Research Paper

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A study on comparison of retromuscular prefascial placement of mesh versus other methods of mesh placement in repair of ventral hernias

Medical Science

KEYWORDS : Ventral hernias-retromuscular, inlay, onlay & underlay meshplasty

Dr. Jaypal sinh Ashoksinh Gohil	4th year resident(M.S.surgery) sairam recidency, b/h Nutan rawhouse, New pal road, surat-395009. Corresponding author
Dr. Divyesh Jayesh kumar Pathak	4thyear resident(M.S.surgery) sairam recidency, b/h Nutan rawhouse, New pal road, surat-395009.
Dr. Jenish Yogesh kumar Sheth	Assistant professor(M.S.surgery) sairam recidency, b/h Nutan rawhouse, New pal road, surat-395009.

ABSTRACT

Ventral hernias repair are most routinely performed procedure in daily life of general surgeons. The objective of the present study is to compare the outcome of retromuscular repair over other methods of ventral hernia repair. 90 diagnosed cases of ventral hernias were randomly split into two groups A (retromuscular meshplasty) and B(onlay, inlay & underlay meshplasty). The comparison across groups were carried out in terms of operation length, postoperative pain, wound complications, length of hospital stay & recurrence. No difference was found between the groups regarding age, gender, type and classification of hernia. Operation length was 110min in retromuscular repair and 90min in onlay and 114min underlay method. Statistically difference was seen between these groups. Among complications recurrence, seroma, mesh infection and wound complications were seen in group B. Postoperative pain and well being score were better in retromuscular group. Retromuscular meshplasty have more advantage compare to other open methods in ventral hernia repair. Retromuscular meshplasty is still most appropriate method in open ventral hernia repair

Introduction:

"No disease of the human body belonging to the province of the surgeon requires in its treatment a better combination of accurate anatomical knowledge with surgical skill than hernia in all its varieties" -sir Astely copper (1804)

Abdominal wall hernias are a familiar surgical problem. Millions of patients are affected each year. Whether symptomatic or asymptomatic, hernias commonly cause pain or are asthenically distressing to patients. These concerns, coupled with the risk of incarceration, are the most common reason patient seek surgical repair of hernias. More than 2 million laparotomy are performed annually with a reported 2 to 11 % incidence of incisional hernia. It is most common complication after laparotomy by 2:1 ratio over bowel obstruction. Such hernias can occurs after any type of abdominal wall incision although the highest incidence is seen with midline incision, the most common incision for many abdominal procedure[1-5]

The presence of ventral hernias is itself an indication for repair. The field of hernia repair has evolved as a result of surgical innovation and has benefited significantly from technologic improvement. The tension free repair is the key concept that have revolutionized hernia surgery. The use of mesh prosthesis to approximate the fascial defect has resulted in a decrease in recurrence rates for inguinal and ventral hernias. More recently, Laparoscopic approaches to the inguinal and ventral hernias have extended the option and approaches for repairing the fascial defect. Modified stoppa repair includes placement of mesh in retrorectus position with excellent outcome in ventral hernia repair[6]

In the present study we aimed to compare the benefits of retrorectus meshplasty over other methods.

Aims & Objectives:

- Presentation of ventral hernia
- Preoperative preparation
- Intraoperative findings, type of mesh used, type of repair, drain requirement
- Postoperative complications

Material and methodology:

Following approval of the institutional ethical committee, This Retrospective-prospective randomized single blinded comparative study was conducted in the Department of Surgery at SMIMER hospital, Surat for a duration of 3.5 years ranging from july2011 till December'2014 including follow up. A total of 90 patients of Ventral hernias were included in the study. From these, 45 patients were randomly included in group A and another in group B by using random number table method. Group A: includes all patients operated by retrorectus mesh plasty through midline vertical incision. Group B includes 45 patients operated by inlay, onlay, and underlay meshplasty.

*Inclusion criteria:*All patients above 18 years ob both sexes with diagnosed ventral hernia

Exclusion criteria: Emmergency condition like obstruction, incarceration, multiple lateral hernia, intraoperative complication like bowel injury

Preoperatively symptoms of patient and mode of presentation recorded. past history of any surgery, type of suture used for closure of abdomen if available recorded and previous any bad event such as wound infection, wound dehiscence, also recorded. Duration of atleast one year kept from the development of incisional hernia to the repair . all patient's hemogram, Liver function test, renal function test & Ultrasonography was done .

