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Comparison of Onlay Mesh Repair Vs Sublay Mesh Repair for Ventral Abdominal Hernias: A Focus on Post Op Seroma Formation

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ABSTRACT

Objective: To compare the effectiveness of Onlay mesh repair versus Sublay mesh repair for ventral abdominal hernias in terms of post op seroma formation.

Study Design: Quasi-experimental study**.**

Place and Duration of Study: Department of General Surgery, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Feb to Sep 2020.

Methodolgy: A total of 140 patients (70 in each group) of ventral abdominal hernia who met the inclusion and exclusion criteria were included in the study. Patients with complicated or recurrent hernias were excluded. Group-A patients underwent Onlay hernioplasty while in group B hernioplasty was performed via Sublay technique. All patients were followed for post op seroma formation till 2 weeks via ultrasonography. Data was analyzed by Statistical Package for Social Sciences version 22.

Results: Mean operation time in Group-A was 52.30±6.65 minutes while in Group-B the mean operation time was 85.82±8.26 minutes. Post op seroma formation between the two groups was 18.10% vs 4.65%, which was statistically significant (p=0.023).

Conclusion: The occurrence of Post op seroma formation is less in Sublay lay mesh repair as compare to Onlay mesh repair however it requires longer operative time.

Keywords: Onlay mesh, Sublay mesh, Seroma formation, Ventral abdominal hernia.

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INTRODUCTION

Ventral abdominal hernias are defined as protrusion of gastrointestinal contents that occurs due to fascial defect in abdominal wall. Most common ventral hernias are incisional hernia, umbilical or para-umbilical hernias or epigastric hernias. In Unites States, the annual incidence of ventral hernias ranged from 15-20%.[1] There is a huge burden on health-care system with majority of the expenses required for emergency repairs or postoperative complications. After surgery, there are about 10% patients who have high risk of developing ventral hernia after the major midline laparotomy, while risk is around 5% in patients after transverse muscle splitting incision, while <1% after the laparoscopic abdominal surgery.[2,3]

With the application of new modalities and updated meshes used in hernia repair, the chances of recurrence have dropped to around 5% or less. These hernias can be repaired by laparoscopic procedure or by open surgery or laparotomy.[4] There is still a conflict exist about the more appropriate method for management of the ventral and incisional hernias. The surgical methods applied for hernia repair for both types; i.e. primary and recurrent hernias are almost same.[5] Option of biological mesh affects the long term post-surgical consequences after ventral hernia repair.[6] Choice of mesh in repairing ventral hernias is very important, as the postoperative wound complications and recurrence is significantly associated with type of mesh employed.[7]

The hernia repair by open method is mostly used to close the abdominal wall, although the minimally invasive laparoscopic method has been now developed acceptance during the last ten years.[8] The most commonly applied meshes are the Sublay mesh and Onlay mesh. In Sublay mesh repair method, the mesh is positioned between peritoneum and posterior rectus sheath, while in Onlay mesh repair method, mesh is positioned between the anterior rectus sheath and abdominal skin.[9] Sublay mesh-plasty is a good replacement to the Onlay meshplasty, which can be applied in any type of ventral and incisional hernias. The rate of complications and recurrence, related to the type of mesh has been was observed as minimal with Sublay mesh repair technique.[10]

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We have conducted this study to compare the occurence of postoperative seroma formation in Onlay vs Sublay mesh repair to set our local protocols. It has been observed that Sublay mesh repair is an improved version and can be a good replacement of Onlay mesh repair. But still there is a need to conduct the research to attain evidence for local practice, as the findings of both methods are under debate.

METHODOLOGY

A quasi-experimental study was carried out in surgical unit of Pak Emirates Military Hospital from Feb to Sep 2020 after approval from ethical committee (A/28/EC/237/204). Sample size of 140 cases (70 in each group) was estimated by keeping 80% power of stud, 5% significance level and percentage of seroma formation i.e. 2% with Sublay and 14% with Onlay mesh repair.[11] Non-probability consecutive sampling technique was used to include the patients in the study. The patients were randomly assigned to two group, 70 patients were placed in Group-A, while 70 patients were placed in Group-B.

