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Comparison of Intraoperative and Postoperative Outcomes of Sublay and Onlay Metaplasty in the Treatment of Ventral Hernia

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ABSTRACT
The term "hernia" originates from Greek, meaning "to rupture" or "to break" and it specifically refers to a protrusion of an organ or tissue through a weakened area of the body. To compare intraoperative and postoperative outcomes of sublay and onlay meshplasty in the treatment of ventral hernias. The study was conducted at JLN Medical College and Hospitals in Ajmer, focusing on all electively operated cases for ventral hernias within the Department of General Surgery. A total of 100 patients were included in the study, with 50 individuals undergoing Onlay meshplasty and another 50 receiving Sublay meshplasty. The study spanned a duration from January 2023 to January 2024. The study found that patients in Group A (Onlay) had higher rates of complications, including seroma formation (30%), suture site infections (18%), and chronic pain (38%), compared to Group B (Sublay), which had lower rates of 10%, 4% and 10%, respectively, with significant p-values indicating statistical relevance. Additionally, the mean duration of hospital stay was significantly longer for Group A at 10.08±3.36 days versus 6.82±2.39 days for Group B, while no recurrences were reported in either group. Compared to sublay mesh repair, individuals who undergo onlay mesh repair are more likely to experience complications.

INTRODUCTION

The term "hernia" originates from Greek, meaning "to rupture" or "to break" and it specifically refers to a protrusion of an organ or tissue through a weakened area of the body[1]. Hernias can occur in various locations, such as the abdominal cavity and they often result from factors like strain or congenital weaknesses in the tissue. A protrusion of the viscus or a portion of the viscus through the anterior abdominal wall fascia is known as a ventral hernia[2]. A "ventral hernia" is a defect in the abdominal wall's fascia that is neither inguinal nor hiatal. Approximately 350,000 surgeries are performed annually to repair these hernias, making it a routine procedure for general surgeons. Surgery is typically recommended for patients with symptomatic hernias, those at acceptable operative risk, or those facing high complication risks. Untreated ventral hernias can lead to hospitalizations and, in some cases, death, significantly affecting a patient's quality of life[3]. Hernias can be classified as congenital, acquired, or spontaneous, with types including epigastric, umbilical, and less common paraumbilical and hypogastric hernias. Surgical techniques have evolved significantly over time, notably with Bourret's introduction of prosthetic mesh in 1948 and Usher's replacement with prolene in 1963. Additionally, Bassini performed the first inguinal hernia repair in 1884[4], marking important milestones in hernia surgery. The first ventral hernia repair performed laparoscopically was documented by Leblanc and Booth in 1993[5]. Wantz, Jean Rives and Renesola were the first to describe the sublay hernia repair procedure. Ventral hernias, with an incidence of 2-13%, are common issues for surgeons[6], often resulting from previous surgical incisions (incisional hernias)[7]. Key risk factors include surgical site infections and weak repair sites, with women being twice as likely as men to develop these hernias. The risk of ventral herniation after midline laparotomy ranges from 3-20%, particularly when infections are involved[8]. Acquired ventral hernias often stem from prior surgical incisional hernias, trauma, or repeated strain on weak abdominal wall areas like ostomy sites and the umbilicus. Obesity further weakens the abdominal fascia through stretching and weight fluctuations[9]. Treatment options include conservative measures and surgical approaches, such as laparoscopic, open and robotic surgery, with mesh support recommended for larger hernias[10]. However, suturing alone may suffice for small defects., tension in larger hernia repairs can lead to high recurrence rates, sometimes reaching 54%[11]. In hernia repair, mesh can be positioned using various techniques: Onlay places it on the fascia beneath the subcutaneous layer[12], while sublay/retrorectus positions it in the retromuscular space.Underlay involves placing the mesh intraperitoneally or preperitoneally[13]. Laparoscopic procedures typically deploy mesh intraperitoneally to distribute intra-abdominal pressure evenly[14]. Robotic surgery, introduced in 2000, enhances laparoscopic techniques, with its first use in ventral hernia repair reported in 2003. The best anatomical location for mesh placement-onlay, inlay, or sublay[15]-remains a topic of debate.

