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A Comparative Study of Outcomes between Onlay and Sublay Techniques for Incisional Hernia Repair using Mesh Reinforcement in Bangladesh

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Abstract:
Background: *Abdominal surgeries are among the most frequently performed procedures in both emergency and routine settings in Bangladesh. Incisional hernia is a common complication following major abdominal surgeries, particularly those involving midline incisions. Several surgical approaches are used to deal with this problem, among which onlay technique (above the fascial defect) and sublay technique (below the fascial defect but above the posterior rectus sheath) are the most common ones regarding repair with mesh reinforcement. However, until now, there is a dilemma about a specific guideline on deciding which technique is best for a random patient.* ***Objective:*** *The aim of the study was to compare the safety and efficacy of onlay versus sublay mesh repair techniques in the treatment of incisional hernias with regard to the complication rate within the first 2 years of post-surgical period.* ***Methods:*** *An open label randomized controlled trial will be conducted in multiple surgical centers. For this study, a total number of 53 subjects has been selected. The patients will be divided into two groups, Group A, 27 patients, onlay technique applied. Group B 26 patients, sublay technique applied. Data will be recorded in the pre-designed structured data sheet by the researcher himself. For statistical analysis, ANOVA, independent sample 't'-test will be done by using SPSS.* ***Results****: According to age distribution, 18.18% of patients in group A were between the ages of 18 and 29, 40.90% were between the ages of 30 and 49, and 22.72% were between 50 and 69. In group B, 14.28% of the patients were between the ages of 18 and 29, 33.33% were between the ages of 30 and 49, and 28.57% were aged 50 to 69. In group A, the majority of the patients (63.63%) were male, while group B had 57.14 percent. In terms of socioeconomic level, 45.45% of patients in group A are from middle-class families, while 42.85% come from group B.* ***Conclusion:*** *Both Bangladeshi and international studies indicate that sublay mesh repair may offer advantages over onlay repair in terms of reducing postoperative complications and hospital stay duration, despite requiring longer operative times. Nonetheless, further large-scale, well-structured randomized controlled trials are recommended to confirm these findings and establish definitive clinical guidelines.*
Keywords: *Abdominal, Onlay, Sublay, Incisional hernia.*

I. Introduction

Incisional hernia (IH) is a frequent complication that can occur after major abdominal surgeries, such as laparotomies, with reported incidence rates ranging from 2% to 20%. An incisional hernia occurs when a hernia develops through the abdominal wall at the site of a prior surgical incision, making it a subtype of ventral hernia. Incisional hernias commonly present as a bulge or protrusion at the site of a previous abdominal surgical incision,

which becomes more noticeable with increased intra-abdominal pressure. Symptoms vary widely, ranging from being asymptomatic to causing discomfort, pain, or complications such as bowel obstruction or strangulation. For many individuals, hernias can restrict physical activity either due to symptoms or as a precautionary measure to prevent exacerbation. Physical examination typically induces abdominal palpation during which the hernia contents can often be felt. In some cases, the edges of the hernia defect maybe identifiable, allowing an estimation of its rise. Although most incisional hernias are diagnosed based on clinical history and physical examination, imaging may be necessary in certain situations, such as early-stage hernias, obese patients, or complex cases. A focused abdominal wall CT scan is particularly useful not only for confirming the diagnosis in unclear cases but also for guiding the surgical plan and determining the extent of repair.

Abdominal wall hernias are among the most common surgical issues seen in medical practice. These hernias include ventral, inguinal, and other uncommon hernias. Ventral hernia is the second most prevalent type of hernia, following inguinal hernia. The most effective treatment for these ventral hernias is surgical correction. The literature describes a variety of surgical procedures, including both open and laparoscopic approaches. Although the laparoscopic technique offers certain advantages over open surgeries, it is not widely available and is pricey. Mesh repair is standrad for open surgical procedures. High tissue tension has been linked to greater recurrence rates with primary tissue repair. [1] Hernia repair with mesh resulted in a considerable reduction in recurrence rates, however there are still mesh-related wound problems. [2] Onlay and sublay mesh placements were the most often used mesh placement techniques in ventral hernia repair. However, both methods have benefits and drawbacks. The superiority of either approach over the other remains unknown, and there is no widespread agreement among experts on management strategy or the tissue plane in which the mesh should be inserted. [3] These warrants further investigation to determine the best treatment method and tissue plan for mesh installation in the management of ventral hernias. [4]

