

A Comparative Study of Tissue versus Mesh Repair for Abdominal Incisional Hernia - Jammu Kashmir Experience

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Abstract: Aims: To evaluate and compare the efficacy of Tissue versus Mesh repair in mid-line abdominal incisional hernia in Jammu and Kashmir population. Methods: This study was conducted in the Departments of Surgery, Government Medical College Srinagar and Jammu from January 2003 to September 2012. It was a prospective study whereby a total of 50 patients with abdominal incisional hernia were taken. Out of 50 patients, 25 patients were taken for Mesh (polypropylene) repair and 25 for Tissue (shoelace technique) repair from January 2003 to September 2005. The patients were followed every 2,4,6, 12 weeks and thereafter every 6 months for any discharge, sinus formation, recurrence etc. Results: The median follow-up was 90 months for tissue repair group and 94 months in mesh repair group. The total operating time was more in tissue repair group. Post-operative pain using VAS was more in mesh repair group. Wound hematomas were almost same in both the groups whereas wound seroma and wound infection was more in mesh repair group. Recurrence rate was high in tissue repair group after a prolonged follow up. Conclusion: The comparative analysis revealed that as the rate of recurrence was more in tissue repair group, the mesh repair was superior to it. It also revealed that mesh repair should not be undertaken in emergency incisional hernia surgery as the chances of mesh infection are high and as such the recurrence.

Keywords: Polypropylene Mesh, Tissue Repair, Prolene Sutures, Polyamide Sutures.

1. Introduction

Incisional hernia is a very common problem encountered by the surgeons. The incisional hernia rate is between 2-11% with 80-95% developing within first 6 months to 3 years after primary surgery. Recurrence rate after incisional hernia repair is reported to range from 10-50% with concurrent morbidity and mortality.(1)

It results from failure of the lines of closure of the abdominal wall following laparotomy. It represents a breakdown or loss of continuity of a facial closure.(2)

Incisional hernia are seen post laparotomy, post-cholecystectomy, post LSCS, post hysterectomy, post appendectomy. Hernias are also reported in the incision for the ports used to access the abdominal cavity following laparoscopic surgeries.(2). They are also reported from Iliac Crest graft sites(3).

The two important local factors for development of incisional hernia are:-

- Poor Surgical Technique
- Post-operative wound sepsis.

Poor Surgical Technique includes

- Non-anatomic incisions,
- Multilayered closures,
- Inappropriate suture material
- Inappropriate suturing technique and
- Tension in the wound

General condition of the patient is an important factor in the development of incisional hernia which includes

- Age,
- Obesity,

- Malnutrition,
- Hypoalbuminia,
- Avitaminosis especially Vit. C,
- Malignant disease,
- Liver or Renal failure,
- Diabetes,
- Prolonged steroid therapy,
- Alcoholism,
- Oral anti-coagulation.

Post-operative complications like paralytic ileus, intestinal obstruction and abdominal distention can lead to development of incisional hernia. Other diseases like COPD, bronchopneumonia, emphysema and asthma also contributes to development of incisional hernia(2).

There is altered synthesis of Type 1 and Type 3 collagen suggesting a disturbance of collagen metabolism in patients of incisional hernia (4).

Types of incisional hernia:

- Type 1:-** This includes incisional hernias with wide defect in the aponeurosis or muscle layer of the abdominal wall. The hernia reduces spontaneously as the patient lies down and there is very low risk of developing strangulation.
- Type 2:-** The defect is relatively small and vague. The hernia is partially or wholly irreducible because of adhesions and the chance of strangulation are very high and so warrant an early surgical repair.

Surgery in incisional hernia is usually required for pain, discomfort or in strangulated hernias. Some patients having a large and unsightly hernia request repair for aesthetic reasons.

