



MIDLINE ABDOMINAL INCISIONAL HERNIA REPAIR BY COMPONENT SEPARATION TECHNIQUE AUGMENTED WITH PROSTHETIC MESH- PROSPECTIVE STUDY

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ABSTRACT

Background- Any abdominal wall gap with or without bulge in the vicinity of the post-operative scar, detectable or palpable by clinical examination or imaging, is referred to as an incisional hernia.

Objectives- This study was done to see the feasibility of component separation technique (CST) with mesh augmentation.

Methods- This was a Prospective Study conducted from October 2022 to March 2023 in Department of General Surgery. Regardless of the cause, 30 individuals with Midline Abdominal Incisional Hernia were included. Operative time and seroma formation were two key criteria, along with many others, for the viability of the repair by CST and augmentation by mesh prosthesis. Convenience sampling technique was used. Pregnant women, children below 12 years and elderly above 75 years of age, presence of associated groin or other hernias, Patients on steroid therapy, coagulopathies, Patient with associated malignancy, local tissue irradiation were considered under exclusion criteria. **Results-** There were 16 females and 14 males and accounts to 55% of female patients. Out of 30 patients 18 patients were operated under General anaesthesia accounting to 65% of patients whereas rest of the 12 patients got operated under Combined Spinal Epidural anaesthesia. 22 out of 30 patients had split thickness skin cover, accounting for 75 % of the patients whereas rest of the 8 patients had intact skin cover. Out of 15 patients developing complications 11 had Split thickness skin cover and 4 had intact skin cover. The mean age of the patients in our group was 43.8 years and the majority of patients are of 40-60 years age group. **Conclusion-** The midline abdominal incisional hernia fixed by CST enhanced with prosthetic mesh was found to be viable and superior to the standard primary repairs & mesh hernioplasties in our research of 30 patients

KEYWORDS : Incisional hernia, Mesh, Prosthetics, seroma, blood loss, IAP.

INTRODUCTION-

Any abdominal wall gap with or without bulge in the vicinity of the post-operative scar, detectable or palpable by clinical examination or imaging, is referred to as an incisional hernia.

[1] Having an incisional hernia after abdominal surgery is a common (11%) but potentially asymptomatic (8-29%) problem. [2] and offer noticeable cosmetic difficulties with abdominal bulge that induce pain and complications like imprisonment or strangling, in addition to presenting severe functional impairment as they enlarge. 4 80-95% of these develop between 6 months and 3 years following the initial surgery.[3]

Only sutures are initially used to support the approximated face margins. As the lesion heals over time, the musculotendinous the abdominal wall's layers regain structural integrity. A hernia may result if the abdominal wall cannot withstand IAP form. expressed scar tissue from incisional hernias higher ratios of soluble (mature) collagen, collagen III, an early wound matrix collagen isoform, and elevated levels of tissue matrix metalloprotease and reduced type I: type III collagen mRNA ratio protein. [4] Abdominal fascia healing that is unsuccessful can surgical and biological factors have an impact. [5]

For the diagnosis of tiny and early hernias, diagnostic technologies like computed tomography or ultrasonography may be helpful. [6] Depending on the magnitude of the defect, the recurrence rate for primary repair ranges from 18% to 62%. The most successful method for preventing recurrence is the adoption of mesh prosthesis to treat incisional hernias. [7] When synthetic mesh is added, the recurrence rate decreases by 22% to 32%. The type of mesh used varies depending on the surgeon and the location where the surgery is carried out, despite current statistics indicating that 70% to 86% of incisional hernias are corrected with mesh. It was still difficult to mimic a large abdominal wall defect without tension. Although CST was able to solve the issue, it nevertheless recurred 36% to 40% of the time.

Therefore, the planned study was designed to examine the viability of CST-augmented repair and to examine both early and late problems.

