

Laparoscopic Mesh versus Open Mesh Repair of Inguinal Hernia. An Experience from West Bengal, India.

V Singh, U De

Citation

V Singh, U De. *Laparoscopic Mesh versus Open Mesh Repair of Inguinal Hernia. An Experience from West Bengal, India.* The Internet Journal of Surgery. 2008 Volume 20 Number 1.

Abstract

Objective: To compare tension-free open mesh hernioplasty with total extra-peritoneal (TEP) laparoscopic hernia repair. **Design:** A prospective comparative study of 120 patients with inguinal hernias. **Setting:** Department of Surgery, Medical College Hospital, Kolkata between January 2005 and July 2008. **Results:** The laparoscopic method took significantly more time than the open procedure ($p < 0.01$). Intra-operative and immediate postoperative complications were more frequent in the laparoscopic group, although rates of long-term complications were similar in the two groups. Duration of hospital stay ($p < 0.01$) and recurrence rate (6.67%) were significantly higher after laparoscopic repair. Pain scores showed significantly more pain for the laparoscopic group ($p < 0.01$). The mean cost per patient for laparoscopic repair was higher. **Conclusion:** The open technique is still superior to the laparoscopic technique for mesh repair of groin hernias in a developing country like India.

INTRODUCTION

Inguinal hernia repair in adults is one of the commonest surgical procedures performed worldwide. Since the original description of hernia repair by Bassini in 1889 [1], hernia surgery underwent numerous refinements with the sole idea to reduce recurrence. Hernia repair using suture has paved the way to synthetic meshes to cover the myopectineal orifice. Lichtensteins tension-free mesh placement reduced recurrence rates to less than 1% [2]. Preperitoneal placement of mesh as advocated by Cheatle in 1921 and later approved by Stoppa was further explored by Ger in 1982 by laparoscopic approach. Since the advent and wide-spread application of laparoscopy to various surgical procedures, inguinal hernia surgery received a new dimensional approach claiming equivalent or even better results than the available methodologies [34]. The increased cost of laparoscopy was obviated by other factors like less morbidity and earlier return to work. Laparoscopic inguinal hernia repair has been tested in a number of trials but with conflicting results [567]. Moreover, most of these trials are from the western world, which does not reflect the true picture from developing countries. The present study was designed to evaluate the effectiveness of the laparoscopic procedure compared with open mesh technique for treatment of inguinal hernia in a developing country.

PATIENTS AND METHODS

This comparative prospective study included patients treated for inguinal hernia by laparoscopic TEP (total extra-peritoneal) and open tension-free hernioplasty under the care of one surgeon between January 2005 and July 2008 in the Department of Surgery, Medical College Hospital, Kolkata. Approval from the hospital's ethics committee had been obtained. Patients were excluded if they were medically unfit for general anesthesia, had a previous lower midline or paramedian incision, had an acute or irreducible inguinoscrotal hernia, had an uncorrected coagulation disorder, or were pregnant. The surgeon had performed 50 TEPs before beginning of the study. Selection of patients for a particular procedure (laparoscopic or open) was done as per patients' wishes after proper explanation about the operative procedure. Those patients who opted for laparoscopic procedure were further screened for fitness to undergo laparoscopic surgery. Patients opting for laparoscopy but unfit for surgery were excluded from the study. All patients included in the study were operated under general anesthesia.

Patients with inguinal hernia who opted for open surgery underwent Lichtenstein tension-free hernioplasty. Patients with bilateral or recurrent hernias underwent open repair using mesh with access through a lower transverse abdominal incision placed approximately halfway between

the level of the anterior superior iliac spine and the pubic symphysis.

Patients opting for laparoscopic repair underwent a totally extraperitoneal laparoscopic repair. The preperitoneal space was entered just below the umbilicus and enlarged using gentle blunt dissection with a laparoscope. Two 5-mm ports were placed in the midline under direct vision, and reusable cannulas and instruments were used. After the hernia sac was reduced, a 15x10cm polypropylene mesh was used to cover the myopectineal orifice in all patients and was fixed to the pectineal ligament and further laterally using tacks.

All patients were followed up at the outpatient clinic weekly for three months and annually thereafter. Patients who failed to keep their clinic appointment were given the option to return to the clinic at earliest occurrence of any discomfort. Those, who did not comply with this and did not attend outpatient clinic for a period of more than two years, were noted as cured without recurrence.

RESULTS

This comparative prospective study included 120 patients; 60 patients underwent an open procedure (Lichtenstein tension-free mesh hernioplasty) whereas 60 patients underwent laparoscopic total extraperitoneal mesh hernioplasty (TEP).

