

Evaluation of the Component Separation Technique for Treatment of Patients with Large Incisional Hernia

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Abstract

Background: Incisional hernia remains a frequent complication of abdominal surgery. Results of surgical repair are disappointing with recurrence rates of suture repair being in the range of 5–63% depending upon the type of repair used, with better results using mesh implantation. In extreme cases a large hernial defect exists with a “loss of abdominal domain”. In addition, the approximated rectus muscles under tension become hypoper fused leading to atrophy and increased chances of recurrence. For the management of such large hernias, interest has been generated in the “*Component Separation Technique*”. This technique relaxes abdominal wall by translation of muscular layers without severing the innervation and blood supply, with or without the mesh augmentation. This can accommodate for defects up to 25–30cm in the waistline. However, wound complications are frequent and reported in up to half of the patients. Thus, the study was planned in view of the potential benefits of “CST” and its capability to restore lost abdominal domain. **Methods:** The study was conducted on 20 patients with “Large Incisional Hernia” with defect size >5cm or with a surface area >50cm² operated upon with component separation. Outcome was measured over a follow up period of three months in terms of recurrence and other local complications. **Result:** There were 20 patients [3 men and 17 women; 70% cases above the age of 50years]. Mean defect size was 9.5cm [range = 6–20cm]. Average body mass index was 28.97kg/m² [range = 22–37kg/m²]. Mean duration of hospital stay was 9 days [range = 5–21 days]. Early complications occurred in 15% (3/20) cases and post-operative abdominal compartment or recurrence was not reported over a follow up period of 3 months. **Conclusions:** It is finally concluded that “Large Incisional Hernias” can be effectively treated by “Component Separation Technique”.

Keywords: Incisional Hernia, Component Separation Technique, Surgery

Introduction

The Incidence of incisional hernia, as a complication of abdominal surgery, has been reported in 2–20%¹⁻³ of operated cases. Nearly 4% of the patients undergoing laparotomy will go through additional surgery to repair an incisional hernia⁴. Out of the patients undergoing incisional hernia repair, strangulation or incarceration is the indication for repair in 17% of such patients⁵. The

cause is difficult to determine, but obesity, wound healing defects, multiple prior procedures, prior incisional hernias, and technical errors during repair may all be contributory.

Despite significant improvement in various fields of surgery, recurrence rates of 2–36%^{6,7} are reported. Mesh implantation is associated with several other complications, the rate being almost twice as high compared to suture repair⁸ which includes infections,

seroma or hematoma formation, and subsequently removal of the mesh.

In extreme cases, the size of incisional hernia can be so large that it could be insufficient and occasionally impossible to repair even with a mesh. In such cases of “loss of abdominal domain” simple reduction of hernial contents causes “abdominal compartment syndrome” resulting in decrease in cardiac output, and fall in renal, pulmonary and also cerebral function. Perfusion of the approximated rectus muscles under tension is impaired leading to atrophy and increased chances of recurrence.

“Component separation technique” has been introduced based on enlargement of abdominal wall surface by translation of muscular layers without severing the innervations and blood supply of the muscles. This was further developed by separation of the posterior rectus sheath from the rectus abdominis muscle and later by augmentation with mesh between rectus abdominis muscle and the posterior rectus sheath⁹⁻¹¹. With this technique, defects up to 25–30 cm in the waistline can be bridged.

However, wound complications are frequent¹² – hematoma, seroma and infections are reported to be in up to half of the patients. A few pitfalls during the CST have been pointed such as – avoiding wide skin excision, a thicker skin flap, avoid injury to internal oblique, suture to wound length ratio of >4. However, despite all these efforts, there is no perfect technique to deal with such complications.

