

## Comparison of Onlay versus Sublay Hernioplasty for Ventral Hernia

MUHAMMAD KHURAM JAMEEL<sup>1</sup>, RABBIA SAEED<sup>2</sup>, ABDUL BASIT SAEED<sup>3</sup>, AUN JAMAL<sup>4</sup>, ARUJ ALAM<sup>5</sup>, ASIF HANIF<sup>6</sup>

<sup>1</sup>Senior Registrar, Deptt of Surgery, King Edward Medical university, Mayo Hospital Lahore.

<sup>2</sup>Senior Registrar, Deptt of Surgery Azra Naheed Medical College/Chaudhry Akram Teaching Hospital, Lahore

<sup>3</sup>General surgeon, Ever Care international Hospital, Lahore.

<sup>4</sup>Surgical Oncologist, Shaukat Khanam Memorial Cancer Hospital & Research Centre. Lahore

<sup>5</sup>Associate Prof. of Surgery, Continental Medical College, Lahore

<sup>6</sup>Associate Prof. Biostatistics, Institute of public health, Faculty of Allied health sciences, The University of Lahore.

Correspondence to Dr. Khurram Jameel, Email: khurramjameel999@gmail.com, Cell: 03027334990 /

### ABSTRACT

**Background:** Onlay and Sublay Hernioplasty for ventral hernias are commonly performed techniques. However, it remains unclear which technique is better.

**Aim:** To compare the outcome of on-lay versus sublay hernioplasty in ventral hernia presenting in our setup.

**Methods:** This randomized controlled trial was done at surgical unit IV of Services Hospital Lahore. The duration of this study was on year i.e., from Feb, 2017 till Jan 2019. An approval was taken from hospital ethical committee. Consecutive sampling technique was used. Patients were randomly divided in two equal groups using random number tables in Group A: Onlay hernioplasty and Group B: Sublay hernioplasty. All procedures were performed by a single operating team to control bias. Patients were followed up 1<sup>st</sup>, 2<sup>nd</sup>, and 4<sup>th</sup> weeks for seroma formation.

**Results:** The mean age of cases in this study was 39.47±11.24 years and there were 33(55%) male and 27(45%) female cases with higher male to female ratio. During first week after surgery in On-lay and Sub-lay group seroma was seen in 9(30%) and 2(6.7%) respectively, p-value = 0.020. After 2<sup>nd</sup> week post operatively seroma was seen in 6(20%) of the cases in onlay group and 1(3.3%) of the sublay group, p-value = 0.044. And at 4<sup>th</sup> week follow up, seroma was seen in 6(20%) of the cases in Onlay mesh group and 1(3.3%) of sublay mesh group, p-value=0.044.

**Conclusion:** In the light of results, we found that Sublay mesh repair has better compliance as lesser seroma formation and low recurrence rate.

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

### INTRODUCTION

Hernia is the protrusion of any organ or the part of the organ through defect in the wall of its containing cavity. The ventral hernia is the defect or weak area of the anterior abdominal wall<sup>1</sup>. The protrusion in ventral hernia may involve preperitoneal fat, intestinal contents, or omentum. Ventral hernias are either primary or secondary<sup>2</sup>. Primary hernias represent approximately 2/3 of all the ventral hernias and are congenital or acquired<sup>3</sup>.

Primary hernias are nominated after their anatomical locations<sup>2</sup>; umbilical 71%, epigastric/ linea alba 25%, rest 4% are of rare locations e.g. lumbar and linea semilunaris/ Spagellian hernias<sup>4</sup>. Secondary hernias are complications to previous surgery and develop in relation to incision after laparotomy 89%, laparoscopy 5% and after stoma formation 6%<sup>3</sup>.

The mesh can be placed in between the subcutaneous fat of the abdominal wall and anterior rectus sheath (on-lay mesh placement) as well as in the retro rectus plane which is in between the rectus muscle and posterior rectus sheath (sub-lay mesh placement)<sup>1</sup>.

There is controversy regarding the site of placement of mesh for ventral hernia repair in terms of complications especially seroma formation and recurrence. Some surgeons prefer onlay mesh hernioplasty due to less operative time and easy technique while others do sublay mesh hernioplasty due to fear of increase seroma formation and wound infection in onlay mesh hernioplasty. However sublay mesh hernioplasty is a time taking

procedure compared to on lay mesh hernioplasty<sup>10</sup> and requires more expertise<sup>11</sup>. In developing countries like Pakistan complications especially the recurrence of the disease puts an extra financial burden on patient's family. Thus this study can help to get better understandings in above mentioned controversies, so that in future better technique can be recommended in order to decrease the financial, pathological and psychological burden.