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The management of incisional hernia has evolved through many methods and techniques. Five basic methods are consistent for all repairs of incisional hernias:-

- 1) **Resuture:-** A small defect in which the musculoaponeurotic edge come together without tension is suitable for closure by re-suturing.
- 2) **Tissue Repair:-** hernia with a wider defect or large hernias can be repaired by this technique. It is the extra-peritoneal method, whereby the hernial sac and its contents are returned to the abdominal cavity and lateral cut edges of the muscular sheath or aponeurosis are brought together and sutured.
- 3) **Synthetic Non-Absorbable Mesh Repair:** in this method, sheets of synthetic nonabsorbable mesh like Polypropylene, Polyester, Polytetrafluoroethylene (PTFE), etc. are placed across the defect and sutured to the abdominal wall.
- 4) **Regional Flaps:-** regional flaps based on the thigh pedicle can be used to cover defects, particularly lower abdominal hernias.
- 5) **Laparoscopic Mesh Repair:-** the introduction of laparoscopy in the management of incisional hernia has added a new dimension in the management of incisional hernias.

Surgeons have debated the timings of the repair, type of repair, type of prosthetic material used and approach to repair but no consensus on the best technique has been forthcoming on the common difficult problem encountered and created by surgeons.

So, considering our economic constraints in this part of the developing world, we conducted this study to compare the efficacy of Tissue Repair with Mesh Repair in the management of midline abdominal incisional hernias.

2. Materials

This prospective study was conducted in the Departments of General Surgery, Government Medical Colleges, Srinagar and Jammu, from January 2003 to September 2012. Fifty patients with midline abdominal incisional hernia were taken for this study. Patients with recurrence were excluded from the study. Twenty five were taken for Tissue repair and twenty five for Mesh repair.

The patients were initially evaluated in the OPD. A detailed **history** was asked from the patient including present complaints and its duration, past history especially with reference to previous operation like indication, incision, post-operative period and any other surgery. Any associated chronic ailment like diabetes, any steroid intake, immunosuppression therapy, oral anti-coagulation intake, vascular insufficiency etc.

Examination included GPE, followed by systemic examination. BMI was also calculated. Local examination included shape of the abdomen, site of incision, site of swelling, cough impulse, visible peristalsis, temperature, tenderness, guarding, contents, reducibility, and size of the ring followed by Digital Rectal Examination and Proctoscopy.

Investigations included complete Haemogram, Coagulogram, Urine Examination, RFT's, LFT's Lipid Profile, ECG, CXR, Abdominal X-ray, USG- abdomen and Pelvis.

Any condition that might later on interfere with the recovery of the patients was treated or controlled. Obese patients were encouraged to reduce weight; smokers were advised to abstain from smoking. Patients with conditions like Diabetes Mellitus, Hypertension, Hypothyroidism, etc. were stabilized. Surgery was performed at least one year from the appearance of hernia in the elective cases. Those that presented as surgical emergencies were operated on the same day after proper preparation.

3. Procedure

All patients were operated under general anesthesia using endotracheal intubation.

All patients were catheterized.

The two methods employed for repair were;

1) Tissue repair (Shoelace Technique):-

An elliptical incision was made around the previous incision and scar tissue was excised. The anterior rectus sheath was exposed sufficiently. The new linea alba was constructed as follows;

- An incision was made in each anterior rectus sheath about one cm from its medial edge, extending up and down the entire length of the hernial opening.
- The two strips were sewn together from above downwards by continuous over and over suture of mono-filament polyamide. This not only created the new linea alba but also returned the unopened sac and its contents to the abdominal cavity.
- The second suture of mono-filament polyamide begun at the top end of incision in the rectus sheath and was passed out on that side and returning through the opposite corner and slipping through the loop. In this way the recti muscle were restored to their normal thickness and position by the continuous heavy mono-filaments polyamide sutures passing to and fro in front of rectus abdominis muscle, between the cut edges of the anterior rectus sheath and through the strong new midline anchor for the whole length of the hernia, in a manner of a shoelace tightening a boot.
- Vacuum drains were put on either side and brought out through separate stab. The incision was closed and dressing applied.

2) Polypropylene Mesh repair:-

- An elliptical incision was made around the previous incision and scar tissue was excised.
- Sheath completely separated from the underlying peritoneum. Peritoneum, if opened, was sutured with catgut.
- Rectangular piece of prolene mesh cut according to size of the defect and was secured with non absorb-able mono-filament suture prolene or polymide 'over' or 'under' the sheath.