The development of an incisional hernia following abdominal surgery is a significant complication. Rates of up to 20% have been reported in prior publications. [5] Although this rate is connected to clinical parameters such as the patient's age, obesity, co-morbidities, and the type of surgery performed, the physical properties of the graft used in the repair, as well as surgical procedures, are thought to be major contributors in the formation of hernia. [6] During open incisional hernia surgery, the graft is attached to several anatomical layers of the abdominal wall. These various repair techniques are classified as "onlay", "inlay" and "sublay". [7] Some writers consider the "sublay" approach to be the gold standard for open incisional hernia repair with transplant. This approach is also regarded as one of the two most regularly utilized techniques for laparoscopic incisional hernia repair. [8] However, there is debate about which procedure is more effective and safer for surgically treating incisional hernias.

The location of the graft has a strong correlation with postoperative problems and recurrence. [7] Previous research, however, found little evidence that one strategy was preferable to another. Furthermore, no significant differences in recurrence or infection rate were found in systematic evaluations of papers comparing the "sublay" and "onlay" graft techniques. [9] On the other side, it is believed that "sublay" grafts result in reduced seroma development. Despite its high complication rate, "onlay" graft repair has been shown to produce less recurrence. According to current literature, the long-term effects of putting grafts in different layers of the abdominal wall are not entirely understood.

The onlay and sublay (retromuscular) techniques are among the most commonly used methods for incisional hernia repair. Over time, numerous studies have compared these two approaches to determine which provides better outcomes in terms of surgical site complications and recurrence rates. While some studies suggest that the sublay technique may result in fewer surgical site occurrences (SSOs), there is no clear consensus on the superior method. This study aimed to compare the complication rates of the two most widely used incisional hernia repair techniques—onlay and sublay-within the first 2 years postoperatively. Additionally, it sought to analyze the epidemiological profile of patients undergoing incisional hernioplasty.

II. Methodology

This randomized controlled trial study was carried out in the Department of General surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU) during January 2014 to December 2015. A total of 53 patients were participated in the study. Among them 27 patients, onlay technique applied (Group-A) and 26 patients, sublay technique applied (Group-B). **Data Collection and Processing:** After taking consent and matching eligibility criteria, data were collected from patients on variables of interest using the predesigned structured questionnaire by interview, observation. To collect data, face to face interview has been carried out with a standardized semi-structured questionnaire. Alongside, the medical records of the patients have been

reviewed. Data regarding sociodemographic background, diabetic and smoking status has been collected and recorded. Collected data were edited and Statistical analyses of the results were be obtained by using window-based Microsoft Excel and Statistical Packages for Social Sciences. Frequency and percentages have been depicted for qualitative data and mean and standard deviation has been calculated for quantitative data.

III. Result

This observational cross-sectional study was conducted in the Department of Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. This study was conducted a total 53 patients, among them 27 patients diagnosed as Group-A and 26 patients diagnosed as Group-B were enrolled in this study. Patients diagnosed as either Group-A and Group-B age 18 years or more of both sexes were selected as study population.

Table I: Baseline distribution of the study population

Variable	Group-A		Group-B	
Age of the patient	(n=27)	%	(n=26)	%
18-29	5	18.51	3	11.54
30-49	11	40.74	7	26.92
50-69	6	22.22	6	23.08
≥70	5	18.51	10	38.46
Sex Distribution				
Male	17	62.96	15	57.69
Female	10	37.03	11	42.31
Socio Economic condition				
Low	9	33.33	7	26.92
Middle	13	48.15	11	42.31
High	5	18.52	8	30.77
Total	**27**	**100.0**	**26**	**100.0**

Table-1 shows the age distribution of the study population. It was observed that 5 (18.51%) patients belonged to the age group 18-29 years, 11 (40.74%) patients belonged to the age group 30-49 years, and 6 (22.22%) patients belonged to the age group 50-69 years in Group-A. In Group-B, 3 (11.54%) patients belonged to the age group 18-29 years, 7 (26.92%) patients belonged to the age group 30-49 years, and 6 (23.08%) patients belonged to the age group 50-69 years. The sex distribution of the study population showed that the majority, 17 (62.96%) patients, were male in Group-A, and 15 (57.69%) patients were male in Group-B. Regarding the socio-economic status of the study population, it was observed that the majority, 13 (48.15%) of the patients, came from middle-class families in Group-A, while 11 (42.31%) patients came from middle-class families in Group-B.

