International Surgery Journal
Thulasilingam K et al. Int Surg J. 2023 Apr;10(4):599-605
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: https://dx.doi.org/10.18203/2349-2902.isj20230962

Original Research Article

A comparative study on short term surgical outcome between laparoscopic inguinal hernia mesh repair vs. open inguinal hernia mesh repair for primary unilateral inguinal hernias

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Received: 29 January 2023
Revised: 17 February 2023
Accepted: 21 February 2023

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ABSTRACT

Background: Current study was performed to compare the short-term surgical outcome of laparoscopic (TAPP) and open inguinal hernia mesh hernioplasty (Lichtenstein) in primary unilateral inguinal hernias such as time taken by patients to return to routine daily activities and return to work.
Methods: This is a prospective, comparative study done in Apollo Main Hospital, Chennai comparing surgical outcomes between laparoscopic and open primary unilateral inguinal hernia mesh repair in a total of 60 patients with 30 patients in each arm.
Results: Return to Job is 8 median days in laparoscopic group and 9 median days in open group which is significant with a p value of 0.000. Pain score at 12th hour is significantly lesser in laparoscopic group with a VAS score of 3 compared to open group with a VAS score of 4 with p value of 0.015. VAS score at POD 1 in laparoscopic group is 2 and in open group is 3 which is significantly lesser in laparoscopic group with a p value of 0.026. Pain score at POD 3 and 4 is significantly lesser in laparoscopic group with a p value of 0.001 and 0.008 respectively. laparoscopic group takes analgesia for a lesser number of days than the open group with a p value of 0.019.
Conclusions: This study concludes laparoscopic repair for primary unilateral inguinal hernias is superior to Lichtenstein tension free mesh hernioplasty in terms of postoperative pain, early return to job and less consumption of postoperative analgesia.

Keywords: Laparoscopic hernia repair, TAPP, Inguinal hernia mesh repair, Postoperative outcomes, Complications

INTRODUCTION

Hernia is one of the common conditions encountered by general surgeons. Hernia occurs when an organ protrudes out of the cavity in which it is normally contained.[1] Hernia is rupture in Latin.[1] About 75% of abdominal hernias are inguinal hernias.[2] 2/3rd of these are indirect hernia and 1/3rd falls under direct hernia.[2] Men are 25 times more likely to get inguinal hernias. Indirect hernias are the most common in both men and women. Indirect hernias are more common in the right side because of the delay in atrophy of processus vaginalis, with slower descent of right testis.[2] There are various operative techniques to perform inguinal hernia repair. The decision making depends on the surgeon's knowledge of anatomy and individual's preferences. As per European Hernia Society guidelines, there is no technique that is generally accepted, which is suitable for all inguinal hernias. The choice of technique is based on the surgeon's expertise and patient and hernia related factors. We have open, laparoscopic and robotic techniques where we still prefer open technique for primary unilateral inguinal hernias. Groin hernia repair

does not have the glamour of a Whipple or of a heart transplant, but in terms of preserving years of useful life, in sheer volume, is one of the most important surgical procedures.[3] Surgical management of inguinal hernia has evolved through years. Lichtenstein's tension free repair remains the ideal method for inguinal hernias. Meanwhile for cholecystectomy the advent of laparoscopy played an important role and laparoscopic cholecystectomy became the gold standard technique for gallbladder stones.[4] Since inguinal hernia repair also witnessed minimal access advent, we have a wide variety of surgical techniques. Here in this study, quality of life and complication rates after laparoscopic inguinal hernia mesh repair and open Lichtenstein tension free inguinal hernia mesh repair in primary unilateral inguinal hernias were compared. Hernia can occur in various sites, but most common in the inguinal region. No disease of the human body, belonging to the province of the surgeon, requires in its treatment, a better combination of accurate, anatomical knowledge with surgical skill than hernia in all its varieties.[5]

Aim and objectives

Primary objective of current study is to compare the time taken by patients to return to daily activities and return to job between laparoscopic and open inguinal hernia mesh repairs. Secondary objective of my study is to compare post operative pain score, seroma, hematoma, surgical site infections, urinary retention and early recurrence between laparoscopic and open repairs.

