

# Open Onlay Versus Sublay Mesh Repair in Ventral Hernias – A Comparative Study

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## A B S T R A C T

**Introduction:** Abdominal hernia means bulging of the part of the contents of the abdominal cavity through a weakness in the abdominal wall. Abdominal wall hernia can be groin hernias or ventral hernias. The present study was undertaken to compare the advantages and disadvantages of prolene mesh hernioplasty in cases of ventral hernias using onlay versus sublay approach.

**Material and methods:** 100 patients were taken who fulfilled the inclusion criterias and randomized into two groups, 50 in each group, Group A (onlay group) and Group B (sublay group), to make study double blind in department of General Surgery of Rohilkhand Medical College and Hospital, Bareilly.

**Results:** Out of 100 patients, 50 patients operated by onlay repair and 50 patients operated by sublay repair. The average duration of surgery for onlay group was  $44.48 \pm 3.84$  minutes and for sublay repair was  $55.28 \pm 9.63$ , immediate post-operative pain with usual doses of analgesics was more in onlay group for first 48 hours, two patients in onlay group had wound infection and none was seen in sublay group, hospital stay among patients of onlay group was more as compared to patients of sublay group and one patient from onlay group had early recurrence.

**Conclusion:** Sublay mesh repair is a better alternative to onlay mesh repair for repair of ventral hernias, the mesh is mostly hidden and anchored behind the rectus muscle, there are less rate of complications and there is a low recurrence rate.

**Keywords:** Ventral Hernia, Onlay Mesh Hernioplasty, Sublay Mesh Hernioplasty

## INTRODUCTION

Abdominal hernia means bulging of the part of the contents of the abdominal cavity through a weakness in the abdominal wall.<sup>1</sup> They are among the oldest-known condition affecting the humankind. Abdominal wall hernia can be groin hernia or ventral hernia.

The calculated incidence of ventral hernias are 15-20%.<sup>2</sup> Ventral hernias include umbilical-paraumbilical hernia, epigastric hernia, incisional hernia, parastomal hernia, spigelian hernia, lumbar hernia and traumatic hernia. Based on localisation of hernia, primary ventral hernia can be classified into two midline hernias (epigastric and umbilical) and two lateral hernias (spigelian and lumbar).<sup>3</sup>

Ventral hernia can be congenital or acquired. Surgery is the mainstay of treatment since the natural history of hernia is progressive, i.e. hernia can increase in size, cause pain and discomfort or they may lead to complications like obstruction and strangulation of bowel. Hernia surgery has evolved over time. Notable contributors include Bassini with first repair of inguinal hernia in 1884, Bourret designed the first nylon prosthetic mesh in 1948, replaced by prolene by Usher in

1963.<sup>4,5</sup>

Leblanc and Booth in 1993 described the first laparoscopic repair of ventral hernia. Although laparoscopic repair has gained popularity worldwide, it is not widely available in our country. Hence open mesh repair is the most widely practiced technique for ventral hernia repair.<sup>6,7</sup> Various techniques have been introduced for placement of prolene mesh in ventral hernias.

Onlay and sublay techniques are most commonly applied techniques for ventral hernia meshplasty. The number of studies in our region on this topic are limited with onlay technique being more commonly employed by most surgeons because of shorter operation time however it is associated with higher incidence of complications.<sup>8</sup> The present study was undertaken to compare the advantages and disadvantages of prolene mesh hernioplasty in cases of ventral hernias using onlay versus sublay approach.

## MATERIAL AND METHODS

The present study was carried out in Department of surgery at Rohilkhand Medical College and Hospital, Bareilly, Uttar

Pradesh.

The present study was undertaken to compare the advantages and disadvantages of prolene mesh hernioplasty in cases of ventral hernias using onlay versus sublay approach.

**Type of Study:** A randomized control study. It was a double blind comparative study.

**Randomization criteria:** Patients were randomly divided into two groups, Group A (onlay repair) and Group B (sublay repair) and this randomization was done using website www.random.org to make study double blind.

**Study Duration:** November 2018 to October 2019.

**Subjects:** Patients, who were admitted with diagnosis of ventral hernia in the department of General Surgery of Rohilkhand Medical College and Hospital, Bareilly.

**Sample Size:** 100 patients were included in this study with diagnosis of ventral hernia, and who fulfilled the inclusion criteria and consented for the study.

#### Inclusion Criteria:

1. Patients admitted and diagnosed clinically as a case of ventral hernia in the department of General Surgery of Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh.
2. Patients between age group of 18-65 years.
3. ASA class I (normal healthy patient) and class II (patient with mild systemic disease) patients.

