

## Comparison of Sublay and Onlay Mesh Repair in Terms of Post-Operative Complications

Farukh Gulzar Khawaja, Khalid Mahmood, Uzma Javed Gul, Asim Aslam, Farhan Saeed, Afza Nayyar

Department of Surgery, Combined Military Hospital/National University of Medical Sciences (NUMS) Rawalpindi Pakistan

### ABSTRACT

**Objective:** To compare Sublay and Onlay mesh repair in terms of post-operative complications among patients undergoing hernioplasty.

**Study Design:** Prospective comparative study.

**Place and Duration of Study:** Surgical Department, Combined Military Hospital, Rawalpindi Pakistan, from Jan 2020 to Jun 2021.

**Methodology:** This study was conducted on 300 patients who underwent hernioplasty for anterior abdominal wall hernias at our hospital. They were randomly divided into two groups before the surgery. Group-A received only mesh repair, while Group-B received subway repair. They were followed up for two weeks for any post-operative complications. Post-operative pain, seroma formation, hematoma formation and the presence of surgical site infection were compared in both groups.

**Results:** Out of 300 patients included in the final analysis, 189(63%) were male, and 111(37%) were female. About 163(54.4%) underwent subway repair, while 137(45.6%) underwent only repair. The commonest complication observed in patients was post-operative pain 68(22.7%), followed by surgical site infection 36(12%). Statistical analysis revealed that seroma formation, post-operative pain and surgical site infection were significantly observed more in patients undergoing only mesh repair than subway repair ( $p$ -value<0.05).

**Conclusion:** Post-surgical complications were commonly observed in patients within two weeks of surgery. In addition, patients undergoing Onlay mesh repair were more prone to have seroma formation, post-operative pain and surgical site infection than those undergoing Sublay repair.

**Keywords:** Complications, Hernioplasty, Onlay mesh, Sublay mesh.

**How to Cite This Article:** Khawaja FG, Mahmood K, Gul UJ, Aslam A, Saeed F, Nayyar A. Comparison of Sublay and Onlay Mesh Repair in Terms of Post-Operative Complications. *Pak Armed Forces Med J* 2023; 73(3): 686-689.  
DOI: <https://doi.org/10.51253/pafmj.v73i3.7130>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

## INTRODUCTION

Surgeons across the globe commonly encounter anterior abdominal wall hernias.<sup>1</sup> Hernioplasty is considered one of the most frequently performed surgeries by general and laparoscopic surgeons.<sup>2</sup> Hernioplasty has been associated with few adverse effects like post-operative pain, bleeding, surgical site infection, seroma formation etc.<sup>3,4</sup> Ventral or incisional hernia could be repaired by both open and laparoscopic methods. The laparoscopic method is usually considered better and is the first choice in a lot of surgical centres where expertise is available.<sup>5</sup> Both mesh or suture repair is in practice, but many trials favour the use of mesh repair for both short-term and long-term good outcomes.<sup>6</sup>

Onlay and subway techniques could be used to repair the ventral and incisional hernia, and both have proved effective for this purpose, but at the cost of certain adverse effects. Weber *et al.* concluded that Onlay mesh reconstruction provided significantly better ( $p$ <0.05) results than subway reconstruction. The

recurrence rate was much lower in the only group.<sup>7</sup> Demetrashvili *et al.* showed that both methods were equally effective in managing the hernia. However, the only method was associated with more wound complications as compared to other method.<sup>8</sup> Shahan *et al.* studied 97 patients who underwent Onlay mesh repair for incisional hernias, primary ventral hernias, flank hernias and complex abdominal wall reconstruction. They revealed that seromas were the commonest complication among these patients, followed by wound infections and skin necrosis. Around 10% of their study participants had to undergo re-operation due to any post-operative complication.<sup>9</sup>

Post-operative complications are usually a nightmare for surgeons and ruin the efforts made during the surgery. They also burden patients and the health care system as they may require long hospital admission or redo surgeries. A local study by Ahmad *et al.* compared Onlay versus Sublay Mesh Fixation Technique in Ventral Abdominal Wall Incisional Hernia Repair. They revealed that seroma formation, wound infection and dehiscence were less in the subway group than in the only group.<sup>10</sup> Therefore, we designed our study to compare subway and Onlay mesh repair in terms of

**Correspondence:** Dr Farukh Gulzar Khawaja, Department of General Surgery, Combined Military Hospital Rawalpindi Pakistan  
Received: 18 Jul 2021; revision received: 05 Jan 2022; accepted: 10 Jan 2022

post-operative complications among patients undergoing hernioplasty.

