

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

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 on the type of repair used, with better results using mesh implantation. 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 25–30 cm in the waistline. **Materials and Methods:** The study was conducted on 20 patients with “Large Incisional Hernia” with defect size >5 cm at its maximum width or with a surface area >50 cm² operated upon with Component Separation. Clinical outcome was measured over a follow-up period of 3 months from the surgery in terms of recurrence and other local complications. **Results:** There were 20 patients (3 men and 17 women; 70% of cases above the age of 50 years). Mean defect size was 9.5 cm (range = 6–20 cm). Average body mass index was 28.97 kg/m² (range = 22–37 kg/m²). Mean duration of hospital stay was 9 days (range = 5–21 days). Early complications occurred in 15% (3/20) cases and postoperative abdominal compartment or recurrence was not reported over a follow-up period of 3 months. **Conclusions:** Component Separation Technique is a safe, easy, and quick option for patients with large hernias.

Keywords: Component separation technique, incisional hernia, 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 for repair of incisional hernia.^[4] Out of all the patients undergoing incisional hernia repair, strangulation or incarceration is the indication for repair in 17% of such patients.^[5] 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 surgical techniques, recurrence rates following repair vary from 2% to 36%.^[6,7] Mesh implantation, though frequently used, is associated with several complications like infection, seroma or hematoma formation, the incidence being almost twice as high compared to suture repair.^[8]

In some cases, the size of incisional hernia can be so large that it could not be repaired even with a mesh. In such difficult cases of loss of abdominal domain, a simple reduction of hernial contents can cause abdominal compartment syndrome, resulting in decrease in cardiac output, and fall in renal, pulmonary, and also cerebral function.

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 sheath.^[9-11] With this technique, defects up to 25–30 cm in the waistline can be bridged. However, wound complications are frequent^[12]– hematoma, seroma and infections are reported to be in up to half of the patients.

Munish Trehan,
Kunwar Aggarwal,
Jaspal Singh,
Sanjeev Singla,
Ramneesh Garg¹

Departments of General Surgery and ¹Plastic Surgery, Dayanand Medical College and Hospital, Ludhiana, Punjab, India

Submitted: 04-Sep-2020

Revised: 02-Nov-2020

Accepted: 17-Dec-2020

Published : 26-Jan-2021

Address for correspondence:

Dr. Ramneesh Garg,

183- A, Sarabha Nagar,

Ludhiana - 141 001, Punjab, India.

E-mail: ramneeshgarg@yahoo.com

Access this article online

Website:

www.ijabmr.org

DOI:

10.4103/ijabmr.IJABMR_530_20

Quick Response Code:



How to cite this article: Trehan M, Aggarwal K, Singh J, Singla S, Garg R. Evaluation of the component separation technique for the treatment of patients with large incisional hernia. Int J App Basic Med Res 2021;11:40-3.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

Materials and Methods

The study was conducted on 20 patients admitted between January 2015 and June 2016, aged between 18 and 70 years with mid-line large incisional hernia measuring >5 cm at its maximum width or >50 sq cm in its surface area. Any patient with cardiac, renal, hepatic illness or with evidence of immunosuppression was excluded from the study. The patients were followed up during the hospital stay as well as for 3 months after discharge from the hospital. The clinical outcome in patients was measured in terms of recurrence, wound infection, seroma/hematoma formation, and overall quality of life.

Surgical technique

Patients were operated upon under general anesthesia. Antibiotic prophylaxis, in the form of Cefuroxime 1.5 g I/V 20 min before incision and repeated if the surgery lasted >2 h, was given. The procedure was started by excision of scar and all previously implanted synthetic material (mesh or sutures) [Figure 1]. 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 fibers 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 [Figure 2].

As the second step, the posterior rectus sheath was separated from the rectus abdominis muscle with an incision 1 cm 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 No1 interrupted sutures taking full thickness bites at least 3 cm from the edge, placed no more than 1 cm 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 5 cm [Figure 3]. Meticulous hemostasis was achieved followed by bilateral insertion of suction drains and skin closure [Figure 4].

Postoperatively, strict bed rest was advised for at least 3 days. Drains were allowed *in situ* till the 5th postoperative day or till the output dropped to <30 ml/day.