#### Exclusion Criteria:

1. Patients of age less than 18 years and more than 65 years
2. Patients with ascites.
3. Patients with respiratory distress.
4. Patients with chronic cough.
5. Patients who have not opted for study.
6. Patients with BMI > 40.
7. Obstructed/Strangulated hernias which were operated in emergency.
8. ASA class III (patient with severe systemic disease that is not life-threatening) and IV (patient with severe systemic disease that is a constant threat to life) patients.

Ethical clearance was taken from Institutional Ethical Committee.

All the participants were explained about the objectives of the study and an informed and written consent was taken. Face to face interviews, history taking and physical examinations were done after explaining the purpose, benefits, risks of the procedure and they were ensured about their anonymity and confidentiality of the study.

All the data was assessed by using SPSS version 23 and the qualitative data was assessed by Chi-square and the quantitative data was assessed by Unpaired T-test. The results were presented in frequencies, percentages and mean±SD.

## RESULTS

A total of 100 patients, 50 in each group, were included in the study. Out of 50 patients operated by onlay mesh hernioplasty, 24 were male and 26 were female and out of 50 patients operated by sublay mesh hernioplasty, 20 were male patients and 30 were female patients.

Table-1 shows the comparison of duration of surgery between the groups. The minimum time taken in onlay group was 40minutes and maximum time taken was 55minutes, whereas in sublay group minimum time taken was 40minutes and maximum time taken was 72minutes. The duration of surgery was significantly (p-value<sup>#</sup>=0.0001, \*significant) lower among patients of onlay (44.48±3.84 minutes) compared to sublay (55.28±9.63 minutes).

Visual Analogue Scale (VAS) for pain was used to grade first 48 hours of post-operative pain with usual doses of analgesics. The immediate post-operative pain was significantly (p=0.001) lower among patients of sublay group (2.58±0.70) compared to onlay group (3.86±1.10) with usual doses of analgesics.

Table-2 shows the comparison of wound infection between the groups. The wound infection was present in 2 patients of onlay group i.e. 4% of total patients of onlay group and none wound infection was noted in sublay group i.e. 0% wound infection in sublay group. There was no significant (p>0.05) difference in wound infection between the groups.

Table-3 shows the comparison of hospital stay between the groups. The hospital stay for patient in onlay group ranged

Groups	Duration of surgery in minutes (Mean±SD)
Onlay group	44.48±3.84
Sublay group	55.28±9.63
p-value <sup>#</sup>	0.0001*
#Unpaired t-test, *Significant	
Table-1: Comparison of Duration of surgery between the groups	

Wound infection	Onlay group (n=50)		Sublay group (n=50)		p value <sup>#</sup>
	No.	%	No.	%	
Present	2	4.0	0	0.0	0.07
Absent	48	96.0	50	100.0	
#Chi-square test					
Table-2: Comparison of post-operative wound infection between the groups					

Groups	Hospital stay in days (Mean±SD)
Onlay group	7.92±1.66
Sublay group	6.02±0.97
p-value <sup>#</sup>	0.001*
#Unpaired t-test, *Significant	
Table-3: Comparison of Hospital stay between the groups	

Recurrence	Onlay group (n=50)		Sublay group (n=50)		p value <sup>#</sup>
	No.	%	No.	%	
Yes	1	2.0	0	0.0	0.31
No	49	98.0	50	100.0	
#Chi-square test					
Table-4: Comparison of recurrence between the groups					

from 5 days to 12 days and in sublay group it ranged from 5 days to 9 days. The hospital stay was significantly ( $p=0.001$ ) lower among patients of sublay group ( $6.02\pm 0.97$  days) than onlay group ( $7.92\pm 1.66$  days).

Table-4 shows the comparison of recurrence between the groups. Only 1 case of recurrence within one month was seen from onlay group, which meant 2% of patients of onlay group and there was no case of recurrence among patients of sublay group. There was no significant ( $p>0.05$ ) difference in recurrence between the groups.

## DISCUSSION

Repair of ventral hernia without complications is always challenging for the operating surgeons and advancements in basic surgical techniques have been made to prevent complications in hernia repair. Placement of mesh has been shown to be effective in reducing the risk of recurrence.<sup>9,10</sup> Onlay and sublay are two most commonly used techniques of mesh placement during ventral hernia repair. Some studies have concluded that sublay technique should be declared as gold standard because there is a less risk of mesh infections and seroma formation.<sup>11</sup> Onlay technique has the advantage of separating the mesh from abdominal contents but the major disadvantage of this is that mesh can become easily infected in presence of surgical site infections and there is also a higher risk of seroma formation.<sup>12</sup>

Based on national operative statistics, ventral hernia commonly encountered in surgical practice accounts for 15-20% of all abdominal wall hernias.<sup>2</sup> Based on localisation of hernia, primary ventral hernia can be classified into midline hernias (epigastric and umbilical) and lateral hernias (spigelian and lumbar). Incisional hernias based on location can be classified as medial or midline hernias and lateral hernias.<sup>3</sup>

The present study was conducted in the Department of General Surgery, Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh with the objective to compare the advantages and disadvantages of prolene mesh hernioplasty in cases of ventral hernias using onlay versus sublay approach. A total of 50 patients in each group were included in the study. Randomisation was done using website [www.random.org](http://www.random.org).