### MATERIALS AND METHODS

This randomized controlled trial was conducted at surgical unit IV of Services Hospital Lahore. The duration of this study was two year i.e., from Feb, 2017 till Jan 2019. An approval was taken from hospital ethical committee. Consecutive sampling technique was used. The sample size estimated as 60 cases (30 in each group) with 5% level of significance and 80% power of test with an expected percentage of seroma formation in onlay group as 40 % and in sublay group as 6.66%<sup>6</sup>.

**Inclusion Criteria:** Patients of both genders between age 20-60 year with ventral hernia (ventral hernia is the defect or weak area of the anterior abdominal wall<sup>1</sup>) are included.

**Exclusion Criteria:** Incisional hernias (presence of swelling in previously operated hernia site with positive cough impulse and reducible), Strangulated hernias (presence of ventral hernia with sign of strangulation like tenderness, hyperthermic, redness of skin, tachycardia, (H.R >100) fever (100 F) and raised white count (>11,000/mm<sup>3</sup>) and Obstructed hernias (Hernia with 4 cardinal symptoms of intestinal obstruction i.e. abdominal pain, abdominal distension, vomiting and absolute constipation) were excluded from the study. Also pregnant

Received on 27-09-2019

Accepted on 11-02-2020

females (as confirmed by viable fetus on ultrasound) not included in study. Other exclusion criteria were diabetes mellitus (fasting blood sugar >110mg/dL, hypertension (Blood pressure > 140/90 mmHg, malignancy-confirmed on previous medical record) and abnormal Hepatorenal, coagulation profile with history of Anticoagulation therapy.

After approval from hospital ethical committee, 60 patients fulfilling the criteria were recruited from outdoor and emergency department of SIMS/ Services Hospital, Lahore. A detailed history was taken including demographic data (age, address) and all patients were clinically examined. Patients were divided in two equal groups randomly using random number tables. Group A included patient with Onlay mesh placement and Group B include patients with Sublay placement of mesh during repair of ventral hernia. All procedures were performed by a single surgical operating team to control bias. Patients were followed up 1<sup>st</sup>, 2<sup>nd</sup>, and 4<sup>th</sup> weeks for seroma formation. For recording of recurrence of hernia at same site patient were followed in 6 months and then after one year of surgery.

Outcome was assessed in terms of Seroma formation (Collection of serosanguineous fluid more than 50 ml in subcutaneous plane after surgery which was assessed by the ultrasound after 1st, 2nd and 4th weeks of surgery) and Recurrence of Hernia (defined as swelling at previously operated site with positive cough impulse after 6 months of surgery). All data was collected and recorded on the attached Performa. Data was entered and analyzed by using SPSS version 20.0. Descriptive analysis like frequency and percentage was calculated for qualitative variable like gender, seroma formation and recurrence chi-square test was applied to compare seroma formation and recurrence in both groups and P-value ≤ 0.05 was considered as significant. Quantitative variable like age & BMI was presented as mean ± S.D. Data was stratified for age, gender & BMI to address effect modifiers. Chi-square

test was used post-stratification with p-value ≤ 0.05 considered as significant. Confounding factors like age, gender and Body Mass Index (BMI) was controlled through stratification. Post stratification chi-square test was applied by taking P ≤ 0.05 as significant.

## RESULTS

The median age of cases in this study was 39.47 ± 11.24 years; the mean age in Onlay and Sublay group was 41.93 ± 11.75 years and 37.00 ± 10.32 years. Overall in both groups there were 33(55%) male and 27(45%) female cases with higher male to female ratio. In Onlay group there were 15(50%) male and 15(50%) female cases while in Sublay group there were 18(36%) male and 12(40%) female cases. The mean BMI in all cases was 26.51 ± 5.86 while mean BMI in Onlay and Sublay was 25.84±5.30 and 27.17 ± 6.38 respectively. During first week post operatively Onlay and Sublay group Seroma was seen in 9(30%) and 2(6.7%) respectively, p-value = 0.020. At 2<sup>nd</sup> week post operatively Seroma was seen in 6(20%) of the cases in Onlay group and 1(3.3%) of the sublay group, p-value = 0.044. After 4<sup>th</sup> week of surgery Seroma was seen in 6(20%) of the cases in Onlay group and 1(3.3%) of the sublay group, p-value = 0.044. Seroma formation at each follow-up was significantly higher in Onlay group when compared with sublay group, p-value < 0.05. In Onlay group there were 4(13.3%) recurrence and in sublay group no cases presented with recurrence after one year of surgery, with significant p-value = 0.038 (< 0.05). When data was stratified for age, gender and obesity, Seroma formation was found significantly higher in Onlay group at 4<sup>th</sup> week in male cases, p-value < 0.05 and recurrence was significantly higher in Onlay group in cases with age < 40 years, p-value < 0.05. While in other subgroups the Seroma formation at each follow up and recurrence rate was statistically insignificant, p-value > 0.05.

