

# Comparison of Open Mesh Repair with Open Suture Repair of Incisional Hernia

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## Abstract

**Background:** Incisional hernia is an important complication of abdominal surgery. Procedures for the repair of these hernias with sutures and with mesh have been reported. For many years, the repair of incisional hernia was associated with a high recurrence rate. The introduction of synthetic prosthetic materials has provided the opportunity to perform a tension free repair, thereby reducing the rate of recurrence. There is no consensus about which type of procedure is best.

**Aims and Objectives:** To compare the results of mesh repair with suture repair of an incisional hernia with regard to recurrence.

**Materials and Methods:** A detailed study of 70 cases was conducted between January 2013 and December 2014 in Sri Siddhartha Medical College and Hospital, Tumkur, Karnataka, India. We randomly assigned 70 patients to suture repair or mesh repair of an incisional hernia. The patients were followed up by physical examination at 1, 6, 12, and 15 months.

**Results:** Among 70 cases females constituted 94.2% (66 cases). 30 cases underwent suture repair, of them 4 cases recurred (13.33%). 40 cases underwent mesh repair, with no recurrence up to 15 months of follow-up.

**Conclusions:** Mesh repair is superior to suture repair with regard to the recurrence of hernia. Suture repair carries an unacceptably high recurrence rate.

**Key words:** Incisional hernia, Mesh repair, Recurrence, Suture repair

## INTRODUCTION

Incisional hernias are unique in that they are the only abdominal wall hernias that are considered to be iatrogenic. Incisional hernia is a frequent complication of abdominal surgery and is a significant source of morbidity and loss of time from productive employment. Many of these patients will alter their lifestyles so as not to exacerbate their abdominal wall hernia. This change may even reduce or even eliminate the potential for gainful employment.

Incisional hernias can incarcerate, obstruct, strangulate or cause skin necrosis and perforation, all of which markedly increases the risk of patient life. For many years, the repair of an incisional hernia was associated with a high recurrence rate. The introduction of synthetic prosthetic materials has provided the opportunity to perform a tension-free repair, thereby reducing the rate of recurrence.

## MATERIALS AND METHODS

A detailed study of 70 cases of an incisional hernia was conducted between January 2013 and December 2014 in Sri Siddhartha Medical College and Hospital, Tumkur, Karnataka, India.

### Inclusion Criteria

All patients with primary incisional hernia.

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### Exclusion Criteria

The presence of more than one hernia, signs of infection, prior hernia repair with mesh, plan to repair the hernia as a part of another intra-abdominal procedure, patient with significant respiratory illness, associated malignancy.

Patients were randomly assigned to undergo suture repair or mesh repair. Intravenous antibiotic injection cefotaxime 1 g given 1 h before surgery. Location of hernia and size of the defect was noted. Relevant investigations were done, and medical fitness for surgery obtained. In suture repair, continuous polypropylene no-1 stitches with stitch width and interval of approximately 1 cm were used. In mesh repair polypropylene mesh was used over the fascia (overlay) with at least 4 cm of mesh overlapping the edges and fixed with polypropylene stitches to the fascia. Suction drain was used in all patients. Factors related to the operation including the surgical technique, presence or absence of seroma, hematoma, infection, dehiscence were recorded. Follow-up of cases was done after 1, 6, 12, and 15 months after surgery on an outpatient basis for recurrence of hernia.

### Statistical Analysis

Data collected were entered in Microsoft Excel 2007 and analyzed using Epi Info 3.4.3. Descriptive statistics such as mean, standard deviation and proportion were calculated. Chi-square test was used as test of significance.  $P < 0.05$  is considered as statistically significant.

## RESULTS

The total number of cases studied was 70.

A study of sex incidence shows that only four patients (5.71%) were males and the rest 94.2% were females with a male to female ratio of 1:16.5. Majority of patients were between 20 and 50 years. The youngest patient was 20 years female, and the oldest was 70-year-old male shown in Table 1.