METHODS

This is a non randomised, prospective, comparative study done in Apollo Main Hospital, Greams Road, Thousand lights, Chennai. This sample size calculation is derived using sample size calculating software G*power 3.1.9.2 with a power of 80% and total sample size is 60. Study duration was from June 2021 to June 2022.

Inclusion criteria

People above 18 years of age with primary inguinal hernias, unilateral inguinal hernias and uncomplicated inguinal hernias were included.

Exclusion criteria

People below 18 years of age, Recurrent inguinal hernias, obstructed or strangulated hernias, Bilateral inguinal hernias, patients with cardiac disease (myocardial infarction, ischemic heart disease), respiratory diseases (asthma, COPD), Renal disorders, Liver disorders and patients with bleeding disorders were excluded.

Follow up

Patients were followed up for 3 months post operatively. Normality of the data was assessed through Shapiro-Wilk's test. Normally distributed variables were expressed as mean±SD, otherwise median (Interquartile range). Categorical variables represented by percentage. Comparison of normally distributed continuous variables was done by independent sample t-test if there are two categories. Kruskal Wallis H test or Mann-Whitney U test was used if the distribution is not normal. Comparison of categorical variables was done by using Chi square test or Fisher's Exact test based on the number of observations. Data entry was done in Microsoft Excel 2007. Data analysis carried out by IBM SPSS statistics for Windows Version 25.0, Armonk, NY: IBM Corp. All 'p' values <0.05 considered as statistically significant data.

Statistical analysis

Data analysis was done using SPSS 25.0. After running out normality test median and IQR were considered.

RESULTS

Age distribution

Age plays an important role in postoperative recovery, analgesia consumption and complications such as urinary retention.

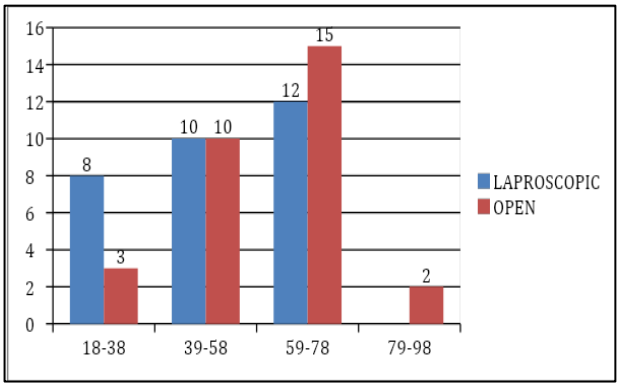

Figure 1: Age distribution between laparoscopic and open group.

Sex distribution

All were males in both group.

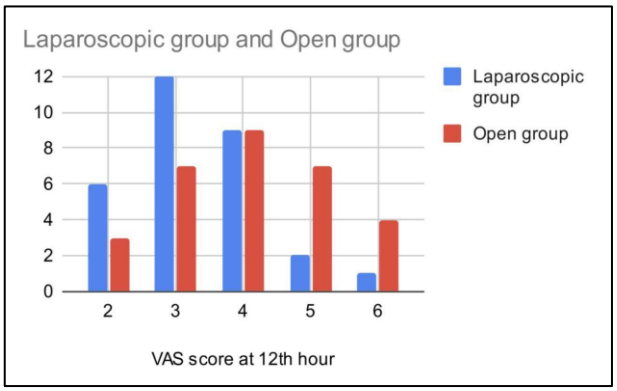

Figure 2: Postoperative VAS score for 12 hours in open and laparoscopic group.

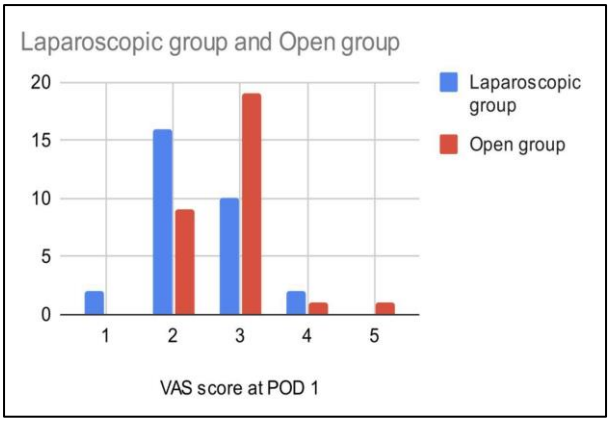

Figure 3: Postoperative VAS score for 24 hours at POD 1 between laparoscopic and open group.

