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Research Article

Abdominal Wall Reconstruction for Complex Ventral Hernias: An Early Single-Center Experience

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ABSTRACT

Background: Abdominal wall reconstruction (AWR) has emerged as an essential surgical discipline for managing complex ventral and incisional hernias. The transverse diameter of the fascial defect is an important determinant of whether retro-muscular Rives–Stoppa repair alone suffices or advanced posterior component separation via transversus abdominis release (TAR) is required to achieve tension-free midline closure. This study presents our early single-center clinical experience evaluating outcomes, technical feasibility, and complication profiles in complex ventral hernia repairs.

Methods: A prospective observational study was conducted in the department of general surgery between October 2018 and may 2019 at NRIGH mangalagiri, guntur . Twelve adult patients (aged 18–60 years) presenting with complex, recurrent, or large incisional hernias with fascial defect transverse diameter 5–10 cm underwent open abdominal wall reconstruction. Patients underwent either a standard Rives–Stoppa retro-muscular repair or posterior component separation with TAR (unilateral or bilateral) based on defect size and myofascial tension. Primary outcome measures included operative duration, intraoperative peak inspiratory pressure changes, postoperative surgical site infection (SSIs), and early hernia recurrence were evaluated.

Results: Among the 12 patients operated upon, eight 66.7% underwent traditional Rives–Stoppa repair and four 33.3% underwent posterior component separation with TAR. High rates of comorbidity were observed, with obesity 83.3%and type 2 diabetes mellitus 66.7%were the most common co-morbidities. Mean operative duration was 160 minutes for Rives–Stoppa and 210 minutes for TAR. Postoperative complications included seroma in 3 patients 25%, superficial surgical site infection in 2 patients 16.7% , hematoma in 1 patients 8.3%, and postoperative ventilatory support requirement in 1 patient 8.3%. 2 patients experience non-specific abdominal wall pain Intraoperative peak inspiratory pressure increased from a baseline of 21 cm H_2O to 25 cm H_2O following fascial closure, without clinical evidence of abdominal compartment syndrome. No hernia recurrence was observed during a mean follow-up of 2.5 months. Patients resumed routine functional activities at approximately one month postoperatively. **Conclusion:** Rives–Stoppa retrorectus repair and posterior component separation with TAR are feasible approaches for the reconstruction of complex ventral hernias. Individualizing the surgical technique according to fascial defect dimensions and intraoperative tension facilitates midline restoration with acceptable early postoperative morbidity. However, larger studies with longer follow-up are necessary to establish long-term recurrence outcomes and durability.

Keywords: Complex Ventral Hernia, Abdominal Wall Reconstruction, Rives–Stoppa Repair, Transversus Abdominis Release, Posterior Component Separation, Retro Muscular Mesh.

INTRODUCTION

The repair of complex ventral and recurrent incisional hernias remains a formidable technical challenge in general and reconstructive surgery. Simple primary closure or bridged open repairs are accompanied by

unacceptably high rates of surgical site occurrences (SSOs) and long-term recurrence. Consequently, abdominal wall reconstruction (AWR) has evolved into a specialized subdiscipline focused on dynamic restoration of the linea-alba, reconstitution of abdominal core functionality, and placement of large sublay prosthetic meshes.

A critical surgical consideration is the transverse diameter of the abdominal fascial defect. While moderate defects (up to 4–5 cm) can often be reconstructed using the retrorectus Rives–Stoppa technique, larger transverse defects (4–10 cm) typically generate excessive closing tension. In such scenarios, posterior component separation maneuvers, specifically transversus abdominis muscle release (TAR), are required to gain substantial myofascial advancement and expand the retro-muscular pocket. This study documents our institutional experience over an 8-month period, examining the surgical decision-making, intraoperative parameters, and short-term perioperative outcomes of AWR.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective observational study conducted in the Department of General Surgery at NRIGH mangalagiri Guntur ,over an 8-month period from October 2018 to May 2019. Ethical committee clearance was obtained prior to study initiation, and written informed consent was acquired from all enrolled participants.