Aims: To compare intraoperative and postoperative outcomes of sublay and onlay meshplasty in the treatment of ventral hernias.

MATERIALS AND METHODS

The study was conducted at JLN Medical College and Hospitals in Ajmer, focusing on all electively operated cases for ventral hernias within the Department of General Surgery. A total of 100 patients were included in the study, with 50 individuals undergoing Onlay meshplasty and another 50 receiving Sublay meshplasty. The study spanned a duration from January 2023 to January 2024. Inclusion criteria encompassed all patients undergoing Onlay and Sublay mesh repair for various types of ventral hernias, specifically umbilical, paraumbilical, and epigastric hernias. Exclusion criteria were carefully defined to ensure participant safety and study integrity, ruling out individuals under 12 or over 65 years of age, those with obstructive hernias, recurrent hernias, previous mesh repairs and a Body Mass Index (BMI) over 35. Additional exclusions included patients with defects smaller than 2cm or larger than 5cm, those with diabetes mellitus, incisional hernias, chronic liver disease, chronic obstructive pulmonary disease, pregnant individuals, those planned for other gastrointestinal surgeries, HIV-positive patients and those with advanced-stage tumours or currently treated malignancies. This prospective study aims to contribute valuable data to the field of hernia repair techniques.

RESULTS AND DISCUSSIONS

Table 1: Age Distribution

Age Group (years)	Group A (Onlay)		Group B (Sublay)	
	No.	%	No.	%
15-30	3	6	4	8
31-45	12	24	13	26
46-60	23	46	26	52
> 60	12	24	7	14
Total	50	100	50	100
Mean+SD	50.64+11.16	48.86+11.51		

(Table 1) indicates that the mean age in Group A (Onlay) was 50.64±11.16 years and in Group B (Sublay) was 48.86±11.51 years, with a p-value of 0.4343, indicating no statistically significant difference between the groups. (Table 2) reveals that the mean duration of surgery was 60.08±10.82 minutes in Group A (Onlay) and 73.04±19.53 minutes in Group B (Sublay), with a highly significant p-value of <0.0001.

Table 2:Duration of Surgery

Duration of Surgery (minutes)	Group A (Onlay)		Group B (Sublay)	
	%	No	%	No
40-70	45	90	23	46
70-100	5	10	24	48
> 100	0	0	3	6
Total	50	100	50	100

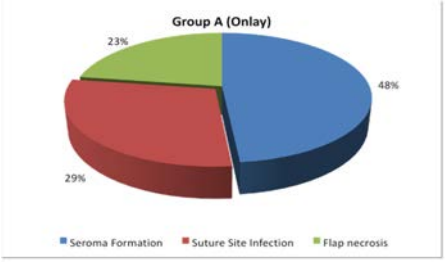

Fig. 1: Post Operative Outcome (Group A)

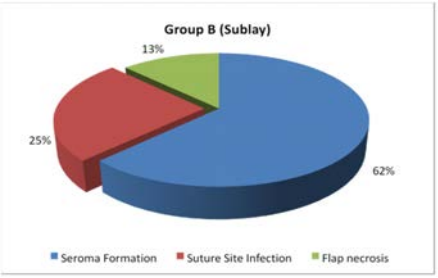

Fig. 1: (Group B)

Fig demonstrates that in Group A (Onlay), there were higher rates of seroma formation (30%), suture site infection (18%) and flap necrosis (14%) compared to Group B (Sublay), which had rates of 10%, 4% and 2% respectively, with a significant p-value of <0.05 for all outcomes (Fig. 1).

Table 3:Duration of Hospital Stay

Duration of Hospital Stay (days)	Group A (Onlay)		Group B (Sublay)	
	%	No	%	No
<5	1	2	21	42
6-10	33	66	26	52
> 10	16	32	3	6
Total	50	100	50	100

Table 4: Chronic Pain and Recurrence

Chronic Pain	Group A (Onlay)		Group B (Sublay)	
	No	%	No	%
Yes	19	38	5	10
No	31	62	45	90
RECURRENCE				
No	50	100	50	100
Total	50	100	50	100

(Table 3) reveals that the mean duration of hospital stay was significantly longer in Group A (Onlay) at 10.08±3.36 days compared to 6.82±2.39 days in Group B (Sublay), with a highly significant p-value of <0.0001. The study found chronic pain in 38% of patients in Group A (Onlay) compared to 10% in Group B (Sublay), with a statistically significant p-value of 0.001 (Table 4).