Inclusion criteria: Patient of age between 20-60 years male or female diagnosed with uncomplicated ventral hernias having 4-6 cm defect on ultrasound with no previous history of surgery.

Exclusion criteria: Patients with recurrent hernias, patients with complicated hernias.

Written informed consent was taken from all patients who met the inclusion criteria. 140 patients were randomly allocated to Group-A and Group- B. 70 patients placed in Group-A underwent Onlay hernioplasty while 70 patients in Group-B underwent hernioplasty via Sublay technique. All patients were followed up for post op seroma formation till 2 weeks via ultrasonography. Drain was placed in Group-A. All patients were discharged on 2nd post op day and drain was removed on first follow up on day 5. All patients underwent abdominal ultrasound on post op day 5 and day 14 to see for any fluid collection/ seroma formation. If output drain contained more than 50 ml on 5th postop day or post op ultrasound shows any collection it was taken as postop seroma formation.

Data was analyzed by using Statistical Package for Social Sciences (SPSS) version 22.00. Quantitative data was represented using Mean±standard deviation. Qualitative data was represented by using percentage and frequency. Chi square test (for qualitative variables and Student t-test (for normally distributed variables) were applied and *p*-value of ≤0.05 was considered as statistically significant".

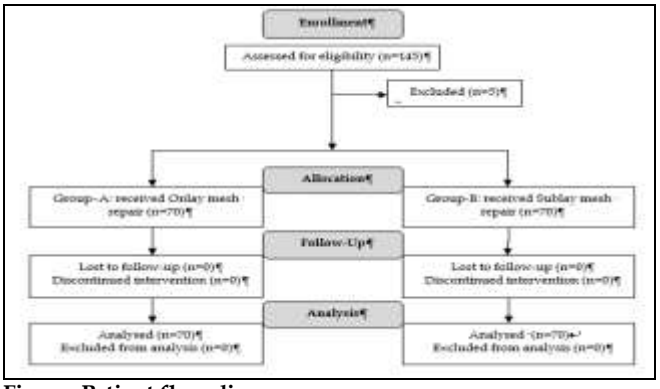

Figure: Patient flow diagram

RESULTS

A total 140 patient (70 patients in each group) were included In the study. The mean age of patients in Onlay group was 41.28±12.36 years. The mean age of patients in Sublay group was 43.25±9.11 years. In Onlay group, there were 13(18.6%) males and 57(81.4%) females. In Sublay group, there were 12(17.1%) males and 58(82.9%) females. The mean duration of hernia was 3.69±2.87 years in Onlay group while 4.18±2.22 in Sublay group. The mean defect size was 5.23±1.17 cm in Onlay group while 2.11±1.09 cm in Sublay group. There were three common types of hernia observed in this study. Para umbilical hernia was present in 72 cases, out of which 39(55.7%) were allocated to Onlay group while 33(47.1%) were allocated to Sublay group. Epigastric hernia was present in 37 cases, out of which 16(22.9%) were allocated to Onlay group while 21(30.0%) were allocated to Sublay group. Umbilical hernia was present in 31 cases, out of which 15(21.4%) were allocated to Onlay group while 16(22.9%) were allocated to Sublay group (Table-I).

Table-I: Demographics of Patients (n=140)

	Onlay mesh repair (n=70)	Sublay mesh repair (n=70)
Age (years)	41.28±12.36	43.25±9.11
Gender		
Male	13(18.6%)	12(17.1%)
Female	57(81.4%)	58(82.9%)
Duration of hernia (years)	3.69±2.87	4.18±2.22
Defect size	5.23±1.17	5.11±1.09
Type of hernia		
Para umbilical	39(55.7%)	33(47.1%)
Epigastric	16(22.9%)	21(30.0%)
Umbilical	15(21.4%)	16(22.9%)

The mean operation time in Onlay group was 52.30±6.65 minutes while in Sublay group, the mean

operation time was 85.82±8.26 minutes, which was statistically significant. Postoperative seroma formation occurred in 13(18.6%) cases with Onlay mesh while in 3(4.3%) cases with Sublay mesh repair technique, which was statistically significant (p=0.007) (Table-II).

