$ and $P = 0.004$ respectively). However, pain and analgesic requirement was not significantly different at 72 hrs. post-op. and thereafter ($P = 0.19$).

Median(range) post operative hospital stay for the open group was 4 (3-6) days while it was 3 (2-4) in the laparoscopy group, which was statistically significant ($P < 0.01$) (Table-1).

Patients with Open repair took more time to return to normal activities like ambulation, personal dressing and toilet use with mean of 1.76 ± 0.6 days as compared to 1.39 ± 0.58 days in the Laparoscopic repair group which was statistically significant ($P = 0.036$, Table-2).

The mean time to drain removal was 10.7 days in the open group.

Patients with Open repair took significantly more time to return to work with mean of 14 ± 1.77 days as compared to 8.96 ± 0.88

Duration of Hospital Stay	Laparoscopic (n=23)(%)	Open (n=25)(%)
2 days	11 (47.82%)	0 (0%)
3 days	9 (39.13 %)	10 (40%)
4 days	3 (13.04 %)	12 (48%)
5 days	0 (0%)	2 (8%)
6 days	0 (0%)	1 (4%)

Table-1: Comparison of duration of hospital stay.

	Laparoscopic (n=23)(%)	Open (n=25)(%)	P value
Return to normal Activity (Days)	1.39 ± 0.58	1.76 ± 0.6	0.0359

Table-2: Comparison of time taken for return to normal activity

	Laparoscopic	Open	P Value
Return to Work	8.96 ± 0.88	14 ± 1.77	<0.0001

Table-3: Comparison of time taken for return to Work.

days in Laparoscopic repair group (Table-3).

There was 1 case of hernia recurrence in the present study in the laparoscopic converted to open group in the follow up till the date of completion of study.

DISCUSSION

The ventral hernia, whether it is umbilical or following surgery is not covered by healthy skin, but by scar tissue, which might be the umbilical scar or the scar of previous surgery. The approach to the hernial sac involves incising scar tissue and excising as much of it as will allow satisfactory wound closure. The 'onlay' technique of hernia repair necessitates dissection of soft tissues, between the external Oblique aponeurosis and the subcutaneous tissues, to create adequate space for the placement of the mesh, with adequate overlap of the hernial defect. This dissection almost always involves injury to or division of the penetrating branches of the intercostal vessels and nerves, which compromises blood supply to the skin and wound edges. The opening up of a large space in the subcutaneous tissues results in fluid collection around the mesh and a closed system of suction drainage needs to be frequently used. Traditional teaching has been that regardless of the location of the mesh, a drain needs to be placed after open mesh repair of ventral hernias, and this is common practice.⁷ The suction drain needs to be kept for varying periods of time in the postoperative period. While the drain itself may not be the cause of significant discomfort, it effectively precludes returning to work in most patients. The incidence of wound complications is also significantly higher with discoloration and necrosis of wound edges, being common.⁸ The incision may sometimes require the excision of the umbilicus which is found cosmetically unacceptable by many patients.

The Laparoscopic method involves approaching the hernia through a separate port site, that is, through healthy skin. The placement of the mesh is also intraperitoneal, does not involve dissection and creation of spaces and hence involves none of the issues relating to wound healing that are a matter of concern in open surgery as described above.

There is, however a significant difference in the costs of laparoscopic and open repair. The cost of the dual layered mesh is several fold higher than the cost of the mesh used at open

surgery. There is also the cost of fixation devices which are used for fixation of the intraperitoneal mesh.

This study was conducted to find out whether the traditionally claimed advantages of laparoscopic surgery over open procedures, viz. decreased post-operative pain, decreased wound complications and early return to work are observed in sufficient measure in laparoscopic ventral hernia repair.

Our study showed a significant difference, in terms of the length of hospital stay, days taken to return to normal activities and days before return to work. Beldi et al. have found significant decrease in hospitalization time and fewer wound infection rates with laparoscopic repair.⁹ They also noted that though the direct cost of surgery was higher with laparoscopy, the overall cost was lower with laparoscopic repair. Bedi et al. have reported similar results.¹⁰

Our study did not show a significant difference in wound infection rates and rates of seroma formation between the laparoscopic and open groups. However, Sauerland et al. in a review of the literature found consistently that laparoscopy reduced the rate of wound infections.¹¹

A randomized controlled trial by Olmi et al. shows shorter hospitalization, early return to work and decreased wound complication rates with the laparoscopic method.¹²

Our study showed an increased operative time in the laparoscopy group. Hasan et al have reported increased operative time and a higher operative complication rate with the laparoscopy group.¹³ However, our study did not show an increased rate of operative complications.

