(International Print/Online Journal)

SJIF IMPACT FACTOR: 4.617
PUBMED-National Library of Medicine ID-101739732

ISSN (Print): 2209-2870
ISSN (Online): 2209-2862

International Journal of Medical Science and Current Research (IJMSCR)
Available online at: www.ijmscr.com
Volume2, Issue 6, Page No: 327-332
November-December2019

Open Onlay versus Preperitoneal Mesh Repair in Ventral Hernias: An Observational Study

Ashok Kumar Nayak[1] Debasis Naik [2], Saroj Kant Sahoo [3], Chandra Sekhar Behera [4*]
[1]Associate Prof, [2]Assistant Prof, [3] Prof, [4]Post-Graduate Junior Resident
Department of General Surgery, VSSIMSAR, Burla, Odisha, India
[3]Department of General Surgery, S.C.B MCH, Cuttack, Odisha, India

***Corresponding Author:**
Chandra Sekhar Behera
Address: Room no-203, sushruta hostel, VSSIMSAR, Burla, Odisha, India, PIN-768017

Type of Publication: Original Research Paper
Conflicts of Interest: Nil

ABSTRACT

Introduction:
Ventral hernia repair is one of the most widely performed surgical procedure with a variety of techniques available for surgeons ranging from anatomical repair to prosthetic mesh repair either open or laparoscopic approach.

Aim:
To compare the post-operative outcomes of open onlay and open preperitoneal mesh repair in ventral hernia.

Material and methods:
70 patients with ventral hernia, satisfying inclusion and exclusion criteria admitted to Department of Surgery, VSSIMSAR, Burla, Odisha, India, from November 2017 to October 2018, were divided into two groups: Group A, comprising 35 patients underwent preperitoneal mesh repair and Group B, comprising 35 patients underwent onlay mesh repair. Patients were followed of post-operatively for 1 year to compare the post-operative outcomes.

Results:
Mean operative time was 109.43 ± 15.5 minutes and 70.86±12.6 minutes in preperitoneal and onlay mesh repair group, respectively. Seroma formation, wound infection and chronic pain were found in 17.1%, 11.4% and 2% patients in preperitoneal repair group and 42.8%, 31.4% and 22.8% patients in onlay repair group, respectively, which was statistically significant. Recurrence was found in 2% and 17.1% patients in preperitoneal and onlay repair group, respectively during 1year of follow up.

Conclusion:
Though, open preperitoneal mesh repair is technically demanding and more time consuming but it is associated with fewer post-operative complications than that of open onlay mesh repair..

Keywords: open onlay mesh repair, open preperitoneal mesh repair, recurrence, seroma, ventral hernia

INTRODUCTION

More than 1 million ventral hernia surgeries are done annually in India. Primary repair with suture had dominated ventral and incisional hernia repair over a century. The most popular of these techniques was the Mayo duplication. In larger hernias, suture repair requires the application of tension to the fascia in order to close the orifice. Therefore, many suture repairs failed mechanically, and recurrence rates were

found to be as high a 54%. The advantages of mesh implantation have first been confirmed by an influential trial by Luijendijk *et al* [1].

The choice of type of open surgical repair is controversial; the technique of hernia repair is often based on tradition rather than evidence [2]. According to databases [3] and reviews there is good evidence that open mesh repair is superior to suture repair in terms of recurrences and insufficient evidence as to which type of mesh or which mesh position should be used.

The main goal of this study is to compare the outcome of mesh repair with preperitoneal and onlay meshplasty in case of small and large hernias.

The two operative techniques most frequently used in case of open ventral hernia repair are the onlay and sublay (retro-rectus and preperitoneal) repair. Till now, there is a debate going on regarding the superiority of these techniques

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Surgery, VSSIMSAR, Burla, Odisha during the period from November 2017 to October 2018. 70 patients with ventral hernia [including primary and midline incisional hernia] were included in study. These patients were divided into two groups with 35 patients each [group A, who underwent preperitoneal mesh repair and group B, who underwent onlay mesh repair]. These patients were followed up postoperatively for 1 year.

Inclusion criteria

All patients with more than 18 years of age presented with ventral hernia including primary and incisional hernias.

Exclusion criteria

- Divercation of recti
- Groin hernias
- Patient medically unfit for surgery
- Obstructed or strangulated hernia
- Hernia defect size less than 3 cm and more than 8 cm

Pre-operative management

Patients with ventral hernias were worked up with all routine investigations along with Chest X-ray, abdominal USG and ECG. Patients found fit for the Surgery were admitted in the hospital. Informed consent for open mesh hernioplasty was taken. Relevant part preparation was done and test dose of Ceftriaxone antibiotic and Lignocaine was given along with Inj. TT (0.5 ml) i.m. stat. The size of the hernial defect was assessed clinically; however the exact size of the defect was determined intra-operatively.

