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Original Article

Comparison of Efficacy and Safety in Sublay versus Onlay Mesh Repair for Para-Umbilical Hernia: A Randomized Controlled Trial

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ABSTRACT

Background: Ventral hernias, either spontaneous or post-surgical, represent a significant challenge in surgical practice. The recurrence rates after primary tissue repair, especially in larger hernias, necessitate the use of tension-free mesh repairs. However, the choice between onlay and sublay mesh repair methods remains a subject of debate, with each technique having its own set of advantages and drawbacks.

Objective: The study aimed to compare the efficacy and safety of sublay versus onlay mesh repair techniques in the treatment of ventral hernias, with a focus on postoperative complications, pain, and treatment success rates.

Methods: This randomized controlled trial was conducted from May 2023 to October 2023 at multiple surgical centers. It involved 120 patients, aged 18 to 70 years, undergoing ventral hernia repair. Patients were randomly allocated into two groups: Group A (60 patients) receiving onlay mesh repair and Group B (60 patients) receiving sublay mesh repair. The study assessed postoperative complications, including seroma, wound infection, and pain using the Visual Analogue Scale (VAS), as well as overall treatment efficacy. Data were analyzed using SPSS version 25.0, with a p-value of less than 0.05 considered statistically significant.

Results: The mean age in Group A was 40.90±11.56 years, and in Group B, 40.55±11.63 years. Group A comprised 41.7% males and 58.3% females, while Group B had 46.7% males and 53.3% females. In Group A, seroma developed in 10%, wound infection in 15%, and postoperative pain in 18.3% of patients. Group B reported seroma in 3.3%, wound infection in 3.3%, and postoperative pain in 6.7%. The effectiveness of the treatment was 80% in Group A and 93.3% in Group B, with a notable difference in complication rates and success between the groups.

Conclusion: The sublay mesh repair technique demonstrated superior outcomes in terms of lower complication rates and higher treatment efficacy compared to the onlay method. This suggests that the sublay approach may be more advantageous for ventral hernia repair, offering better patient outcomes with fewer postoperative complications.

Keywords: Ventral Hernia, Mesh Repair, Onlay, Sublay, Randomized Controlled Trial, Postoperative Complications, Surgical Efficacy.

INTRODUCTION

Para-umbilical hernias, which involve the protrusion of abdominal contents through a defect near the umbilicus, present a frequent ssurgical challenge (1). The management of these hernias has evolved, particularly with the isntroduction of mesh to reinforce the repair and reduce the likelihood of recurrence (2). Two primary techniques, sublay and onlay mesh repairs, have gained prominence due to their distinct methodologies and outcomes. The sublay mesh repair is characterized by placing the mesh in the preperitoneal space, located between the posterior rectus sheath and the peritoneum (3). This approach is designed to minimize the mesh's contact with intra-abdominal tissues, potentially reducing the risk of adhesions and complications related to the intestines. On the other hand, the onlay mesh repair involves positioning the mesh on the external surface of the anterior rectus sheath (4-6). This method strengthens the abdominal wall by creating a bridge over the hernia defect.

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An important aspect of comparing these procedures is their efficacy in preventing hernia recurrence. Studies suggest that the sublay method may offer better long-term outcomes with lower recurrence rates compared to the onlay repair (7). The sublay technique's placement of the mesh ensures more extensive coverage of the hernia defect and a more even distribution of tension, which may lead to improved support and a reduced chance of recurrence (8). However, the onlay procedure, despite its simplicity and efficiency, may have a higher recurrence rate due to its positioning on the outer surface, potentially leading to increased strain at the repair site (8).

Postoperative discomfort and patient satisfaction are crucial in assessing the safety and effectiveness of hernia repair treatments (9, 10). Studies indicate that patients undergoing sublay mesh repair experience less postoperative pain compared to those receiving onlay repair (11-13). The sublay method, by preventing direct contact between the mesh and abdominal muscles, may reduce discomfort during recovery.

