

A STUDY ON COMPONENTS SEPARATION TECHNIQUE IN THE REPAIR OF COMPLEX VENTRAL HERNIAS

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1.INTRODUCTION:

Ventral hernia occurs in approximately 0.5 to 1 % of the population. It can be primary or secondary to previous abdominal surgeries (incisional hernia). 2 to 11 % of laparotomy wounds develop into incisional hernias. Ventral hernia is repaired by the closure of the defect without tension, along with reinforcement with artificial prosthesis, which can be placed on the defect (onlay) or below the defect and above the peritoneum (sublay). Wide defects in large ventral hernia cannot be closed. Traditionally, such defects are not closed but bridged with artificial prosthesis (onlay, sublay, or intraperitoneal onlay). Non-closure of defects has significant physiological derangements. Repair of large ventral hernia is a challenge for even experienced surgeons, as there are large defects with large contents, often with loss of domain. The large defects were bridged by various plastic surgical procedures like myofascial flaps or free flaps with high recurrences and complications. More often, the bridging was done with artificial prosthesis, leaving the defects open. This was accomplished by either open surgery (onlay, inlay, sublay, or underlay) or laparoscopic intraperitoneal onlay meshes (IPOMs). However, non-closure of the midline had adverse effects on postural maintenance, respiration, micturition, defecation, and biomechanical properties, which have a profound impact on the patients' overall physical capacity and quality of life. The Component Separation Technique (CST) was first described by Ramirez et al. in 1990^[2]. It is very effective for reconstructing large or complex midline abdominal wall defects and it has the advantage of restoring the innervated dynamic abdominal wall integrity without producing undue tension on the repair. It can be performed to reconstruct a large abdominal wall defect without the need for mesh. Recurrence rates after the use of component separation technique ranged from 0% to 30%. Endoscopic-assisted CST was performed to save the perforators of the epigastric arteries and the results were comparable to the open technique. Despite the versatility of the CST and its low recurrence rates compared to the recurrence rate in the conventional repair of similar complex abdominal wall defects, the technique is still not popular in general surgical practice.

11.AIMS & OBJECTIVES:

To analyse the outcome of treatment of complex ventral hernias (defect ≥ 10 cm) by component separation technique (Transversus abdominis release), taking into account recurrence rate and postoperative complications.

11.1. MATERIAL AND METHODOLOGY:

The study was conducted on 40 patients with complex ventral hernias admitted under Department of general surgery in CHENGALPATTU GOVERNMENT MEDICAL COLLEGE AND HOSPITAL. Ethical committee clearance was obtained from the institutional ethical committee. This study was conducted between January 2020 and June 2021 for a period of 18 months. Before the study conducted informed consent was obtained from all the patients.

METHOD OF COLLECTION:

Study design: A descriptive study.

Sample size: 40 cases

Inclusion criteria: Patients between 18 to 75 years of age presented with complex ventral hernias (defect ≥ 10 cm).

Exclusion criteria:

1. Patients with strangulated and incarcerated hernias
2. Intra-abdominal malignancies
3. Severe cardio pulmonary disorders
4. Uncontrolled ascites
5. Major bleeding disorder

METHODOLOGY:

Forty patients with complex ventral hernias admitted at Chengalpattu Medical College & Hospital between Jan 2020 to June 2021 will be included in the study after applying inclusion and exclusion criteria. Detailed history and thorough clinical examination was done for each patient. Routine blood investigations were done. USG abdomen & CT abdomen were taken for all the patients to

know the number and size of the defect, content, and other abdominal pathology. After preop optimization and anesthetic fitness, patients were taken up for surgery (Transversus Abdominis Muscle Release TAR). Polypropylene mesh was used and fixed with 2-0 proline. Romovac suction DT was kept for all the patients.

In the post-op period, all patients were received intravenous antibiotics and adequate analgesics. An abdominal binder was advised for all the patients. Wound was inspected daily for Surgical site infection, Seroma formation, Skin necrosis, and Wound gapping. Drains were removed when the collection was less than 30 ml for 3 consecutive days. All the patients were discharged after complete ambulation and tolerating normal diet. Follow-up was done for one year.

The data were collected using predefined proforma and entered in Microsoft Excel 2019. Statistical analysis was done using SPSS 23.0. To describe the descriptive statistics, frequency analysis & percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables.