Table 2: Mean±SD of Height, weight and BMI of the study population

	Group-A (Mean±SD)	Group-B (Mean±SD)
Height (inch)	5.39(±0.28)	5.31(±0.34)
Weight (kg)	60.22(±8.83)	88.0(±8.02)
BMI (kg/m2)	25.2(±2.9)	27.2(±3.2)

Table 2 shows Height, weight and BMI of study population, it was observed that height was 5.39(±0.28), weight was 60.22(±8.83) and BMI 25.2(±2.9) in group A. And in group B height was 5.31(±0.34), weight was 88.0(±8.02) and BMI 27.2(±3.2).

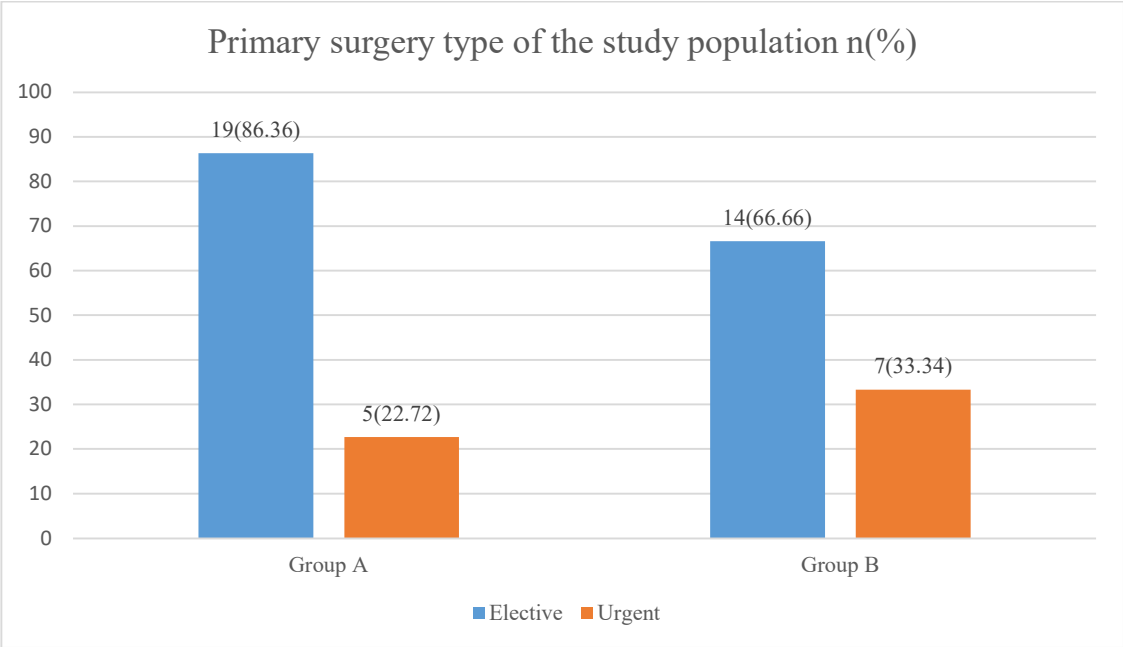

Figure 1 Primary surgery type of study population

Table 3 Recurrent incisional hernia of study population

Recurrent incisional hernia	Group-A		Group-B	
	N=10	%	N=9	%
After primary repair	2	9.09	2	9.52
After onlay repair	5	22.72	7	33.33
After sublay repair	3	13.63	0	0.0

Table 3 shows recurrent incisional hernia of study population, it was observed that after primary repair was 2(9.09%), after onlay repair was 5(22.72%) and after sublay repair was 3(13,63%) in group A. And in group B after primary repair was 2(9.52%), after onlay repair was 7(33.33%) and after sublay was null.

Table -4 Distribution of complications by groups

Complications	Group-A n (%)	Group-B n (%)
Postoperative bleeding	4(18.18)	2(9.52)
Wound complications	10(45.45)	6(28.57)
Wound infection	6(27.27)	4(19.04)
Seroma	3(13.63)	2(9.52)
Hematoma	4(18.18)	3(14.28)
Chronic pain	7(31.81)	3(14.28)
Recurrence	8(36.36)	5(23.80)
≤1 year	0(0)	1(4.76)
1-2 years	3(13.63)	2(9.52)
≥2 year	6(27.27)	4(19.04)

Table - 4 shows distribution of complications by groups, it was observed that Postoperative bleeding, Wound infection, Hematoma and Chronic pain were 4(18.18%), 6(27.27%), 4(18.18%) and 7(31.81%) respectively. And in group B Postoperative bleeding, Wound infection, Hematoma and Chronic pain were 2(9.52%), 4(19.04%), 3(14.28%) and 3(14.28%) respectively.