### Types of Previous Operation

A total of 51 (72.8%) patients had undergone gynecological procedures. Of these 26 (37.14%) were tubectomy, 10 (14.2%) were *lower segment cesarean section*, 9 patients has undergone (12.8%) two or more operation. The type of previous operation has been shown in Table 2.

The various incisions used in previous operation have been depicted in Table 3. Majority, 77% of patients, had undergone operation through lower midline incision.

Most of the patients (61%) 43 presented with swelling and 23 (32%) with pain and swelling, and 4 (5.7%) with pain.

**Table 1: Age and sex distribution**

Age group	Male	Female	Percentage
11-20	-	1	1.4
21-30	-	25	33.7
31-40	-	17	24.2
41-50	1	15	22.8
51-60	1	7	11.4
61-70	2	1	4.28
Total	4	66	100

**Table 2: Types of previous operation**

Type of previous operation	Number of patients (%)
Tubectomy	26 (37.14)
LSCS	10 (14.2)
Hysterectomy	6 (8.57)
LSCS+hysterectomy	2 (2.8)
LSCS and BAT	7 (10)
Appendectomy	4 (5.7)
GJ and vagotomy	2 (2.8)
Previous hernia repair	6 (8.57)
Laparoscopic surgery	2 (2.85)
Mayo's repair	2 (2.85)
Emergency laparotomy	3 (4.28)

LSCS: Lower segment cesarean section, GJ: Gastrojejunostomy, BAT: Bilateral Abdominal Tubectomy

**Table 3: Various incisions used in the previous operation**

Incisions	Number (%)
Lower midline	54 (77)
Upper midline	5 (7.14)
Mcburney's	4 (5.17)
Transverse	2 (2.85)
Infraumbilical port site	2 (2.85)
Pfannenstiel	2 (2.85)
Upper paramedian	1 (1.42)
Subcostal	0 (0)

Of the 70 patients, 30 were anemic, 18 patients were obese and around 30 had poor musculature, 7 were diabetic, 13 hypertension, 2 chronic cough, 1 ischemic heart disease and 2 on steroids, 1 epileptic, 1 was hypothyroid. All the patients were made medically fit before surgery.

The smallest defect measures 1 cm × 1 cm and the largest defect measured 10 cm × 6 cm in our study.

Majority of patients had omentum as the content of sac (53), 16 had small bowel, and 1 had transverse colon.

30 patients underwent suture repair and forty with onlay mesh repair.

All patients were given injection cefotaxime 1 g till the suture removal.

**Post-operative Complication**

The complications that occurred have been shown in Table 4. No major complications occurred in both groups (Table 6). Wound infection was treated with antibiotics and regular dressings. Seroma was drained. The other complications were treated appropriately.

All patients except ten were followed for variable period limited by the study period.

**Follow-up and Recurrence**

Four patients treated by suture repair presented with recurrence at 5, 6, 8, 10 months respectively after surgery.

**Table 4: Post-operative complications**

Complications	Number of patients
Seroma	6
Wound infection	3
Paralytic ileus	3
Respiratory infection	7
Wound sinus	1
Mesh rejection	0
Wound dehiscence	0
Deep vein thrombosis	1
UTI	2

UTI: Urinary tract infection

**Table 5: Recurrence**

Type of operation	Number of patients	Recurrence	Percentage of recurrence	P value
Suture repair	30	4	13.33	P<0.05
Mesh repair	40	0	0	

No patients with mesh repair showed recurrence (Table 5). All patients with recurrence were advised to undergo mesh repair. Three patients with recurrence underwent mesh repair. Recurrence rate for suture repair in this series is 13.33%.

**DISCUSSION**

This study includes a total number of 70 cases of an incisional hernia. The outcome of the analysis with interpretation and explanation with other series will be discussed.

**Details of Previous Surgery**

Majority of patients had undergone gynecological procedures (72.8%) through lower midline incision.

5.7% of patients had undergone appendicectomy through gridiron incision.

7.14% of patients had upper midline incision for TV and gastrojejunostomy, emergency laparotomy.

