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Concomitant Repair of Parastomal Hernia in the Presence of Midline Ventral Hernia. How Do I Do It?

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1. Abstract

1.1. Introduction

Parastomal hernias (PHs) and midline ventral hernias are frequent complications following abdominal surgeries, particularly stoma creation, and laparotomies. These hernias are associated with significant morbidity, high recurrence rates, and impaired quality of life. Traditional repair methods, such as the keyhole and Sugarbaker techniques, often fall short due to technical limitations and suboptimal outcomes. There is a pressing need for a practical, effective, and minimally invasive approach to address both conditions simultaneously.

1.2. Aim of the Study

To propose a novel retromuscular technique for concomitant repair of midline and parastomal hernias that combines simplicity, efficacy, and safety. The approach avoids stoma relocation, incorporates tissue repair, and utilizes mesh positioned outside the peritoneum to minimize complications.

1.3. Methods

A retrospective analysis was conducted on 10 patients who underwent simultaneous midline and parastomal hernia repair using an open retromuscular technique between 2012 and 2022. The repair utilized a permanent polypropylene mesh placed in the retro-rectus plane. Patient demographics, surgical characteristics, and outcomes were assessed. Short-term complications (e.g., surgical site infections) and long-term outcomes (e.g., recurrence rates, quality of life improvements) were evaluated through clinical follow-ups and patient-reported metrics.

1.4. Results

The mean age of the cohort was 73 years, with a mean BMI of 26.98 kg/m². Recurrence rates were observed in 20% clinically and 30% radiologically during a 12-24-month follow-up. Complications included seromas (40%), hematoma (10%), and infections (10%), with 20% requiring reoperations. Quality of life improved significantly, with better postoperative pain scores and patient-reported satisfaction. The tailored mesh placement avoided complications related to stoma relocation and achieved durable reinforcement of the abdominal wall.

1.5. Conclusion

This novel retromuscular approach offers a safe and effective solution for managing concomitant midline and parastomal hernias. By combining tailored mesh placement with robust tissue repair outside the peritoneum, this technique minimizes complications and recurrence while maintaining stoma functionality. The method's simplicity, adaptability, and favorable outcomes support its potential as a practical option for complex abdominal wall reconstructions. Further studies with larger cohorts are needed to establish its broader application in hernia management.

2. Introduction

Parastomal hernias (PHs) are a prevalent and challenging complication following the creation of stomas for gastrointestinal or urinary diversion. Defined as the protrusion of abdominal contents through a defect adjacent to the stoma, PHs manifest with symptoms such as discomfort, difficulty in fitting ostomy appliances, bowel or urinary obstructions, and skin complications, significantly impairing patients' quality of life and contributing to increased healthcare burdens [1-3]. Up to 50% of stoma patients are estimated to develop a PH, with risk factors including advanced age, obesity (BMI > 25), diabetes, large fascial incisions (>35 mm), and elevated intra-abdominal pressure [4-6]. These hernias are particularly common following ileal conduit formation, often associated with radical cystectomy or gastrointestinal surgeries for conditions such as cancer or inflammatory bowel disease (IBD)[7-9]. Patients with PHs frequently face high recurrence rates and complex clinical challenges despite surgical repair [10-12].Midline ventral hernias compound the issue, often arising as postoperative complications following laparotomy. These hernias affect up to 20% of patients undergoing complex surgeries like radical cystectomy and present significant challenges due to their recurrence rates and associated morbidity [13-15]. Surgical management is tailored to hernia size and complexity: small defects (<4cm) may be treated with simple suture repairs, while larger or more complex cases necessitate advanced techniques such as retromuscular mesh placement or component separation [16-18]. However, even with contemporary advancements, large or recurrent hernias remain difficult to manage due to risks of infections and suboptimal outcomes [19-21].Parastomal hernia repair techniques are divided into open, laparoscopic, and robotic approaches, each with distinct advantages and limitations. The open keyhole repair is simple but has high recurrence rates due to poor tension distribution [7,9]. The Sugarbaker method, which lateralizes the bowel over the mesh, reduces recurrence but is technically demanding and may lead to bowel obstruction [11,16]. Open techniques are associated with longer recovery and higher wound morbidity, limiting their use in high-risk patients [8,16]. Laparoscopic repairs, including keyhole and Sugarbaker, reduce wound complications and hospital stays compared to open repairs [11,15]. The laparoscopic Sugarbaker offers low recurrence rates, though it requires advanced skills and longer operative times [11,16]. The Intraperitoneal Onlay Mesh (IPOM) method is minimally invasive but risks mesh erosion and adhesions [9,15]. The robotic Pauli technique, combining retromuscular mesh placement with transversus abdominis release (TAR), provides precise abdominal wall reinforcement with low recurrence rates [9,13]. However, robotic repairs are resource-intensive, technically complex, and require extended operative times[13,15]. The simultaneous repair of midline and parastomal hernias—or the reinforcement of the peristomal region in the absence of an existing hernia—is notably underrepresented in surgical literature. This gap is significant given the shared anatomical and pathological features of these hernias. Addressing both conditions during a single operation has the potential to simplify patient care, reduce the risk of multiple surgeries, and improve overall outcomes. However, there remains a lack of high-quality evidence and consensus guiding such approaches [13,20,22].To address this unmet need, we propose a novel surgical approach combining