Patient Selection

- Inclusion Criteria: Patients aged 18 to 60 years of both genders diagnosed with complex ventral hernia, recurrent or re-recurrent incisional hernia, or large primary/incisional hernia with a transverse fascial defect measuring 5 to 10 cm. Only those who gave consent were included in this study.
- Exclusion Criteria: Patients with ASA physical status > III, strangulation and obstruction, enterocutaneous fistulas and stomas, transverse defect size > 10 cm, extreme obesity (BMI > 40 text{kg/m}2), or significant loss of domain.

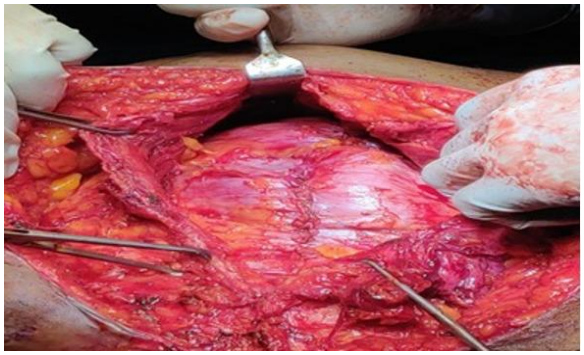
Preoperative Evaluation and Perioperative Protocol

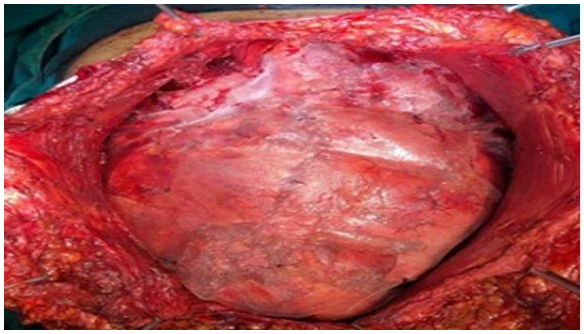
All patients underwent standard preoperative optimization including routine haematological and biochemical profiles, pre-anaesthetics clearance, pulmonary function testing (PFT), abdominal ultrasonography, and contrast-enhanced computed tomography (CECT) of the abdomen and pelvis to define defect anatomy and rectus abdominis muscle width. Procedures were conducted under general anaesthesia with or without epidural analgesia. Prophylactic intravenous antibiotics and analgesics were dosed according to patient body weight. Intraoperative airway mechanics specifically peak inspiratory pressure, were monitored to evaluate intra-abdominal tension variations before and after fascial closure.

Surgical Technique

1. Rives–Stoppa Retro-Rectus Repair

The hernia sac was identified, dissected, and reduced. The retro-rectus space was entered by making a vertical incision along the posterior rectus sheath within 1 cm of the medial linea-alba edge. The rectus abdominis muscle was elevated laterally off the posterior sheath until the linea semilunaris was identified, carefully preserving neurovascular bundles entering the lateral rectus border. If medial approximation of the posterior rectus sheaths was achievable without excessive tension, the posterior layer was closed in the midline using running absorbable sutures, followed by sublay placement of a macro-porous polypropylene mesh and midline restoration of the anterior fascia.