Table-II: Comparison of outcome in both groups (n=140)

Outcome	Study Group		*p*-value
	Onlay mesh repair (n=70)	Sublay mesh repair (n=70)	
Operative time (minute)	52.30±6.65	85.82±8.26	0.006
Seroma formation	13(18.6%)	3(4.3%)	0.007

DISCUSSION

The application of mesh during repair of ventral hernias is the well-known and most accepted way. However, the perfect position of placement of the mesh is still under debate. Traditionally the ventral hernias repair by placing the Onlay mesh has been associated with the higher rate of post-surgical wound complications. This surgical technique is technically less challenging as compared to the ventral hernia repair by using the Sublay mesh placement.[12] During the repair of ventral or incision hernia, the most common and important problem is the position of the repairing mesh. Few methods have been reported as related to the higher frequency of postsurgical complications, like wound infection or dehiscence, fistula formation, seroma, formation, mesh failure and recurrence of hernia.[13]

Repair of ventral hernias by using the Sublay mesh method is the safest substitute to the repair of ventral hernias by using Onlay mesh method in patients having low risk of post-surgical complications. But further researcher is required to assess the prolonged consequences and rate of recurrence by using both type of meshes.[12] Sevinc *et al.* reported that Sublay mesh placement was associated with least risk of recurrence i.e. odds ratio = 0.218 (95% confidence interval; 0.06-0.47) and was considered as the best treatment modality out of four methods applied [Probability (best) = 94.2%].[13] Rhaguveer *et al* also found that Sublay mesh repair is associated with the least risk of surgical site infection with odds ratio of 0.449 (95% confidence interval; 0.12-1.16)] and was considered as the best treatment modality out of four methods applied [Probability (best) =77.3%].[14]

Results of our study also showed that the hernia repair by using Sublay mesh has better outcome in terms of less seroma formation as camped to the Onlay mesh repair. It has been proposed in few trials that Sublay mesh repair can be applied by laparoscopic method as well.[15,16] But, by laparoscopic placement of Sublay mesh can lead to more bowel related morbidities and recurrence of hernia.[17] Although laparoscopic method has less overall complications in old aged patients but it is quite expensive.[18] The significant decrease in the rate of incisional hernia is achieved by using Onlay mesh support than the Sublay mesh support. Onlay mesh placement has probability to develop as the standard method in high risk cases who are planned to undergo the midline laparotomy.[19]

The new modality for the repair of ventral abdominal hernia is endoscopic constituent separation method that is applied in large sized abdominal hernias.[20,21] Persistent unresolved post-surgical seromas can cause an increase in the post-operative wound infection.[22] In our study, we applied open surgery in all the patients. We observed that the seroma formation after surgical repair was the most common complication of open method, especially in cases with large sized hernias. Raghuveer *et al.*, observed that the frequency of post-surgical seroma formation was around 6.52% with Sublay mesh repair while 21.30% with Onlay mesh repair which was catcalled as significant (p-value <0.05). Although the mean operative time was also significantly more with Sublay mesh repair as compared to Onlay mesh repair (72.3±9.23 vs. 65.25±10.58 minutes, p-value <0.05). The researcher thus proposed that although the duration of surgery is prolonged with Sublay mesh repair than Onlay mesh repair, but still mesh placement by using Sublay technique is a better choice in ventral hernia repair by pen surgical technique, as Sublay mesh repair method has less frequency of post-surgical complications and morbidities than Onlay mesh repair.[14]