Pre-operatively the following parameters were assessed:

- Age
- Sex
- Weight
- Number of previous abdominal operations and hernia repairs.
- Laboratory parameters

Intra-operative management

Surgeries in both the groups were done under General Anaesthesia with the patient lying supine and hands tucked at the sides. Antibiotic Inj. Ceftriaxone (1g) was given prophylactically before the incision was made and often again if the operation continued for more than 2 hours. A nasogastric tube was placed for gastric decompression. Abdomen was cleaned, painted and draped.

Operative technique

A. Open preperitoneal mesh repair

The preperitoneal mesh repair included two main steps; mesh placement between the posterior rectus sheath and peritoneum and mesh extension well beyond the hernia defect. After the sac was being dissected and delineated, the sac was opened and content reduced. The preperitoneal space was created between the posterior rectus sheath and the peritoneum for the placement of the mesh. The peritoneum was closed with delayed absorbable sutures. A prolene mesh tailored to the size was placed in the already created plane [Figure-1]. The mesh was secured with few interrupted 2/0 polypropylene sutures. The rectus sheath was closed with continuous 1/0 polyglactin suture and the closed

Volume 2, Issue 6; November-December 2019; Page No.327-332

suction drain given in subcutaneous plane and the skin closed.

Figure 1: Preperitoneal mesh placement

B. Open onlay mesh repair

The onlay repair was done with the skin incision over the bulge or the defect. Subcutaneous flap was raised above the anterior rectus sheath and the sac along with its content was identified and dissected from subcutaneous tissue. The contents were reduced and the margins of the defect were held by Kocher forceps. The sac was dealt with and its contents were reduced into the abdominal cavity. With non-absorbable suture, the defect in the linea alba was closed and a prolene mesh of adequate size was placed on the rectus sheath and secured with stitches [Figure-2]. Haemostasis was achieved and wound was closed over a suction drain.

Figure 2: Onlay mesh placement

Intra-operative observation

Intra-operatively following parameters were documented

i. Defect size
ii. Duration of operation- from time of incision to closure of incision

Post-operative management

Post operatively patients were allowed to take sips of clear liquid after the recovery from general anaesthesia. Analgesia was given as per the patient demand. Intravenous antibiotic (1gm ceftriaxone) was given twice a day for the duration the patient stayed in the hospital. Patient were allowed to take normal diet postoperatively after bowel sounds appeared and were advised to carry on their normal routine work as per as their level of comfort. Drain output and pain score were recorded regularly. Drain removed when output was 10 ml or less. Incision site was checked for any infection and if found managed with dressing and antibiotic as per the sensitivity result. Number of days in hospital was considered as the number of nights patient spent in the hospital after surgery. Patient was discharged when regular bowel habit and ambulation was achieved. Recurrent seroma formation after drain removal was assessed with ultrasonography and for prevention of infection oral tablet cefixime was given for 5 days.

Regular follow up of the patient was done at the time period of 1week, 1 month, 3 months, 6 months and 1 year. In follow up period, pain, wound status and recurrence were assessed.

Post-operatively the following parameters were observed:

- Pain Score at 24 hours and 48 hours.
- Analgesic requirement.
- Ambulation
- Length of Hospital stay.
- Wound infection.
- Seroma formation.
- Recurrent seroma formation after drain removal
- Recurrence within 1 year.

Volume 2, Issue 6; November-December 2019; Page No.327-332

Statistical analysis

The inferences were drawn with the use of appropriate tests of significance.

RESULTS

Out of 70 patients, the mean age of patients in group A was 50.17 years and that in group B 51.06 years. Majority of patients were female (71.4%). Both groups were comparable with respect to body weight, number of previous surgeries undergone and laboratory parameters. There was significant difference in the duration of surgery with mean duration in group A being 109.43 min and that in group B being 70.86 min, $p<0.001$ [Table-1]. The mean Visual Analogue pain score of postoperative pain at 24 hours and 48 hours was significantly higher in group B [Table-2]. Duration of requirement of analgesia administration was significantly less in group A, with mean duration of analgesia use being 3.2 days in group A and 5.86 days in group B ($p<0.001$). The mean drain output at 1st , 3rd and 5th POD was significantly higher in group B and the mean POD of drain removal was 3.6 day in group A and that in group B was 6.1day, $p<0.001$ [Table-3]. Recurrent seroma formation after drain removal occurred in 6 patients (17.1%) in group A and in 15 patients (42.8%) in group B, $p=0.019$. Surgical site infection occurred in 4 patients (11.4%) in group A and in 11 patients (31.4%) in group B, $p=0.041$. Patients in group A were able to resume normal activity earlier in postoperative period with mean POD of ambulation in group A being 3.1 and that in group B being 5.26, $p<0.001$. The patients in group A were discharged earlier than group B, with mean duration of stay in group A being 5.3 days while in group B was 9.6 days, $p<0.001$.