Table -1: Descriptive Statistics of age (years) and BMI in both groups

|             | Study groups  | Mean  | S.D   | Minimum | Maximum |
|-------------|---------------|-------|-------|---------|---------|
| Age (years) | Onlay (n=30)  | 41.93 | 11.75 | 22.00   | 60.00   |
|             | Sublay (n=30) | 37.00 | 10.32 | 20.00   | 58.00   |
|             | Total (n=60)  | 39.47 | 11.24 | 20.00   | 60.00   |
| BMI         | Onlay (n=30)  | 25.84 | 5.30  | 18.09   | 37.27   |
|             | Sublay (n=30) | 27.17 | 6.38  | 18.09   | 37.76   |
|             | Total (n=60)  | 26.51 | 5.86  | 18.09   | 37.76   |

Table 2: Comparison of Seroma formation at different follow-ups and recurrence rate in both groups

| Variables        |                              |     | Study groups    |                  | Chi-square test | p-value |
|------------------|------------------------------|-----|-----------------|------------------|-----------------|---------|
|                  |                              |     | Onlay (Group A) | Sublay (Group B) |                 |         |
| Seroma formation | 1 <sup>st</sup> Post OP week | Yes | 9(30.0%)        | 2(6.7%)          | 5.45            | 0.020   |
|                  |                              | No  | 21(70.0%)       | 28(93.3%)        |                 |         |
|                  | 2 <sup>nd</sup> Post OP week | Yes | 6(20%)          | 1(3.3%)          | 4.04            | 0.044   |
|                  |                              | No  | 24(80%)         | 29(96.7%)        |                 |         |
|                  | 4 <sup>th</sup> Post OP week | Yes | 6(20%)          | 1(3.3%)          | 4.04            | 0.044   |
|                  |                              | No  | 24(80%)         | 29(96.7%)        |                 |         |
| Recurrence       | One year Post OP             | Yes | 4(13.3%)        | 0(0%)            | 4.29            | 0.038   |
|                  |                              | No  | 26(86.7%)       | 30(100%)         |                 |         |

## DISCUSSION

The incidence of post-operative wound infection and wound complications after mesh repair aimed at continuing research into the optimal method of treatment of hernias. The two frequently used techniques in case of ventral hernia are the onlay and sublay repair. However, it remains unclear which technique is better.

Study of Timmermans L et al showed no statistical difference regarding seroma formation in onlay and sublay groups (odds ratio=1.06; 95% CI, 0.38 to 2.95; I<sup>2</sup>=48%; P=0.89)<sup>7</sup>. Leithy M et al, study showed statistically significant difference between two groups regarding seroma formation (40% in onlay group, and 6.66% in sublay group, P value > 0.0005)<sup>8</sup>

In current study we found that at first week after surgery in Onlay and Sublay group Seroma was seen in 9(30%) and 2(6.7%) respectively. At 2<sup>nd</sup> week post operatively Seroma was seen in 6(20%) of the cases in Onlay group and 1(3.3%) of the sublay group. At 4<sup>th</sup> week post operatively Seroma was seen in 6(20%) of the cases in Onlay group and 1(3.3%) of the sublay group, p-value = 0.044. Seroma formation at each follow-up was significantly higher in Onlay group when compared with sublay group, p-value < 0.05. In Onlay group there were 4(13.3%) recurrence and in sublay group no cases presented with recurrence after six months of surgery, the recurrence rate after six months was significantly lower in Sublay group, p-value = 0.038 (< 0.05).

A previous study showed that patients reported with seroma formation in Onlay group were 12%, 34.67% and 0% on 7th, 15th and 30th day respectively. And patients who presented with seroma in Sublay were 6.3%, 3.78% and 0% on 7th, 15th and 30th day respectively.<sup>9</sup> These findings are almost similar to our study..

Studies of Leithy M et al<sup>8</sup>, Godara R et al<sup>10</sup> and Bessa SS et al<sup>11</sup>, showed no statistically significant difference in regard of recurrence between two groups (0% in sublay and 5% in onlay with p - value 0.48 in each group). These findings are contrary to this study. While study of Weber G et al, showed recurrence was much lower in onlay group (12%) versus sublay group (20%) with P value < 0.05 which is assessed after 6 months of surgery<sup>12</sup>. In our study we found no recurrence rate in Sublay group but found statistical difference with Onlay group. Another study comparing onlay and sublay mesh repair for ventral hernias, recurrence was 0%, in sublay group and in the onlay, the recurrence rate was 4% in one year followup<sup>13</sup>.