The sublay procedure appears advantageous in terms of reduced recurrence rates and possibly less postoperative pain, the onlay approach offers simplicity and speed. Surgical decision-making should be individualized, considering factors such as hernia size, patient characteristics, and surgeon experience. Further research and long-term studies are needed to deepen our understanding of these techniques and optimize their use in para-umbilical hernia repair. As hernia surgery continues to evolve, the quest for the most effective and safe method remains paramount in advancing abdominal wall restoration.

MATERIAL AND METHODS

This randomized controlled trial was conducted at various centers, including the Department of General Surgery at MRHSM Hospital Pabbi Nowshera, DHQ Ghallani Mohmand, and Cat C Hospital Tangi Charsadda, between May and October 2023. The study encompassed a cohort of 120 patients undergoing ventral hernia repair surgery, comprising both male and female participants aged between 18 and 70 years. The inclusion of patients in the study was contingent on the voluntary provision of informed written consent, which also facilitated the collection of demographic information such as age and gender. Exclusion criteria included individuals under 18 years of age, those who did not provide consent, and patients diagnosed with liver cancer.

Participants were fairly allocated into two groups, A and B, each consisting of 60 patients. Group A underwent the onlay mesh repair approach, while Group B was treated using the sublay technique. A meticulous data collection process was employed, focusing on postoperative outcomes such as pain, seroma formation, and wound infection. This facilitated a comprehensive comparative analysis between the two groups.

The data obtained were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0. The Chi-square test was utilized to detect significant differences between the two groups. For the purposes of this study, a p-value of less than 0.05 was deemed indicative of statistical significance. This rigorous approach to data collection, assessment, and analysis ensured a thorough and accurate evaluation of the efficacy and safety of the onlay and sublay mesh repair techniques for ventral hernia surgery.

RESULTS

One hundred twenty patients were counted in this study. Group A patients were operated using Onlay mesh repair while group B using Sublay mesh repair. Mean age recorded in group A was 40.90±11.56 while the mean age recorded in group B was 40.55±11.63 years. Gender wise distribution revealed that 41.7% patients were males while 58.3% were females in group A while there were 46.7% male while 53.3% female patients in group B. Regarding the complications, seroma was developed in 10% patients in group A while 3.3% patients in group B, wound infection was developed in 15% patients in group B while 3.3% in group B, postoperative pain was observed in 18.3% patients in group A while 6.7% patients in group B. No complication surfaced in 56.7% patients in group A while 86.7% patients in group B, the difference between both groups was notably significant. The treatment in group A was effective in 80% patients while 93.3% in group B, the difference was significant.

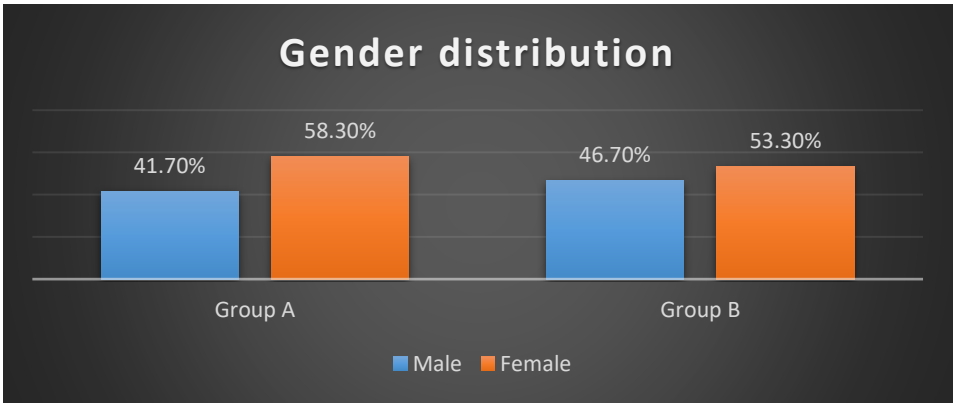

Figure 1 Gender distribution

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Table 1 Comparison of complications between both groups