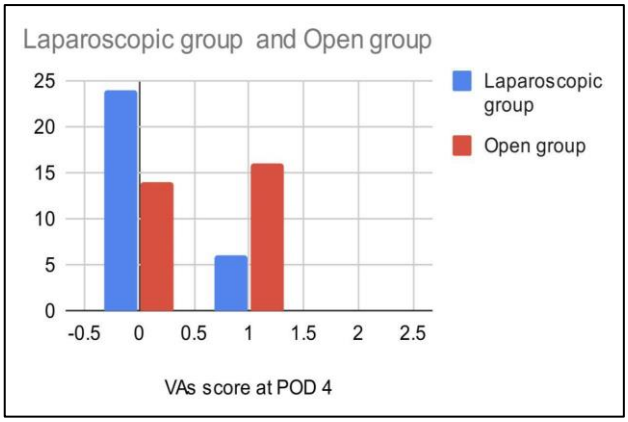

Figure 5: Postoperative VAS score at POD 4 between laparoscopic and open group.

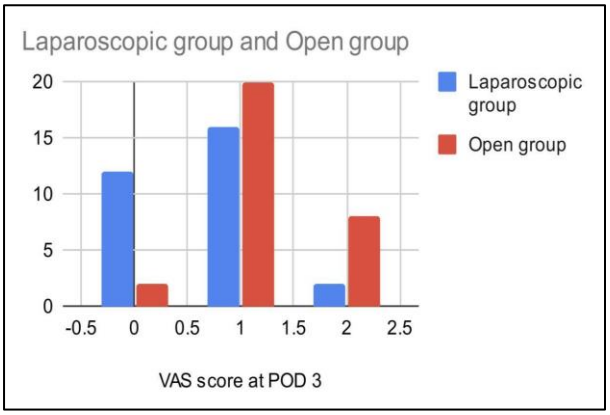

Figure 4: Postoperative VAS score at POD 3 between open and laparoscopic group.

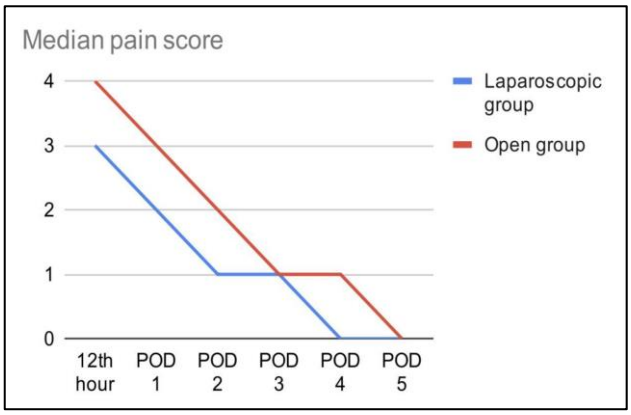

Figure 6: Median pain score between laparoscopic and open group.

Table 1: Median and IQR VAS score for both groups with p values.

Parameters	Surgery type	N	Median	IQR	P value
Postoperative pain at 12th hour	Laparoscopic	30	3.00	1.00	0.015
	Open	30	4.00	2.00	
POD 1 pain	Laparoscopic	30	2.00	1.00	0.026
	Open	30	3.00	2.00	
POD 2 pain	Laparoscopic	30	1.00	1.00	0.067NS
	Open	30	2.00	1.00	
POD 3 pain	Laparoscopic	30	1.00	1.00	0.001
	Open	30	1.00	1.00	
POD 4 pain	Laparoscopic	30	0.00	0.00	0.008
	Open	30	1.00	1.00	
POD 5 pain	Laparoscopic	30	0.00	0.00	0.393NS
	Open	30	0.00	0.00	
Return to daily activities	Laparoscopic	30	4.00	2.00	0.195NS
	Open	30	4.50	1	
Return to job	Laparoscopic	30	8.00	1.00	0.000

Table 2: Analgesia consumption in laparoscopic and open group.