- Vacuum drains were put on either side and brought out through separate stab. The incision was closed and dressing applied.

In case of emergency surgery presenting as obstructed incisional hernia, the peritoneum was opened and after careful lysis of the adhesions, contents of the sac were reduced and abdominal exploration was done as practicable followed by repair of hernia.

The extent of dissection and time taken for surgery was noted.

Post-Operative Management

- After the operation, patients were shifted to Post-operative ward and monitored. Patients were put on i .v fluids, antibiotics and analgesics. In the immediate post-operative period, pain was noted using VAS and analgesics were given accordingly. Condition of the wound was inspected daily for wound haematoma, seroma and infection and was managed accordingly. Patients were made ambulatory on 1st post-operative day. Orals were started on 2nd to 3rd post-operative day.
- Catheter was removed on 1st post-operative day. Drains were removed 48-72 hrs after the procedure. Stitches were removed on 7th- 10th day post-operatively. The total post-operative hospital stay and cost of therapy were recorded.

Follow-Up

Patients were directed to attend surgical out-patient department (OPD) regularly. The patients were asked to refrain from lifting weights or performing stressful work. The results were then analyzed by screening the patients for any late post-operative complications or any recurrence. Finally the data obtained was interpreted and analyzed for:

- Wound condition
- Recurrence
- Return to work
- Patient satisfaction
- Any other complication.

Patients who didn't return for regular follow- ups were contacted on their Cell Phones and even home visits were made in some cases who didn't turn up to look for the recurrence and other complications.

4. Observations and Results

All the patients enrolled in this study had primary incisional hernia.

Patients with recurrent hernia were not taken for this study.

All of them were having midline incisional hernias.

There were no significant differences between patients in the tissue repair and the mesh repair groups.

Twenty five patients were assigned to tissue repair group and twenty five to mesh repair. Out of four patients presenting as strangulated incisional hernia, two underwent tissue repair and the other two mesh repair.

There was a female preponderance of cases of incisional hernia in our study with male to female ratio of 1: 2.66.

Most patients in our study had undergone Gynae-obstretic surgeries with LSCS accounting for 19(38%) of the cases followed by exploratory laparotomy for peritonitis with 16(32%).

Out of the 50 patients, 39 (78%) patients develop incisional hernia within first year of the previous surgery with 34% developing it in first six months.

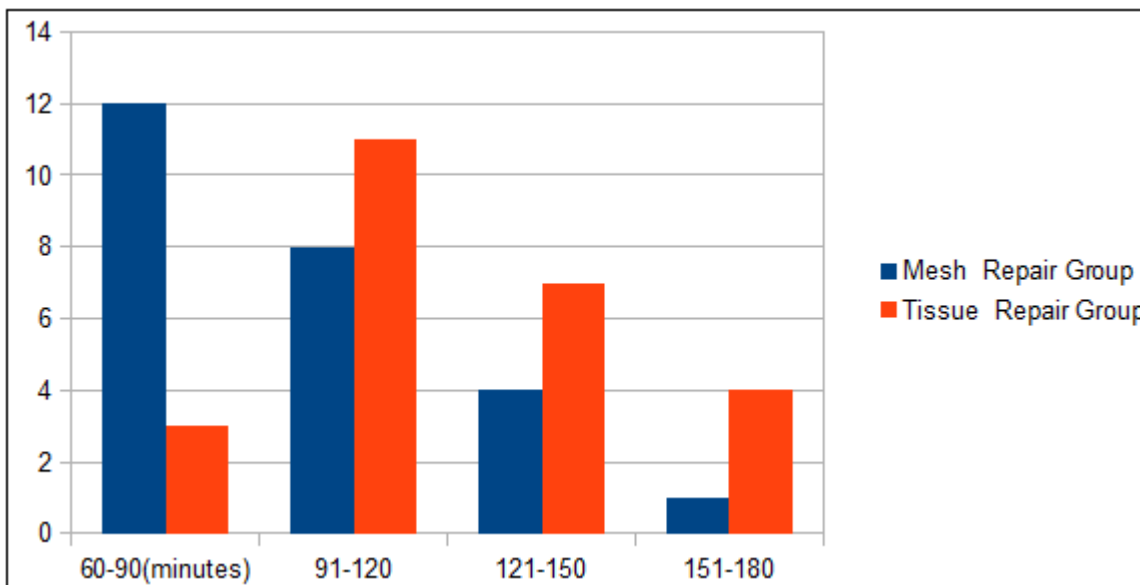
Post-operative wound infection was the predominant risk factor present in 27(54%) cases that developed incisional hernia followed by RTI in 7(14%) patients and abdominal distention in 5(10%) whereas there was no post-operative complication in 9 (18%) cases.