The demographic profile of the patients is depicted in table 1.

Figure 1

Table 1: Demographic profile of patients, hernias and coexisting conditions according to allotted method of surgery.

Characteristics	Open (n=60)	Laparoscopic (n=60)
Age (yrs.)	36.1 (19-59)	36.81 (19-60)
Sex (%)		
Male	89.3	92.9
Female	10.7	7.1
Duration of hernia (%)		
<6 weeks	23.3	31.6
6 wk. to 1 yr.	41.6	38.3
>1 yr.	35.0	30.0
Hernia (%)		
Unilateral	81.6	86.6
Bilateral	18.3	13.3
Primary	78.3	96.6
Recurrent	21.7	3.3
Coexisting conditions (%)		
Hypertension	21.6	16.6
Severe COPD	20.0	5.0
Chronic cough	16.6	11.6
Prostatism	3.3	0
Diabetes	15.0	23.3
Smoking	40.0	33.3
Alcohol consumption	33.3	26.6

The distribution of patients in the two groups was similar. In both groups higher grades of hernias were not present. This had probably arisen from a selection bias, as we wanted to compare the results among the more common categories of hernias. It was also noted that duration of hernia and other coexisting morbidities were no hindrance to performing a laparoscopic hernioplasty.

The average duration for unilateral and bilateral open hernioplasty was 45 minutes and 75 minutes, respectively. For laparoscopic TEP, average duration for unilateral and bilateral hernia was 75 minutes and 120 minutes, respectively. In unilateral and bilateral hernia surgery, the laparoscopic method took significantly more time than the open procedure (p <0.01). In the earlier part of the study, the operative time was longer as a part of the learning curve and diminished as the study period progressed. This increased operating time in the initial phase of the study was due to unfamiliarity of the assistants to laparoscopic inguinal anatomy. The surgeon was the sole person accustomed to laparoscopic TEP and as such, time was lost training the assistants. In the later part of the study the average duration for unilateral TEP was reduced to 40 minutes and for bilateral TEP to 90 minutes.

Proportional odds modeling of the visual pain scores at 6 hours, 1, 4 and 7 days after surgery showed significantly more pain for the laparoscopic group than the open group (p <0.01). Postoperatively, patients indicated their levels of pain at various time points by using integer scores of 0 (no pain) to 10 (unbearable pain). There were no differences in the pain scores between the two groups at weeks 2 and 4 (table 2). The exact reason for this could not be ascertained.

Figure 2

Table 2: Pain scores in patients after hernia repair by open or laparoscopic surgery. Values are proportions of patients.

Pain score	Open	Laparoscopic	P value
6 hours	2/60	3/60	<0.01
Day 1			
0	2/60	3/60	
1-5	20/60	38/60	<0.01
6-10	41/60	13/60	
Day 4			
0	3/60	5/60	
1-5	38/60	42/60	<0.01
6-10	12/60	6/60	
Day 7			
0	6/60	9/60	
1-5	43/60	42/60	<0.01
6-10	4/60	3/60	
Week 2			
0	12/60	13/60	
1-5	41/60	40/60	0.03
6-10	6/60	3/60	
Week 4			
0	23/60	21/60	
1-5	32/60	31/60	0.51
6-10	4/60	5/60	

The postoperative complications are depicted in table 3. Intra-operative and immediate postoperative complications were more frequent in the laparoscopic repair group than in the open repair group, although rates of long-term complications were similar in the two groups.

Figure 3

Table 3: Postoperative complications and recurrence at 6 months.

Variable	Open (n=60)	Laparoscopic (n=60)
	% of patients	
Intraoperative complications		
Problems related to anesthesia	0.8	1.3
Injury to vessels	0.1	1.0
Injury to cord structures	0.8	0.1
Peritoneal defect over mesh at closure	0	1.5
Immediate complications		
Urinary retention	2.2	2.8
Urinary tract infection	0.4	1.0
Hematoma/seroma	13.6	16.4
Orchitis	1.1	1.4
Wound infection	1.4	1.0
Late complications		
Hematoma/seroma	3.0	9.0
Orchitis	2.2	1.9
Wound infection	0.6	0.4
Recurrence at 6 months	1.67% (1)	6.67% (4)

The duration of hospital stay was also significantly lower in the open group compared to the laparoscopic group (p <0.01). The mean duration of postoperative hospital stay in

the open group was 1.8 days (range 1-3 days) as compared to 3.5 days in the laparoscopic group (range 2-6 days). The shorter stay in the open group was due to the fact that in the initial study period some patients undergoing TEP had prolonged stay due to complications.