Parameters	Surgery type	N	Mean	SD	P value
No of days consuming analgesia	**Laparoscopic**	30	4.67	0.758	0.019
	Open	30	5.00	0.00	

Return to job

Return to Job is 8 median days in laparoscopic group and 9 median days in open group which is significant with a p value of 0.000. Pain score at 12th hour is significantly lesser in laparoscopic group with a VAS score of 3 compared to open group with a VAS score of 4 with p value of 0.015. VAS score at POD 1 in laparoscopic group is 2 and in open group is 3 which is significantly lesser in laparoscopic group with a p value of 0.026. Pain score at POD 3 and 4 is significantly lesser in laparoscopic group with a p value of 0.001 and 0.008 respectively. laparoscopic group takes analgesia for a lesser number of days than the open group with a p value of 0.019.

Number of days consuming analgesia

All patients were given paracetamol 1 gm three times daily as postoperative analgesia. Assessment was done considering the number of days patients required analgesia.

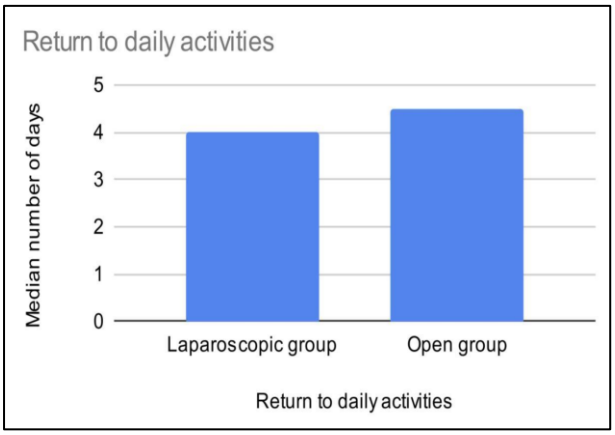

Figure 7: Median number of days taken to return to their daily routine in laparoscopic and open group.

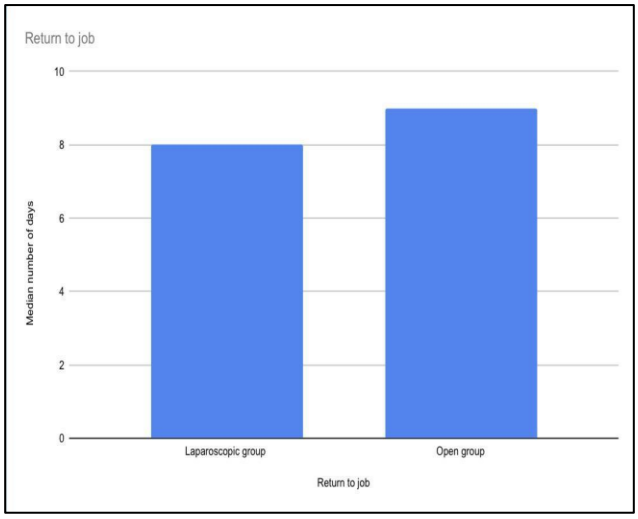

Figure 8: Median number of days taken to return to their job between laparoscopic and open group.

Seroma formation

Out of 60 patients, only 3 patients had seroma formation. 2 in the laparoscopic group and 1 in the open group.

Urinary retention

Out of 60 patients, only 4 patients developed urinary retention. 1 in the laparoscopic group and 3 in the open group.

DISCUSSION

For inguinal hernia mesh repairs, the pain management has become the unavoidable factor mostly due to tacker application in laparoscopy group and retractions and fixation of mesh to pubic tubercle or nerve entrapment in open hernia repairs. This significantly affects the patient's postoperative hospital stay, return to their daily routines and return to their job.

In both study groups, the maximum number of patients fall under 59 to 78 years in the age distribution graph, whereas in 18-38 years more number of patients fall under laparoscopic group and 2 patients in 79 to 98 years of age fall under open hernia repair group. In our study all the participants in each group were males.