2. Materials and Methods

The observation time based study describes the outcome of the surgery being performed routinely on patients admitted during the year 2015–16 with mid-line large incisional hernia at Dayanand Medical College, Ludhiana, India, after approval from ethics committee. The inclusion criteria consisted of hernial defect size measuring >5cms at its maximum width or >50cm² in its surface area in patients aged 18–70 years excluding those with evidence of immunosuppression or cardiac, renal or hepatic failure, pregnancy, peritonitis or enteric fistulae. The patients were followed up during the hospital stay as well as for a period of three months after discharge from the hospital. The clinical outcome in patients was measured in terms

of recurrence, wound infections, formation of seroma or hematoma and overall quality of life.

Patients were operated upon under general anesthesia. Antibiotic prophylaxis, in the form of Cefuroxime 1.5 gm I/V 20 min prior to incision and repeated if the surgery lasted > 2 hours, was given. The procedure was started by excision of scar and all previously implanted synthetic material (mesh or sutures). Complete adhesiolysis was performed. Then dissection in the subcutaneous space was started just ventral to the rectus sheath going up to about 1–2 cm lateral to linea semilunaris just lateral to the prospective site of external oblique incision, as determined by palpation of the thickness of the rectus muscle. These flaps were raised using diathermy, leaving the skin and subcutaneous layer as thick as possible. Then the actual relaxing incision was placed with a (new) scalpel, just lateral to the fore mentioned junction, confirmed by visualization of the direction of the exposed underlying muscle fibers of internal oblique which run perpendicular to the direction of fibres of external oblique. The incision proceeded cranially till above the costal margin, and caudally till inguinal canal. Now the external oblique muscle was separated from the internal oblique muscles till the approximate level of the posterior axillary line.

As the second step, the posterior rectus sheath was separated from the rectus abdominis muscle with an incision 1cm lateral to its medial border along the backside of the rectus abdominis muscle from subxiphoid to the arcuate line. Rectus sheath was now closed in the midline using polypropylene #1 interrupted sutures taking full thickness bites at least 3cm from the edge, placed no more than 1cm apart, taking care to keep the suture length: wound length ratio of at least 4:1. Non resorbable synthetic (polypropylene) mesh was placed over the musculo-aponeurotic layer (onlay), fixing it laterally to the lateral free edge of the incised external oblique muscle, cranio-caudally reaching beyond the suture line by at least 5cm. Meticulous hemostasis was achieved followed by bilateral insertion of suction drains and skin closure.

Post-operatively strict bed rest was advised for at least 3 days. Drains were allowed *in situ* till the 5th post-operative day or till the output dropped to <30 ml per day.

3. Observations and Results

This study was conducted on 20 patients with mid-line large Incisional Hernia aged from 40 to 70 years with majority (70%) of the patients above 50 years of age (Table 1). Females constituted 85% (17/20) of the study group.

Most of the patients in the study, 90% (18/20), were either overweight with BMI >25 or obese with BMI>30 (ranged from 22 to 37; Table 2).

Diabetes mellitus was the commonest comorbid condition (35%). Gynecological and obstetrical surgery (TAH and CS) was the most common (40%) reason

Table 1. Age wise distribution of patients

Age group (Years)	No. of patients	% age of total patients
18-40	01	5
41-50	05	25
51-60	05	25
61-70	09	45
Total	20	100

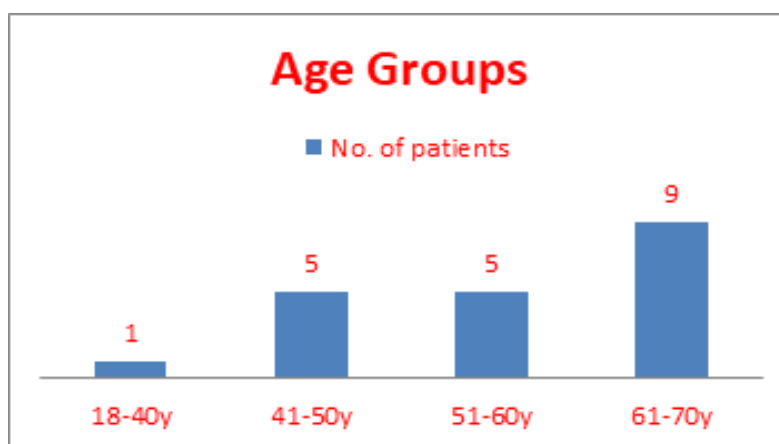


Table 2. BMI of the patients

BMI (kg/m ² BSA)	No. of patients	%age of patients
<25	2	10
25 to <30	8	40
30 to <35	8	40
35 and above	2	10
Total	20	100