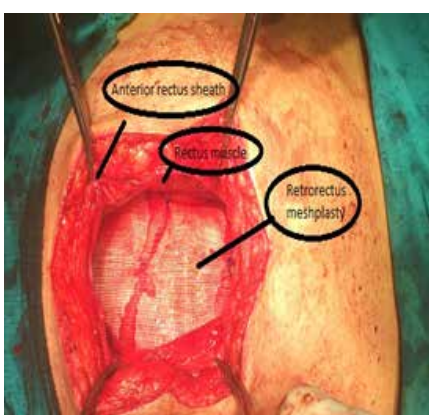
Group A: In all cases midline vertical incision was made, as it is suitable for making retromuscular space. Hernial sac identified and dissected free from margins. Excision/reduction of the hernia sac was done. Closure of the peritoneum and posterior rectus sheath with running suture using vicryle no.1 suture material. Placement of polypropylene mesh in retromuscular position in appropriate size. Polypropylene mesh fitted in order to exceed the edge of the defect atleast 2cm in all directions. The mesh was fixed to posterior sheath vith Prolene no 2-0. at angles and center part. Closure of anterior rectus sheath with running suture with prolene no- 1. Negative suction drainage placed if large amount of dissection was done not in all cases.

Group B : patients operated by onlay 10(22.2%), inlay, underlay 35(77.8%) meshplasty. In onlay repair mesh kept above defect, in inlay repair mesh kept within defect and in underlay repair mesh kept preperitoneal space. mesh was fixed using Prolene 2-0 suture.

Post operatively all patients were monitored for vitals, bowel sounds, drain output. Postoperative period time required for ambulation(in no. of days),postoperative pain according to Visual Analogue scale which ranges from 1 to 10 recorded from 1st postoperative day. Postoperative well being score was compared with WHO approved well being score from postoperative day 1 to 7.Postoperative complications such as , seroma/hematoma formation, Sinus /fistula formation, Flap necrosis recorded and treatment taken for it also noted and compared with "Chi Square Test" of significance between case and control group. If drain was used then duration of drain kept and days on which drain removed was also recorded.

Patient were discharged from the hospital once drain is removed and if there was no serious infection or bleeding. Duration of hospital stay after surgery in no. of days ranged between 7th to 14th postoperative day, were compared using " Leveny's T test "of significance between case and control group. recurrence (in months after surgery) also recorded and compared. Patient were kept on follow up to one year on telephone calls and personal interview and status of wound, any discomfort and recurrence were recorded.

Retromuscular meshplasty



Underlay meshplasty

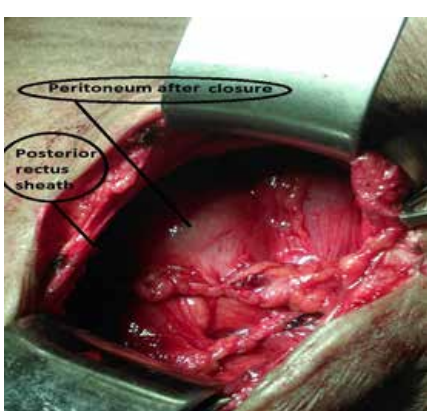


figure: Retromuscular space with mesh and preperitoneal (underlay) space

Results and observation::

In this study of 90 patients, Umbilical hernia and Incisional hernia mostly found in age group of 41 -50 years. Epigastric and Paraumbilical hernia found in 21 -40 years of age group. The majority of cases were of Incisional hernia 22 (48.9%) followed by Umbilical hernia 18(40%) in Group A and Umbilical hernia 19(42.2%) followed by Incisional hernia 17(37.8%) in group B. P-value 0.3(>0.05). Majority of patient in each group were female patient in group A(23 patient) and group B(25 patient).P -value o.3(> 0.05). There was no significant difference in distribution according to age and sex. The most common symptoms was abdominal swelling both in group A 40 patient(88.9%) and group B 39 patient(86.7%). Wound infection was most commonly associated wound complication in previous surgery in incisional hernia patient in group A 5 patient(11.1%) and group B 14 patient(20%). P- value <0.05 suggest significant association of previous wound infection with development of incisional hernia later.

Table 1 Duration of surgery

DURATION OF SURGERY (MIN.)	Group		Total
	A	B	
60	0	1	1
	-	2.2%	1.1%
75	0	1	1
	-	2.2%	1.1%
90	26	8	34
	57.8%	17.8%	37.8%
110	10	4	14
	22.2%	8.9%	15.6%
120	7	28	35
	15.6%	62.2%	38.9%
150	2	1	3
	4.4%	2.2%	3.3%
180	0	2	2
	-	4.4%	2.2%
Total	45	45	90
	100%	100%	100%

P-value-<0.0001

Patient operated by retromuscular meshplasty have duration of surgery less (M-110min) compare to underlay meshplasty (M-114 min) but higher compared to onlay (M-90 min.) meshplasty method.

P-value -<0.0001(M-mean).