There were quite a few complications known to occur in inguinal hernia repair in both open and laparoscopic methods. In our study there were no intra operative complications in terms of visceral and vascular injuries. These results were similar and correlated to the study done by Sudharshan, Ansari and Hamza.[6-8] There were studies which showed intra operative complications with respect to visceral and vascular injuries. Neumayer in his study noted bladder and bowel injury.[9] McCormack in his study showed 7 intra operative visceral injuries in which 6 patients were in the laparoscopic group.[10] Tolba in his study showed trocar injuries to the bladder in 2 patients.[11]

Postoperative pain was assessed by VAS. Pain following hernia repair plays a pivotal role in determining the return to daily routines, return to job and urinary retention immediate post operatively.

In 12 hours, the median pain score for the laparoscopic group was 3 and the open group was 4. At 12th hour with a pain score of 2 and 3 more patients fall under the laparoscopic group. 4 patients in the open group fall under the pain score of 6 whereas none in the laparoscopic group. Significant difference was found between open and laparoscopic groups in terms of postoperative pain in 12 hours with a p value of 0.015. Rathod in his study showed similar results with the laparoscopic group having a lesser pain score in 12th hour post procedure with a p value of 0.000.[12] Most of the literature portrays similar results where laparoscopic repair has lesser pain scores. In a study conducted by Sudharshan found that, no significant

difference was elicited in terms of pain score between both the groups.[6]

In Post operative day 1, median pain score for laparoscopic group was 2 and median pain score for open group was 3.

Two patients in the laparoscopic group had a VAS score of 1, whereas none in the open group and no patients in the laparoscopic group had a pain score more than 4. There is a significant difference in terms of postoperative pain in POD 1 with a p value of 0.026. Rathod in his study got similar results of a lesser pain score in the laparoscopic group at the 24th hour with a p value of 0.000. But a study by Sudharshan showed a similar pain score in post operative day 1 in both groups.[6,12] In post operative day 3, median pain score for the laparoscopic group was 1 and the median pain score for the open group was 1. 12 patients in the laparoscopic group had no pain and only 2 patients in the open group were off pain. There is a significant difference in pain between laparoscopic and open repair in POD 3 with a p value of 0.001. With increase in age, it is found to have increased postoperative pain score. These results were similar to the study conducted by Sudharshan.[6,12] On post operative day 4, median pain score for laparoscopic group was 0.00 and median pain score for open group was 1.00. 6 patients in laparoscopic group had pain score of 1 and rest of them had no pain. In those 6 patients 3 patients fall under the age distribution of 59-78. 16 patients in the open group had a pain score of 1. Significant difference was found between the two groups in terms of postoperative pain in POD 4 with a p value of 0.008. In a study conducted by Sudharshan, the pain score in POD 4 is almost similar between the 2 groups.[6] On post operative day 14, no patients had pain. Most of the literature and analytical studies showed very less pain score in laparoscopic repair. Some of the literature showed similar pain scores in both groups. In a study conducted by Pedroso the pain score in POD 10 and POD 30 were significantly lesser in laparoscopic repair groups.[13] Fumihiko studied 253 patients and concluded that post operative pain was age dependent. Meanwhile laparoscopic repair had lower pain score for younger patients in POD 1 and return to daily routine is earlier.[14] Colak, Champault concluded that the laparoscopic repair group has lesser pain. These studies also showed that postoperative analgesia requirement is lesser in the laparoscopic group. Similarly Winslow in his study showed significantly lesser pain score in the laparoscopic group.[15-17] Median for the laparoscopic group was 4 and the open group was 4.5. 4 patients in the laparoscopic group took 6 days to do their routine activities and 5 patients in the open group took 6 days to do their routine activities. Statistically there is no significant difference in return to daily activities between open and laparoscopic groups in our study. Rathod in his study showed that the mean time to do daily routine is significantly lower in the laparoscopic group.[12] Wall,in his study showed early return to daily routine in laparoscopic approach.[18] But in our study there is no significant difference. In contrast to our study Schrenk, Schwab and McCormack all in their studies showed significantly less time to return to their usual routine in the laparoscopic group.[10,19,20] Median days of return to job in laparoscopic group was 8 and open group was 9. 12 out of 30 patients in the open group returned back to their job in 10 days, 1 patient took 11 days and 1 patient needed 12 days to be back in his job. Only 2 patients in the laparoscopic group took 10 days to get back to their job. There is a statistically significant difference in time taken to return to their job between both groups with a p value of 0.000. Hamza in his work found similar results where patients in the laparoscopic repair group took 13 days, whereas patients in the open group took 16 days to return to their job.[8] Mean number of days laparoscopic group taken analgesia was 4.67 and open group was 5. There is a significant correlation of analgesia consumption to age distribution. These results were similar to the results in studies conducted by Colak and Champault, which showed lesser analgesia consumption by the laparoscopic group.[15,16] Also Mwagiru studied 63 patients in which they concluded that there is statistically no significant difference in analgesia consumption between laparoscopic and open groups.[21]