MATERIALS AND METHODS-

This was a Prospective Study conducted from October 2022 to March 2023 in Department of General Surgery. Regardless of the cause, 30 individuals with Midline Abdominal Incisional Hernia were included. The article "Repair of Giant Midline Abdominal Wall Hernias: Components Separation Technique versus Prosthetic Repair Interim Analysis of a Randomized Controlled Trial" by de Vries Reilingh [8] served as the basis for the sample size estimate. Operative time and seroma formation were two key criteria, along with many others, for the viability of the repair by CST and augmentation by mesh prosthesis.

Convenience sampling technique was used. Pregnant women, children below 12 years and elderly above 75 years of age, presence of associated groin or other hernias, Patients on steroid therapy, coagulopathies, Patient with associated malignancy, local tissue irradiation were considered under exclusion criteria.

METHODOLOGY-

IAP monitoring was completed once preoperatively, once during the procedure, and once on the first postoperative day. The external oblique muscle's aponeurosis was cut longitudinally about 2 cm laterally of the rectus sheath, and the external oblique muscle was dissected until the internal oblique fascia was encountered, as is typical procedure for hernia repair. A minimally tensioned interrupted figure-of-eight 0 polypropylene suture (Prolene; Ethicon, Inc., Somerville, NJ) was used to add mesh (sublay) to this mobilization. An uninterrupted 2/0 polydioxanone suture (Vicryl, Ethicon, Inc.) was used to plice the midline abdominal wall from the xyphoid to the pubis. This reinforced the hernia repair and improved the contour and tone of the lax abdominal wall while also approximating nearby fascia over the repair. Suction drains were frequently employed. After

Careful hemostasis, multilayer skin closure was carried out using interrupted dermal 3/0 poliglecorone 25 (Monocryl, Ethicon, Inc.), uninterrupted cutaneous 3-0 nylon (Ethilon, Ethicon, Inc.), and interrupted deep 2/0 polydioxanone sutures (Vicryl). The umbilicus was reattached if it had previously been separated from the abdominal wall. An inexpensive way to determine the IAP is by using a Foley catheter, an intravenous infusion set, a 50 ml syringe, a measuring scale, and a hemostat.

The intravenous infusion set's connector was disconnected from the infusion tube and attached to a syringe containing 50 ml of saline. Saline was then inserted into the empty bladder, and this was connected to the main drainage channel of the Foley catheter. A rubber hemostat was then used to clamp the connector. The conductor connected to the Foley catheter was then removed together with the empty syringe. Next, the connector was attached to the intravenous set tubing, which was then held vertically above the symphysis. When the hemostat is removed, saline flows out of the catheter drainage tubing and rises to a height that corresponds to the IAP (in cm of saline multiplied by 1.36 for conversion to mm of Hg). [9]

Statistical Analysis-

For quantitative data, descriptive statistics like mean, median, and standard deviation were removed. Proportions were calculated and indicated in the study for qualitative data. Where necessary, diagrammatic representation is used in conjunction with photos. To compare different studies, the student t-test is utilized. P 0.05 is regarded as significant. SPSS (V24.0) was used for analysis.

RESULTS-

Table 1- Demographic and Clinical characteristics of participants

Variables	Frequency (%)
Gender	
Males	14 (45)
Females	16 (55)
Mean Age	43.8±6
Type of Anaesthesia given	
General	18 (65)
Spinal + Epidural	12 (35)
Skin Cover	
Split thickness	22 (75)
Intact Skin cover	8 (25)
Complications	
Due to Split thickness	11
Due to intact Skin cover	4
Mean Hernia Defect size	215.32cm ²
Mean Operative time	170.2 minutes
Mean Hospital stay	5.3 days

As per table 1 in our study there were 16 females and 14 males and accounts to 55% of female patients. Out of 30 patients 18 patients were operated under General anaesthesia accounting to 65% of patients whereas rest of the 12 patients got operated under Combined Spinal Epidural anaesthesia. 22 out of 30 patients had split thickness skin cover, accounting for 75 % of the patients whereas rest of the 8 patients had intact skin cover. Out of 15 patients developing complications 11 had Split thickness skin cover and 4 had intact skin cover. The mean age of the patients in our group was 43.8 years and the majority of patients are of 40-60 years age group.