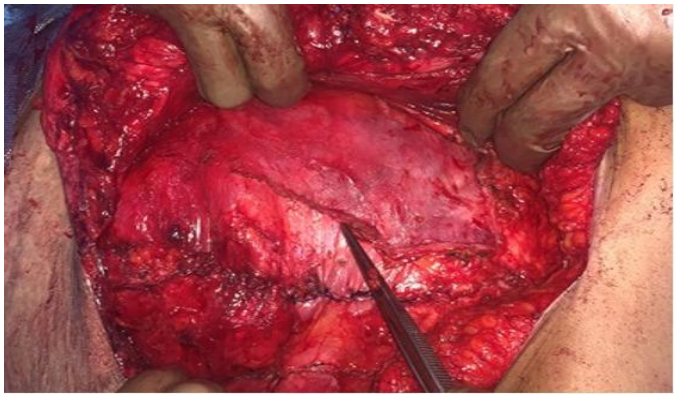


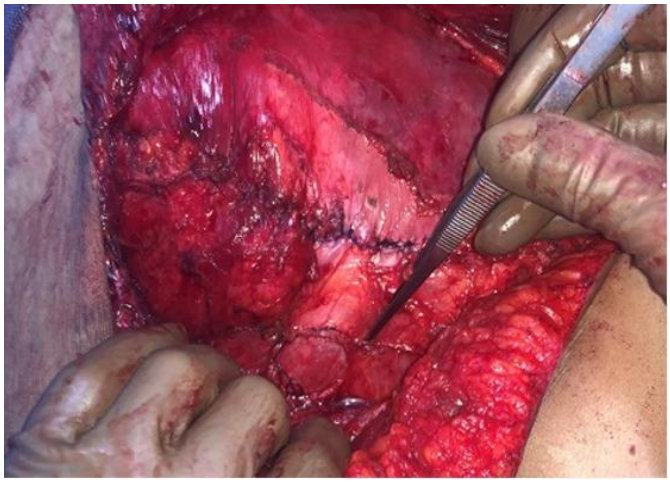


2. Posterior Component Separation with Transversus Abdominis Release (TAR)

When the defect width prevented tension-free re-approximation of the posterior rectus sheath via retro-rectus dissection alone, a posterior component separation with TAR was performed.

- The posterior rectus sheath was incised medial to the linea semilunaris to visualize the underlying muscular fibers of the transversus abdominis.
- Division of the transversus abdominis muscle was initiated in the upper abdomen, where the posterior rectus sheath is well-developed and muscular fibers are distinct. The lateral border of the psoas muscle served as an anatomic landmark.
- The dissection plane was extended into the preperitoneal and retromuscular space laterally towards the retroperitoneum, superiorly behind the costal margins up to the diaphragm, and inferiorly into the space of Retzius (clearing the symphysis pubis and Cooper's ligaments).
- Following unilateral or bilateral TAR, the visceral peritoneal-posterior fascial layer was closed with a running suture, a wide-coverage prosthetic mesh was positioned in the sublay position, closed-suction drains were placed, and the anterior rectus sheath/linea alba was reconstructed in the midline





Follow-Up Protocol

Patients were scheduled for clinical follow-up at 1 month, 3 months, and 6 months postoperatively. Evaluations were supplemented telephonically and conducted via outpatient department (OPD) visits. Total follow-up ranged from 3 weeks to 8 months (mean follow-up: 2.5months).

RESULTS

A total of 12 patients met the inclusion criteria and underwent open abdominal wall reconstruction during the study timeframe.

Patient Characteristics and Comorbidities

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Patient Characteristics and Comorbidities

The patient population exhibited high baseline metabolic and systemic risk factors:

- **Obesity**: 10 patients (83.3%)
- **Type 2 Diabetes Mellitus**: 8 patients (66.7%)
- **Chronic Obstructive Pulmonary Disease (Copd)**: 4 patients (33.3%)
- **Hypertension:** 3 patients (25.0%)
- **Hypothyroidism**: 2 patients (16.7%)
- **Ischemic Heart Disease (Ihd**): 1 patient (8.3%)

Operative Details

Of the 12 cases, 8 (66.7%) were successfully managed with Rives–Stoppa retro-muscular repair, while 4 (33.3%) required posterior component separation with TAR (including unilateral and bilateral releases).

- **Mean Operative Duration**:
- Rives–Stoppa group: 160 minutes.
- Posterior component separation with TAR group: 210 minutes.
- **Ventilatory Mechanics**: Intraoperative ventilator tracking demonstrated controlled elevations in peak inspiratory pressures following midline fascial restoration confirming acceptable compliance without abdominal compartment syndrome

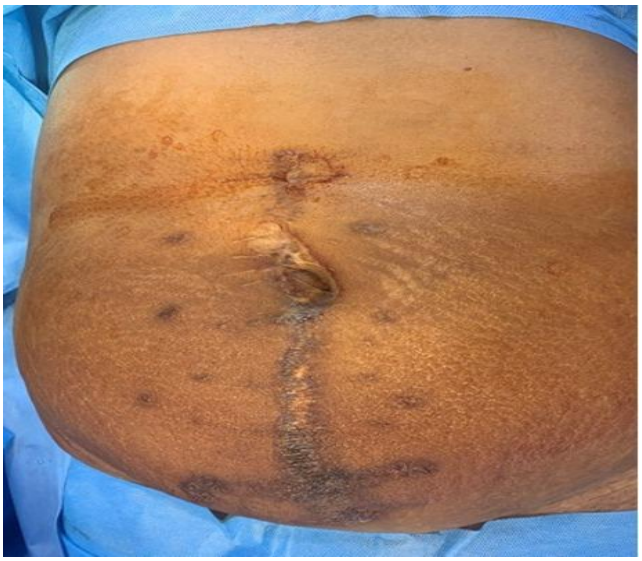
Postoperative Outcomes and Complications