There was no recurrence in both groups in our study. In the present study with a mean age of 50.64+11[16]. years in Group A (Onlay) and 48.86+11.51 years in Group B (Sublay), the age range in the current study is 12-65. In the same way, group A's mean age in the Goyal[16] study was 49.37±9.92 years, while group B's mean age was 48.83±14.51 years. About the distribution of ages, both groups were similar. Age ranges in the study by Choudhry[17] are 15-60 years old, with a mean age of 44.5 years. The majority of patients in our study who underwent onlay and sublay mesh repairs were between the ages of 46 and 60, with 23 (46%) and 27 (54%) belongs to this age range. The surgical procedure took 45-80 minutes, with an average duration of 60.0+10.82 minutes, in the onlay group. Surgery took 60-120 minutes on average for the sublay group, with a mean duration of 73.04+19.53 minutes. In a similar study, Al-Tai[18] found that the mean surgical time for the onlay group was 64±8 minutes (50-80 minutes), while the mean surgical time for the sublay group was 72±10 minutes (68-112 minutes). Kancharla[19] study was 81.30 minutes and 85.85 minutes, respectively. In present study, 15 patients (30%) in Group A showed seroma formation, 9 cases (18%) had suture site infections and 7 cases (14%), had flap necrosis. 5 (10%) of Group B's cases exhibited seroma development, 2 (4%) had suture site infections and 1 (2%) had flap necrosis. likewise, in the Goyal[16] study, seroma formation took place in 10% cases of the sublay group and 33% cases of the onlay group within the first week following surgery. Four patients (16%) out of the twenty-five patients who underwent onlay meshplasty in the study by Dora[20] reported having flap necrosis., in contrast, there was no incidence in the case of sublay mesh repair. In the current study, Group A consisted of 1 (2%) case that stayed in the hospital for less than 5 days, 33 (66%) cases that were in the hospital for 6–10 days and 16 (32%) cases that stayed in the hospital for more than 10 days. In Group B, three cases (6%) stayed in the hospital for more than ten days, 26 cases (52%) stayed for six to ten days and 21 cases (42%) stayed for less than five days. The mean duration of hospital stay in Group A (onlay) was 10.08+3.36 days and Group B (Sublay) was 6.82+2.39 days. The length of hospital stays for Group A (Onlay) and Group B (Sublay) in the study by Deherkar[21] was 6.35+2.64 days and 5.40+1.729 days, respectively. In his study, Dora[20] found that the average hospital stay following surgery for onlay mesh repair was five days, while the average hospital stay following pre-peritoneal mesh repair was four days. Similarly, onlay mesh repair needed an average postoperative hospital stay of 6.13+1.55 days in the Goyal[16] study, while sublay mesh repair required an average stay of 7.70+3.08 days. (Table 3) Chronic pain was present in 19 cases (38%) out of 50 patients in Group A (Onlay) and 5 cases (10%) in Group

B (Sublay). In the current study, the P value was significant at P<0.05. Similar results were also noted in the study conducted by Rajsiddharth[22], which discovered that seven patients (11.6%) reported having chronic pain. Of them, six (20%) were in the onlay group and one (3.33%) was in the pre-peritoneal mesh repair group (P < 0.05). (Table 4). In this study, there was no recurrence in either group. According to Al-Tai[18] study, there was no recurrence in the sublay group during the two-year follow-up, but there were four patients (6.66%) in the onlay group. (Table 4).

CONCLUSION

Compared to sublay mesh repair, individuals who undergo onlay mesh repair are more likely to experience complications such as seroma formation, suture site infection, flap necrosis and chronic discomfort. While onlay mesh repair surgeries typically have shorter operative times, the associated complications limit its broader application. Consequently, sublay mesh hernioplasty emerges as a preferable option for patients with ventral hernias, as it tends to result in fewer complications and improved overall outcomes.

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