Our study was carried out with prospective data and utilizes objective, measurable parameters to compare the two methods of treatment. However, time to resume normal activities and return to work, although clearly measurable tend to vary between patients, depending upon the nature of work, motivation to return to work, physical fitness before and after surgery and considerations like availability of leave from work.

Also, the balance between increased costs and the benefits of laparoscopy would have to be evaluated by each patient individually depending on his/ her particular situation. A cosmetically acceptable umbilicus and early return to work may be perceived as being important by some patients. An urban, working person would be concerned about how a loss of work days during which the patient is required to carry around the suction apparatus will impact his or her job and the financial loss thereof; the presence of a drain would also restrict performance of his/her domestic chores.

Conclusion: Ventral hernia repair is an elective procedure. In a young, working, urban patient, the ability to return to domestic chores and to work, after surgery may be critical issues. While the laparoscopic method of repair cannot at present be unequivocally recommended for all patients, In selected patients, the earlier return to normal activity and work could justify the high cost of laparoscopic hernia repair.

REFERENCES

1. Williams NS, Bulstrode CJK, O'Connell PR. Bailey and Love's Short Practice of Surgery. 26th ed. Boca Raton: CWC Press; 2013.
2. Poulouse BK, Shelton J, Phillips S, Moore D, Nealon W, Penson D et al. Epidemiology and cost of ventral hernia repair: making the case for hernia research. *Hernia*.

- 2012;16:179-83.
3. Dabbas N, Adams K, Pearson K, Royle G. Frequency of abdominal wall hernias: is classical teaching out of date? *JRSM Short Reports*. 2011;2:5.
 4. Jenkins ED, Yom VH, Melman L, Pierce RA, Schuessler RB, Frisella MM *et al*. Clinical predictors of operative complexity in laparoscopic ventral hernia repair: a prospective study. *Surg Endosc*. 2010;24:1872-7.
 5. Cuccurullo D, Piccoli M, Agresta F, Magnone S, Corcione F, Stancanelli V *et al*. Laparoscopic ventral incisional hernia repair: evidence-based guidelines of the first Italian Consensus Conference. *Hernia*. 2013;17:557-66.
 6. McCormack HM, Horne DJ, Sheather S. Clinical applications of visual analogue scales: a critical review. *Psychol Med* 1988; 18:1007-19.
 7. Gurusamy KS, Samraj K. Wound drains after incisional hernia repair. *CochraneDatabase Syst Rev*. 2007;(1):CD005570.
 8. White TJ, Santos MC, Thompson JS. Factors affecting wound complications in repair of ventral hernias. *Am Surg*. 1998;64:276-80.
 9. Beldi G, Ipaktchi R, Wagner M, Gloor B, Candinas D. Laparoscopic ventral hernia repair is safe and cost effective. *Surg Endosc*. 2006;20:92-5.
 10. Amrit Pal Singh Bedi, Tahir Bhatti *et al*. Laparoscopic incisional and ventral hernia repair. *J Minim Access Surg*. 2007;3:83-90.
 11. Sauerland S, Walgenbach M, Habermalz B, Seiler CM, Miserez M. Laparoscopic versus open surgical techniques for ventral or incisional hernia repair. *Cochrane Database Syst Rev*. 2011 Mar 16;(3).
 12. Olmi S, Scaini A, Cesana GS, Erba L, Croce E. Laparoscopic versus open incisional hernia repair An open randomized controlled study. *Surg Endosc*. 2007;21:555-559.
 13. Hasan HE, Hansson B, Buunen M, Janssen I, Pierik R, Hop WC *et al*. Laparoscopic vs Open Incisional Hernia Repair A Randomized Clinical Trial. *JAMA Surg*. 2013;148:259-263.

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