Sevinc *et al*. observed that the mean duration of surgery was short for Onlay mesh repair i.e. 56.7±15.7 min as compared to the Sublay mesh repair i.e. 73.9±14.2 min, which was also statistically significant (p-value <0.001), while the post-surgical seroma formation was less with Sublay mesh technique (2%) than the Onlay mesh technique (14%).[13] Naz *et al.*, conducted another trial to compare the outcome of Sublay and Onlay mesh repair methods for management ventral hernia repair. They observed that the mean duration of surgery was 46.10±7.25 minutes

with Onlay mesh repair method while 77.82±9.97 minutes with Sublay mesh repair method. Although the time was statistically prolonged, but seroma formation was noted in 23.08% patients with Onlay mesh repair method while in 5.13% patients with Sublay mesh repair method. The difference was found to be statistically significant (*p*-value <0.05).[23] These findings were comparable to that of findings of our study.

In another trial, conducted by Saber *et al*., the mean duration of surgery was 67.04±13.19 minutes by using Onlay mesh method, while 93.26±24.94 minutes with Sublay mesh method. Post-surgical seroma formation was noted in 6% patients with Onlay mesh repair technique while only in 2% patients with Sublay mesh repair technique.[24] Also Shahryar *et al*., observed that the seroma formation after surgery was more prevalent with Onlay mesh technique i.e. 20% cases than the Sublay mesh technique i.e. 4.61% cases.[25] Dhaigude *et al*., observed that the frequency of postsurgical seroma formation was 2% with Sublay mesh repair while 8% with Onlay mesh repair with the mean duration of surgery was 70.72±18.56 minutes with Sublay mesh repair and 50.96±12.61 minutes with Onlay mesh repair.[10]

CONCLUSION

Sublay mesh repair is effective and better technique as compared to Onlay mesh repair in terms of post op seroma formation but it requires long operative time and surgical expertise.

We suggest more trials on Sublay vs Onlay mesh repair with a longer follow up.

Conflict of Interest: None.

Authors' Contribution

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

FL & MQB: Data acquisition, data analysis, critical review, approval of the final version to be published.