The patients who underwent laparoscopic repair returned to their usual activities one day (median time, 4 days) sooner than those who underwent an open repair (median time, 5 days). At three months of follow-up, however, differences in activity level between the two groups were not apparent.

The mean cost per patient of laparoscopic repair was higher than the cost of open repair. Average cost of hernia repair, both in unilateral and bilateral cases, was significantly higher in the laparoscopic procedure than in open surgery (p <0.01). The major differences between the two groups in terms of use of resources were the use of expensive consumables and more costly equipment as part of the laparoscopic procedure (table 4).

Figure 4

Table 4: Mean cost per patient of two forms of hernia repair. (Average amount in Indian rupees).

Type of hernia	Open	Laparoscopic
Unilateral	4000	6000
Bilateral	5000	8000

All the patients were followed-up for a period ranging from six months to two years. Recurrence rates were higher among patients whose hernias were repaired by the laparoscopic technique. There was significant interaction between the surgical approach and the type of hernia (primary or recurrent). Recurrence rates were significantly higher after laparoscopic repair of hernias (in which there were 4 recurrences among 60 patients [6.67%]) than after open repair of hernias (in which there was only 1 recurrence among 60 patients [1.67%]). The presence of bilateral hernias did not alter the rate of recurrence after either procedure.

DISCUSSION

Laparoscopic cholecystectomy has withstood the test of time and has been proclaimed and accepted as the gold standard for patients with gall stone disease [8]. But unfortunately, laparoscopic hernia surgery attempting similar claims underwent controversies with conflicting results [9]. This was primarily because of the fact that the patients', society's

and surgeons' perspective varied widely from not only country to country but also among regions within the same country [3]. This was primarily because the question of what is to be compared was difficult to know. Moreover, the parameters of ideal hernia surgery remained elusive even for the so-proclaimed conventional hernia techniques. This was proved by the fact of a published data involving recurrent hernia surgery where recurrence was claimed to be 17 % [10]. As such, "the battle for the bulge" still continues.

It has been claimed that the Shouldice method should be the gold standard when evaluating other methods of hernia repair [11]. We chose to ignore this fact, as Lichtenstein repair of inguinal hernia is a time-tested option, mimics clinical reality and is associated with the lowest rate of recurrence among the various methods for open repair of inguinal hernia with results equally reproducible from all quarters of the globe. Moreover, many studies compared laparoscopic mesh repair with open "mesh-less" procedures where results would not have been comparable as the influence of minimal access and prosthetic mesh would have been ignored.

The other point of carrying out this study was that limited indexed Indian literature [12] on the subject was available though laparoscopic hernia surgery was rampantly preached and practiced. The few data available were from specialized centers compared to general Indian population where the scenario is totally different as far as social and economic factors are concerned.

Our study revealed the fact that the so-proclaimed morbid factors like hypertension, obstructive airway diseases which contraindicated laparoscopic surgery played a minimal role [13]. With the availability of safe and effective general anesthetic agents and better postoperative care, laparoscopic hernioplasty could be performed without complications.

Total operating time was found to be longer for the laparoscopic group. This indirectly added to the increased overall cost of the procedure. Moreover, the patients were subjected to increased exposure to carbon dioxide. But we felt that the time spent is well spent as unnecessary hurry could lead to perforation of the peritoneum leading to conversion as has been reported [14]. The other danger is that of injury to vessels and cord structures leading to collection, thus decreasing the small potential space further, making surgery difficult as anatomy becomes obscure.

One of the interesting facts of the study was that patients

undergoing laparoscopic repair experienced more pain in the immediate and early postoperative period contrary to the popular belief of experiencing less pain. But long-term pain scores were equivocal for both the open and laparoscopic group. A definite cause could not be ascertained. Similar findings have been reported from a Swedish SCUR hernia study [15]. Apart from pain the other complication pattern varied among the different groups with seroma formation being most common. This is a frequent occurrence in patients where mesh is implanted.

A longer duration of stay after laparoscopic surgery was noted in our study compared to the open surgery. Several reasons were attributable. Firstly, as this study was the first of such a kind in our setup we were a bit skeptical about early discharge of patients undergoing laparoscopic repair. This was further compounded by some early complications including recurrence in the initial part of our study. During the concluding phases we were confident enough and the later group of patients was discharged early. As the study neared completion we were enthralled by the early convalescence and discharge of our patients.