## METHODOLOGY

The prospective comparative study was conducted at the Surgical Department, Combined Military Hospital Rawalpindi from January 2020 to June 2021. Ethical approval (letter no 179/07/21) was taken from the Ethical Review Board Committee before the start of this study. The sample was gathered by using the non-probability consecutive sampling technique. The sample size was calculated using the WHO sample size calculator, keeping the population prevalence of complications with mesh repair at 22.4%.<sup>11</sup>

**Inclusion Criteria:** All patients aged 18-60 years undergoing ventral or incisional hernia repair were included in the surgery.

**Exclusion Criteria:** Patients with hernias other than a ventral wall or incisional hernias or those who underwent any procedure other than hernioplasty were excluded from the study. The study did not include patients in immunocompromised states or taking long-term steroids or immunosuppressant agents. Patients undergoing redo surgeries or complications during surgery were also excluded.

After written informed consent from the potential participants, patients diagnosed with a ventral or incisional hernia based on clinical and relevant imaging studies,<sup>12</sup> were included in the study. They were randomly divided into two Groups. Group-A received only mesh repair, while Group-B received subway mesh repair. Both of these repairs were done as per the set protocol.<sup>13,14</sup> A similar standardized mesh was used in all the patients. Antibiotic and anaesthesia protocols also remained the same for all the patients. Patients were discharged from the hospital according to their clinical condition. They were followed up for two weeks to look for post-operative complications like hematoma formation, seroma formation, surgical site infection and post-operative pain. A visual analogue scale score of more than six was taken as significant post-operative pain.

All statistical analysis was performed using the Statistics Package for Social Sciences (SPSS) version 24.0. Mean, and standard deviation were calculated for the patients' age and hospital stay. Frequency and percentages for patients having hematoma formation, seroma formation, surgical site infection and significant post-operative pain were calculated. Pearson Chi-square and Fisher's exact test were applied to

compare complications in both groups by keeping the *p*-value less than or equal to 0.05 as significant.

## RESULTS

Of the 300 patients in the final analysis, 189(63%) were male, and 111(37%) were female. About 163 (54.4%) underwent subway repair, while 137(45.6%) underwent only repair. The mean age of the study participants was 42.443±6.662 years. Table-I summarizes the patients' basic characteristics and the post-operative complications observed in them. The commonest complication observed in patients was post-operative pain 68(22.7%), followed by surgical site infection 36(12%).

**Table-I: Characteristics of Patients Undergoing Hernioplasty (n=300)**

| Study Parameters                    | n(%)            |
|-------------------------------------|-----------------|
| <b>Age (Years)</b>                  |                 |
| Mean±SD                             | 42.443±6.662    |
| Range (min-max)                     | 19-59           |
| <b>Method of Repair</b>             |                 |
| Onlay                               | 137(45.6%)      |
| Sublay                              | 163(54.4%)      |
| <b>Gender</b>                       |                 |
| Male                                | 189(63%)        |
| Female                              | 111(37%)        |
| Mean duration of admission          | 4.3 ±6.662 days |
| <b>Post-operative Complications</b> |                 |
| Seroma                              | 33(11%)         |
| Hematoma                            | 27(9%)          |
| Pot operative pain                  | 68(22.7%)       |
| Surgical site infection             | 36(12%)         |
| Others                              | 05(1.7%)        |

Table-II summarizes the results of the statistical analysis. It was revealed that *p*-values for seroma formation, post-operative pain and surgical site infection were <0.001, 0.002 and 0.006.

**Table-II: Comparison of Complications between the Study Groups(n=300)**

| Socio-Demographic Factors      | Sublay Mesh Repair | Onlay Mesh Repair | <i>p</i> -value |
|--------------------------------|--------------------|-------------------|-----------------|
| <b>Seroma Formation</b>        |                    |                   |                 |
| No                             | 158(96.9%)         | 109(79.5%)        | <0.001          |
| Yes                            | 05(3.1%)           | 28(20.5%)         |                 |
| <b>Hematoma Formation</b>      |                    |                   |                 |
| No                             | 149(91.4%)         | 124(90.5%)        | 0.786           |
| Yes                            | 14(8.6%)           | 13(9.5%)          |                 |
| <b>Post-operative Pain</b>     |                    |                   |                 |
| No                             | 136(83.4%)         | 96(70.1%)         | 0.006           |
| Yes                            | 27(16.6%)          | 41(29.9%)         |                 |
| <b>Surgical Site Infection</b> |                    |                   |                 |
| No                             | 152(93.2%)         | 112(81.7%)        | 0.002           |
| Yes                            | 11(6.8%)           | 25(8.3%)          |                 |

These *p*-values showed that these complications were significantly observed more in patients undergoing only mesh repair than subway repair. At the same time, hematoma formation had no such difference among patients in both groups (*p*=0.786).