2.85% of patients had herniation through infraumbilical port site, and 8.5% of patients had undergone previous repair for incisional hernia; 1.42% through paramedian incision.

Toms *et al.*<sup>1</sup> have said incisional hernia are more common following midline incision through the relatively avascular linea alba and are less common following transverse incision, especially where muscle splitting approaches have been used.

**Table 6: Complications in the present study compared to others**

Complications	Present study		Luijendijk <i>et al.</i> <sup>4</sup>		Korenkov <i>et al.</i> <sup>5</sup>	
	Suture repair	Mesh repair	Suture repair	Mesh repair	Suture repair	Mesh repair
Local complications						
Wound infection	2	1	0	3	0	4
Hematoma	-	-	7	0	2	0
Seroma	2	4	3	4	1	3
Suture sinus	0	1	1	0	0	0
Post-operative bleeding	-	-	-	1	-	-
Enterotomy	0	0	4	0	0	0
Paralytic ileus	1	2	1	5	0	0
Mesh rejection	-	-	-	-	-	-
Wound dehiscence	-	-	1	-	-	-
Enterocutaneous fistula	-	-	-	1	-	-
General complications						
Thromboembolism	0	0	-	-	1	0
Deep vein thrombosis	0	1	-	-	0	0
Stroke	0	0	-	-	0	0
Pneumonia	0	0	4	-	1	0
MI	0	0	1	-	-	-
UTI	1	1	3	-	-	-
Respiratory infection	3	4	-	-	1	0
Recurrence (%)	13.33	0	43	24	12.12	7.6
Death	0	0	0	0	0	0

UTI: Urinary tract infection, MI: Myocardial infarction

**Table 7: Studies comparing open suture and open mesh repair of incisional hernia (Cassar and Munro<sup>7</sup>)**

Reference	Years	Technique	Number of patients	Percentage of recurrence	Follow-up (months)
Liakakos <i>et al.</i> (comparative study)	1994	Suture repair	53	25	90
		Mesh repair	49	8	90
Schumpelick <i>et al.</i> (comparative study)	1996	Suture repair	190	33	64
		Mesh repair	82	7	64
Clark (comparative study)	2001	Suture repair	13	38	25
		Mesh repair	8	25	13
Luijendijk <i>et al.</i> <sup>4</sup> (randomized clinical trial)	2000	Suture repair	97	46	26
		Mesh repair	84	23	26
Korenkov <i>et al.</i> <sup>5</sup>	2002	Suture repair	33	12.12	16
		Mesh repair	39	7.69	16
Present study	2016	Suture repair	30	13.33	15
		Mesh repair	40	0	

Millikan<sup>2</sup> found a 10.5% ventral hernia rate in 4,129 midline incisions, compared with a 7.5% rate for transverse incision and a 2.5% rate of paramedian incision.

Ríos *et al.*<sup>3</sup> has given the percentages of various incisions through which hernia has occurred as shown in Table 3. As many as 20% of patients who underwent laparotomy develop an incisional hernia (Roland *et al.* and Luijendijk *et al.*)<sup>4</sup>.

Korenkov *et al.*<sup>5</sup> have said that incisional hernia can occur after all types of abdominal surgery, and the risk lies between 11% and 15% after midline laparotomy and 0.2 and 1.2% after laparoscopy.

### Modes of Presentation

In our study, 61% presented with swelling, 32% with pain and swelling, and 5.7% with pain only. Of 23 patients with pain and swelling, 5 presented with obstructive features. Of the 70 patients, 53 were uncomplicated.

Santora and Rosyln<sup>6</sup> have stated that incisional hernia manifest as bulge in an abdominal wall closure. Cassar and Munro<sup>7</sup> defined as a bulge visible and palpable when the patient is standing and often requiring support or repair. Toms *et al.*<sup>1</sup> say that abdominal wall hernias present with asymptomatic to life threatening emergency.