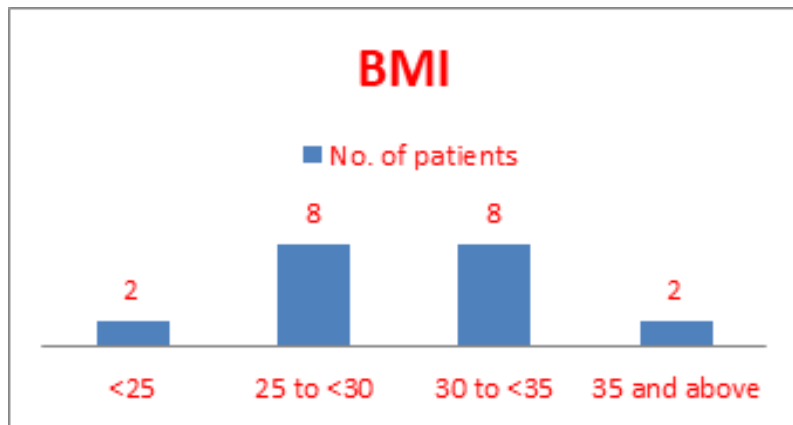
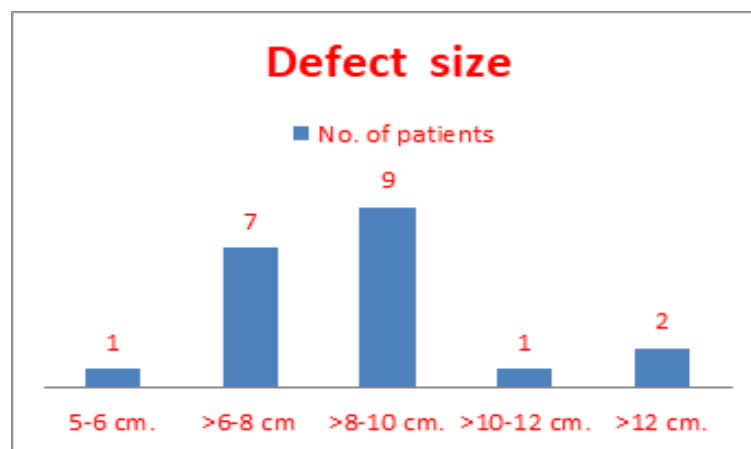


Table 3. Hernia size wise distribution of the patients

Hernia Size (max. width)	No. of patients	% age of patients
5-6 cm.	1	5
>6-8 cm	7	35
>8-10 cm.	9	45
>10-12 cm.	1	5
>12 cm.	2	10
Total	20	100



for the occurrence of hernia in our study, followed by exploratory laparotomy for perforation peritonitis (30%). Nearly half of the patients presented within 5 years of the primary surgery (range from 8 months to 28 years).

The defect size ranged from a 6cm to a maximum of 20cm with a mean of 9.5cm (Table 3). Most of the cases had a size from 6 to 10 centimeter (80%). Mesh placement was done in 19(95%) cases.

Table 4. Hospital stay time

Hospital stay time	No. of patients	%age of patients
1-7 days	5	25
8-14 days	14	70
More than 14 days	1	5

Table 5. Early post-op complications

Complication	No. of patients	%age of patients
Seroma	1	5
Superficial wound infection	2	10
Abdominal compartment syndrome and Hematoma	0	0

The operating time had a wide variation ranging from 1 hour to 5 and a half hours. 60% of cases were operated upon within 180 mins. Nearly three-quarters of the drains were out by the end of the 1st week of surgery, and all drains were removed by day 10. Hospital stay ranged from 5 to 21 days with a mean period of 9 days (Table 4). One patient was over stayed due to local wound infection.