In this study, more than half of the patients of both onlay (52%) and sublay (60%) groups were females. There was no significant ( $p>0.05$ ) difference in gender between the groups showing comparability of the groups in terms of gender. Shehryar et al (2018)<sup>13</sup> reported that there were 64% female patients in group S and 60% in group O ( $p$ -value 0.56).

The duration of surgery was significantly ( $p=0.0001$ ) lower among patients of onlay ( $44.48\pm 3.84$  minutes) compared to sublay ( $55.28\pm 9.63$  minutes) in the present study. Alsoudany et al (2018)<sup>14</sup> found that the duration of surgery in patients treated with onlay mesh repair (Group A) ranged from 75-90 minutes ( $83.41\pm 10.24$ ) and duration of surgery in patients treated with retromuscular mesh repair (Group B) ranged from 80-100 minutes ( $89.52\pm 7.25$ ). Godara et al (2006)<sup>15</sup> reported that the duration of surgery ranged from 30 – 90 minutes ( $49.35 \pm 8.29$ ) onlay group and the duration of surgery ranged from 36 – 96 ( $63.15 \pm 15.0$ ) in retromuscular

mesh repair (Group B).

The post-operative pain was significantly ( $p=0.001$ ) lower among patients of sublay ( $2.58\pm 0.70$ ) compared to onlay ( $3.86\pm 1.10$ ) in this study. Shehryar et al (2018)<sup>13</sup> reported that the mean pain score after 6 hours of surgery in group S was  $2.91\pm 0.71$  versus  $4.43\pm 0.86$  in group O ( $p$ -value  $<0.0001$ ). The mean post-operative pain score in study of Saber and Al-Masry (2015)<sup>16</sup> was  $5.5\pm 0.7$  in onlay group and  $3.0\pm 0.97$  in sublay mesh.

In the present study, the wound infection in the early post-operative period was present among 4% patients of onlay and in 0% of sublay which improved with antibiotics and regular antiseptic dressings. There was no significant ( $p>0.05$ ) difference in wound infection between the groups. Shehryar et al (2018)<sup>13</sup> found that wound infections rate was significantly lower in group S patients. These occurred in 8% patients in group S and in 17% patients in group O ( $p$ -value 0.05).

The hospital stay was significantly ( $p=0.001$ ) lower among patients of sublay ( $6.02\pm 0.97$  days) than onlay ( $7.92\pm 1.66$  days) in this study. Patients were discharged once they have adequate pain control, passed stool and resumed oral feeding. Alsoudany et al (2018)<sup>14</sup> found that the length of hospital stay following treatment of ventral hernia by onlay mesh repair (Group A) was 3-9 days ( $4.63 \pm 0.35$ ) while following treatment of ventral hernia by retromuscular mesh repair (Group B), the duration of hospital stay was 1-4 days ( $2.62 \pm 0.74$ ).

Hernia recurrence is distressing to the patient and embarrassing to the surgeon. Nowadays due to tension free repair using prosthetic mesh, recurrence rate has become negligible. The recurrence was in 2% patients of onlay and was nil in patients of sublay group in the present study at one month of follow up.

Alsoudany et al (2018)<sup>14</sup> reported that hernia recurrence was observed in patients treated with onlay mesh repair (Group A), only one patient (5%) developed hernia recurrence (occurred after about 11 months post operation).

Limitations of this study included small sample size and a shorter duration of follow up. The studies with larger sample size with long duration of follow-up are required to have more robust findings.

## CONCLUSIONS

The following are the conclusions of this study:

1. More than half of patients of both onlay group (52%) and sublay group (60%) were females. There was no significant ( $p>0.05$ ) difference in gender between the groups.
2. The duration of surgery was significantly ( $p=0.0001$ ) lower among patients of onlay group ( $44.48\pm 3.84$  minutes) compared to sublay group ( $55.28\pm 9.63$  minutes).
3. The immediate post-operative pain was significantly ( $p=0.001$ ) lower among patients of sublay group ( $2.58\pm 0.70$ ) compared to onlay group ( $3.86\pm 1.10$ ), with usual dose of analgesics.
4. Wound infection was noted among 4% patients of onlay group and in 0% of sublay group. There was no

significant ( $p>0.05$ ) difference in wound infection between the groups.

