

A COMPARATIVE STUDY BETWEEN ONLAY AND SUBLAY MESHPLASTY IN VENTRAL HERNIAS IN A TERTIARY CARE CENTRE – A RANDOMIZED CONTROL STUDY

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Abstract

Background: Ventral hernias are a very common problem encountered by surgeons all over the world. Despite numerous techniques and advancements in the management of them, there is no clear evidence stating which technique can be routinely used with minimal post-operative complications. Hence this study is to compare the efficacy of the sublay meshplasty with the commonly practiced onlay meshplasty. The aim of the study is to compare the duration of surgery and postoperative complications of sublay and onlay meshplasty in the treatment of ventral hernias. **Materials and Methods:** A prospective study was conducted among 100 patients undergoing ventral hernia repair in Kilpauk Medical College and Hospital and Govt. Royapettah Hospital. Inclusion and exclusion criteria were placed and a sample population of 100 was selected. A comparative study was conducted dividing these patients into 2 groups of 50 members using single blinded technique. Surgical site Infection, flap necrosis and duration of hospital stay (in days) were considered as primary outcome variables. A P value < 0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis. **Result:** The incidence of post-operative seroma and wound infection was 4% and 2% in sublay group compared to 36% and 18% in onlay group which was statistically significant (p<0.05). Post-op hospital stay (3 to 4 days vs 5 to 13.25 days) was low in sublay group compared to onlay group which was statistically significant (p<0.05). **Conclusion:** Even though operating time is longer, placement of mesh in sublay position is a better option than onlay placement in open ventral hernia repair because of lower complication rate and post-op morbidity.

INTRODUCTION

Ventral hernias result from defects in the abdominal wall. Various types may be umbilical, epigastric, paraumbilical, incisional, spigelian hernias. Despite more than 1,00,000 surgeries being performed every year for ventral hernias, there is no concrete evidence in the literature as to the indications for repair, the ideal approach, or the appropriate long term outcome to determine success rates.(1) With the different causes of ventral hernias, wide differences in defect sizes and locations and the associated medical comorbidities of every patient, it is not likely that a single approach to various ventral hernia repairs will ever be identified.

With the advancement of time, changes in the management of ventral hernias is being attributed not only to the understanding of their origins, but also in

understanding failures of their repair. The use of prosthetic mesh for the reinforcement in hernia repair has established a strong position not only in the repair of large or recurrent hernias but also in the repair of small primary hernia.(3) Research in the area of prosthetic mesh has increased over the last decade with materials designed for placement both inside and outside the abdomen.

“Nonstick” surface mesh preformed for left or right sided laparoscopic inguinal hernia repairs and recently, the development of a huge number of biologic meshes is being made from the human and Xenograft sources. There is little doubt that these options have helped to reduce the rates of recurrence and the morbidity in most common surgeries performed by surgeons. Patients have to be evaluated on a case by case basis for the ideal approach taking into account the patient’s age, comorbidities, the risk

of surgical site occurrence, size of defect, and physiologic and functional status. In order to identify the ideal repair for each patient, the surgeon should understand the goals of the repair.

All hernia repairs at a minimum requires prevention of herniated bowel contents from becoming incarcerated in the defect which must be accomplished with less morbidity and a minimal recurrence rate. A patch type hernia repair is adequate for achieving this goal. However, certain patients need extensive reconstructive approach with medialization of both the rectus muscles and to reconstruct the abdominal wall. The reconstructive surgeon must take all of these factors into consideration to provide a comprehensive approach to abdominal wall reconstruction.

Depending on the location of mesh while repair, the terms have been laid for various planes. In onlay technique the mesh is placed anterior to the Rectus abdominis muscle while in sublay technique the mesh is placed posterior to the Rectus abdominis muscle, anterior to peritoneum.

Need for the study

Onlay meshplasty is the most common technique used to correct ventral hernias. But it is associated with complications like seroma formation, recurrence, mesh infection, flap necrosis, omphalectomy and prolonged hospital stay. Sublay meshplasty is associated with lesser complications and lesser recurrence. The rate of occurrence of complications in postoperative period can be taken as an indicator to prove the superiority of technique and so that it can be hereafter used as the routine for ventral hernias.