Incisional hernia can cause pain and may lead to serious condition, such as incarceration (6-15%) or strangulation of bowel (2%).<sup>8</sup>

The first sign of an incisional hernia is usually an asymptomatic bulge noticed by the patient. The bulge can be noticed directly over the incision or in an adjacent area locally related to the incision.<sup>2</sup> Hernias<sup>9</sup> defines as unsightly bulge in the operation scar as well as pain and discomfort.

Patient's experience pain and tenderness and vague discomfort if omentum or even preperitoneal fat herniates

through a small defect. Intestinal obstruction may be the presenting complaint in older patients with neglected hernias.

### Associated Risk Factors/Illness

Anemia, diabetes mellitus, alcoholism, obesity have been associated with a high percentage of post-operative hernias (Jack Abrahamson).<sup>9</sup> In our study, 30 patients were anemic, 18 obese, 7 diabetic.

Ellis Group (1982)<sup>11</sup> found that obesity was associated with a threefold increase in herniation and recurrence. In our study, 25% of patients were obese.

19.9% were diabetes, 9.3% obesity, 3.7% immunosuppressed as quoted by Ríos *et al.*<sup>3</sup> In our study, 10% were diabetic, 25% obese, and 2.8% were immunosuppressed.

Obesity has been cited as a risk factor for acute fascial dehiscence and incisional hernia after major abdominal operation.<sup>2</sup>

### Operative Procedure

In our study, 42.85% underwent suture repair and 57.14% mesh repair.

There was no strangulation in our study, and 7.14% had obstructed hernia which was an indication for emergency surgery.

The techniques used for repairing incisional hernias have generally developed in a practical, experiential way. Several authors have reported favorable results with mesh repair, but to date, this technique has not been studied systematically. In our study, the results of a prospective randomized trial in which suture repair was compared with mesh repair.

In techniques for the repair of incisional hernias in which sutures are used, the edges of the defect are brought

together, which may lead to excessive tension and subsequent wound dehiscence or incisional herniation as a result of tissue ischemia and the cutting of sutures through the tissues. With prosthetic mesh defects of any size can be repaired without tension. In addition, prolene mesh by inducing an inflammatory response sets up scaffolding that, in turn, induces the synthesis of collagen.

### Defect Size

The size of the fascial defect and the appearance of the fascia should dictate the selection of the most appropriate method of hernia repair.<sup>6</sup>

In our study, 36 patients had defect size up to 10 cm<sup>2</sup>, 12 patients 10-20 cm<sup>2</sup> and 30-40 cm<sup>2</sup> respectively and 7 patients with defect 20-30 cm<sup>2</sup>.

### Complications

Wound infection is the major cause of post-operative herniation having a high propensity for fascial necrosis with resultant loss of integrity of the closure. Sepsis is the second major cause of early wound failure, in more than 50% of post-operative hernias that develop in 1<sup>st</sup> year after operation (Jack Abrahamson).<sup>9</sup> Approximately, 35-40% of incisional hernias occur with a documented history of wound infection, but the reported incidence of hernia in treated wound infections varies from 5% to 20% (Baker).<sup>11</sup>

Post-operative wound infection was associated with a fivefold increase in the risk of development of a hernia (23%) compared with patients with uninfected wounds (4.5%). Similar findings had been reported earlier by Blomstedt and Welin Berger (1972). Incisional hernia occurs in 23% of those who develop postoperative wound infection.<sup>7</sup> In our study, three patients had developed wound infection 1 (2.5%) in mesh group and 2 (6.6%) in suture repair group.

The common etiological factors responsible for recurrence after incisional hernia repair are postoperative wound sepsis, suturing under tension, persistent postoperative distention, missed defects of hernia not taken into repair (false recurrence).<sup>12</sup>

Post-operative pulmonary complications increase the incidence of herniation because of the strain placed on the wound closure by coughing or straining. Wound tensile strength patterns are grossly abnormal and ultimate wound integrity is usually less than satisfactory in malnourished patients Baker.<sup>13</sup>

In our study, 7 patients had pulmonary complications and 3 had abdominal distension temporarily.