5. The hospital stay was significantly ( $p=0.001$ ) lower among patients of sublay group ( $6.02\pm 0.97$  days) than onlay group ( $7.92\pm 1.66$  days).
6. Early recurrence was noted in 2% patients of onlay group and was nil in patients of sublay group. There was no significant ( $p>0.05$ ) difference in early recurrence between the groups.

### Overall

Sublay mesh repair is a better alternative to onlay mesh repair for repair of ventral hernias, our study favours the use of sublay meshplasty for repair of ventral hernia as it can be used for all sites of ventral hernia, the mesh is mostly hidden and anchored behind the rectus muscle, there are less rate of complications and there is a low recurrence rate. This observation suggests to carry out more trials on the sublay mesh repair technique and to include bigger number of cases and longer duration of follow up to assess late recurrences.

## REFERENCES

1. Tulloh B, Nixon SJ. Abdominal Wall, Hernia and Umbilicus. In: Williams NS, O'Connell PR, McCaskie AW, eds. Bailey & Love's short practice of surgery. 27<sup>th</sup> ed. India: CRC press; 2017. P. 1022-46.
2. Stumpf M, Conze J, Klinge U, Rosch R, Schumpelick V. Open mesh repair. *European Surgery*. 2003 Jan 1;35(1):21-4.
3. Muysoms F, Miserez M, Berrevoet F, Campanelli G, Champault GG, Chelala E, Dietz UA, Eker HH, El Nakadi I, Hauters P, Pascual MH. Classification of primary and incisional abdominal wall hernias. *Hernia*. 2009;13(4):407-14.
4. Nho RL, Mege D, Ouaisi M, Sielezneff I, Sastre B. Incidence and prevention of ventral incisional hernia. *Journal of visceral surgery*. 2012;149(5):e3-14.
5. Poulouse BK, Shelton J, Phillips S, Moore D, Nealon W, Penson D, Beck W, Holzman MD. Epidemiology and cost of ventral hernia repair: making the case for hernia research. *Hernia*. 2012;16(2):179-83.
6. LeBlanc KA, Booth WV. Laparoscopic repair of incisional abdominal hernias using expanded polytetrafluoroethylene: preliminary findings. *Surgical laparoscopy & endoscopy*. 1993;3(1):39-41.
7. Afzal S, Baloch SH, Usman J. Comparison of on-lay (on the rectus sheath) and sub-lay (Retromuscular) mesh repair of ventral abdominal hernias. *Pak J Med Health Sci*. 2016;10(4):1161-4.
8. Parker SG, Wood CP, Sanders DL, Windsor AC. Nomenclature in abdominal wall hernias: is it time for consensus?. *World Journal of Surgery*. 2017;41(10):2488-91.
9. Lujendijk RW, Hop WC, Van Den Tol MP, De Lange DC, Braaksma MM, IJzermans JN, Boelhouwer RU, de Vries BC, Salu MK, Wereldsma JC, Bruijninx CM. A comparison of suture repair with mesh repair for incisional hernia. *New England Journal of Medicine*. 2000;343(6):392-8.
10. Burger JW, Lange JF, Halm JA, Kleinrensink GJ, Jeekel H. Incisional hernia: early complication of abdominal surgery. *World journal of surgery*. 2005;29(12):1608-13.
11. 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.
12. Ibrahim AH, El-Gammal AS, Heikal MM. Comparative study between 'onlay' and 'sublay' hernioplasty in the treatment of uncomplicated ventral hernia. *Menoufia Medical Journal*. 2015;28(1):11.
13. Shehryar HA, Shahka MA, Javed MU. Comparison of Sublay versus Onlay Mesh Technique of Ventral Hernia Repair. *Pakistan journal of medical & health sciences*. 2018;12(1):57-9.
14. Alsoudany SE, Khalil OO, Shebl AM. Comparative Study between " Onlay" Versus" Retrorectus" Hernioplasty in Management of Uncomplicated Ventral Hernias. *Egyptian Journal of Hospital Medicine*. 2018;73(4).
15. Godara R, Garg P, Raj H, Singla SL. Comparative evaluation of " Sublay" versus" Onlay" meshplasty in ventral hernias. *Indian journal of gastroenterology: official journal of the Indian Society of Gastroenterology*. 2006;25(4):222-3.
16. Saber A, Emad KB. Onlay versus sublay mesh repair for ventral hernia. *J Surg*. 2015;4(1-1):1-4.

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