This was a prospective study conducted at Government Kilpauk Medical College and Hospital, Chennai to determine whether the sublay method of meshplasty was better than the widely preferred onlay meshplasty. The aim of the study was to compare the duration of surgery and postoperative complications of sublay and onlay meshplasty in the treatment of ventral hernias. Objectives were to study operative time, early postoperative complications, duration of hospital stay, postoperative pain, recurrences, and outcomes of the onlay versus sublay mesh repair.

MATERIALS AND METHODS

A prospective double blinded randomized control study was conducted among 100 patients undergoing ventral hernia repair in Kilpauk Medical College and Hospital and Govt. Royapettah Hospital for a period of 6 months from March 2023 to August 2023. 100 patients were selected by simple random sampling method from a study population of those who underwent elective surgeries for uncomplicated midline ventral hernias. Exclusion criteria were those age <18 and more than 70; patients with uncontrolled hypothyroidism, diabetes, hypertension; patients with complications like irreducibility, obstruction, recurrence, strangulation; patients with malignancies

or in immunocompromised state, hepatic or renal failure and patients who are morbidly obese and those who were not giving consent for participation.

100 patients were divided into two groups at random using simple randomization. Lots were coded with the letters A (50) and B (50) and serially numbered from 1 to 100. Group A patients underwent onlay meshplasty and group B patients underwent sublay meshplasty.

After obtaining informed written consent and appropriate fitness patients were posted for surgery. Patients were admitted, taken for elective surgery with antibiotic cover of second generation cephalosporin given till 5th postoperative day. Drain removed after the drain output was less than 30 ml for two consecutive days.

Surgical site Infection, Flap necrosis and duration of hospital stay (in days) were considered as primary outcome variables. Study Group (On lay Meshplasty v/s Sub lay Meshplasty) was considered as explanatory variable.

All Quantitative variables were checked for normal distribution within each category of explanatory variable by using visual inspection of histograms and normality Q-Q plots. Shapiro- Wilk test was used to assess a normal distribution and a p value of >0.05 was considered as normal distribution. The association between categorical explanatory variables and quantitative outcome was assessed by comparing the mean values. The mean differences along with their 95% CI were presented. Independent Samples t-test was used to assess statistical significance for normally distributed variables and Mann Whitney U test was used for non-normally distributed variables. Data was also represented using simple bar chart, stacked bar chart and clustered bar charts. The association between study group and categorical outcomes was assessed by cross tabulation and comparison of percentages. Chi square test was used to test statistical significance. P value < 0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis.

RESULTS

A total of 100 participants were included in the final analysis with 50 participants in each of the group. Among the study population, there was 50 (50%) participants in onlay meshplasty group and 50 (50%) participants in sublay meshplasty group. Mean age was 44 ± 9 years in both the groups. Out of 50 participants in onlay meshplasty group, 26 (52%) participants were female and 24 (48%) participants were male. Out of 50 participants in sublay meshplasty group, 24 (48%) participants were female and 26 (52%) participants were male. The difference in proportion of gender between study group was not statistically significant (P Value>0.05).

Out of 50 participants in onlay meshplasty group, the surgical site infection was normal healing for 34 (68%) participants and normal healing with

mild bruising or erythema for 24 (48%) participants. Out of 50 participants in sublay meshplasty group the surgical site infection was normal healing for 49 (98%) participants and normal healing with mild bruising or erythema for 1 (2%) participants. The difference in proportion of surgical site infection between study groups was statistically significant (P Value <0.05). Out of 50 participants in onlay meshplasty group, 9 (18%) participants had flap necrosis and out of 50 participants in sublay meshplasty group, no participant had flap necrosis. Among the study population, the duration of hospital stay was 6 (5 to 13.25) days in onlay meshplasty

group and it was 3 (3 to 4) days in sublay meshplasty group. The difference in duration of hospital stay between the study group was statistically significant (P Value<0.05). Out of 50 participants in onlay meshplasty group, seroma was present for 18 (36%) participants and absent for 32 (64%) participants. Out of 50 participants in sublay meshplasty group, seroma was present for 2 (4%) participants and absent for 48 (96%) participants. The difference in proportion of seroma formation between study group was statistically significant (P Value<0.05).