29(58%) of the patients were obese in our study whereas 28(56%) were anemic.

Distribution of Cases according to Duration of Operation

Duration (In Minutes)	Tissue Repair Group	Mesh Repair Group
60-90	3	12
91-120	11	8
121-150	7	4
151-180	4	1
TOTAL	25	25

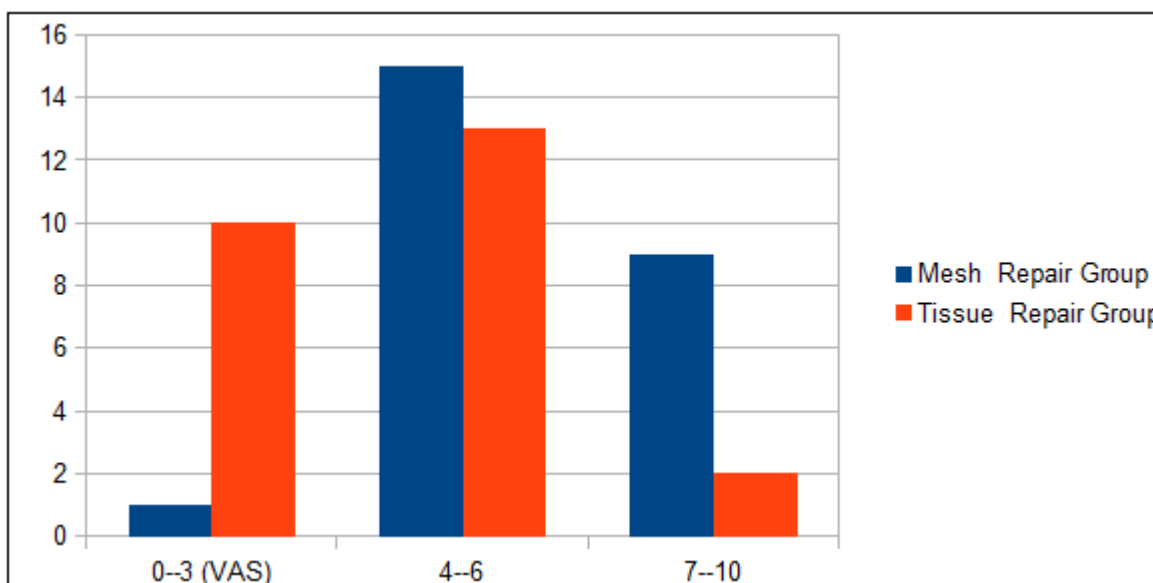
Time taken for tissue repair ranged from 75- 180 minutes with a mean of 120 minutes.



Time taken for mesh repair ranged from 65- 175 minutes with a mean of 97 minutes.

Post-Operative Analgesia Requirement in Each Group

Visual Analogue Scale	Tissue Repair	Mesh Repair
0-3 (Mild)	10	1
4-6 (Moderate)	13	15
7-10 (Severe)	2	9
TOTAL	25	25