During follow up period, 1 patient (2%) in group A and 8 patients (22.8%) in group B complained chronic, $p=0.013$. Recurrence was observed in 1 patient (2%) and 6 patients (17.1%) in group A and group B, respectively, $p=0.046$.

Group	Mean duration of surgery
A	109.43±7.75 min
B	70.86±6.28 min
p value	< 0.001

Table 1: Comparison of duration of surgery

POD	VAS score (mean± SD)		p value
	Group A	Group B	
1st	4.9±0.9	7.2±0.6	0.008
3rd	1.9±0.8	3.8±0.8	0.008

Table 2: Comparison of pain score

Group	Mean drainage volume in ml			Mean POD of drain removal
	1st POD	3rd POD	5th POD	
A	33.9±12.2	14.6±11.1	3.4±5.9	3.6±1.2
B	78.7±9.7	52.7±9.1	28.7±8.2	6.1±0.6
p value	<0.001			<0.001

Table 3: Comparison of amount drain collection and duration

DISCUSSION

Ventral hernia includes both primary and incisional hernia of anterior abdominal wall. Incisional hernia is a long term complication of 2 to 11% of all abdominal surgeries [4].

Usually, small hernias of size less than 2 cm diameter are successfully repaired by primary tissue repair method. But larger ones have a recurrence rate of up to 30-40% following primary tissue repair [5]. Recurrence increases morbidity of patients [6] and it is an embarrassment to the operating surgeon. Now recent trend is towards tension free repair with prosthetic mesh placement and this has decreased the incidence of recurrence and its associated morbidities. But mesh placement is associated with increased risk of infection and mesh removal and other mesh related complications [7] because of its foreign body reaction. Also mesh cost factor exists. However, it has reduced the duration of hospital stay.

In open repair of ventral hernia, the mesh can be placed as onlay, inlay, sublay (retro-rectus and preperitoneal). Most commonly used mesh placement methods are onlay and sublay [8]. In our study, attempt made to derive a conclusion regarding which open mesh repair technique is a better option.

In our study, majority of ventral hernia cases were of incisional hernia type (42.9%). Ventral hernias are more common in age group of 40 to 60 years. Also it was more common in female patients (71.4%),

Volume 2, Issue 6; November-December 2019; Page No.327-332

mostly because of multiparity and gynaecological operations.

Mean operative time taken for surgery was longer in preperitoneal mesh repair because of time taken for creating preperitoneal space(p<0.001), which is similar to the data from other studies [9][10]. Seroma formation was more in onlay repair (42.8%) than preperitoneal repair (17.1%), with p= 0.019, probably due to an extensive subcutaneous dissection required for creating adequate space for onlay mesh placement. Postoperative pain was also more in onlay mesh repair (p=0.003). In preperitoneal mesh repair, analgesic requirement was also less (p<0.001). Surgical site infection was found in 16 patients out of which, 4 patients (11.4%) of preperitoneal mesh repair group and 11 patients (31.4%) of onlay mesh repair group. The superficial location of mesh in onlay mesh repair also puts it at risk of mesh becoming infected, if there is any superficial wound infection. In our study, infection related mesh removal was not required in any patients and all patients were managed conservatively with intravenous antibiotics. Patients, who underwent preperitoneal mesh repair were able to start normal activity earlier than patients underwent onlay mesh repair (p<0.001). Duration of hospital stay is an indicator of degree of morbidity. Average hospital stay was less in preperitoneal repair group (p<0.001). The complication rates were in concordance with previous studies [Table-4].

Study	Seroma Formation		Surgical Site Infection	
	Onlay repair	Preperitoneal repair	Onlay repair	Preperitoneal repair
***Aly Saber et al*[11]**	6%	2%	8%	4%
***Rajsiddharth et al*[12]**	20%	10%	13.33%	6.66%
***Kharde et al*[13]**	16%	12%	4%	0
***Thangamani P et al*[14]**	24%	8%	24%	1%
Our study	42.8%	17.1%	31%	11%

Table 4: comparison of complication rates with previous studies

Recurrence was detected in 7 patients, 1 patients (2%) in preperitoneal mesh repair group and 6 patients (17.1%) in onlay mesh repair group, p=0.046, which is comparable to the results of other studies [Table-5].

Study	Recurrence	
	Preperitoneal repair	Onlay repair
Gleysteen JJ *et al*[15]	4%	20%
Aly Saber *et al*[11]	3%	8%
Our study	2%	17%

Table 5: Comparison of recurrence rates with previous studies

Long term studies are required to accurately describe the recurrence rate with these procedures, but retrospective review suggests a rate of 25% and 32% at 5 and 10 years [16][17].