Table 2 complication of Seroma/Aspiration

SEROMA/ASPIRATION	Groups		Total
	A	B	
NO	45	37	82
	100%	82.20%	91.10%
YES	0	8	8
	-	17.80%	8.90%
Total	45	45	90
	100%	100%	100%

P value-0.006 (<0.05)

Drain was used in all patients in group B while 23 patients in group A Patient operated by retromuscular meshplasty had low requirement to keep negative suction drain compared to group B patient (P- value-<0.0001).Maximum number of cases of seroma formation were seen in group B compared to group A. Hematoma formation was seen in group B 6 patient(13.30%). In group A there was no reported case of hematoma. P value- 0.026 <0.05 which is significant. Mesh infection was seen in group B-1 patient, in underlay mesh repair. There was no reported case of mesh infection in patient operated by retromuscular meshplasty and onlay meshplasty. Wound infection was seen in group B, Among these 2 patients were operated by onlay meshplasty and 1 patient was operated by underlay meshplasty. P-

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value-0.2(>0.05).

Table 3 Comparison of post operative pain (Mean value of VAS scale)

VAS scale	Group	Total	Mean	Std. deviation	P-value
Post op pain1	A	45	3.13	.919	P< .0001
	B	45	5.18	1.336	
Post op pain2	A	45	1.96	.737	P<0.0001
	B	45	3.89	.959	
post op pain3	A	45	.80	.625	P<0.0001
	B	45	2.87	.757	
post op pain4	A	45	.09	.288	P<0.0001
	B	45	1.89	.682	

Table 4 Mean value of well being score

	Group	N	Mean	Std. Deviation	P- value
well being score1	A	45	9.5778	2.98853	.000
	B	45	6.5556	3.49386	
Well being score2	A	45	12.4444	3.05670	.000
	B	45	9.0222	3.44759	.000
well being score3	A	45	15.3111	2.67838	.000
	B	45	11.6444	3.69370	.000
well being score4	A	45	20.4222	1.25207	.000
	B	45	15.0667	3.44700	.000
well being score5	A	45	21.4889	.50553	
	B	45	19.3556	3.78487	.001

VAS value revealed Retromuscular meshplasty was significantly less painful compared to onlay and underlay meshplasty. P value < 0.0001. After 5 days there was no significant difference between two groups.

Well being score was in lower range in group A compared to group B from first to fifth post operative day, P- value <0.0001 suggest significant difference and patient operated by retromuscular meshplasty having rapid recovery. After 6th post operative day well being score was within equal range in both groups. There was no recurrence in group A and in group B there was 2 recurrence 1 in patient operated by onlay meshplasty and 1 in patient operated by underlay meshplasty P-value-0.24(>0.05)

Discussion:

Ventral hernia operations are still one of the most commonly encountered procedures in the lifetime of a general surgeon**.** In ventral hernia surgery , the best indicator of the success of the operation is the recurrence which totally based on objective criteria. In this study of 90 cases, patient were followed upto 1 year .recurrence categorised in early(<1 year) and late period. Tension in the reinforced line is held responsible for the early recurrence, disruption in the collagen metabolism are held accountable for late recurrences. The use of synthetic non absorbable sutures for abdominal wall closure provide significant tensile strength and delays development of swelling from date of surgery. In most circumstances this strength is sufficient to hold the fascia together, but with delayed healing due to infection or raised intra-abdominal pressure due to postoperative chest infection or abdominal distension the strength of the wound may be insufficient, leading to the formation of an incisional hernia[12]. This is comparable with Obey et al[13], where 20-30% wounds were infected. Approximately 35% to 40% of incisional hernias occur with a documented history of wound infection. Another study reported incidence of wound infection varying from 5 to 20%.[11] In this study total 14 (15.6%) patient had history of wound infection during previous surgery. As per Toms P.A. et al[14], incisional hernias are more common following midline incision through relatively avascular linea alba.

Previous wound complication Blomstedt and Bauer 1972[9] et al demonstrate that Post operative wound infection was associated with a fivefold increase in the risk of development o hernia(23%) compared with patients with uninfected wounds

Duration of surgery: The length of operation should be kept to minimum which is important in respect to hernia surgery. The patients who are middle aged to elderly, spend less time on operating table, which reduces the risk of associated complication. The mean time to perform retromuscular meshplasty in this study group A was 110 minutes and group B was 146 minutes with P value <0.0001, suggestive of significant difference in mean duration of surgery between group A and Group B. The difference of time can be accounted due to more dissection needed for creating preperitoneal space . Onlay meshplasty has mean duration of surgery of 90 minutes, because it require less tissue dissection This is further affected by large hernias and multiple adhesion where it takes more time for tissue separation. Patient operated by underlay meshplasty having mean operative time 120 minutes. 3 patients in group B operated by underlay meshplasty having duration of surgery up to 150 minutes.

These results are comparable with other studies Polemon et al[17] and FS Aoda[16], both studies showed mean duration of surgery for onlay meshplasty was 63 minutes.