Postoperative Morbidity and Surgical Site Occurrences were Tracked Through the Follow-Up Period:

Complication	Number of Patients (n=12)	Percentage (%)	Outcome
Seroma	**3**	25.0%	Managed conservatively / resolved
Surgical Site Infection (SSI)	**2**	16.7%	Superficial; responded to wound care and targeted antibiotics
Hematoma	**1**	8.3%	Managed conservatively
Postoperative Ventilatory Support	**1**	8.3%	Extubated successfully post-monitoring
Non-specific Abdominal Wall Pain	**2**	16.7%	Self-limiting within first 3 months
Hernia Recurrence	**0**	0.0%	None detected at mean 2.5 months follow-up

Patients returned to routine functional daily activities at an average of 1 month postoperatively.





DISCUSSION

The management of complex ventral hernias has shifted from bridging techniques to anatomic reconstructive strategies that emphasize restoration of the linea alba and retromuscular mesh reinforcement. Historically, the anterior component separation technique described by Ramirez offered fascial advancement but carried considerable wound morbidity (up to 40–50%) due to the disruption of perforator vessels during extensive subcutaneous flap elevation.

In contrast, posterior component separation via transversus abdominis release preserves abdominal wall blood supply and epigastric perforators while creating an expansive vascularized pocket extending from the subxiphoid region to the retroperitoneum. Majumder et al. demonstrated that incremental advancement during posterior component separation yields significant myofascial release—retro-rectus dissection accounts for approximately 7.5 cm of release, which advances to 11.2 cm after full transversus abdominis muscle division and retro-muscular dissection. This explains the utility of TAR in closing defects between 5 and 10 cm without requiring anterior subcutaneous dissection.

Our findings align with published literature comparing open anterior versus posterior component separation. Krpata et al. observed significantly higher wound morbidity with open anterior CST compared to posterior CST (48.2% vs. 25.5%, $p = 0.01$), along with higher recurrence (14.3% vs. 3.6%). Systematic reviews by Cornette et al. similarly highlighted reduced long-term recurrence rates in TAR (5.25%) relative to anterior component separation (11.9%, $p < 0.001$). Furthermore, series by Novitsky et al. and Winder et al. established the reproducibility and low recurrence rates (2.7%–3.7%) of the TAR procedure.

In our cohort, the mean operative duration was modest (160 minutes for Rives–Stoppa and 210 minutes for TAR), reflecting the initial learning curve associated with dissecting and identifying retro-rectus fascial layers. Despite high baseline comorbidities—with 83.3% of patients being obese and 66.7% having diabetes—the wound complication rate remained manageable (seroma in 25%, superficial SSI in 16.7%) without mesh infection, major wound debridement, or early recurrence.

Study Limitations

This study represents an initial institutional experience and carries inherent limitations:

- Limited sample size (n = 12) from a single center.
- Short duration of follow-up (mean 2.5 months), which restricts definitive evaluation of long-term hernia recurrence.
- Selective inclusion criteria that excluded active contamination, massive loss of domain, defects >10 cm, and morbid obesity (BMI >40 kg/m2.
- Absence of minimally invasive (laparoscopic/robotic) arms.

CONCLUSION

Abdominal wall reconstruction utilizing Rives–Stoppa repair and posterior component separation with transversus abdominis release (TAR) is a safe and reproducible approach for managing complex and recurrent ventral hernias. When tailored to fascial defect width and patient comorbidity, this approach provides reliable fascial medialization, durable sub-lay prosthetic support, and minimal early complications. Longer follow-up and larger prospective cohorts are planned to assess long-term myofascial durability and functional quality of life.

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