Table 1: Comparison of outcome variables between the two groups.

Variable	On lay meshplasty	Sub lay meshplasty
SSI	32%	2%
Flap necrosis	18%	0%
Seroma formation	36%	4%

Table 2: Comparison of duration of hospital stay between the groups.

Parameter	Study group median (IQR)		P value
Duration of stay	Onlay meshplasty	Sublay meshplasty	<0.001
	6(5-13)	3(3-4)	

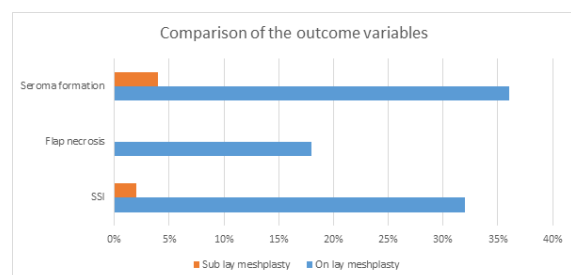


Figure 1: comparing outcome variables among the two groups (SSI, Flap necrosis and Seroma formation)

DISCUSSION

In the study there was equal representation from both sexes. Hernia occurrence was most common in the middle age group.

The incidence of seroma following the procedure was noted in 2 patients in those underwent sublay meshplasty which resolved with continuous compressive dressing. The incidence was 4% which was on par with the study done by Afifi.(17) Onlay technique had more of seroma formation (18 patients out of 50, 36%), due to the fact that onlay techniques require significant subcutaneous dissection to place the mesh, which can lead to devitalized tissue with seroma formation. Furat Shani found seroma 12% & 1% in onlay and sublay respectively, AlySaber et al found seroma 6% & 2% in onlay and sublay respectively and Kharde K et al in his study found seroma 16% & 12% in onlay and sublay respectively (13, 14, 15).

As the location of the mesh is deep to the muscular plane in sublay meshplasty, we expected a low incidence of surgical site infection, which in this study was 2%. No patient required mesh removal following SSI. This result was comparable to the

studies by Bessa et al. (18) Milad and his colleagues reported that the retro muscular plane is highly vascular and helps preventing infection, and if any infection occurs in the subcutaneous plane, it will not affect the mesh, as the mesh is retromuscular in a deeper plane. (12)

There was no case of flap necrosis found in the study in sublay meshplasty group when compared to that of the 18% in onlay meshplasty. No cases of mesh rejection or mesh infection were noted. This result was comparable to the study by M. Alobaidi et al. (23) In a meta-analysis comparing the sublay and onlay methods in the surgical treatment of incisional hernia, sublay method was stated to be more effective than the onlay method in terms of recurrence and wound infection. (22) In a systematic review and meta-analysis of four different graft placement techniques (onlay, inlay, sublay and underlay), the lowest rates of recurrence, wound infection and other wound complications were seen after the sublay method. (20)

The average duration of hospital stay following sublay meshplasty was 3 days which is an indirect indicator of morbidity which is comparable to series published by de Vries Reilingh et al. (16).

CONCLUSION

By the study results, it can be concluded that sublay meshplasty is a better alternative to onlay meshplasty in ventral hernias with defect in midline with less incidence of seroma as well as least incidence of flap necrosis and SSI. There is little incidence of any mesh infection. Complications with sublay mesh hernioplasty were lower than when compared to onlay such as with regards to wound infection, drainage time, and seroma formation. Hence sublay

meshplasty should be considered the preferred choice of midline ventral hernia repair.

Limitations of study: Short term follow UP, hence recurrence rate shouldn't be compared.