The mean hernia defect size was 215.32cm². All the patients with split thickness skin cover were of the BMI range group of 25kg/m²-30kg/m² whereas intact skin cover was noticed in patients belonging to all the BMI range groups. Mean operative time in our study was 170.2 minutes and majority of the patients got operated within the time span of 120 minutes to 210 minutes. In the study it was found that patients in group having a larger defect size had longer operative timing and larger blood loss.

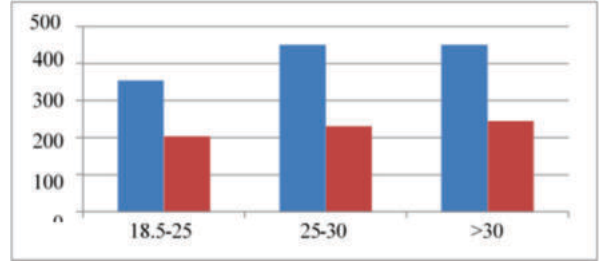


Figure 1 - Relation between BMI, blood loss & defect size.

Blue: blood loss, red: defect size.

As per figure 1 in our study patients with BMI of >30 kg/m² had an average blood loss of 450ml and an average defect size of 244.62 cm². Patients with BMI between 25 kg/m² and 30 kg/m² had an average blood loss of 450 ml and an average blood loss of 230.2 cm². Patients with BMI between 18.5kg/m² and 25 kg/m² had an average blood loss of 350.58 ml and an average defect size of 203.23 cm². To conclude there was a direct relationship between BMI, blood loss and the defect size.

Table 2- Distribution of Complications among patients

Complications	Frequency (%)
Seroma	16 (55)
Skin necrosis	2 (3)
Wound dehiscence	1 (1)
Hematoma	0 (0)

As per table 2 Out of 30 patients, 16 patients had seroma formation, 2 patients developed skin necrosis, 1 patient had wound dehiscence and none had Hematoma formation.

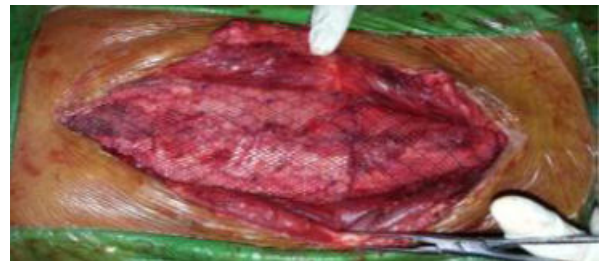


Figure 2- Mesh placement over the peritoneum in retro rectus plane followed by rectus closure.

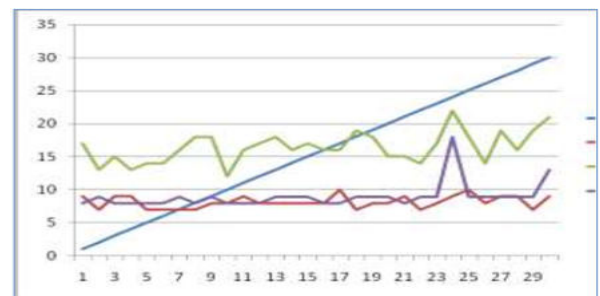


Figure 3- Pre and Post-Operative periods IAP measurements

Red: pre-operative IAP, Purple: Immediate post-operative IAP, Green: post-operative day 1

As per figure 3 IAP was <20 mm Hg in immediate post-operative period in all except 2 patients (22- and 21-mm Hg respectively) who also responded to conservative management. No other cases of prolonged increased pressure were noted.

