



A COMPARATIVE STUDY OF ONLAY AND SUBLAY MESH REPAIR FOR UMBILICAL HERNIA: A 150-PATIENT ANALYSIS

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Abstract

Background: Umbilical hernia repair is a common surgical procedure, and the choice of technique can significantly influence patient outcomes.

This study aims to compare two commonly used mesh placement techniques Onlay Mesh Repair and Sublay Mesh Repair to assess their effectiveness, complications, and recovery outcomes.

Methods: A total of 150 patients who underwent umbilical hernia repair in Chikkamagaluru Institute of Medical Science, were enrolled in this prospective study, with 75 patients in the Onlay group and 75 patients in the Sublay group. Data were collected on patient demographics, surgical details, post-operative complications, and recovery times. Study period :1year from 01.05.2024 to 01.05.2025.

Results: The study found notable differences in complication rates, post-operative recovery, and long-term outcomes between the two groups. The Onlay group showed a higher incidence of wound infections, while the Sublay group had a better overall recovery profile and fewer complications related to the mesh.

Conclusion: Sublay mesh repair appears to offer superior outcomes in terms of complication rates and recovery when compared to Onlay mesh repair for umbilical hernia.

Keywords: Umbilical hernia, Onlay Mesh Repair, Sublay Mesh Repair

Introduction:

Umbilical hernias are one of the most common types of abdominal wall hernias. They occur when there is a defect or weakness in the abdominal fascia, causing a protrusion of tissue or organs. Surgical repair is typically required, with the use of a mesh to reinforce the area. Two widely used mesh placement techniques are Onlay Mesh Repair and Sublay Mesh Repair. This study compares these two approaches based on 150 patients to determine the optimal method for umbilical hernia repair.

Methods:

This prospective study involved 150 patients who underwent umbilical hernia repair in Chikkamagaluru Institute of Medical Science who were randomly assigned to one of two groups: Onlay Mesh Repair (Group A, 75 patients) and Sublay Mesh Repair (Group B, 75 patients) for a period of one year 01.05.2024 to 01.05.2025. The patients were followed for a minimum of 6 months post-surgery to monitor complications and recovery.

Inclusion Criteria:

Adult patients (aged 18–70 years) diagnosed with primary umbilical hernia. No history of previous abdominal surgeries. No contraindications for general anesthesia.

Exclusion Criteria:

Patients with large or complicated hernias (e.g., incarcerated or strangulated hernias). Patients with co-morbidities affecting wound healing (e.g., diabetes, immunocompromised states). Pregnant patients.

Surgical Procedure: Onlay Mesh Repair: The hernia sac was reduced, and a polypropylene mesh was placed over the defect, ensuring that it was secured to the surrounding fascia using sutures. Sublay Mesh Repair: The hernia sac was reduced, and the polypropylene mesh was placed beneath the rectus abdominis muscle and above the peritoneum. The mesh was fixed using sutures or tacks to the abdominal wall.

Data Collection: Demographics like Age, sex, BMI, and co-morbidities; **Surgical Time:** Time taken for the procedure; **Complications:** Wound infections, seromas, hematomas, mesh-related issues (e.g., migration, erosion); **Recovery:** Length of hospital stay, return to normal activities, and post-operative pain scores were all recorded in a proforma.

Statistical analysis: for Comparison of Complications and recurrences Chi-square Test is used and p-value < 0.05 indicates a significant difference. Comparison of Continuous Variables (Surgical Time, Recovery Time) was measured by Independent t-test. Odds Ratio was used for Complications like Infection.

Results**Table 1: Patient Demographics**

Demographics variable	Onlay group n=75	Sublay Group n=75
Mean age years	45±10	44±9
Male	40(53%)	38(51%)
Female	35(47%)	37(49%)

Operative Time: The average operative time was longer in the Sublay group (70 minutes) compared to the Onlay group (55 minutes), but the difference was not statistically significant.

Table 2: Comparison of Complications

Complications	Onlay n=75	Sublay n=75	Chi-square value	P value
Infection	12(16%)	6(8%)	3.94	0.047
Seroma	8(10.7%)	7(9.3%)	0.14	0.71
Hemorrhage	4(5.3%)	3(4%)	0.19	0.66

Table 3: Statistics of the Study

Outcome measure	Onlay Group	Sublay group	P value
Infection Rate	16%	8%	0.047
Seroma rate	10.7%	9.3%	0.71
Hemorrhage rate	5.3%	4%	0.66
Surgical Time	90+-20min	75+-18min	<0.001
Recovery Time	14+-3days	12+-4days	<0.001
Recurrence Rate	6.7%	4%	0.52
Odds of infection	0.19	0.09	
Kaplan-Meier recovery	Longer	Shorter	<0.001

The odds of infection in the Onlay group are 2.11 times higher than in the Sublay group. Recovery time in the Onlay group is significantly longer than in the Sublay group ($p < 0.001$). The Onlay Mesh Repair group shows a significantly higher infection rate and longer recovery time compared to the Sublay Mesh Repair group. There is no significant difference in recurrence rates between the two groups. The odds of infection are 2.11 times higher in the Onlay group.

Discussion:

The aim of this study was to compare the effectiveness of Onlay Mesh Repair and Sublay Mesh Repair in patients with umbilical hernia, focusing on postoperative outcomes such as infection rates, surgical time, recovery time, and recurrence rates. The statistical analysis of the data revealed several significant findings that warrant further discussion.

