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Post-operative Pain Outcomes of Laparoscopic Ventral Hernia Repair (LVHR): An eight-year experience

Shahid Rasul, Hassan Ahmed, Sanum Ali, Surrendar Dawani, Sarah Zahid, Sehrish Hussain, Salman Jafferi, Mansab Ali

ABSTRACT:

Objective: To evaluate post-operative pain, recovery time and standard of living in patients undergoing LVHR in detail.

Study design and Setting: This prospective cohort study was conducted at a tertiary care hospital of Karachi, Pakistan, after getting approval from the "National Medical Centre Ethical Review Board", from January 2011 to December 2019,

Methodology: Total n= 577 patients undergoing standard LVHR procedure (defect closed with non-absorbable monofilament suture, reinforced with intra-abdominal dual layer mesh, anchored with non-absorbable tacks & sutures). Patient demographics, perioperative & postoperative findings and post-operative pain analysis were investigated and presented as descriptive statistics. Follow-up was carried out at 1st week, 2nd week, 3rd monthly, 6 monthly and 12 monthly post-operative appointments.

Results: During the study period of nine years (January 2011 to December 2019), 577 patients (primary ventral hernia *n*=232, recurrent ventral hernia *n*=188 patients, incisional hernia *n*=157) underwent LVHR. Mean post-operative hospital stay was 1.53 ± 1.8 days. Mean post-operative pain assessment on visual analog scale (VAS) after surgery (0-3days) was reported to be 38.5±29 by 65 patients out of 577 (11.26%), which significantly decreased at the end of 1st week to 27.9 ± 25.6. Only 3 patients (0.51%) reported chronic pain during the span of 3-6 months.

Conclusion: LVHR was associated with considerably less post-operative pain, shorter hospital stay and reduced time of convalescence. It is demonstrated that LVHR to be a safe and superior approach for the repair ventral hernias.

Keywords: Chronic pain, Laparoscopic ventral hernia repair, Post-operative pain, Ventral hernia, Visual analog scale

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INTRODUCTION:

One of the most common pathologies presenting in the surgical clinic is Ventral hernia, appearing as a bulge through an opening in the anterior abdominal wall.[1] Ventral hernia is a broad term and can be categorized as; epigastric, umbilical, paraumbilical, subcostal and Spigelian hernias and others, while incisional hernia is acquired in nature and occur at the site of any previous surgery through abdominal wall musculature.[2]

Ventral hernias are associated with abdominal discomfort, pain and deformed body image, leading to impaired patient's standard of living by creating hindrance in carrying out routine activities.[3] More than 300,000 open ventral hernia repairs (OVHR) are performed in the United States each year for the repair of primary ventral hernia[4], 2–30 % of them result in the development of incisional hernia, requiring approximately 90,000 repair procedures annually for its correction.[5]

Laparoscopic ventral hernia repair (LVHR) was introduced by LeBlanc and Booth in early 1990s and now it is being considered as a well-established procedure for the treatment of ventral hernia.[6] The advantages it has over the conventional open repair include; minimal invasion, reduction in perioperative morbidity, less postoperative pain, reduced need of analgesics, shorter hospital stay and low recurrence

rates followed by quick recovery.[7] It also provides complete exploration of the abdominal cavity, making the parietal and visceral adhesiolysis easier, which is a basic step to maintain the stability of intestinal package and paramount factor in the reduction of the chronic abdominal pain, linked to the open repairs.[8]

In the recent years, attempts to evaluate the outcomes of different ventral hernia repair procedures have increased. LVHR has been extensively compared with OVHR for safety, morbidity and recurrence rates. [9,10] However, there are only few studies in the literature evaluating incidence of acute & chronic pain and general well-being of patients post LVHR. This study was aimed to evaluate post-operative pain, recovery time and standard of living in patients undergoing LVHR in detail.

METHODOLOGY:

This prospective study was conducted among patients undergoing LVHR to characterize the repair of primary, recurrent and incisional ventral hernias, post-operative pain, period of recovery and standard of living in detail. Operative time, post-operative hospital stay, use of analgesics were also investigated for their potential association with post-operative pain.

After getting approval from the "National Medical Centre Ethical Review Board", this prospective cohort study was conducted from 1st January 2011 to 31st December 2019, at a tertiary care hospital in Karachi, Pakistan. Total 577 patients, ranging from 20 to 60 years of age were included and divided on the basis of etiology and type of hernia into three groups; *Group A* (Primary Ventral Hernia *n*=232), *Group B* (Recurrent Ventral Hernia *n*=88) and *Group C* (Incisional Hernia *n*=157). Patients suffering from strangulated and obstructed hernias were not included.