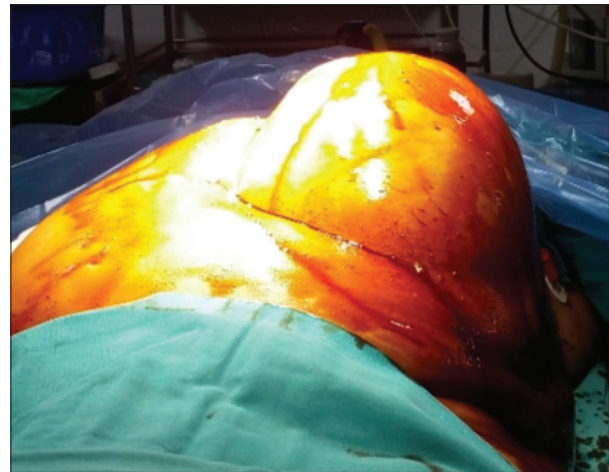


Figure 1: Large incisional hernia

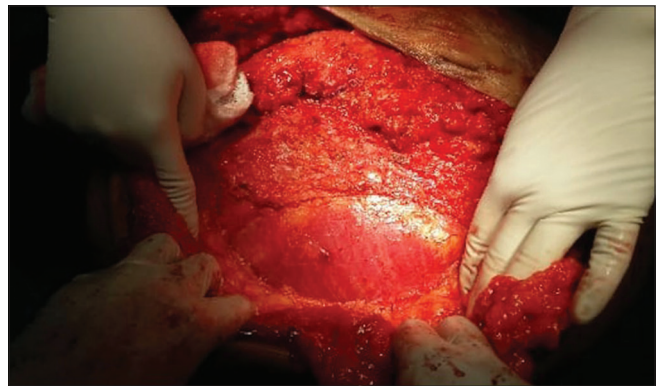


Figure 2: Intra-operative picture after reduction of hernia and abdominal wall component separation

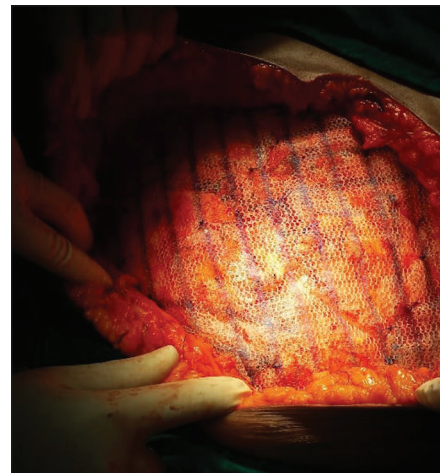


Figure 3: Placement of mesh after component separation

Results

This study was conducted on 20 patients, aged between 40 and 70 years (70% above 50 years), with large mid-line incisional hernia. Females constituted 85% (17/20) of the study group. About 90% of patients (18/20), were either overweight with body mass index (BMI) >25 or obese with BMI >30 (ranging from 22 to 37). [Table 1] Diabetes



Figure 4: Postoperative picture

mellitus was the most common comorbid condition (35%). Gynecological and obstetrical surgery (Total Abdominal Hysterectomy and Cesarean section) was the most common (40%) reason 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 6 cm to a maximum of 20 cm with a mean of 9.5 cm. Most of the cases had a size from 6 cm to 10 cm (80%). [Table 2] Mesh placement was done in 19 (95%) cases.

The operating time had a wide variation ranging from 1 h to 5 and a half hours. Sixty-percent of cases were operated upon within 180 min. 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. One patient overstayed 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. 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 3 months. However, 4 (20%) patients reported mild interference in daily activities such as defecation, weight bearing, or tying shoe-laces etc.

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. In the study, about 10%–15% of 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. Van Geffen *et al.*^[11] had reported that 58% of their patients had

Table 1: Body mass index of the patients

BMI (kg/m ² BSA)	Number of patients (%)
<25	2 (10)
25–<30	8 (40)
30–<35	8 (40)
35 and above	2 (10)
Total	20 (100)

BMI: Body mass index, BSA: Body surface area

Table 2: Hernia size-wise distribution of the patients

Hernia size (maximum width)	Number 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)

developed short-term complications, which, however, were of a type that required no intervention. Van Geffen *et al.*^[11] reported hematoma/seroma formation in 23 out of 95 (24%) of the patients, whereas 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 this study was 28.97 kg/sq m body surface area. Van Geffen *et al.*^[11] reported the mean BMI of the patients in their series to be 28 kg/sq m 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 this study, 60% of total cases were operated upon within 180 min. Van Geffen *et al.*^[11] reported a mean time of 120 min (range 30–240 min), Samir *et al.*^[13] reported a time range from 130 to 210 min, with a mean of 140.45 ± 33.065 min with an “onlay” mesh application.

