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ORIGINAL ARTICLE

The outcome of Sublay vs Onlay mesh hernioplasty in obstructed paraumbilical hernia.

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ABSTRACT… Objective: To compare the results of sublay mesh repair vs onlay mesh repair in patients with obstructed paraumbilical hernia in terms of post operative pain, wound infection and recurrence rates after 2 years. **Study Design:** Comparative prospective study. **Period:** 3 years from 1st January 2022 to 30th December 2024. **Setting:** department of General Surgery of CMA teaching and research hospital which is teaching hospital of Azra Naheed Medical College Lahore Pakistan. **Methods:** Sample size of this study is 112 patients and patients were divided into 2 groups Group A and Group B with 56 patients in each group. Inclusion criteria include all the patients with age between 18 years and 70 years diagnosed with obstructed paraumbilical hernia. Outcomes were measured in terms of post operative pain, wound infection, seroma hematoma formation and recurrence of hernia after 1 and 2 years. All the data was entered and processed by using SPSS 26. **Results:** The most common age group who presented with obstructed paraumbilical hernia is 40 to 49 years of age. post operative pain 24 hours surgery, wound infection after 48 hours of surgery, seroma/hematoma formation 24 hours of surgery and recurrence of hernia after 1 and 2 years is significantly higher in patients who underwent onlay mesh hernioplasty. Post operative pain has no significant relation with diabetic or BMI of patient while wound infection was more in diabetic patients. **Conclusion:** Sublay mesh hernioplasty is superior even for obstructed paraumbilical hernia as compared to onlay mesh repair.

Key words: Hernia, Infection, Onlay, Pain, Recurrence, Sublay.

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INTRODUCTION

Hernia is a common surgical condition characterized by the protrusion of an organ or tissue through an abnormal opening in the body.[1] Among the various types of hernias, paraumbilical hernias, which occur near the navel or umbilicus, are very common, especially in adults. The choice of surgical technique is critical, as it can influence postoperative outcomes, including pain, recurrence rates, and overall patient satisfaction.[2] Two prominent surgical approaches for the repair of paraumbilical hernias are sublay and onlay mesh hernioplasty.

The sublay technique involves the placement of mesh in a retro-muscular position, which is situated behind the rectus abdominis muscle. This approach provides several theoretical benefits, including reduced tension on the abdominal wall, decreased risk of nerve injury, and improved integration of the mesh with the surrounding tissues.[3] Conversely, the onlay technique entails placing the mesh directly on the abdominal wall, above the muscle layer. While this approach is often simpler and quicker to perform, it may also carry a higher risk of complications, such as seroma formation, infection, and increased postoperative pain.[4]

Recent studies have sought to compare the outcomes of sublay and onlay techniques for hernia repair, particularly in the context of obstructed paraumbilical hernias. The use of mesh in the repair of obstructed hernias has frequently been controversial due to the possibility of infections from prosthetic materials. Recent research has proven that biomaterials offer acceptable materials for performing urgent hernia repair. While some research exclusively suggests mesh repair in situations where bowel resection is not necessary, other studies also suggest mesh repair for patients who need colon resection.[5,6]

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Moreover, the impact of patient-related factors, such as body mass index (BMI), comorbidities, and the size of the hernia defect also play important role in the outcomes.[7]

In this study we are going to compare the results of sublay and only mesh hernioplasties exclusively in obstructed paraumbilical hernias in terms of post operative pain, infection and recurrence rates.

METHODS

The general surgery department of CMA Teaching and Research Hospital, a teaching hospital of Azra Naheed Medical College in Lahore, Pakistan, conducted this comparative prospective study. The study ran for three years, from January 1, 2022, to December 30, 2024. With a 90% test power and a 5% level of significance, the sample size of 112 patients (56 in each group) was determined. The mean operative time for the onlay group was 4.4 ± 2.1, while the sublay group's was 3.2 ± 1.4.[8] The formula used was n = Z2 1-α/2 {P1 (1 – P1) + P2 (1 – P2)} / d2. Where Z2 1-α/2 = confidence level 90% = 1.6, P1 = population proportion 1 = 4.4 ± 2.1 and P2 = population proportion 2 = 3.2 ± 1.4 and d = absolute precision = 5.