REFERENCES

- Hell DH, de la Torre J, Andrades P, Vasconez LO (2008) Open Repair of Ventral Incisional Hernias. *Surg Clin North Am* 88: 61-83..
- Rives J, Pire JC, Flement JP (1987) Major incisional hernia. *Surgery Springer-Verlag*: 116-44.
- Stumpf M, Conze J, Klinge U, Rosch R, Shumpelick V. Open mesh repair. *European Surgery* 35 (1) 21-24. 2003
- Israelsson LA, Smedberg S, Montgomery A, Nordin P, Spangen L (2006) Incisional hernia repair in Sweden 2002. *Hernia* 10: 258- 261. 7
- Robinson TN et al (2005) Major mesh-related complications following hernia repair: events reported to the Food and Drug Administration. *SurgEndosc* 19(12):1556–1560
- Losanoff JE, Richman BW, Jones JW (2002) Enterocolocutaneous fistula: a late consequence of polypropylene mesh abdominal wall repair: case report and review of the literature. *Hernia* 6(3):144– 147
- Miller K, Junger W (1997) Ileocutaneous fistula formation following laparoscopic polypropylene mesh hernia repair. *SurgEndosc* 11(7):772–773
- Cuccurullo D et al (2013) Laparoscopic ventral incisional hernia repair: evidence-based guidelines of the first Italian Consensus
- Conference. *Hernia* 17(5):557–566
- Silecchia G et al (2015) Laparoscopic ventral/incisional hernia repair: updated guidelines from the EAES and EHS endorsed consensus development conference. *SurgEndosc* 29:2463–2484
- Moher D et al (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *J Clin Epidemiol* 62(10):1006–1012
- Milad NM, Said SM, Samir M. Comparison between onlay and retromuscular drainless mesh repair for paraumbilical hernia with divarication of recti. *KasrElAini JSurg*. 2009;10:11-6
- Furat Shani Aoda, Alaa Sharif Ibrahim. Sublay versus onlay mesh repair of ventral hernia. *QMJ*. ISSN:18170153 VOLUME:9 ISSUE . 2013 pages 208~216.
- Aly Saber, A., and Emad K. Bayumi. Onlay versus Sublay Mesh Repair for Ventral Hernia. *Journal of Surgery. Special issue : Abdominal Surgery: Toward the Best*. Vol. 4, No. 1-1, 2015; pp. 1-4.
- Kharde K, Dogra BB, Panchabhai S, Rana KV, Sridharan S, Kalyan S. A comparative study of onlay and retrorectus mesh placement in incisional hernia repair. *Med J DY Patil Univ* 2013;6:258-62.
- de Vries Reilingh TS, van Geldere D, Langenhorst B, de Jong D, van der Wilt GJ, van Goor H, et al. Repair of large midline incisional hernias with polypropylene mesh: Comparison of three operative techniques. *Hernia* 2004;8:56-.
- Afifi RY (2005) A prospective study between two different techniques for the repair of a large recurrent ventral hernia: a double mesh intraperitoneal repair versus onlay mesh repair. *Hernia* 9(4):310–315
- Bessa SS, El-Gendi AM, Ghazal AH, Al-Fayoumi TA. 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 Feb;19(1):141-6. doi: 10.1007/s10029-013-1143-2. Epub 2013 Aug 10. PMID: 23934354.
- Weber G, Baracs J, Horvath OP (2010) [“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]. *Magy Seb* 63(5):302–311
- Holihan JL, Nguyen DH, Nguyen MT, Mo J, Kao LS, Liang MK. Mesh location in open ventral hernia repair: a systematic review and network meta-analysis. *World J Surg* 2016;40:89–99.
- Ibrahim R, Abounozha S, Alshehri T. Is the surgical site infection rate higher in sublay or onlay mesh repair of incisional hernia? *Ann Med Surg (Lond)* 2021;62:200–2. [CrossRef]
- 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. *Am J Surg* 2014;207:980–8.
- Mohammed Hussien Alobaidi, Nahedh R. Alammar. (2019). Comparative Study between the "sublay" versus "onlay" techniques of mesh hernioplasty in Ventral hernias. *Int. J. Adv. Res. Biol. Sci.* 6(4): 127-138