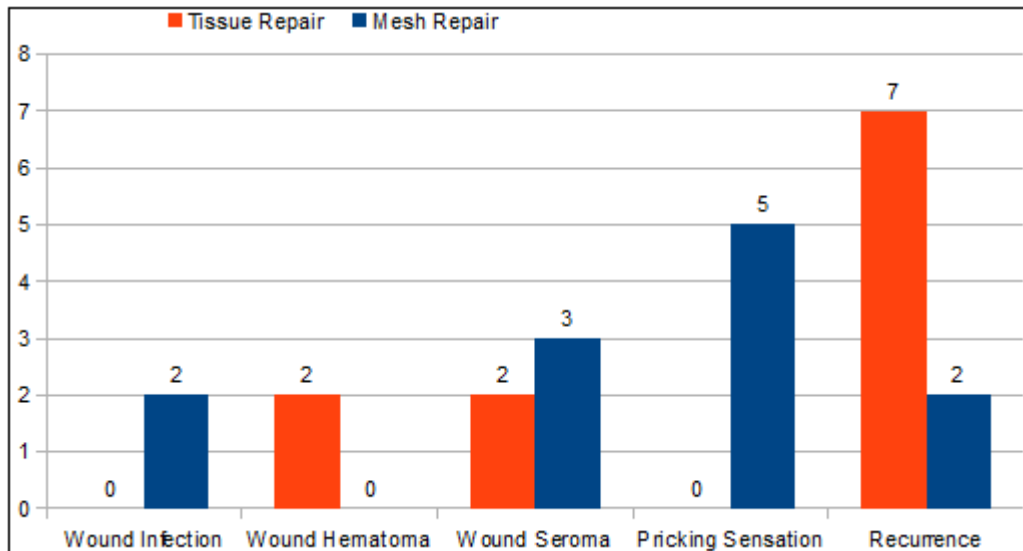
Pain scoring done using Visual Analogue Scale (VAS) was done half an hour after discharge from the post-operative recovery ward and need for analgesia determined. Pain as measured using VAS was more in patients who had undergone mesh repair.

Complications Following Hernia Repair

S.No.	Complication	Tissue Repair Group	Mesh Repair Group
1	Wound Infection	0	2
2	Wound Hematoma	2	0
3	Wound Seroma	2	3
4	Pricking Sensation	0	5
5	Recurrence	7	2

Tissue Repair- 25cases

Mesh Repair- 25cases



Incidence of wound infection was more in mesh repair group (8%) as the both the cases of mesh repair done as emergency surgery were infected whereas there was no case of wound infection in tissue repair group.

Incidence of wound haematoma was more in tissue repair group (8%).

Incidence of wound seroma was more in mesh repair group (12%) as compared to tissue repair group (8%).

Five (20%) patients in mesh repair group complained of pricking sensations after prolonged follow-up whereas there was no such complain in tissue repair group.

After a prolonged follow-up, recurrence was seen in seven (28%) cases of tissue repair group whereas only two (8%) cases of recurrence were seen in mesh repair group.

Return to full physical activity was similar in both the groups with range of 6-12 weeks.

5. Discussion

With the evolution of modern surgery, many types of repair have undertaken for the treatment of incisional hernias. But patients and surgeons alike are discouraged by reported and other unsuccessful attempts at repair, with many patients confirmed to restricted life style.

Incisional hernia affects both sexes, with our study showing female preponderance with a male to female ratio of 1: 2.66. The reason being that 28(56%) of our patients had undergone Caesarian section or other gynecological intervention. Similar results have been published by *Sharma Jayant et al (5)*.

The commonest presentation with which patients presented to us was abdominal swelling with or without dragging sensation (92%). Only 4 (8%) cases presented as obstructed incisional hernia.

Wound infection was the most common complication after the initial surgery accounting for 27(54%) of cases followed by RTI and cough in 7(14%) cases and post-operative abdominal distension (10%). No post-operative complication was seen in 9(18%) cases.

Wound infection ranges from frank acute cellulitis with fascial necrosis of the tissues to low grade sub-clinical infection which result in loss of integrity of closure. Post-operative pulmonary complication and abdominal distention lead to increase intra-abdominal pressure and therefore increased strain on the closure.

Bucknell TE(6) et al in 1982, **Molly RG(7)** et al in 1991 concluded that post-operative wound infection, chest infection and abdominal distension were the most significant factors associated with herniation.