After taking written and informed consent, all patients underwent detailed clinical history, examination, investigations. General anesthesia fitness evaluation was obtained and standard LVHR was performed on all patients. All surgeries were performed under general anesthesia with patients in a supine position, arms tucked at the sides, urinary and nasogastric catheters placed for decompression. Preoperative prophylactic antibiotics were administered. Pneumoperitoneum was established using Veress needle, followed by insertion of optical port for the exploration of abdominal cavity to visualize the location of hernia defect and distribution of adhesions. Additional two 5mm assisting trocars were inserted under direct vision for the lysis of adhesions and reduction of hernial sac (Figure: I). Defect size was measured and closed with non-absorbable monofilament suture. Appropriately sized intra-abdominal dual layer Mesh (ePTFE & Polypropylene) placed with an overlap of approximately 3-4cm, in all directions. Points of reference were marked on the mesh and corresponding site on abdominal wall, to aid in orientation. Mesh was anchored with four non-absorbable monofilament transabdominal sutures and was stapled with non-absorbable spiral tacks measuring 5mm. Ports were removed and skin incisions were closed. Postoperative analgesic protocol included Ketorolac (30mg) and Paracetamol (1g) I/V 8 hourly. Follow-up was carried out at 1st week, 2nd week, 3rd monthly, 6 monthly and 12 monthly post-operative appointments.

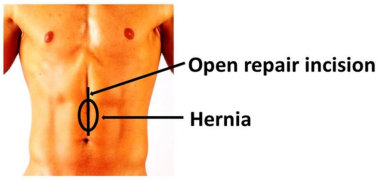
RESULTS:

During the study period of nine months, 577 patients underwent LVHR. A total of 232 patients (40.2%) for repair of primary ventral hernia, 188 repair of recurrent ventral hernia (15.25%) and 157 incisional hernia (27.20%). The mean age of patients in all groups was 42.07 ± 17.93 years and majority of patients were of female gender (55%), as shown in Table- I. Mean post-operative hospital stay was found to be 1.53 ± 1.8 days. Parameters like operating time, estimated blood loss, analgesia requirement, return to daily activities & work along with complications and recurrence rate can be observed in Table-1. Visual analog scale (VAS) was used on a 100 mm line, for the assessment of postoperative pain in patients after LVHR. Out of 577, 65 patients (11.26%) complained of pain having mean VAS score of 38.5±29.3, immediately after the surgery (0-3days). They were managed conservatively by I/M and oral doses of Ketorolac or NSAIDs. Out of those 65 patients, 20 (3.46%) reported pain with mean VAS score of 27.9 ± 25.6 by the end of 1st week, depicting a significant reduction in pain. Only 3 out of 65 patients (0.51%) reported chronic pain during the span of 3-6 months (Table: II). They were prescribed oral doses of Ketorolac or NSAIDs.

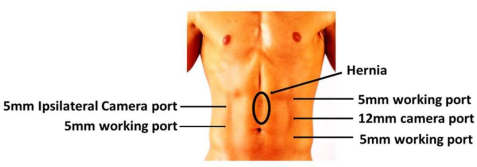
DISCUSSION:

In the past, surgeons tended to focus on the outcomes of LVHR in terms of recurrence and complications. From a patient's perspective, however, pain and discomfort from the abdominal wall may be more important than the risk for recurrence. The ultimate surgical goal should be to restore or increase the standard of living by limiting the incidence

Figure. 1: Schematic representation of OVHR incision (A) and LVHR ports (B)



A: Open repair incision



B:Laparoscopic Repair Port Placement

Table 1: Patient Demographics

Variables	Overall	Primary ventral hernia	Recurrent ventral hernia	Incisional hernia
Total no: of patients (%)	577 (100)	232 (40.2)	88 (15.25)	157 (27.20)
Females (%)	317 (55)	162 (69.82)	51 (57.95)	119 (75.79)
Males (%)	260 (45)	70 (30.17)	37 (42.04)	38 (24.20)
Age (mean ± std)	42.07 ± 17.93	46.77 ± 13.23	45.82 ± 14.18	49.46 ± 10.54
BMI (mean ± std)	29 ± 6.4	28 ± 6.2	31.92 ± 6.10	31.06 ± 6.53
PERIOPERATIVE FINDINGS				
Defect width (cm^2)	8 (3-15)	4.67 (3-8)	5 (4-8)	7.5 (5-15)
Operative time (min)	100 (80-120)	87 (75-100)	100 (80-120)	110 (90-130)
Estimated blood loss (ml)	30 (10-50)	25 (10-40)	28 (10-40)	34 (10-60)
Mesh size (cm^2)	25×20	15×10	20×15	25×20
POST-OPERATIVE OUTCOMES				
Post-operative hospital stay (days)	1.53 ± 1.8	1.49 ± 1.4	1.32 ± 1.5	2.1 ± 1.2
Use of analgesics (doses)	4 (2-6)	3 (2-4)	3 (2-4)	3 (2-5)
Return to daily activities (days)	3.61 (2-5)	2 (1-2)	2 (1-2)	3 (2-4)
Return to work (days)	7.13 (6-10)	5 (5-7)	5 (5-7)	6.5 (6-10)
Post-operative complications	15 (2.59%)	2 (0.34%)	4 (0.68%)	9 (1.53%)
Recurrence	7 (1.21%)	-	2 (0.34%)	5 (0.86%)

BMI: Body mass index, std: Standard deviation

Table 2: Post-Operative Pain Analysis on Visual scale (VAS)