1V RESULTS AND DISCUSSION:

Reconstruction of large complex ventral hernias is still a major problem in surgical practice. Most of these defects cannot be closed primarily because the fascial edges of the defect are retracted far laterally into the flank. To overcome this problem, polypropylene mesh is widely used to bridge these defects. But it is associated with high wound morbidity and high recurrence rate. To address the shortfalls of the traditional repairs, posterior component separation (PCS) using transversus abdominis muscle release (TAR) was developed in 2006 by Novitsky^[22].

In our study, we have discussed the Transversus abdominis release procedure in the treatment of large complex ventral hernias. The postoperative complications assessed were:

- Wound discharge
- Wound gaping
- Flap necrosis
- Seroma and hematoma formation
- One-year recurrence rate.

In this study, the incidence of complex ventral hernia is more in males (57.5%) and greatest in the age group of 41-50 years. The mean age is 52.5 with Standard Deviation of 11.1.

In our study, 85% of the patients were affected by Incisional hernia and 15% of the patients were affected by Umbilical hernia. Among the total number of Incisional hernias, 6 patients (17.65%) were recurrent incisional hernias. The average defect size is 11.1 and SD is 1.3.

In our study, 62.5% of the patients had co-morbidities and 55% of the patients were diabetic. The average duration of surgery is 125.8 minutes with Standard Deviation of 19.4.

We observed postoperative complications like wound discharge in 22.5% of the patients, wound gaping in 7.5% of the patients, seroma in 10%, hematoma formation in 5% of the patients. None of the patients showed flap necrosis.

The average post-op hospital stay is 11 days with SD of 2. At the end of one year follow-up, recurrence is seen in only 5% of the patients.

In a review done by Pauli *et al.*, the outcome for TAR showed a wound complication rate of 3.4% - 31% and a recurrence rate of 1.1% - 7.3%. In our study recurrence rate is 5%.

In the largest case series of 428 consecutive TAR procedures by Novitsky YW, 80 (18.7%) surgical-site events occurred, of which 39 (9.1%) were SSIs. There was no case of mesh removal. Of 347 (81%) patients with at least 1-year follow-up (mean 31.5 months), there were 13 (3.7%) recurrences.

The recent systematic review by Cornette *et al.* included 22 studies with 1348 cases for open anterior approach and eight studies with 761 cases for posterior Component separation technique with TAR. They found comparable rates but significantly lower recurrence rates after TAR (5.3% vs. 11.9; $P < 0.001$).

V.CONCLUSION:

Abdominal wall reconstruction in complex ventral hernias represents a unique surgical challenge. In our study, we demonstrate that posterior component separation using transversus abdominis release with synthetic mesh provides a very effective repair with a low recurrence rate and less wound morbidity. In patients with large defects, TAR provides significant myofascial medialization and midline closure. This technique requires a thorough understanding of abdominal wall anatomy and technical details of the procedure. We recommend TAR as an effective surgical technique in the repair of complex ventral hernias.

REFERENCES:

1. Dan H, Shell IV, de la Torre J, Andrades P, Vasconez LO (2008) Open repair of ventral incisional hernias. *Surg Clin N Am* 88:61-83.
2. Ramirez OM, Ruas E, Dellon AL (1990) "Components separation" method for closure of abdominal-wall defects: an anatomic and clinical study. *Plast Reconstr Surg* 86:519.
3. Carbonell A M, C obb WS, C hen S M. Posterior components separation during retromuscular hernia repair. *Hernia*. 2008;12(4):359-362.
4. Carbonell A M. Interparietal hernias after open retromuscular hernia repair. *Hernia*. 2008;12(6):663-666.