Out of 50 cases in our study, 29(58%) were obese with BMI of more than 30. In obese patients the fat is not able to hold the sutures as it adds enormous tension on the sutures causing a defect in abdominal wall. Obese patients are also more prone to post-operative atelectasis, pneumonia, paralytic ileus etc.

In our study, the total operating time was more in tissue repair group (mean 120 minutes) as compared to mesh repair group (mean 97 minutes). Tissue repair is technically more time consuming as after proper dissection, the aponeurosis is divided and sutured in two layers. The outer one forming the cross-cross layer like shoelace tightening the boot.

M Korenkov(8) et all in 2002 compared the length for different operative procedures and reported Mean time of 54 mins for suture repair, 73 mins for mesh repair and 67 mins for anterolateral graft.

Using Visual Analogue Scale (VAS), pain intensity and the need of analgesics was more in mesh repair group as compared to tissue repair group. **M Korenkov et all (8)** in 2002 also concluded the same things.

Regarding wound complications, wound infection was seen in mesh repair group (8%) only as the both cases done in emergency the mesh got infected and had to be removed. The incidence of wound haematoma was more in tissue repair group(8%) whereas wound seroma was in mesh repair group(12%). Out of 25 patients in mesh repair group, 5(20%) complained of pricking sensations in the wound . There was no such complained in tissue repair group.

Temudum et al (9) in 1996 in their study of 50 patients undergoing incisional hernia mesh repair reported 4% incidence of wound seroma and 8% wound infection.

Repair of an incisional hernia has an unusually high incidence of infection that may be the result of persistent sub-clinical infection from an originally contaminated wound. It is evident from the ongoing discussion that mesh repair has a high incidence of wound infection because of excessive use of Cautery leading to increased dead tissue and mesh itself serving as a foreign body in the human tissue.

After following the patients 2-96 months in our study, there was recurrence of 8% in mesh repair group and 28% in tissue repair group. High recurrence rate was seen in tissue repair group because these techniques are based on the principles of the approximation of defect edges which leads to excessive tension and subsequent repair failure. However there is no such tension on cut edges in case of mesh repair thereby decreasing the recurrence.

Liakakos(10) et al in 1994 compared primary closure with mesh(Marlex) repair and found recurrence of 8% with marlex mesh and 25% with primary closure.

Luijendijk RW(11) et al in 2000 compared suture versus mesh repair in incisional hernia found recurrence of 46% in suture group and 23% in mesh group after a mean duration of twenty-six months.

Return to full activity was almost same in both the groups (4-12 weeks).

Out of 25 patients, in each group 4(16%) patients in each group were not satisfied with the cosmetic results.

Studies comparing open suture/tissue and open mesh repair of incisional hernia

S.No	Reference (Author/Year)	Technique	No. of Pts.	Recurrence (%)	Followup (Months)
1	Liakakos et al, 1994	Suture Repair	53	25	90
		Polypropylene Repair	49	8	90
2	Schumpelck et al 1996	Suture Repair	190	33	64
		Polypropylene Repair	82	7	64
3	Luijendijk et al 2000	Suture Repair	97	46	26
		Polypropylene Repair	84	23	26
4	Clarck et al 2001	Suture Repair	13	30	25
		Polypropylene Repair	8	25	13
5	M Korenkov et al 2002	Suture Repair	33	12	13
		Polypropylene Repair	39	8	14
6	Present Series	Tissue Repair	25	28	90
		Polypropylene Repair	25	8	94

6. Conclusion

The findings of present study coupled with earlier reports indicate that mesh repair is superior to tissue repair in mid-line abdominal incisional hernias. Recurrence is more frequent after tissue repair while the hernia repair related complications cosmetic results, patient satisfaction is comparable for both groups. Mesh repair should not be undertaken in emergency surgery in obstructed/ strangulated incisional hernia as the chances of infection are very high. Other complications like small bowel obstruction, bowel adhesion, bowel erosion, enterocutaneous fistula was not seen in our study.

No operation is suitable for every case of incisional hernia. The surgeon should be familiar with many types of incisional hernia repair and each procedure should be tailored to the individual cases taking into consideration the general condition of the patient, the size of the hernia, economic condition of the patient etc.

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