With increasing trend of minimally invasive surgical techniques repair of recurrent hernias through a laparoscopic approach are intermixed with primary repair and not studied independently. Somehow laparoscopy allows access through a different and new incision site to avoid previously placed incisions and areas of scar. There is an increased risk of bowel injury due to adhesion. One study, supporting the use of laparoscopy, showed 69 patients with recurrent ventral hernias repaired laparoscopically demonstrating low repeat recurrence rate with an overall morbidity of 13% and bowel injury of 4.3%<sup>14</sup>. Single-institution studies have shown moderate success with this approach in experienced hands<sup>14,15</sup>. Laparoscopic techniques also allows for direct visualization of hidden

defects<sup>15</sup>. A study evaluating the presence of adhesions during revision laparoscopic hernia repair, 47.05% had no adhesions, 42.3% had adhesions of the omentum, and 10.58% had adhesions of bowel serosa<sup>16</sup>. Repairing recurrent hernias with a laparoscopic approach is possible, but it should be considered only in selected patients and by surgeons with expertise<sup>17</sup>.

## CONCLUSION

Through the findings of this study we found that Sublay mesh repair is a good alternative to Onlay mesh repair that may be applicable to all forms of ventral hernia. The mesh related Seroma formation rate is low as well as the recurrence rate is also significantly low.

## REFERENCES

- Williams NS, Bulstrode CKJ, O'Connell PR, editors. *Bailey & Love's short practice of surgery*. 26th ed. Boca Raton: CRC Press; 2013. p. 901-22
- Muysoms F, Miserez M, Berrevoet F, Campanelli G, et al. Classification of primary and incisional abdominal wall hernias. *Hernia*. 2009;13(4):407-14.
- Helgstrand F, Rosenberg J, Bay-Nielsen M, Friis-Andersen H, Wara P, Jorgensen L, et al. Establishment and initial experiences from the Danish Ventral Hernia Database. *Hernia*. 2010;14(2):131-5.
- Ponten J, Somers K, Nienhuijs S. Pathogenesis of the epigastric hernia. *Hernia*. 2012;16(6):627-33.
- Chitrambalam TG, Anguraj P, Sundaraj J, Pethuraj M. A comparative study between onlay and sublay meshplasty in ventral hernias: a randomized controlled trial. *International Surgery Journal*. 2019 Mar 26;6(4):1264-8.
- Rhemtulla IA, Fischer JP. Retromuscular sublay technique for ventral hernia repair. In *Seminars in plastic surgery*. 2018 Aug (Vol.32, No.03, pp.120-126). Thieme Medical Publishers.
- Timmermans L, de Goede B, van Dijk SM, Kleinrensink G-J, Jeekel J, Lange JF. Meta-analysis of sublay versus onlay mesh repair in incisional hernia surgery. *Am J Surg*. 2014;207(6):980-8.
- Leithy M, Loulah M, Greida HA, Baker FA, Hayes AM. Sublay hernioplasty versus onlay hernioplasty in incisional hernia in diabetic patients. *Menoufia Med J*. 2014;27(2):353.
- Murad QAF, Awan TA, Khan A, Malik AZ. Onlay Versus Sublay Technique of Repairing Ventral Abdominal Hernia. *J Rawalpindi Med Coll*. 2013;17(2):192-4.
- Godara R, Garg P, Raj H, Singla SL. Comparative evaluation of "Sublay" versus "Onlay" meshplasty in ventral hernias. *Ind J Gastroenterol*. 2006;8(1):42-7
- Bessa S, El-Gendi A, Ghazal A-H, Al-Fayoumi T. Comparison between the short-term results of onlay and sublay mesh placement in the management of uncomplicated para-umbilical hernia: a prospective randomized study. *Hernia*. 2015;19(1):141-6.
- Weber G, Baracs J, Horvath O. "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. *Magyar sebeszet*. 2010;63(5):302-11.
- Radwa M, Mohamed, Omnia M, Rabie. Comparative study between onlay and sublay repair of ventral hernia. *Al-Azhar Assiut Medical Journal*. 2019;17(1):96-102.
- Ferrari G, Bertoglio C, Magistro C, Girardi V, Mazzola M, Di Lernia S, et al. Laparoscopic repair for recurrent incisional hernias: a single institute experience of 10 years. *Hernia*. 2013;17(5):573-80.
- Chelala E, Baraké H, Estievenart J, Dessily M, Charara F, Allé J. Long-term outcomes of 1326 laparoscopic incisional and ventral hernia repair with the routine suturing concept: a single institution experience. *Hernia*. 2016;20(1):101-10.
- Chelala E, Debardemaeker Y, Elias B, Charara F, Dessily M, Allé J-L. Eighty-five redo surgeries after 733 laparoscopic treatments for ventral and incisional hernia: adhesion and recurrence analysis. *Hernia*. 2010;14(2):123-9.
- Bittner R, Bingener-Casey J, Dietz U, Fabian M, Ferzli G, Fortelny R, et al. Guidelines for laparoscopic treatment of ventral and incisional abdominal wall hernias (International Endohernia Society (IEHS)—Part 1. *Surg Endosc*. 2014;28(1):2-29.