IV. Discussion

Some recommendations for graft placement in different anatomical layers can be considered when treating incisional hernias surgically. If the hernia spreads to the suprapubic region, the "sublay" approach is recommended since it allows for graft attachment in deep parts of the pelvis. Similarly, if the hernia is in the upper quadrant of the abdomen, the "onlay" approach is thought to allow for less seroma production and more successful graft attachment without requiring huge dissection areas. [8,10] As a result, it does not seem appropriate to make a more exact assertion about the superiority of two distinct strategies over one another.

Our present study observed that, in group A, 4 (18.18%) patients were between the ages of 18 and 29, 9 (40.90%) were between the ages of 30 and 49, and 5 (22.72%) were between the ages of 50 and 69 years. In group B, 3 (14.28%) patients were between the ages of 18 and 29, 7 (33.33%) were between the ages of 30 and 49, and 6 (28.57%) were between the ages of 50 and 69. In group A, the bulk of the patients (14, 63.63%) were male, while group B included 12 (57.14%). In terms of socioeconomic level, 10 (45.45%) of the patients are from middle-class families in group A, while 9 (42.85%) are from group B.

Wound complications such as wound infection, seroma, and hematoma can occur at different rates following incisional hernia repair. Such issues are assessed in connection to the tissue dissection width and graft material used. [11] According to several research, the "onlay" approach increases the frequency of seroma and hematoma formation. [12] Acar et al. found that 15.7% of patients developed seroma and hematoma after using the "onlay" graft procedure. This rate was found to be 13.63% for seroma and 18.18% for hematoma for procedures conducted using the same method in our study. The relatively low occurrence of seroma and hematoma in this study was assumed to be due to the surgical method. It is possible that variances in the clinical parameters of the patient and hernia, surgical technique, and graft may have resulted in differing findings in earlier research.

In a meta-analysis of the "sublay" and "onlay" approaches in the surgical treatment of incisional hernias, the "sublay" method was found to be more effective than the "onlay" method in terms of recurrence and wound infection. [13] In a comprehensive review and meta-analysis of four alternative graft placement strategies ("onlay", "inlay" and "sublay"), the "sublay" method had the lowest rates of recurrence, wound infection, and other wound problems. [9] Another comprehensive analysis comparing repairs for big incisional hernias (>15 cm) revealed that the "sublay" method outperformed the component separation method. [3] Although large-scale prospective studies are required to disclose the benefits and drawbacks of each strategy, it is possible to conclude that the "sublay" method is a more effective and safe approach than other approaches based on the data.

Recurrence following incisional hernia repair is seen as another significant concern. A broadly accepted association between various graft implantation procedures and recurrence rates cannot be established. [1] Studies have yielded conflicting outcomes on this subject. The typical "sublay" approach has been shown to have high recurrence rates of up to 24%. Cano-Valderrama et al. presented a series of 1078 instances, and the "onlay" strategy was not found to increase the rate of recurrence. Hawn et al. [11] found a 28.5% recurrence rate in a 1346-case incisional hernia series with a median follow-up length of 73.4 months. The open or laparoscopic "underlay" approach was shown to be the most effective in terms of recurrence. With the same follow-up period as our study, Aurangzeb et al. [1] discovered a recurrence rate of 5.8% following the "onlay" graft procedure. In contrast, our recurrence rate was 14.8% in the "onlay" method and 12% in the "sublay" method. Although the recurrence rate was higher in patients who underwent recurrent incisional hernia repair and developed early wound problems, statistical significance could not be determined due to the large number of cases. Although the study's recurrence rates were within the range provided in the literature, it was hypothesized that the number of patients who underwent recurrent incisional hernia repair could influence this rate. Furthermore, it should be noted that as the follow-up period increases, recurrence rates may rise. [5]

Incisional hernia repair with mesh reinforcement is a critical aspect of surgical management, with various techniques available, including onlay and sublay mesh placement. The choice of technique can influence clinical outcomes, including recurrence rates, complications, and patient recovery. The sublay technique is generally superior to the onlay technique for incisional hernia repair in terms of recurrence rates, postoperative complications, and long-term outcomes. However, it is technically more demanding and may not be suitable for all patients or surgeons. The onlay technique remains a viable option in select cases but is associated with higher risks of recurrence and complications. Patient-specific factors and surgical expertise play crucial roles in determining the best approach.