In retromuscular meshplasty it takes time for dissection of hernial sac and identification of defect margins. Once defect margins are identified it is easier to separate posterior rectus sheath from anterior rectus sheath & rectus muscle and making retromuscular space. This is also supported by V. Opera et al[20] where mean duration of surgery was 110minutes.

Wound complications: In this study 8 patient had seroma (8.9 %) and 6 patient had hematoma (6.7%) , 3 patient(3%) had wound infection and 1 patient had mesh infection. Group A had no incidence of post hernia repair wound infection seroma or hematoma formation, but in group B 3 patients had wound infection. Among this 1 patient had intra-abdominal abscess and wound infection operated by underlay meshplasty. 2 cases had wound infection operated by onlay meshplasty. P-value was >0.05 which is not significant indicates wound infection can occurs in both groups if proper aseptic precautions were not taken. Complications like seroma formation, hematoma, wound infection attributed largely to extensive dissection and tissue handling during hernia repair. Patients operated by onlay meshplasty had higher incidence of wound infection because it requires extensive tissue dissection. This is comparable with study of Luijendijk et al.[8] having seromas formation in 4 cases. wound infection was seen in 3 patient in Luijendijk et al. and 3 patients in Korenkov M[10].

Post operative pain & Well being score

In this study, pain was scored according to visual analogue scale[15] from post operative day 1 to 7. According to Whitney T test, P value was < 0.05 from post operative day 1 to 4. This indicates patients operated by retromuscular meshplasty having less post operative pain level compared to group B. Less post operative pain may be due to less tissue dissection and proper tissue handling

In this study, well being score was measured according to WHO APPROVED WELL BEING SCORE BY ASSOCIATION OF PSY-

CHIATRIST,[18] from post operative 1 to 7 days, ranging from 0-25. According to t test, p value was < 0.05 from post operative day 1 to 5, which indicates that patient operated by retromuscular meshplasty had higher mean well being score compared to patient operated by onlay / underlay meshplasty. Well being score was good in group A because of less post operative pain and no drain requirement and if drain kept than early removal, compared to group B.

Use of mesh:When choosing a mesh the surgeon must consider the context in which it is to be used. In most situations, one should look for a light weight mesh, with large pores and minimal surface area. Ideally it should consist of a monofilament. Klinge et al.[19] found that light weighted polypropylene mesh exhibit better tissue integration. Heavy weighted mesh induces greater tissue inflammatory response, scar formation, wound contracture and greater pain. Polypropylene mesh is ideal for mesh plasty. In this study polypropylene mesh was used in all cases.

Drain and its removal :In this study, in group B, all cases required negative suction drainage because of more tissue dissection. In group A, not all but some cases required negative suction drain, because mesh kept in retromuscular space, where muscles having good absorptive surface. Mean duration of drain removal was 2-3 days in group A while 4-5 days in group B.

F S Aoda et al.[16] recorded negative suction drain kept in all cases. Duration of removal of drain was 2nd to 5th postoperative day in patient operated by onlay meshplasty, and was 3rd to 5th postoperative day in patients operated by underlay meshplasty.

Duration of hospital stay: Mean Duration of hospital stay in this study was 5.22(SD 0.6) for group A and 7.42 (0.9)for group B with P-value <0.0001, which is significant. It indicates there was a significant difference in mean hospital stay of both groups. Patient operated by retromuscular meshplasty had shorter postoperative hospital stay compared to patient operated by onlay / underlay meshplasty, because longer duration of drain requirement. This is also supported by FS Aoda et al[16] where average duration of hospital stay was 8 days for patients operated by onlay meshplasty, and 7 days for patients operated by underlay meshplasty.

Conclusion:

- Meshplasty is the treatment of choice for ventral hernia repair. Polypropylene mesh was used in all cases.
- Post operative wound infection is the important cause for development of incisional hernias..
- Results of the study showed that implantation of polypropylene mesh using the retromuscular technique is safe and effective in the treatment of ventral abdominal hernias.
- This technique allows patients to recover fast with low level of postoperative pain, less post operative complications and low recurrance rate, Compared to onlay / underlay meshplasty..
- Mean duration of surgery 110minutes is less in retrorectus meshplasty compared to onlay/ underlay meshplasty.
- Duration of hospital stay also less (5days) in patient operrated by retrorectus meshplasty compared to onlay / underlay meshplasty because of no drain requirement or if required early drain removal (2-3 days), compared to onlay / underlay meshlasty(4-5 days).
- Patient operated by retrorectus meshplasty having less postoperative pain because of less tissue dissection and tissue handling which is more in underlay meshplasty.
- Patient operated by retrorectus meshplasty having better well being score compared to patients operated by onlay / underlay meshplasty

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