Seroma and surgical site infections were seen in 5% (1/20) and 10% (2/20) cases, respectively and were managed easily (Table 5). Abdominal compartment syndrome was not encountered in the study. Even on follow up, none of the patients complained of any significant pain. There was no recurrence during the follow up period of three months. However, 4(20%) patients reported mild interference in daily activities like defecation, weight bearing or tying shoe-laces etc.

4. Discussion

The present study describes the outcome of a surgical technique used to manage large sized hernias by increasing the malleability of the abdominal wall with or without the use of mesh reinforcement. It has been demonstrated that the procedure is capable of maintaining the intra-abdominal pressure along with giving cosmetically good results and improving the quality of life. The abdomen

is given a rounded contour and as a large sized mesh is used, laxity of remaining wall is also improved. The patients can now have better fitting clothes and increase in self-confidence. In the study, about 10–15% cases developed minor short term complications which were managed conservatively with local wound care and antibiotics, hence proving to be a good option in case of obese patients with a thicker subcutaneous layer of fat. Geffen *et al.*¹¹ had reported that 58% of their patients had developed short term complications, which, however, were of a type that required no intervention. Geffen *et al.*¹¹ reported hematoma/seroma formation in 23 out of 95 (24%) of the patients, while Samir *et al.*¹³ found incidence of hematoma to be 6.3% and that of seroma to be 37.5%. The mean BMI of the patients in our study was 28.97 kg/sq meter body surface area. van Geffen *et al.*¹¹ reported the mean BMI of the patients in their series to be 28 kg/sq meter body surface area with the range being 22–36.9 kg/sq meter.

Laparotomy for intestinal perforation (30%) or obstetrical surgery (40%) was common causes of herniation. In the study by Samir *et al.*¹³ recurrent ventral hernia itself was the most common indication for repair of abdominal wall (45%), probably due to different population altogether.

In our study 60% of cases were operated upon within 180 mins (range of 1–5 hours). Geffen *et al.*¹¹ reported a mean time of 120 minutes (range 30–240 minutes), Samir *et al.*¹³ reported a time range from 130 to 210 mins, with a mean of 140.45 ± 33.065 min with an “onlay” mesh application. The technique itself doesn’t require too much of additional time and most of the variation is due to adhesiolysis.

None of the patients in our study had any recurrence either during the hospital stay or during a follow up of three months. Geffen *et al.*¹¹ found evidence of recurrence in 15 (15.7%) of their patients. Sailes *et al.*¹⁴ reported a recurrence rate of 18.5% over a period of 10 years, Hultman *et al.*¹⁵ reported a rate of 19.8% at a mean follow-up of 4.4 years. Samir *et al.*¹³ found no recurrence after a follow up of 12.2 months.

One problem with outcome analyses after hernia repair is the lack of a common starting point for patients. In other words, midline hernias can be of various sizes, and patients differ in age, weight, tissue quality, wounds, and the need for concurrent bowel surgery. In addition, multicenter studies involving many patients introduce the added variables of the abilities and judgment of the surgeons.

5. Summary and Conclusions

In this study it is finally concluded that “Large Incisional Hernias” can be effectively treated by using the “Component Separation Technique” as a safe, easy and quick option. It is justified as it allows closure of the defect where simple apposition of the margins is not possible and there were no recurrences over the follow up period. However, the study has some limitations in the form of a small sample size and limited short follow up period of only 3 months. The complications rate can be minimized by individualizing according to patients needs and as the experience with the procedure increases worldwide.

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How to cite this article: Aggarwal K. Evaluation of the Component Separation Technique for Treatment of Patients with Large Incisional Hernia. *Int. J. Med. Dent. Sci.* 2021; 10(2): 2011-2017.