midline and parastomal hernia repair using a retromuscular technique. Our method emphasizes simplicity, safety, and efficacy, offering several key advantages: (1) it is relatively easy to perform and less technically demanding, minimizing surgical strain; (2) it preserves the linea semilunaris and avoids unnecessary extension beyond critical anatomical regions; (3) by utilizing a retromuscolar approach, it maintains neural integrity; (4) it includes tissue repair around the peristomal region reinforced with sublay mesh positioned safely away from the bowel to reduce complications; and (5) most importantly, it addresses two critical problems-midline and parastomal hernias-simultaneously, eliminating the need for stoma relocation and its associated risks. This approach represents a promising advancement, providing a practical and comprehensive solution for managing complex abdominal wall defects [7,11,16].

3. Methods

Following approval from the HELSINKI committee, this study retrospectively analyzed all patients aged 18 years or older who underwent parastomal hernia repair in the presence of midline ventral hernia M1-M3 (EHS classification) using permanent propylene Ultrapro TM synthetic sublay mesh between 2012 and 2022 at our institution. The analysis focused exclusively on open retromuscular hernia repairs performed by our team; ensuring consistent technique and surgical expertise. Data were manually collected and corroborated with CHAMELEON program records, including patient schedules and detailed operative notes. Eligible patients were identified based on the following criteria: open retromuscular repair of parastomal hernia with synthetic sublay mesh. Additional data, including patient demographics (age, gender, BMI, and smoking status), American Society of Anesthesiologists (ASA) class, hernia grade, operative history, dimensions of the fascial defect, wound status, mesh type, and position, utilization of mesh fixation, and method of fascial closure, were retrieved from patient charts and the CHAMELEON system. Data collection extended to patient positioning, incision location, and hernia etiology, which were manually reviewed for accuracy. Short-term outcomes included surgical site infections (SSIs), surgical site occurrences (SSOs), and surgical site occurrences requiring procedural intervention (SSOPIs), assessed at 30 days post-surgery. Long-term outcomes were obtained through follow-up sessions and telephone interviews, focusing on clinical hernia recurrence, postoperative bulges, and patient-reported metrics. Hernia recurrence was diagnosed through physical examination or radiographic evaluation, and bulges were assessed using the Hernia Recurrence Inventory (HRI). Quality of life was evaluated using the Hernia-Related Quality of Life Survey (HerQLes), which measures abdominal wall function on a 0–100 scale, with higher scores indicating better function. Pain intensity was assessed using the PROMIS® Pain Intensity 3A short form, which quantifies pain severity over the prior week. All patients underwent a comprehensive preoperative evaluation, including a detailed history, physical examination, and non-contrast computed tomography (CT) scans. CT imaging was critical for distinguishing true hernias from pseudohernias caused by abdominal wall laxity secondary to intercostal nerve denervation. The scans also helped assess the hernia size, location, and extent of key anatomical structures, such as the Linea alba. Descriptive statistics, including frequencies, percentages, medians, interquartile ranges, means, and standard deviations, were used for baseline characteristics and outcomes

The open surgical algorithm followed at our institution included routine preoperative imaging to guide operative planning. The standardized retromuscular approach emphasized precise dissection, secure mesh placement, and preservation of anatomical integrity. Mesh density was chosen based on defect characteristics, with sublay positioning to optimize reinforcement while minimizing complications. The strategy avoided stoma relocation, instead focusing on robust reinforcement of the peristomal and midline regions.This structured methodology ensured consistent data collection, comprehensive evaluation of outcomes, and alignment with the best practices in hernia repair. It serves as a robust framework for understanding the complexities of parastomal hernia repair and evaluating the efficacy of different surgical approaches.

4. Our Surgical Technique

We present our technique for abdominal wall reconstruction (AWR) in cases of combined postoperative ventral hernia and the presence of a permanent stoma or a concomitant parastomal hernia. For patients with a temporary stoma that can be reversed, we prioritize restoring gastrointestinal continuity during or prior to the AWR procedure. However, in cases where the stoma is permanent, such as after abdominoperineal resection or radical cystectomy with an ileal conduit, we employ a modified Rives-Stoppa approach. This article describes a novel surgical technique for addressing complex parastomal hernias, emphasizing its practicality, precision, and effectiveness. The method combines meticulous dissection, robust closure techniques, and customized mesh placement to ensure functional and durable repair. This innovative approach has demonstrated excellent long-term outcomes, offering a valuable addition to the surgical management of challenging abdominal wall reconstructions.