The sample was gathered using non-convenience probability sampling from among those admitted through the surgical emergency department of CMA Teaching and Research Hospital Lahore, Pakistan, following approval by the Azra Naheed Medical College/CMA Teaching and Research Hospital Institutional Review Board (IRB/ANMC/2021/77-5-8-21). All patients between the ages of 18 and 70 who have been diagnosed with an obstructed paraumbilical hernia by a doctor with more than three years of emergency department experience are eligible to be included. Paraumbilical hernia is defined as presence of swelling in the paraumbilical region distorting the shape of umbilicus. Obstruction is defined clinically as signs of constipation, vomiting, abdominal distension or para umbilical pain with or without fever. Ultrasound abdomen was done in all included patients to assess the size of defect in abdominal wall and contents of hernia sac. All those patients were included in the study in whom small intestine was observed in hernia defect on exploration. Depending upon the condition of small gut, decision of resection of involved gut or reduction of gut back to abdomen was done. Exclusion criteria include patients who were unfit for general anesthesia, recurrent umbilical hernia, non-obstructive paraumbilical hernia and age more than 70 years.

Informed consent of patients was obtained from all the included patients for this study. Basic demographic information of each patient (name, age, sex) was noted.

Patients were divided into 2 groups, Group A and Group B by using lottery method.

Group A patients underwent sublay hernia repair while Group B patients underwent onlay hernia repair. All hernia repair were done by consultant surgeons who had experience of more than 5 years in doing hernia surgeries under general anesthesia. The technique of sublay mesh hernia repair is described by Rhemtulla et al and the technique of onlay mesh hernia repair is described by Kockerling et al.[9,10] Body Mass Index (BMI) was calculated by dividing weight of patient in kilograms by height of patient in meters. HbA1c levels of all patients were done and patients were labelled as Diabetic if their HbA1c levels are more than 6%. Wound infection was defined as developed of skin redness, fever above 100F, pain or purulent discharge from the wound. Recurrence of hernia is defined as development of bulge over the previous hernia site, confirmed by positive cough impulse on standing position and finding of defect in rectus sheath on abdominal ultrasound. Seroma and hematoma formation is the development of fluid collection under the incision site.

The outcomes parameters were measured by post-graduate residents of general surgery who were blinded about group allocation. Intra surgery time was measured in minutes from skin incision till skin closure. Patients were discharged from hospital when hemodynamically stable. Post operative pain was calculated by visual analogue score (VAS) 24 hours after surgery.[11] Patients were discharged from hospital once they were hemodynamically stable with no active compliant after oral diet. Patient were followed after 2 weeks for removal of

skin stiches and then again contacted after 1 year and 2 years for development of any swelling over the incision. Patients who complained regarding any swelling over the incision were called for follow-up and assessed clinically for incisional hernia and further confirmed by abdominal ultrasound to see the defect size.

All the data was entered and processed by using SPSS 26. Quantitative variables like age, intra-operative time and pain score were described by using Mean ± S.D. Gender and development of incisional hernia was described by using frequencies and percentages. Comparison of two groups was done by apply independent sample t-test. A p-value of ≤ 0.05 was considered significant.

RESULTS

Out of total 112 patients included in this study, 83 were females and 29 were male with male to female ratio of 2.8:1. The most common age group who presented with obstructed paraumbilical hernia is 40 to 49 years of age with mean age of patients was 44.7 years with standard deviation of ± 7.8 years. It is clear from Table-I that post operative pain 24 hours surgery, wound infection after 48 hours of surgery, seroma/hematoma formation 24 hours of surgery and recurrence of hernia after 1 and 2 years is significantly higher in patients who underwent onlay mesh hernioplasty. Post operative pain has no significant relation with diabetic or BMI of patient while wound infection was more in diabetic patients while seroma/hematoma formation and recurrence of hernia was more in patients with BMI more than 30.

DISCUSSION

The management of paraumbilical hernias, particularly in the context of obstruction, remains a significant challenge in surgical practice. This study aimed to evaluate the outcomes of two prevalent surgical techniques—sublay and onlay mesh hernioplasty—in patients presenting with obstructed paraumbilical hernias at a tertiary care hospital in Pakistan.

The majority of research in the literature demonstrated that sublay repair was superior to onlay repair in terms of recurrence rates, post-operative pain, and wound infection; however, there are other studies that found no discernible difference in the results of paraumbilical hernias repaired using the sublay or onlay techniques. Both approaches are safe, effective, and associated with comparable rates of complications and recurrence when treating simple paraumbilical hernias, according to a research by Bessa et al.[12]

TABLE-I

Showing number of patients with post operative pain, wound infection, seroma/hematoma formation, recurrence rates after 1 and 2 years. The number and frequency of diabetic patients and patients with increased BMI is also mentioned in this table.