DISCUSSION-

In 2019, Jason et al. grouped 200 patients undergoing incisional hernia surgery into three groups for the study. [10] When component separation was segmented by polypropylene mesh, the recurrence was 0%, compared to repair by component separation enhanced with biological

mesh, which had a recurrence of 22.8%. This verification further compelled us to always augment incisional hernia repairs using the component separation technique with soft polypropylene mesh.

In their study from 2017, Geffen et al. revealed that after mesh augmentation CST, the recurrence rate was lowered from 17% to 4% over a 37-month follow-up period. [11] CST was added to sublay light weight mesh (Vipro II) in our series without causing any recurrence. Reilingh et al. published their randomized trial on the reconstruction of large midline abdominal hernias by CST and prosthetic repair in 2017. The trial involved 39 patients and was conducted at the Department of Surgery, Radboud University, Nijmegen Medical Center, Netherlands (two patients were excluded postoperatively due to gross contamination). [8]

The mean age was 42.9 years in our series while in prosthetic repair group was 58.7 years and CST were 53.9 years but the average range of age of patients was similar in our study and CST study in their series. The gender distribution was 24 females and 6 males in our study group with 4:1: female: male while 1:2 in either group in their study, which may be because of randomization. In our series, there were 30 consecutive cases of midline abdominal incisional hernia included irrespective of the gender keeping the exclusion criteria in mind.

The prospective study conducted by Jacobus et al. at Erasmus University in 2004 with 181 patients between 1992 and 1998 was comparable to the study we conducted with 30 participants. [12] They had separated their groups into two: one for mesh-based incisional hernia repair and the other for suture-only repair. Although the male to female ratio in the suture group was equal by randomization and was 1.5: 1 in the meshplasty group, our study had four times more female participants, probably due to nonrandomization. In our study, the mean age was 42.9 years, and it was 57 years and 63 years for each group, which corresponds to the vulnerable population between the ages of 40 and 60, when co-morbid diseases are common and an incisional hernia can develop. BMI (in kg/m²) of 26.09 in our study group very well corresponds to the meshplasty group BMI 26.2 and 26 in suture group which again precludes morbid obesity as co-morbid condition for incisional hernia formation.

Skin necrosis and infection were observed in two cases of our study group, and it is likely that CST, which involves a bigger dissection, mobilization of the musculotendinous layer, increased incidence of seroma formation, and technical difficulty in perforator preservation, was the cause. Comparing the recurrence rates of the meshplasty and suture groups, which were both 32%, shows that mesh augmentation adds significantly more strength to hernia surgery than suture alone.

In their 2003 study, Lowe et al. examined 30 patients who had incisional hernias treated with CST and meshplasty. [13] The gender ratio in their series was equal, however it was 1:4 in ours, possibly due to the fact that 40% of our study group had an incisional hernia following gynecological intervention.

Few restrictions apply to our investigation. Our study's sample size was limited, lack of randomization, and accessibility to operating rooms were issues. It has been challenging to persuade the majority of patients in our tertiary care hospital—many of whom are from lower socioeconomic strata—to have a secondary surgery, especially one that would involve the family's primary provider of income. Even though it was laborious, a lengthy follow-up was completed by posting post-operative photos on social media without the patients having to come to the hospital.

Conclusion-

The midline abdominal incisional hernia fixed by CST enhanced with prosthetic mesh was found to be viable and superior to the standard primary repairs & mesh hernioplasties in our research of 30 patients. Although the treatment took longer than usual repairs, a solid and resilient abdominal wall was eventually created with little scarring. Higher BMI was discovered to be linked to more blood loss, longer operations, and seroma formation. There were some early problems, which were handled cautiously.

None of the instances had late complications and no patients needed ongoing ICU care. In order to avoid complications during definitive repairs and in emergency situations, monitoring of the pre- and post-operative IAP was proven to be important.

Conflict of Interest- None declared

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