		Complications				Total	P value
		Seroma	Wound infection	Postop pain (> 4 on VAS)	No complication		
Groups	Group A (Onlay)	6	9	11	34	60	0.004
		10.0%	15.0%	18.3%	56.7%	100.0%	
	Group B (Sublay)	2	2	4	52	60	
		3.3%	3.3%	6.7%	86.7%	100.0%	
Total		8	11	15	86	120	
		6.7%	9.2%	12.5%	71.7%	100.0%	

Table 2 Comparison of efficacy between both groups

		Efficacy		Total	P value
		Yes	No		
Groups	Group A (Onlay)	48	12	60	0.03
		80.0%	20.0%	100.0%	
	Group B (Sublay)	56	4	60	
		93.3%	6.7%	100.0%	
Total		104	16	120	
		86.7%	13.3%	100.0%	

DISCUSSION

The research into ventral hernias, including those arising spontaneously or, more commonly, as a result of abdominal surgery, is a critical aspect of abdominal surgery. It is estimated that 2 to 10% of incisional hernias develop post-abdominal surgery (14). While small hernias of less than 2 ½ cm diameter often respond well to primary tissue repairs, larger hernias exhibit a high recurrence rate of 30-40% when managed solely with tissue repair (14). This high recurrence rate poses both a challenge and a professional dilemma for surgeons.

In the realm of hernia repair, the trend has shifted towards tension-free repairs involving prosthetic mesh, which has significantly reduced recurrence rates (15). Despite these advancements, concerns persist regarding the increased risk of infection associated with the introduction of foreign materials and the ensuing financial implications (16). Nonetheless, the adoption of tension-free mesh repairs has shown advantages, leading to reduced surgical time and shorter hospital stays, making it the preferred method for hernia repair (17).

Our study indicated significant differences in postoperative outcomes between the two mesh repair techniques. Group A, which underwent onlay mesh repair, exhibited a 15% incidence of wound infection and a 10% occurrence of seroma development. In contrast, Group B, treated with sublay mesh repair, showed a markedly lower incidence of these complications: 3.3% for both wound infection and seroma formation. These findings are corroborated by multiple studies that highlight the sublay technique's superiority in minimizing postoperative pain, wound infections, and seroma formation compared to the onlay method (18, 19).

The study revealed that onlay mesh repair achieved an 80% success rate, with a 20% failure rate, and a 56.7% safety rate as indicated by the absence of complications. In comparison, sublay mesh repair demonstrated a higher success rate of 93.3%, a lower failure rate of 6.7%, and a safety rate of 86.7%. These findings align with existing literature, which reports an effectiveness rate of 88% and a safety rate of 87% for onlay mesh repair, based on recurrence. In comparison, sublay mesh repair shows an effectiveness rate of 80% and a safety rate of 81%, based on complication rates (19, 20).

This study's strengths lie in its rigorous methodology and the clear differentiation of outcomes between the two techniques. However, it is not without limitations. The study's duration and the size of the cohort may limit the generalizability of the findings. Future research should focus on longer-term follow-up and larger patient cohorts to validate these results. Additionally, further studies could explore the cost-effectiveness of these methods, considering the financial implications associated with mesh repairs. In conclusion, while both onlay and sublay mesh repairs have their merits, our study suggests that the sublay approach may offer superior outcomes in terms of efficacy and safety for ventral hernia repair.

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CONCLUSION

In conclusion, this study's findings have significant implications for the surgical management of ventral hernias. The comparative analysis between onlay and sublay mesh repair techniques revealed that the sublay method is associated with a higher success rate, lower incidence of postoperative complications such as wound infections and seroma formation, and reduced postoperative pain. These results underscore the efficacy and safety of the sublay technique over the onlay method, suggesting it as a preferable option for hernia repair surgeries. This insight is crucial for surgeons in making informed decisions about hernia repair methods, potentially leading to improved patient outcomes and satisfaction. Moreover, the study highlights the need for ongoing research to refine surgical techniques and optimize patient care in the field of hernia repair.

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