Open preperitoneal mesh repair is considered superior to open onlay mesh repair as the mesh placed under the muscular plane with a significant overlap and it works according to Pascal's principle of hydrostatics. The intra-abdominal pressure on abdominal wall is distributed evenly on the mesh. The superficial muscular abdominal wall holds the mesh in intact position against the pressure. In case of onlay mesh placement, skin and subcutaneous tissue overlying mesh do not act as a rigid support against intra-abdominal pressure.

CONCLUSION

Preperitoneal mesh repair was associated with less postoperative complications like seroma formation, surgical site infection and recurrence and also there was less postoperative pain. Also recurrence rates are found to be more in onlay repair.

Although, operative time is significantly less in onlay repair, a higher complication rate limits its usage. Ease of performing the procedure in onlay repair gives it the edge over preperitoneal repair, if the surgeon is lacking the experience of creating pre-peritoneal space.

Volume 2, Issue 6; November-December 2019; Page No.327-332

It may be concluded that preperitoneal mesh repair is superior to onlay mesh repair in management of ventral hernia.

Limitations of this study

The present study was not a randomized study which would have given more reliable results and duration of follow up was short, so exact recurrence rate could not be estimated from our study as 80% of recurrence appears within 2 years.

REFERENCES

1. Luijendijk RW, Hop WC, van den Tol MP, de Lange DC, Braaksma MM, *et al*. A comparison of suture repair with mesh repair for incisional hernia. N Engl J Med. 2000; 343: 392-398.
2. Shell DH, de la Torre J, Andrades P, Vasconez LO. Open Repair of Ventral Incisional Hernias. Surg Clin North Am. 2008; 88:61-83.
3. Baracs J, Sajjadi GS, Kelemen D, Horvath OP, Vereczkei A, *et al*. Open Treatment of Abdominal Wall Hernias: Mesh Repair is Superior to Suture Repair and Onlay Mesh is Better than Sublay Mesh – Five-Year Multicentric, Prospective, Randomised Clinical Trial. Surgery Curr Res. 2016; 6: 270.
4. Santora TA, Rosalyn JJ. Incisional hernia. Surg Clin North Am. 1993; 73: 557.
5. Luijendijk RW, Hop WC, van den Tol MP, *et al.* A comparison of suture repair with mesh repair for incisional hernia. N Engl J Med. 2000; 343: 292.
6. M. Mudge, L.E. Hughes. Incisional hernia: a 10-year prospective study of incidence and attitudes. Br J Surg.1985; 72: 70-71.
7. Robinson TN, Clarke JH, Schoen J, Walsh MD. Major mesh-related complications following hernia repair: events reported to the Food and Drug Administration. Surg Endo SC. 2005; 19(12): 1556-1560.
8. D. den Hartog, A.H. Dur, W.E. Tuinerbreijer, R.W. Kreis. Open surgical procedures for incisional hernias. Cochrane Database Syst. Rev. 16(2008) CD 006438.
9. Elsesy A, Balba MA, Badr M, Latif MA. Retromuscular preperitoneal versus traditional onlay mesh repair in treatment of incisional hernias. Menoufiya Med J. 2008; 21: 209-20.
10. L.A. Israelsson, S. Smedberg, A. Montgomery, P. Nordin, L. Spargen. Incisional hernia repair in Sweden 2002. Hernia. 2006; 10: 258-261.
11. Aly Saber, Emad K. Bayumi. Onlay versus Sublay mesh repair for ventral hernia. Journal of Surgery. 2015; 4(1-1): 1-4.
12. Rajsiddharth B, Venkanna M, Kumar GA, Patlolla SR, Sriramoju S, Reddy BS. Comparative study of onlay and pre-peritoneal mesh repair in the management of ventral hernias. Int J Sci Stud. 2015; 3(7): 121-128.
13. 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.
14. Thangamani P, J. Kiran K, Vijayanand M. A comparative study between onlay and pre-peritoneal mesh repair in management of ventral hernias. IOSR-JDMS. 2016; 15(12): 63-67.
15. Gleysteen JJ. Mesh-reinforced ventral hernia repair: Preference for 2 techniques. Arch Surg. 2009; 144(8): 740-745.
16. Flum DR, Horvath K, Koepsell T. Have outcomes on incisional hernia repair improved with time? A population-based analysis. Ann Surg. 2003; 237: 129-35.
17. Kőckereling F, Koch A, Lorenz R, Schug-Pass C, Stechemesser B, Reinpold W. How long do we need to follow-up our hernia patients to find the real recurrence rate? Front. Surg. 2015; 2: 24.

Volume 2, Issue 6; November-December 2019; Page No.327-332