5. Lipman J, Medalie D, Rosen MJ. Staged repair of massive incisional hernias with loss of abdominal domain: a novel approach. *Am J Surg*. 2008;195(1):84–88.
6. Mcadory RS, Cobb WS, Carbonell A M. Progressive preoperative pneumoperitoneum for hernias with loss of domain. *Am Surg*. 2009;75(6):504–508.
7. Moreno IG. Chronic eventrations and large hernias. Preoperative Treatment by progressive pneumoperitoneum-original procedure. *Surgery*. 1947;22:945–953.
8. Petersen S, Henke G, Zimmerman L, et al. Ventral rectus fascia closure on top of mesh hernia repair in the sublay technique. *Plast Reconstr Surg*. 2004;114(7):1754–1760.
9. Stoppa R. The treatment of complicated groin and incisional hernias. *World J Surg*. 1989;13(5):545–554.
10. Bachman SL, Ramaswamy A, Ramshaw BJ. Early results of midline hernia repair using a minimally invasive component separation technique. *Am Surg*. 2009;75:572–578.
11. Boyd JB, Taylor GI, Corlett R. The vascular territories of the superior epigastric and deep inferior epigastric systems. *Plast Reconstr Surg*. 1984;73:1–14.
12. Burger JW, Luijendijk RW, Hop WC et al. Long-term follow-up of a randomized controlled trial of suture versus mesh repair of incisional hernia. *Ann Surg*. 2004;249:578–585.
13. Cohen M, Morales R Jr, Fildes J, et al. Staged reconstruction after gunshot wounds to the abdomen. *Plast Reconstr Surg*. 2001;108: 83– 92.
14. de Vries Reiligh TS, van Goor H, Rosman C, et al. “Components separation technique” for repair of large abdominal wall hernias. *J Am Coll Surg*. 2003;196:32–37.
15. Espinosa-de-los-Monteros A, de la Torre J, Marrero I, et al. Utilization of human cadaveric acellular dermis for abdominal hernia reconstruction. *Ann Surg*. 2007;245:264–267.
16. Ewart CJ, Lankford AB, Gamboa MG, et al. Successful closure of abdominal wall hernias using the components separation techniques. *Ann Plast Surg*. 2003;50:269–274.
17. Fabian, Croce MA, Pritchard FE, et al. Planned ventral hernia; staged management for acute abdominal wall defects. *Ann Surg*. 1994;219(6):643–653. Flum DR, Horvath K, Koepsell T. Have outcomes of incisional hernia repair improved with time? A population-based analysis. *Ann Surg*. 2003;237:129–135.
18. Giotto JA, Chiaramonte M, Menon NG, et al. Recalcitrant abdominal wall Hernias: long term superiority of autologous tissue repair. *Plast Reconstr Surg*. 2003;112:106–114.
19. El-Mrakby HH, Milner RH. The vascular anatomy of the lower anterior abdominal wall: a microdissection study on the deep inferior epigastric vessels and the perforator branches. *Plast Reconstr Surg*. 2002;109:539–543.
20. Ramirez OM, Raus E, Dellon AL. “Components separation” method for closure of abdominal-wall defects: an anatomical and clinical study. *Plast Reconstr Surg*. 1990;86:519–526.
21. Novitsky YW, Elliot HL, Orenstein SB, Rosen MJ. Transversus abdominis muscle release: a novel approach to posterior component separation during complex abdominal wall reconstruction. *Am J Surg*. 2012 Nov;204(5):709–16. doi: 10.1016/j.amjsurg.2012.02.008. Epub 2012 May 16.
22. Novitsky YW. Posterior Component Separation via Transversus Abdominis Muscle Release: the TAR Procedure. In Novitsky YW (editor), *Hernia Surgery. Current Principles*. Switzerland: Springer International Publishing; 2016. p. 117–136.
23. Lowe JB 3rd, Lowe JB, Baty JD, et al. Risks associated with ‘components separation’ for closure of complex abdominal wall defects. *Plast Reconstr Surg*. 2003;111:1276–1283.
24. Luijendijk RW, Hop WC, van den Tol MP, et al. A comparison of suture repair with mesh repair for incisional hernia. *N Engl J Med*. 2000; 343:392–398.
25. Mathes SJ, et al. Complex abdominal wall reconstruction: a comparison of flap and mesh closure. *Ann Surg*. 2000;232:586–596.
26. Millennium Research Group. US markets for soft tissue repair 2009. Toronto, ON: Millennium Research Group, Inc. 2008.
27. Moon HK, Taylor GI. The vascular anatomy of the rectus abdominis musculocutaneous flaps based on the deep superior epigastric system. *Plast Reconstr Surg*. 1988;82(5):815–829.
28. Nagy KK, Fildes JJ, Mahr C, et al. Experience with three prosthetic materials in temporary abdominal wall closure. *Am Surg*. 1996;62:331–336.
29. Paul A, Korenkov M, Peters S, et al. Unacceptable results of the Mayo procedure for repair of abdominal incisional hernias. *Eur J Surg*. 1998;164:361–367.