The criteria of return to normal activity vary in different studies and as such it is difficult to compare [9,14]. In our social setup, patients and their relatives are traditioned to take leave despite the nature of surgery performed. This was because they felt that more money spent for laparoscopic surgery involved some complex surgery that needed more rest. Repeated encouragement and assurance had little impact on this cultural taboo. Similar results were reported from other studies [5,6,7,9].

We noted a higher recurrence rate in the laparoscopic group. Laparoscopic recurrences were early and recurrence after open repair was late. Though this was the overall reported incidence, some studies claimed equal or even better results. These reports were from dedicated centers with laparoscopic herniologists performing surgeries [16].

The greatest hindrance to laparoscopic surgery in our setup was the added cost. This has been the focus of all the published reports [17]. This is more so in our country as the socioeconomic status of our population is below par. Of late, with the availability of different health insurance policies, there has been some improvement but further time is required to bring about an overall change. Until then, laparoscopic surgery with all its added benefits will have to sit back with fingers crossed.

In conclusion, we feel that laparoscopic repair is a complementary choice and not an alternative to open surgery in our setup. It is of great importance that the laparoscopic technique in hernia surgery be thoroughly evaluated before considering it as one of the standard procedures for hernia surgery, especially in a developing country like ours.

Acknowledgement: The authors are grateful to Dr. B. B. Mukhopadhyay, Department of Community Medicine, Burdwan Medical College for his kind cooperation and for statistically analysing the data.

References

1. Sondana K, Nesvik I, Breivik K, Korner H. Long-term follow-up of 1059 consecutive primary and recurrent inguinal hernias in a teaching hospital. *Eur J Surg* 2001; 167:125-9.
2. Nyhus LM. Individualisation of hernia repair: A new era. *Surgery* 1993; 114:1-2.
3. Michael Bailey. The case for laparoscopic repair. *Ann R Coll Surg Engl* 2005; 87:57-58.
4. Ger R. The management of certain abdominal hernia by intra-abdominal closure of the neck of the sac. *Ann R Coll Surg Engl* 1982; 64:342-344.
5. MRC Laparoscopic Groin Hernia Trial Group. Laparoscopic versus open repair of groin hernia: A randomised comparison. *Lancet* 1999; 354:185-190.
6. Liem MSL, van der Graaf Y, van Steensel CJ, et al. Comparison of conventional anterior surgery and laparoscopic surgery for inguinal-hernia repair. *N Engl J Med* 1997; 336:1541-7.
7. Payne JH Jr, Grininger LM, Izawa MT, Podoll EF, Lindahl PJ, Balfour J. Laparoscopic or open inguinal herniorrhaphy? A randomized prospective trial. *Arch Surg* 1994; 129:973-81.
8. Cuschier A, Terblanche J. Laparoscopic cholecystectomy: evolution, not revolution. *Surg Endosc.* 1990; 4:125-6.
9. Wright D et al. Laparoscopic or open groin hernia repair. A randomized controlled trial. *Annals of surgery* 2002; 235:333-337.
10. Nilsson E, Kald A, Anderberg B, et al. Hernia surgery in a defined population: A prospective three-year audit. *Eur J Surg* 1997; 163:823-829.
11. Hay J-M, Boudet M-J, Fingerhut A, et al. Shouldice inguinal hernia repair in the male adult: The golden standard? A multicenter controlled trial in 1578 patients. *Ann Surg* 1995; 222:719-727.
12. Jani K, Palanivelu C, et al. Late rejection after transabdominal pre-peritoneal inguinal repair: laparoscopic extraction of mesh. *Indian J Gastroenterol* 2004; 24:219-20.
13. Ware JE Jr, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care* 1992; 30:473-83.
14. Papachristou EA, Mitselou MF, Finokaliotis ND. Surgical outcome and hospital cost analyses of laparoscopic and open tension-free hernia repair. *Hernia* 2002; 6: 68-72.
15. Johansson B et al. Laparoscopic mesh versus open preperitoneal mesh versus conventional technique for inguinal hernia repair. A randomized multicenter trial (SCUR Hernia Repair Study). *Ann Surg* 1999; 230:225-231.
16. Liem MSL, van Steensel CJ, Boelhouwer RU, et al. The learning curve for totally extraperitoneal laparoscopic inguinal hernia repair. *Am J Surg* 1996; 171:281-5.
17. Wellwood J et al. Randomised controlled trial of laparoscopic versus open mesh repair for inguinal hernia: outcome and cost. *BMJ* 1998; 317:103-10.

Author Information

Veena Singh, MBBS MS

Post Graduate Trainee, Department of Surgery, Medical College Hospital

Utpal De, MS

Associate Professor, Department of Surgery, Medical College Hospital