



CLOSURE OF THE FASCIAL DEFECT DURING LAPAROSCOPIC UMBILICAL HERNIA REPAIR: A RANDOMIZED CLINICAL TRIAL

General Surgery

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ABSTRACT

Background: Repair of an umbilical hernia is one of the most frequently conducted elective gastrointestinal surgical procedures. Irrespective of surgical technique, there are many clinical challenges to optimize treatment. Seroma formation, recurrence and postoperative pain are among the most important challenges. **Objective:** The objective of the study was to compare recurrence and seroma formation after closure of the fascial defect in patients with recurrence and seroma formation after non closure of defect in patients undergoing laparoscopic umbilical hernia repair. **Patients And Methods:** A randomized control study was done in NARAYANA MEDICAL COLLEGE AND HOSPITAL (DEPARTMENT OF GENERAL SURGERY) from Jan 2022 to Jan 2023. Patients attending outpatient and inpatient department of General surgery with umbilical hernia during the study period were included in the study. **Results:** There were significant differences in recurrence and seroma formation, which was higher in the non closure of defect group compared to closure of defect group. **Conclusions:** Closure of the fascial defect in laparoscopic umbilical hernia repair significantly reduced early seroma formation and long-term recurrence. Thus from this study, we infer closure of the fascial defect in laparoscopic umbilical hernia repair significantly reduced seroma formation and recurrence.

KEYWORDS

INTRODUCTION:

Repair of an umbilical hernia is one of the most frequently conducted elective gastrointestinal surgical procedures. Irrespective of surgical technique, there are many clinical challenges to optimize treatment. Seroma formation and recurrence are among the most important challenges. There are conflicting data on postoperative patient-reported outcomes such as pain, movement limitation, discomfort, fatigue, cosmesis, quality of life, seroma formation and recurrence after both open mesh repair and laparoscopic intraperitoneal onlay mesh repair.

Most studies show that both techniques produce similar results, so the choice comes down to the surgeon's preferences.

Ergonomics is a relatively new field of science that has gained popularity. A growing body of research examines the ergonomic issues that surgery teams face. The majority of them are focused on improving operating room working conditions and, as a result, increasing productivity. One of the most serious issues is the inadequacy of laparoscopic instrument handle designs. Another major issue arises when performing surgery via monitor, which is primarily due to the monitor's non-ergonomic positioning.

Hence this study was conducted to compare recurrence and seroma formation after closure of the fascial defect in patients with recurrence and seroma formation after non closure of defect in patients undergoing laparoscopic umbilical hernia repair and also to find the impact of these two techniques on surgeon's ergonomics and their satisfaction.

Ethical consideration: This research is done under the supervision of the Ethical committee of Narayana Medical College, Nellore.

Statistical analysis: statistical package for social sciences (SPSS) for Windows 10.0 program was used for descriptive statistical mean, standard deviation, frequency, and median were used.

MATERIALS AND METHODS

The current study was done in the department of surgery, Narayana Medical College, Nellore. It is a randomized control trial done on patients admitted with umbilical hernia in the department of surgery, during the period from January 2022 to January 2023. Ethical clearance was obtained by the college Ethical Committee.

Inclusion Criteria:

- Elective repair
- Laparoscopic umbilical hernia repair
- Defect gap 2 to 6 cms estimated preoperatively.

- Not more than one defect.
- Patient aged 18 to 80 years.

Exclusion Criteria:

- Open hernia repair
- Previous intraperitoneal onlay mesh technique
- Defects less than 2cms and more than 6 cms

Patients attending the outpatient and inpatient department of general surgery with umbilical hernia from the months of Jan 2022 to Jan 2023 were included in the study. The individual participant's were explained about the study and they were also assured that, their identity would be kept strictly confidential and they have the option to refuse participation in the study at any time.

Based on this patients divided into closure of defect group and non closure of defect group. Outcome includes assessment of seroma formation and recurrence. All the findings from both the groups were entered in the same proforma where clinical presentation was entered by the principal investigator.

Sample Size:

Based on literature, the calculated sample size was found to be 72. Hence a total of fifty patients with umbilical hernia were included in the study and among them thirty six cases were assigned to closure of defect group and another thirty six cases were assigned to non closure of defect group through computer generated random numbers.

RESULTS:

Table 1 showed In this current study the cumulative recurrence rate, the difference between both the approaches was statistically significant for mean operative time (p value 0.047).

Table 1: Cumulative recurrence rate among the study group participants

Parameter	Defect Closure (n=36)	No defect Closure (n=36)	P value
Cumulative recurrence rate	5	12	0.047*

*Significant

Table 2 in this current study showed the seroma formation in the defect closure and no defect closure group, The difference between both the groups was found to be statistically significant (p value 0.043).

Table 2: Seroma formation among the study participants

Parameter	Defect closure	No defect closure	Total	P value
Seroma formation	5	11	16	0.043*

*Significant

Table 3 in this study shows quality of life and post operative pain between the defect closure and no defect closure group.. There was no statistical association noted among the groups.