Limitations of the study

The present study was conducted in a very short period due to time constraints limitations. The small sample size was also a limitation of the present study.

V. Conclusion

The sublay technique is generally favored for incisional hernia repair due to its superior long-term outcomes, lower recurrence, and infection rates, despite being technically more challenging. The onlay technique may still be considered in specific situations, such as in emergencies or when surgical expertise or time is limited. Proper patient selection and adherence to surgical best practices are critical in achieving optimal results for both techniques.

VI. Recommendation

This study can serve as a pilot to much larger research involving multiple centers that can provide a nationwide picture, validate regression models proposed in this study for future use and emphasize points to ensure better management and adherence.

References

[1]. Aurangzeb M. Tension Free mesh Hernioplasty; a Review of 96 cases. Journal of Postgraduate Medical Institute. 2004;18(1).

[2]. Nguyen MT, Berger RL, Hicks SC, Davila JA, Li LT, Kao LS, Liang MK. Comparison of outcomes of synthetic mesh vs suture repair of elective primary ventral herniorrhaphy: a systematic review and meta-analysis. JAMA surgery. 2014 May 1;149(5):415-21.

[3]. Timmermans L, de Goede B, van Dijk SM, Kleinrensink GJ, Jeekel J, Lange JF. Meta-analysis of sublay versus onlay mesh repair in incisional hernia surgery. The American Journal of Surgery. 2014 Jun 1;207(6):980-8.

[4]. Forbes SS, Eskicioglu C, McLeod RS, Okrainec A. Meta-analysis of randomized controlled trials comparing open and laparoscopic ventral and incisional hernia repair with mesh. Journal of British Surgery. 2009 Aug;96(8):851-8.

[5]. Abdollahi A, Maddah GH, Mehrabi BM, Jangjoo A, Forghani MN, Sharbaf N. Prosthetic incisional hernioplasty: clinical experience with 354 cases. Hernia. 2010 Dec; 14:569-73.

[6]. Eriksson A, Rosenberg J, Bisgaard T. Surgical treatment for giant incisional hernia: a qualitative systematic review. Hernia. 2014 Feb; 18:31-8.

[7]. Kingsnorth AN, Sivarajasingham N, Wong S, Butler M. Open mesh repair of incisional hernias with significant loss of domain. Annals of the Royal College of Surgeons of England. 2004 Sep;86(5):363.

[8]. Chand B, Indeck M, Needleman B, Finnegan M, Van Sickle KR, Ystgaard B, Gossetti F, Pullan RD, Giordano P, McKinley A. A retrospective study evaluating the use of Permacol™ surgical implant in incisional and ventral hernia repair. International journal of surgery. 2014 Apr 1;12(4):296-303.

[9]. Ibrahim AH, El-Gammal AS, Mohamed Heikal MM. Comparative study between «SQ» onlay «SQ» and «SQ» sublay «SQ» hernioplasty in the treatment of uncomplicated ventral hernia. Menoufia Medical Journal. 2015;28(1):11-6.

[10]. Hasbahceci M, Basak F. Interposition of the hernia sac as a protective layer in repair of giant incisional hernia with polypropylene mesh. Surgery today. 2014 Feb; 44:227-32.

[11]. Hawn MT, Snyder CW, Graham LA, Gray SH, Finan KR, Vick CC. Long-term follow-up of technical outcomes for incisional hernia repair. Journal of the American College of Surgeons. 2010 May 1;210(5):648-55.

[12]. El-Gammal AS, El-Kased AF, El-Sisy AA, Sultan HM, Goda El-Santawy HM. Evaluation of retromuscular mesh repair technique for treatment of ventral incisional hernia. Menoufia Medical Journal. 2014;27(2):226-9.

[13]. Jat MA, Memon MR, Rind GH, Shah SQ. Comparative evaluation of "Sublay" versus "Inlay" meshplasty in incisional and ventral hernias. Pak J Surg. 2011;27(1):54-8.