UG & MTA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MSK & TMK: Conception, data acquisition, drafting the manuscript, 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. Godara R, Garg P, Raj H, Singla SL. Comparative evaluation of" Sublay" versus" Onlay" meshplasty in ventral hernias. Indian J Gastroenterol 2006; 25(4): 222-223.
2. Cherla DV, Poulose B, Prabhu AS. Epidemiology and Disparities in Care: The Impact of Socioeconomic Status, Gender, and Race on the Presentation, Management, and Outcomes of Patients Undergoing Ventral Hernia Repair. Surg Clin North Am 2018 Jun; 98(3): 431-440.
3. Zavlin D, Jubbal KT, Van Eps JL, Bass BL, Ellsworth WAt, Echo A, et al. Safety of open ventral hernia repair in high-risk patients with metabolic syndrome: a multi-institutional analysis of 39,118 cases. Surg Obes Relat Dis 2018 Feb; 14(2): 206-213.
4. Tandon A, Shahzad K, Pathak S, Oommen C, Nunes Q, Smart N. Parietex™ Composite mesh versus DynaMesh®-IPOM for laparoscopic incisional and ventral hernia repair: a retrospective cohort study. Ann R Coll Surg Engl 2016; 98(8): 568-573.
5. Tandon A, Pathak S, Lyons NJ, Nunes QM, Daniels IR, Smart NJ. M etaanalysis of closure of the fascial defect during laparoscopic incisional and ventral hernia repair. BJS Open 2016 Nov; 103(12):1598-1607.
6. Huntington CR, Cox TC, Blair LJ, Schell S, Randolph D, Prasad T, et al. Biologic mesh in ventral hernia repair: Outcomes, recurrence, and charge analysis. Surgery 2016; 160(6): 1517-1527.
7. Heniford BT, Ross SW, Wormer BA, Walters AL, Lincourt AE, Colavita PD, et al. Preperitoneal Ventral Hernia Repair: A Decade Long Prospective Observational Study With Analysis of 1023 Patient Outcomes. Ann Surg Open 2020; 271(2): 364.
8. Gonzalez A, Escobar E, Romero R, Walker G, Mejias J, Gallas M, et al. Robotic-assisted ventral hernia repair: a multicenter evaluation of clinical outcomes. Surg. Endosc 2017; 31(3): 1342-1349.
9. Talebpour M, Khatami F, Aghaii M, Aghamir SMK. New technique of inguinal hernia repair during prostatectomy. J Clin Urol 2020: 2051415820961301.
10. Dhaigude B, Sugunan A, Pancbhai S, Francis M, Patel K, Metta V. Comparative evaluation of Sublay versus Onlay meshplasty in incisional and ventral hernias. Int Surg J 2017; 5(1): 187-192.
11. Ibrahim, T., Ahmed, W., Ahmed, I., Mushtaq, K., Hussain, A., & Ahmed, N. (2018). Comparison of onlay versus sublay mesh repair for ventral abdominal hernias. A randomized controlled trial. Pak Armed Forces Med J 68(6): 1700-1704.
12. Haskins IN, Voeller GR, Stoikes NF, Webb DL, Chandler RG, Phillips S, et al. Onlay with Adhesive Use Compared with Sublay Mesh Placement in Ventral Hernia Repair: Was Chevrel Right? J Am Coll Surg 2017; 224(5): 962-970.
13. Sevinç B, Okuş A, Ay S, Aksoy N, Karahan Ö. Randomized prospective comparison of long-term results of Onlay and Sublay mesh repair techniques for incisional hernia. Turk J Surg 2018; 34(1): 17-20.
14. Raghuveer M, Muralidhar S, Shetty H, Veena V. Onlay versus Sublay mesh repair for ventral hernia. Int Surg J 2018; 5(3): 823-826.
15. Pawlak M, Bury K, Śmietański M. The management of abdominal wall hernias–in search of consensus. Wideochir Inne Tech Maloinwazyjne 2015; 10(1): 49.
16. Schroeder AD, Debus ES, Schroeder M, Reinpold WMJ. Laparoscopic transperitoneal Sublay mesh repair: a new technique for the cure of ventral and incisional hernias. Surg. Endosc 2013; 27(2): 648-654.
17. Ahonen-Siirtola M, Vironen J, Mäkelä J, Paajanen H. Surgery-related complications of ventral hernia reported to the Finnish Patient Insurance Centre. Scand J Surg 2015; 104(2): 66-71.
18. Bates AT, Divino C. Laparoscopic surgery in the elderly: a review of the literature. Aging Dis 2015; 6(2): 149.
19. 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. The Lancet 2017; 390(10094): 567-576.
20. Slater NJ, van Goor H, Bleichrodt RP. Large and complex ventral hernia repair using "components separation technique" without mesh results in a high recurrence rate. Am. J. Surg 2015; 209(1): 170-179.
21. Thomsen C, Brøndum T, Jørgensen LN. Quality of life after ventral hernia repair with endoscopic component separation technique. Scand J Surg 2016; 105(1): 11-16.
22. Kaafarani HM, Hur K, Hirter A, Kim LT, Thomas A, Berger DH, et al. Seroma in ventral incisional herniorrhaphy: incidence, predictors and outcome. Am. J. Surg 2009; 198(5): 639-644.
23. Naz A, Abid K, Syed AA, Baig NN, Umer MF, Mehdi H. Comparative evaluation of Sublay versus Onlay mesh repair for ventral hernia. J Pak Med Assoc 2018; 69(5): 705-708.
24. Saber A, Emad KB. Onlay versus Sublay mesh repair for ventral hernia. J Surg 2015; 4(1-1): 1-4.
25. Shehryar HA, Shahka MA, Javed MU. Comparison of Sublay versus Onlay Mesh Technique of Ventral Hernia Repair. Pak J Med Health Sci 2018; 12(1): 57-59.

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