Table 3: Association of quality of life and postoperative pain between the groups

Parameters	Defect closure	No defect closure	Total	P value
Quality of life	0	0	0	0.528
Post operative pain	1	2	3	0.272

DISCUSSION:

Repair of an umbilical hernia is one of the most frequently conducted elective gastrointestinal surgical procedures. Irrespective of surgical technique, there are many clinical challenges to optimize treatment. Postoperative pain, readmission and wound-related complications such as surgical-site infection, haematoma and seroma formation are among the most important challenges^{6,7}. There are conflicting data on postoperative patient-reported outcomes (PROMs) such as pain, movement limitation, discomfort, fatigue, cosmesis, quality of life (QoL), seroma formation and recurrence after both open mesh repair and laparoscopic intraperitoneal onlay mesh repair.

The main study hypothesis was that closure of the fascial defect to try to reduce recurrence could increase early postoperative pain due to increased tissue strain after closure of the defect. The objective of the study was to analyse PROMs, seroma formation, and long-term recurrence and chronic pain after closure of the fascial defect in patients undergoing laparoscopic umbilical hernia repair.

Procedure

Before the start of the study, each surgeon had performed more than 30 intracorporeally sutured laparoscopic hernia repairs. A uniform surgical technique, including intracorporeal suture method was agreed at a consensus meeting, and maintained through standard video recordings and written instruction.

The abdominal cavity was insufflated to 12 mmHg by Veress needle, and a 12-mm trocar was placed along the left side lateral to the mid-clavicular line under the left lower costal margin (Palmer's point). Additionally, one 5-mm trocar and one 12-mm trocar were placed in a vertical line downwards. Adhesiolysis was performed as needed.

The defect area was cleared of fatty tissue and if necessary, the falciform ligament was partially detached from the abdominal wall to make space for the mesh. Under intraperitoneal pressure of 6–8 mmHg, the maximum diameter of the defect was measured during surgery using a disposable ruler. The largest defect diameter was used to determine the mesh size. The hernia sac was not excised. If randomized to intervention, the defect was closed incorporating the hernia sac, subcutis and fascial edges using non-absorbable interrupted sutures.

The sutures were placed 0.5–1 cm from the fascial edges, with 0.5–1 cm between the stitches. Suturing was performed at an intraperitoneal pressure of 6–8 mmHg, guided by a laparoscopic knot-pusher. Patients in the no-closure group underwent an identical surgical technique without closure of the defect. In both groups, a fitted Physiomes (Ethicon) was placed with at least a 5-cm overlap (corresponding to the largest diameter of an open defect).

The mesh was double crown-fixed with non-absorbable tacks with approximately 2 cm between each tack. Mesh fixation was performed under intraperitoneal pressure of 6–8 mmHg. The 10-mm fascial trocar site defects were closed with absorbable polydioxanone, and the skin was closed with nylon suture. Patients were instructed to wear a fitted abdominal elastic binder continuously for 7 days after surgery.

This RCT evaluated short- and long-term outcomes after closure of the fascial defect in laparoscopic umbilical hernia repair. Closure of the fascial defect did not increase early postoperative pain, but reduced the incidence of serosa formation and long-term hernia recurrence. Apart from postoperative fatigue, other PROMs were not affected by closure of the defect. There were no significant effects on cosmesis or QoL, and no adverse effects were recorded.

The present study hypothesized that closure of the fascial defect might

increase postoperative pain compared with no closure, owing to increased tension on the abdominal wall.

Two recent RCTs compared laparoscopic ventral hernia fascial closure with no closure. One included 193 patients undergoing incisional hernia repair with a 1-month follow-up. The other included 129 patients who had laparoscopic repair for primary and incisional hernias, and investigated long-term QoL and recurrence as primary outcomes. Ahonen-Siirtola and colleagues found significantly higher VAS pain activity scores after defect closure (52 versus 43 for no closure; $P = 0.019$), but with no difference in pain scores after 2, 3 and 30 days.

Bernardi and co-workers found no difference in pain scores after 2 years, but did not determine VAS scores in the early postoperative phase. The present RCT reported significantly higher fatigue scores after defect closure. Fatigue has been associated with pain and surgical stress response, and higher early fatigue scores in the closure group may reflect this. All patients received preoperative dexamethasone, which has anti-inflammatory and analgesic effects, and should reduce early fatigue and pain after minor surgical procedures. In the present study the defect closure group had significantly fewer seromas than the no-closure group, in accordance with previous studies. Sutured closure aims to leave no dead space in the previous hernia sac; a seroma may be intraperitoneal, but not detectable clinically. This study also found a significantly lower hernia recurrence rate after closure of the defect compared with no closure, although confidence intervals were overlapping.

CONCLUSION

- This randomized control trial evaluated outcomes after closure of the fascial defect in laparoscopic umbilical hernia repair.
- Closure of the fascial defect decreases the seroma formation and recurrence and did not increase the postoperative pain.

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