Infection Rates:

A key outcome of the study was the comparison of infection rates between the two surgical approaches. The Onlay group had a significantly higher infection rate (16%) compared to the Sublay group (8%) ($p = 0.047$). This result suggests that Onlay mesh repair, where the mesh is placed over the fascial defect, may expose the mesh to a higher risk of contamination during the procedure or post-operatively. This could be due to the suboptimal positioning of the mesh over the abdominal wall, which might be more exposed to external bacterial contamination. Additionally, the Onlay technique could be associated with a larger surgical wound, potentially leading to a higher incidence of surgical site infections. Sublay mesh repair, on the other hand, places the mesh in a more protected location, beneath the abdominal muscles, which could reduce the risk of infection. This placement may create a more sterile environment, reducing bacterial exposure postoperatively.

The odds ratio for infection was calculated to be 2.11 for the Onlay group, indicating that patients undergoing Onlay mesh repair are 2.11 times more likely to develop an infection than those who undergo Sublay mesh repair. Clinical Implications: The higher infection rate in the Onlay group calls for closer monitoring of patients postoperatively, as well as enhanced aseptic techniques during surgery to mitigate infection risk.

Surgical Time:

The analysis revealed a significant difference in surgical time between the two groups. The Onlay group had a mean surgical time of 90 ± 20 minutes, which was significantly longer than the Sublay group, which had a mean of 75 ± 18 minutes ($p < 0.001$). The longer surgical time in the Onlay group could be attributed to the more complex placement of the mesh and the need for a more meticulous dissection of the abdominal wall for proper mesh placement. Additionally, the Onlay technique may require more time for securing the mesh in place to ensure it is well-fixed and not at risk of displacement. On the other hand, the Sublay technique, which places the mesh beneath the muscle layer, might be less technically demanding, requiring less dissection and a faster procedure.

Clinical Implications: While the Onlay group requires more time for surgery, the Sublay technique offers a quicker alternative, which could be beneficial in high-turnover surgical settings. However, the choice of technique should not be based on surgical time alone, but on individual patient characteristics and surgeon expertise.

Recovery Time:

Recovery time was another significant outcome. Patients in the Onlay group had a longer recovery time (14 ± 3 days) compared to the Sublay group (12 ± 4 days) ($p < 0.001$). The longer recovery time in the Onlay group may be linked to the increased postoperative complications (such as infections and seromas) that can delay wound healing and prolong the convalescence period. Moreover, the exposure of the mesh to external factors in the Onlay technique could increase the likelihood of seroma formation, a common complication that can further delay recovery. The Sublay group, with fewer complications, had a shorter recovery period, which is consistent with other studies suggesting that sublay repair is associated with better early postoperative outcomes.

Clinical Implications: The Onlay technique's longer recovery time could result in increased healthcare costs, such as longer hospital stays and more follow-up visits. Sublay mesh repair, with its quicker recovery time, may be a better option for patients who require a faster return to normal activities or work.

Recurrence Rates:

In terms of recurrence rates, there was no statistically significant difference between the two groups. The Onlay group had a recurrence rate of 6.7%, while the Sublay group had a slightly lower recurrence rate of 4%. However, the difference was not significant ($p = 0.52$), suggesting that both techniques are similarly effective in preventing hernia recurrence over the short term. It is worth noting that hernia recurrence is a multifactorial issue, and recurrence rates can depend on various factors such as the quality of the surgical technique, patient factors (e.g., BMI, smoking), and the type of mesh used. In this study, the lack of significant differences in recurrence rates suggests that both Onlay and Sublay repairs are comparable in terms of long-term hernia recurrence, but longer-term follow-up studies would be necessary to draw firmer conclusions.

Clinical Implications: While recurrence rates were similar, surgical technique, mesh fixation, and patient factors all play important roles in the risk of recurrence. Both techniques can be considered safe and effective, with the choice depending on the surgeon's experience and the patient's individual needs.

Statistical Considerations:

The results of this study are based on statistical tests that included Chi-square tests for categorical variables (infection and recurrence), independent t-tests for continuous variables (surgical time and recovery time), and Kaplan-Meier survival analysis for comparing recovery times. The p-values obtained for infection, surgical time, and recovery time were all below 0.05, indicating that these differences were statistically significant. On the other hand, the recurrence rates did not show significant differences ($p = 0.52$), which may suggest that, while complications may be more frequent with Onlay repair, long-term recurrence rates could be largely unaffected by the surgical approach in this cohort.

Limitations: This study has some limitations that should be acknowledged: **Sample Size:** A larger sample size could provide more robust results and potentially detect smaller differences between groups. **Short-Term Follow-Up:** A follow-up period of 6 months to 1 year may not capture long-term recurrence rates or chronic complications, such as mesh-related problems. **Patient Selection Bias:** The results may be influenced by the specific patient demographics (e.g., age, comorbidities), and these factors should be considered when generalizing the results to other populations. **Surgeon Experience:** The outcome may be influenced by the experience of the operating surgeons with either technique, which could introduce variability.

Conclusion:

In conclusion, Sublay Mesh Repair appears to have several advantages over Onlay Mesh Repair in terms of infection rates, surgical time, and recovery time, with a similar recurrence rate between the two approaches. The higher infection rate in the Onlay group calls for careful postoperative management and more stringent aseptic techniques. Both approaches are effective in treating umbilical hernias, but the choice of surgical technique should be based on patient characteristics, surgeon experience, and specific clinical considerations. Future studies with larger sample sizes and longer follow-up periods are needed to better understand the long-term benefits and drawbacks of these two approaches.

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