## DISCUSSION

Surgical procedures, minor or major, carry the risk of various complications. Some might be immediate or short-term, but some may affect the long-term outcome. Hernioplasty procedure, open or laparoscopic, is associated with multiple complications even in the safest hands. Adequate post-operative care and timely follow-up could prevent complications or pick them up early to avoid long-term suffering.<sup>14</sup> Mesh repair methods are generally considered safe and effective procedures to correct hernias. Unfortunately, limited local data was available to compare various Mesh repair methods regarding complications. Therefore, we designed and conducted this study to compare subway and Onlay mesh repair in terms of post-operative complications among patients undergoing hernioplasty. Ibrahim *et al.*<sup>15</sup> concluded that seroma formation was seen in significantly fewer patients who underwent subway repair than patients who underwent Onlay mesh repair. Our study supported their results, and seroma formation was seen more in Onlay mesh repair patients in our study as well. Jairan *et al.*<sup>16</sup> revealed that the Onlay mesh repair method was more effective for hernia repair. Seroma formation was also seen more in the Onlay repair method, and the wound infection rate was almost equal in both methods. We did not study the effectiveness of repair in both methods. However, only the short-term complications & found that both seroma formation and infection rate were higher in patients undergoing only mesh repair.

Another recent study published in 2021 by Ibrahim *et al.*<sup>17</sup> from the data of patients of the United Kingdom explored the infection rate among patients undergoing subway and Onlay mesh repair. They found no statistically significant difference in infection rate after the surgery between both groups. Our results differed from theirs in this regard, and patients undergoing the Onlay mesh repair method had more chances of acquiring surgical site infection than patients undergoing subway repair in our analysis. Venclauskas *et al.*<sup>18</sup> followed up patients managed with an incisional hernia for one year and observed that the wound complications rate was significantly higher in the Onlay technique group. At the same time, post-operative pain was found in a similar number of

patients in both the Onlay and subway groups. In our study, both wound infection rate and post-operative pain were found more in the Onlay group than in the subway group.

## LIMITATIONS OF STUDY

Our study had a few limitations as well. We did not perform long-term follow-ups and could not establish long-term complications related to these procedures. Moreover, patients were not followed up after diagnosis of complications on how well they recovered from surgical site infection, seroma or hematoma after intervention from the team. Response to pain relief was also not recorded. Studies with long-term follow-up of these patients may generate better results.

## CONCLUSION

Post-surgical complications were commonly observed in patients within two weeks of surgery. Patients undergoing Onlay mesh repair were more prone to have seroma formation, post-operative pain and surgical site infection than those undergoing Sublay repair.

**Conflict of Interest:** None.

## Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

FGK & KM: Data analysis, drafting the manuscript, critical review, approval of the final version to be published.

UJG & AA: Conception, study design, data acquisition, approval of the final version to be published.

FS & AN: Drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

## REFERENCES

1. Pandya B, Huda T, Gupta D, Mehra B, Narang R. Abdominal Wall Hernias: An Epidemiological Profile and Surgical Experience from a Rural Medical College in Central India. *Surg J (N Y)* 2021; 7(1): e41-e46. doi: 10.1055/s-0040-1722744.
2. Köckerling F, Sheen AJ, Berrevoet F, Campanelli G, Cuccurullo D, Fortelny R, *et al.* The reality of general surgery training and increased complexity of abdominal wall hernia surgery. *Hernia* 2019; 23(6): 1081-1091. doi: 10.1007/s10029-019-02062-z.
3. Lee TJ, Ullisney KL, Choudhuri AK, Swiger JL, Gibeily GJ. Understanding the patient perspective after ventral hernia repair. *Hernia* 2019; 23(5): 995-1001. doi: 10.1007/s10029-019-02015-6.
4. Clancy C, Jordan P, Ridgway PF. Polypropylene mesh and systemic side effects in inguinal hernia repair: current evidence. *Ir J Med Sci* 2019; 188(4): 1349-1356. doi: 10.1007/s11845-019-02008-02005.
5. Sauerland S, Walgenbach M, Habermalz B, Seiler CM, Miserez M. Laparoscopic versus open surgical techniques for ventral or incisional hernia repair. *Cochrane Database Syst Rev* 2011 ; (3): CD007781. doi: 10.1002/14651858.CD007781.