None of the patients, in our study, had any recurrence either during the hospital stay or during 3 months follow-up. Van 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.

This study was undertaken at a time when component separation technique was beginning to get popularized. Over the years, this technique has withstood the test of time and is at present the most recommended and favored technique for large incisional hernias. A larger sample size and a comparative analysis with similar sized hernias treated without component separation technique would have added more value to the present study.

Conclusions

The component separation technique is a safe, easy, and quick option for patients with large incisional hernias. The complication rate can be minimized by individualizing according to patients needs and as the experience with this procedure further increases.

Ethical clearance

Study was conducted after approval from the Institutional Ethics Committee.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Mudge M, Hughes LE. Incisional hernia: A 10 year prospective study of incidence attitudes. *Br J Surg* 1985;72:70-1.
2. Lewis RT, Wiegand FM. Natural history of vertical abdominal parietal closure: Prolene versus Dexon. *Can J Surg* 1989;32:196-200.
3. Hoer J, Lawong G, Klinge U, Schumpelick V. Factors influencing the development of incisional hernia. A retrospective study of 2983 laparotomy patients over a period of 10 years. *Chirurg* 2002;73:474-80.
4. Noordzij PG, Poldermans D, Schouten O, Bax JJ, Schriener FA, Boersma E. Postoperative mortality in the netherlands: A population-based analysis of surgery-specific risk in adults. *Anesthesiology* 2010;112:1105-15.
5. Read RC, Yoder G. Recent trends in management of incisional herniation. *Arch Surg* 1989;124:485-8.
6. Korenkov M, Sauerland S, Arndt M, Bograd L, Neugebauer EA, Troidl H. Randomized clinical trial of suture repair, polypropylene mesh or autoderma; Hernioplasty for incisional hernia. *Br J Surg* 2002;89:1:50-6.
7. Toniato A, Pagetta C, Bernante P, Piotta A, Pelizzo MR. Incisional hernia treatment with progressive pneumo-peritoneum and retro-muscular prosthetic hernioplasty. *Langenbecks Arch Surg* 2002;387:246-8.
8. Burger JW, Luijendijk RW, Hop WC, Halm JA, Verdaasdonk EG, Jeekel J. Long term follow up of a randomized controlled trial of suture versus mesh repair of incisional hernia. *Ann Surg* 2004;240:578-83.
9. Ramirez OM, Ruas E, Lee Dellon A. Component separation method for closure of abdominal wall defects: An anatomic clinical study. *Plast Reconstr Surg* 1990;86:519-26.
10. De Vries Reilingh TS, van Goor H, Rosman C, Bemelmans MH, de Jong D, van Nieuwenhoven EJ, *et al.* Component separation technique for the repair of large abdominal wall hernias. *J Am Coll Surg* 2003;196:32-7.
11. Van Geffen HJ, Simmermadner RK, van Vroonhoven TJ, van der Werken C. Surgical treatment of large contaminated abdominal wall defects. *J Am Coll Surg* 2005;201:206-12.
12. Bleichrodt R, De Vries Reilingh TS, Malyar A, Van Goor H, Hansson B, Van der Kolk B. Component separation technique to repair large midline hernias. *Oper Tech Gen Surg* 2004;6:179-88.
13. Samir M, Hany M, Ibrahim M. Evaluation of component separation technique in the repair of complex large ventral hernia with large defects. *Egypt J Surg* 2015;34:272-5.
14. Sailes FC, Walls J, Guelig D, Mirzabeigi M, Long WD, Crawford A, *et al.* Synthetic biological mesh in component separation: A 10 yr. Single institution review. *Ann Plast Surg* 2010;64:696-8.
15. Hultman CS, Tong WM, Kittinger BJ, Cairns B, Overby DW, Rich PB. Management of recurrent hernia after components separation: 10-Year experience with abdominal wall reconstruction at an academic medical center. *Ann Plast Surg* 2011;66:504-7.