There was no mortality in our study. In a review of 3107 incisional hernia repairs, Heydorn and Velanovich<sup>6</sup> reported that the mortality rate was appreciably higher in patients undergoing repair of complicated hernias (1.1%) than in those individuals undergoing elective repair (0.3%).

In our study, the complications were treated appropriately and there were no deaths.

In our study, four patients in suture repair showed recurrence and no patient with mesh repair group noticed recurrence in the follow-up period. The *P*-value is significant in our study.

The recurrence rate in suture repair group in our study is comparable to Korenkov *et al.*<sup>5</sup> series.

Matapurkar (1995)<sup>12</sup> and Whitley *et al.* (1998) showed 0% recurrence rate in mesh repair, which is comparable to present study showing 0% recurrence rate in mesh repair group.

In spite of the relative paucity of randomized clinical trials the larger studies published to date highlight unacceptably high rates of recurrence up to 49% with open suture repair.

The recurrence rates reported for open mesh repair have been consistently lower (0-10%). This has been confirmed in three comparative studies and 1 randomized clinical trial in the Table 7, which showed a significantly lower rate in the mesh group (46 vs. 23%) although complications rates did not differ between the groups.

## CONCLUSION

In patients with incisional hernia, repair with polypropylene mesh is superior to suture repair with regard to the recurrence of hernia. Suture repair carries an unacceptably high recurrence rate. The current controversy that exists is what type of fixation (partial or full thickness of abdominal musculofacial wall) is necessary to stabilize the position of the mesh while the tissue in growth occurs.

## REFERENCES

1. Toms AP, Dixon AK, Murphy JM, Jamieson NV. Illustrated review of new imaging techniques in the diagnosis of abdominal wall hernias. *Br J Surg* 1999;86:1243-9.
2. Millikan KW. Incisional hernia repair. *Surg Clin North Am* 2003;83:1223-34.
3. Ríos A, Rodríguez JM, Munitiz V, Alcaraz P, Pérez Flores D, Parrilla P. Antibiotic prophylaxis in incisional hernia repair using a prosthesis. *Hernia* 2001;5:148-52.
4. Luijendijk RW, Hop WC, van den Tol MP, de Lange DC, Braaksma MM, IJzermans JN, *et al.* A comparison of suture repair with mesh repair to



- incisional hernia. *Engl J Med* 2000;343:392-8.
5. Korenkov M, Sauerland S, Arndt M, Bograd L, Neugebauer EA, Troidl H. Randomized clinical trial of suture repair, polypropylene mesh or autodermaI hernioplasty for incisional hernia. *Br J Surg* 2002;89:50-6.
  6. Heydorn WH, Velanovich V. A five years US army experience with 36,250 abdominal hernia repairs. *Am surg* 1990;56:596.
  7. Cassar K, Munro A. Surgical treatment of incisional hernia. *Br J Surg* 2002;89:534-45.
  8. van 't Riet M, Steyerberg EW, Nellensteyn J, Bonjer HJ, Jeekel J. Meta-analysis of techniques for closure of midline abdominal incisions. *Br J Surg* 2002;89:1350-6.
  9. Hernias AJ. In: Michael JZ, Seymore IS, Harold E, editors. *Maingot's Abdominal Operations*. 10<sup>th</sup> ed. Ch. 14. New York: Appelton Century Crofts; 1997. p. 479-580.
  10. Knight R, Fenoglio ME. The use of the Kugel mesh in ventral hernia repairs. *Am J Surg* 2002;183:642-5.
  11. Bucknall TE, Cox PJ, Ellis H. Burst abdomen and incisional hernia: A prospective study of 1129 major laparotomies. *Br Med J (Clin Res Ed)* 1982;284:931-3.
  12. Matapurkar B. Large recurrent incisional hernia: Ultra sonographic mapping of abdominal wall defects and repair by Marlex peritoneal sandwich technique. *Indian J Surg* 1995;321-5.
  13. Baker RJ. Incisional hernias. In: Nyhus LM, Condon RE, editors. *Hernia*. 3<sup>rd</sup> ed. Philadelphia, Pennsylvania: Lippincott; 1995. p. 319-36.

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