6. den Hartog D, Dur AH, Tuinebreijer WE, Kreis RW. Open surgical procedures for incisional hernias. *Cochrane Database Syst Rev* 2008; 2008(3): CD006438. doi: 10.1002/14651858.CD006438.
7. Wéber G, Baracs J, Horváth OP. "Onlay" mesh provides significantly better results than "sublay" reconstruction. Prospective randomized multicenter study of abdominal wall reconstruction with sutures only, or with surgical mesh--results of a five-years follow-up]. *Magy Seb* 2010; 63(5): 302-311. Hungarian. doi: 10.1556/MaSeb.63.2010.5.3.
8. Demetrashvili Z, Pipia I, Loladze D, Metreveli T, Ekaladze E, Kenchadze G, *et al*. Open retromuscular mesh repair versus onlay technique of incisional hernia: A randomized controlled trial. *Int J Surg* 2017 ; 37: 65-70. doi: 10.1016/j.ijsu.2016.12.008.
9. Shahan CP, Stoikes NF, Webb DL, Voeller GR. Sutureless onlay hernia repair: a review of 97 patients. *Surg Endosc* 2016; 1(8): 3256-361. doi: 10.1007/s00464-015-4647-2.
10. Ahmed M, Mehboob M. Comparisons of Onlay versus Sublay Mesh Fixation Technique in Ventral Abdominal Wall Incisional Hernia Repair. *J Coll Physicians Surg Pak* 2019; 29(9): 819-822. doi: 10.29271/jcsp.2019.09.819.
11. Cano-Valderrama O, Porrero JL, Quirós E, Bonachia O, Castillo MJ, Cervantes N, *et al*. Is Onlay polypropylene mesh repair an available option for incisional hernia repair? a retrospective cohort study. *Am Surg* 2019; 85(2): 183-187.
12. Smith J, Parmely JD. *Ventral Hernia*. Stat Pearls Publishing; 2021, Available at: <https://www.ncbi.nlm.nih.gov/books/NBK427/>
13. Kingsnorth AN, Shahid MK, Valliattu AJ, Hadden RA, Porter CS. Open onlay mesh repair for major abdominal wall hernias with selective use of components separation and fibrin sealant. *World J Surg* 2008 ; 32(1): 26-30. doi: 10.1007/s00268-007-9287-9.
14. Ponce Leon F, Manso JEF, Abud VL, Nogueira W, Silva PC, Martinez R. Sublay repair results in superior mesh incorporation and histological fibrogenesis in comparison to onlay and primary suture in an experimental rat model. *Hernia* 2018 ; 22(6): 1089-1100. doi: 10.1007/s10029-018-1808-y.
15. Ibrahim R, Abounozha S, Kheder A. Incidence of seroma in sublay versus onlay mesh repair of incisional hernia. *Ann Med Surg (Lond)* 2020; 61(1): 155-157. doi: 10.1016/j.amsu.2020.12.029.
16. Jairam AP, Timmermans L, Eker HH, Pierik REGJM, van Klaveren D, Steyerberg EW, *et al*. Prevention of incisional hernia with prophylactic onlay and sublay mesh reinforcement versus primary suture only in midline laparotomies (PRIMA): 2-year follow-up of a multicentre, double-blind, randomised controlled trial. *Lancet* 2017; 390(10094): 567-576. doi: 10.1016/S0140-6736(17)31332-6.
17. Ibrahim R, Abounozha S, Alshehri T. Is the surgical site infection rate higher in sublay or onlay mesh repair of incisional hernia? *Ann Med Surg (Lond)* 2021; 62(1): 200-202. doi: 10.1016/j.amsu.2021.01.028.
18. Venclauskas L, Maleckas A, Kiudelis M. One-year follow-up after incisional hernia treatment: results of a prospective randomized study. *Hernia* 2010; 14(6): 575-582. doi: 10.1007/s10029-010-0686-8.

.....