Post-operative pain analysis	**0-3 days**	**At 1 week**	**At 2 weeks**	**3 months**	**6 months**	**12 months**
Mean VAS score	38.5 ± 29.3	27.9 ± 25.6	22.4 ± 24.3	8.8 ± 15.3	4.1 ± 6.4	2.7 ± 4.2
No of patients *(n*=**577)**	65 (11.26%)	20 (3.46%)	08 (1.38%)	03 (0.51%)	01 (0.17%)	00 (0%)

Interpretation of pain on 100mm Visual analogue scale (VAS): no pain (0-4), mild pain (5-44), moderate pain (45-74) and severe pain (75-100).

of post-operative pain and complications. Chronic abdominal pain (persisting for more than 3-4 months) [11] is a serious problem after ventral hernia repair. Nerve injury or entrapment due to extensive adhesiolysis, dissection of the abdominal wall for myofascial structures post OVHR could lead to increased incidence of chronic pain.[12]

With the advent of minimally invasive procedures, such complications can be reduced. The present prospective study demonstrated that LVHR had a significant positive influence on a broad spectrum of recovery parameters. Even though large incision is not used, LVHR may be associated with significant abdominal pain. The incidence of chronic pain after LVHR has been reported to be approximately 1–3 % in literature, affecting the quality of life badly.[13]

Gronnier *et al* reported that after a mean follow-up period of 24.6 ± 9.9 months, 31 patients (28.4%) complained of chronic pain post OVHR, which was predominantly neuropathic in nature.[14] Eker *et al* found association of greater number of patients with post-operative in OVHR group than LVHR group[15], however, our study witnessed an event free recovery by most of patients (table- II). During the span of 72 hours after LVHR, 11.26% of patients experienced post-operative pain which resolved in most of the patients by the end of 2 weeks. Only three patients (0.51%) complained of chronic pain during 3rd monthly appointment, no neuropathic involvement was seen and relief was attained by the administration of opioid analgesics, by the end of 6th month.

Post-operative chronic pain is largely related to fixation of mesh with tacks or sutures. Pain due to fixation is different from that at the port sites. The postoperative pain produced by the fixation techniques could play an important role in deciding between sutures and tacks for mesh fixation.[16] A randomized control trial from Sweden reported persistent post-operative pain in 7.4% of patients with only tacker fixation of mesh.[17] In this study, both tackers and sutures for the fixation of mesh were used and found no incidence of chronic pain with tacker fixation. The observations regarding association of chronic pain with tacker fixation are in alliance with Liot E, and her team who reported no change in the occurrence of chronic pain in group of patients with absorbable tackers, in comparison to non-absorbable

tackers' group.[18]

Operating time did not differ significantly between LVHR & OVHR as reported by Thota A, and his team that, laparoscopic repair took at an average of 94.35 minutes, while open mesh repair took 92.65 minutes.[19] The mean duration of surgery in the study subjects undergoing LVHR was 100 ± 20 minutes, however, it slightly increased in cases undergoing LVHR for incisional hernia (110 ± 20 minutes). An Egyptian prospective study reported shorter hospital stay in patients that underwent LVHR (1.94± 0.67 days)[20], this was in agreement with our study in which patients were discharged from hospital after 1.53 ± 1.8 days. This could be considered as a valuable outcome owing to the fact that shorter hospital stays are associated with reduced hospital expenditure.

This study witnessed few postoperative complications (2.59%), including seromas which were conservatively managed with antibiotics and no need for drain was required. No intestinal injury or obstruction was observed and no mortality took place, indicating that LVHR is a safe surgical procedure for primary and incisional ventral hernia repair. Moreover, no patients required reoperation for a port site hernia between the time of initial laparoscopic ventral hernia repair and assessment for the study.

An overall large number of patients, effective long-term follow-up, and the specific standardized operative methods are the main strengths of this study; however, our study lacks a comparison to an open surgery group. A substantial portion of patients were referred from other private set-ups and surgeons, which proves that minimally invasive surgical outcomes are much better then open repair.

CONCLUSION:

It is demonstrated from the experience that LVHR to be a safe and superior approach for the repair ventral hernias. It is better in terms of postoperative pain related complications and return to routine activities and work, yielding a good standard of living and patient's satisfaction, post-operatively. Although these results are encouraging, larger, long-term, multicenter studies comparing LVHR and open repair are needed.

Authors Contribution:
Shahid Rasul: Drafting of the work and Final approval of the version to be published
Hassan Ahmed: Drafting of the work and Final approval of the version to be published
Sanum Ali: conception or design of the work; or the acquisition, analysis, or interpretation of data for the work and Final approval of the version to be published
Surrendar Dawani: Acquisition & analysis of data and Final approval of the version to be published
Sarah Zahid: Acquisition & analysis of data and Final approval of the version to be published
Sehrish Hussain: Interpretation of data and Final approval of the version to be published
Salman Jafferi: Interpretation of data and Final approval of the version to be published
Mansab Ali: Drafting of the work and Final approval of the version to be published

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