No patients in both group developed any surgical site infections. Rathod CM in his study showed very less number of surgical site infections in laparoscopic repairs compared to open methods.[12] Yet, the results are statistically insignificant with a p value of 0.059. Christou in their study showed that there were no differences in terms of surgical site infection rates between open and laparoscopic methods, nor the type of mesh used.[22] In our study, 3 patients developed seroma. 1 in the open group and 2 in the laparoscopic group. In a study conducted by Sudharshan 23.3% of patients in the open group developed seroma whereas 10% of patients in the laparoscopic group.[6] Out of 60 patients 4 patients developed urinary retention. 1 in the laparoscopic group and 3 in the open group which is statistically insignificant. Similarly, Blair in his study concluded that no significant difference was found in terms of urinary retention between laparoscopic and open groups.[23] Daniel Roadman retrospectively studied 578 patients who underwent laparoscopic inguinal hernia mesh repair. They concluded that patient with age more than 60 and decreased body mass index(≤25.8 kg/m2) were likely to have urinary retention.[24] In our study no patient developed chronic pain or numbness in the inguinal region in 3 months. Guido, Bay Nielsen and Vrijland in their studies showed that no significant difference was found in terms of chronic pain between open and laparoscopic groups.[25-27] In contrast some of the studies like the MRC trial group, EU trials showed less chronic pain in the laparoscopic group.[28-30] We encountered no testicular atrophy in 3 months in our study. In a study conducted by Afandiyev showed that it is mostly secondary and visible in open hernia repairs with a p value of 0.0001.[31] Wantz in his study mentioned that testicular vessel damage could be reduced by leaving the distal sac undisturbed by dividing the sac high in the canal.[32]

No postoperative hydrocele is found in any patients, even though literature shows hydrocele development post hernia surgeries.[3,33] Akbulut in his study concluded that either open repair or laparoscopic repair might not affect testicular function whereas laparoscopic repair may reduce the volume of testes if the hernia is in Nyhus type I-b and II-a.[34] In our study, there were no recurrences in any of the patients in 3 months. It was found that 15% of patients could be developing recurrence in literatures.[7] McCormack in his analytical study through cochrane databases showed 109 recurrences out of 3504 laparoscopic repairs and it recurrences in 3138 open repairs.[7] Apparently, most of the literature shows no significant difference in recurrence rates between the laparoscopic and open approach.[10,35,36] But a study conducted by O'Reilly showed that recurrence rates are significantly higher with primary inguinal hernia in laparoscopic repair group.[37]

Limitations

This is a non-randomised study. This study has age differences between the two groups. Follow up period of 3 months could only detect early recurrence and early complications and late recurrences could not be studied. Sample size is lesser and could have been increased for better results. Operative time could not be compared, because patients in this study were operated by 5 surgeons.

CONCLUSION

The study concludes that laparoscopic repair (TAPP) for primary unilateral inguinal hernias is superior to Lichtenstein tension free mesh hernioplasty in terms of postoperative pain, early return to work and less consumption of postoperative analgesia. We could infer that there is no significant difference in return to routine daily activities between both the approaches. Sir John Bruce once said the final word on hernia will probably never be written. In collecting, assimilating and distilling the wisdom of today we must provide a base from which advances may be made.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Thulasilingam K, Akhter J. A comparative study on short term surgical outcome between laparoscopic inguinal hernia mesh repair vs. open inguinal hernia mesh repair for primary unilateral inguinal hernias. Int Surg J 2023;10:599-605.