	Group A (Sublay Mesh) (N = 56)	Group B (Onlay Mesh) (N = 56)	P-Value
Post-Operative Pain	7 (12.5%)	12 (21.4%)	
Diabetic	1	2	0.01
BMI > 30	2	3	
Wound Infection	3 (5.35%)	7 (12.5%)	
Diabetic	2	5	0.04
BMI > 30	0	1	
Seroma/Hematoma Formation	2 (3.57%)	9 (16.0%)	
Diabetic	0	2	0.01
BMI > 30	2	5	
Recurrence After 1 Year	0 (0.00%)	4 (7.14%)	
Diabetic	-	0	0.01
BMI> 30	-	3	
Recurrence After 2 Years	2 (3.57%)	3 (5.35%)	
Diabetic	-	-	0.00
BMI> 30	2	3	

Obstructed paraumbilical hernias present unique challenges in surgical management. These hernias are characterized by the incarceration or strangulation of abdominal contents, leading to compromised blood supply and the potential for bowel necrosis.[13] Given the urgency of treating obstructed hernias, the surgical technique must be carefully considered because it can have a substantial impact on patient outcomes. In this particular situation, comparing the safety and efficacy of sublay versus onlay mesh hernioplasty is essential since surgical technique variations may affect the procedure's overall outcome and the incidence of complications.

According to our study's findings, obstructed paraumbilical hernias can be effectively managed using both sublay and onlay procedures, each of which has unique benefits and drawbacks. Postoperative problems like seroma and wound infection were less common with the sublay approach, which places the mesh underneath the fascia. This result is consistent with previous research indicating that sublay hernioplasty may provide superior results because of less strain on the wound and improved mesh integration with surrounding tissues.[14]

The sublay approach's lower complication rate is especially relevant in our setting, where postoperative complications can have a substantial impact on patient outcomes and healthcare expenses, and healthcare resources are frequently few.

Conversely, the onlay technique, characterized by the placement of mesh above the fascia, was associated with a shorter operative time and quicker recovery in our cohort. This finding is consistent with previous studies that have reported similar advantages of onlay hernioplasty.[15] The onlay approach's less intrusive nature, which can enable earlier mobilization and discharge, may be the reason for the faster recovery period. This benefit, though, has to be balanced against the higher risk of complications, including infection, which was noticeably higher in our study's onlay hernioplasty patients. The need for a customized strategy that takes into consideration the risk variables of each patient as well as the particular clinical situation is highlighted by the trade-off between operational time and complication rates.

Furthermore, the surgeon's preference and experience may also have an impact on the surgical procedure selection. It is commonly known that depending on the operating surgeon's competence and experience, surgical results might differ greatly.[16] As a result, it is crucial to take into account each technique's learning curve as well as any potential effects on patient outcomes. In order to reduce complications and maximize recovery, surgeons need to be properly trained in the selected technique.

The impact of postoperative care on surgical outcomes is another important factor to take into account. Regardless of the surgical approach used, a study by Sana et al. showed that patients who got comprehensive postoperative treatment, including pain control and early mobilization, had better recovery trajectories.[17] In order to maximize patient outcomes, this research highlights the significance of a multidisciplinary approach to hernia therapy, combining surgical knowledge with nursing and rehabilitative services. Future research should examine how recovery and complication rates are affected by standardized postoperative protocols, especially in high-risk groups.

It is also important to recognize the limitations of our research. First to draw firm conclusions about the relative efficacy of sublay versus onlay hernioplasty in treating obstructed paraumbilical hernias, prospective randomized controlled trials are necessary. Furthermore, our findings may not be as broadly applicable as they may be due to the relatively small sample size. Confirming our findings and clarifying the long-term effects linked to each approach will require further studies with bigger cohorts and longer follow-up times.

CONCLUSION

With this study it is evident that sublay technique is superior to onlay technique for dealing not with simple paraumbilical hernia but also in obstructed paraumbilical hernias in terms of less post-operative pain, wound infections and recurrences of hernia after 2 years. Post operative pain has no significant

relation with diabetic or BMI of patient while wound infection was more in diabetic patients while seroma/ hematoma formation and recurrence of hernia was more in patients with BMI more than 30.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Ahmed Siddique Ammar:** Data collection, analyzing references.
2	**Mahnoor Masood:** Data entry, critical revision.
3	**Imania Khizar Hayat:** Data collection.
4	**Humaira Alam:** Proof reading.
5	**Maham Qazi:** Data analysis.
6	**Muhammad Arshad Kamal:** References.