The technique detailed here incorporates a sequence of precise surgical steps aimed at maximizing anatomical restoration while maintaining stoma functionality. This method is designed for reproducibility and adaptability, addressing the inherent complexities of parastomal hernias.

5. Methodology

1. **Patient Preparation and Positioning**

The procedure begins with positioning the patient in the prone position, facilitating optimal surgical access and visibility. A Foley catheter is inserted into the ileal conduit or ileostomy to aid in clear identification of anatomical landmarks.

2. **Initial Surgical Steps: Midline Incision and Adhesiolysis**

A midline incision is performed, followed by adhesiolysis to release any fibrotic attachments and ensure an unobstructed operative field. Careful handling of tissues is paramount to minimize trauma and maintain integrity.

3. **Rectus Complex Opening and Neurovascular Preservation**

The rectus abdominis complex is carefully opened, with meticulous dissection to preserve neurovascular bundles. This step ensures the maintenance of abdominal wall innervation and vascular supply.

4. **Parastomal Hernia Content Mobilization**

The hernia contents are released with precision, ensuring thorough retromuscular dissection extending superiorly, inferiorly, and laterally to the stoma. A meticulous technique is employed to prevent damage to surrounding structures.

5. **Posterior Leaf Repair**

The posterior leaf of the rectus abdominis sheath is reconstructed using sutures to provide a robust and durable closure. This repair forms the foundation for subsequent reinforcement.

6. **Midline Closure**

The midline incision is closed using a non-absorbable 2:0 suture in a stitch technique. This step secures the abdominal wall while ensuring proper tension distribution.

7. **Customized Mesh Placement**

A mesh is tailored by creating a slit to accommodate the stoma. It is positioned retromuscularly around the stoma and secured with sutures, reinforcing the abdominal wall without compromising the stoma's function. This step enhances the structural integrity of the repair while maintaining stoma patency. Please see Figures 1-5.

This innovative approach represents a pragmatic solution to the midline hernias in the presence of parastomal weaknesses or hernias; it faces the challenges posed by parastomal hernias. Unlike traditional methods, it emphasizes tailored mesh placement and precise anatomical restoration, offering a balance between reinforcement and functionality. The technique's simplicity and adaptability make it accessible to surgeons, while its robust design ensures durable outcomes. This novel method provides a straightforward yet effective strategy for parastomal hernia repair. Based on clinical experience, it has demonstrated good long-term results, reinforcing its value in the surgical management of complex abdominal wall reconstructions. Further studies and clinical trials are warranted to establish its efficacy in broader patient populations.

6. Results

Patient Demographics and Baseline Characteristics are shown in Table 1; In this prospective study, 10 patients underwent definitive

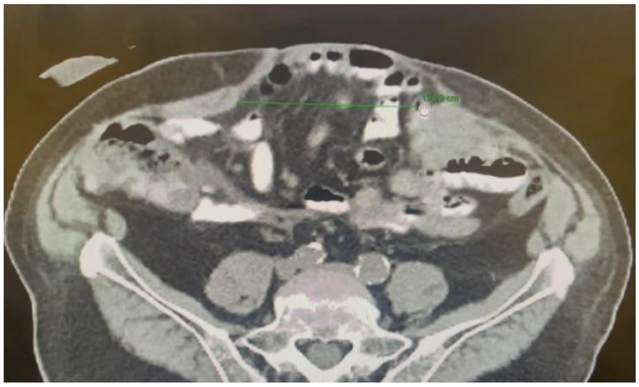

Figure 1: A CT scan shows a Midline hernia and no Parastomal hernia but a non-clinical bulge.

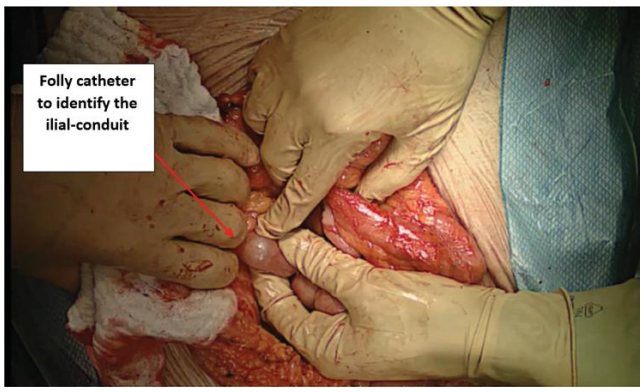

Figure 2: Introducing a folly catheter to identify better the Ilial-conduit.

Figure 3: Making a Slit in the Ultra-pro Mesh to put it around the Conduit.

abdominal wall reconstruction with simultaneous retromuscular repair for midline and peri-stomal region reinforcement. The cohort had a mean age of 73 years (range: 66-79) and a mean BMI of 26.98 kg/m² (range: 22-31). Most patients (70%) had undergone three or more previous abdominal surgeries, with radical cystectomy and ileal conduit reconstruction being the most common preceding procedure. Comorbidities included chronic obstructive pulmonary disease (20%), ischemic heart disease (20%),

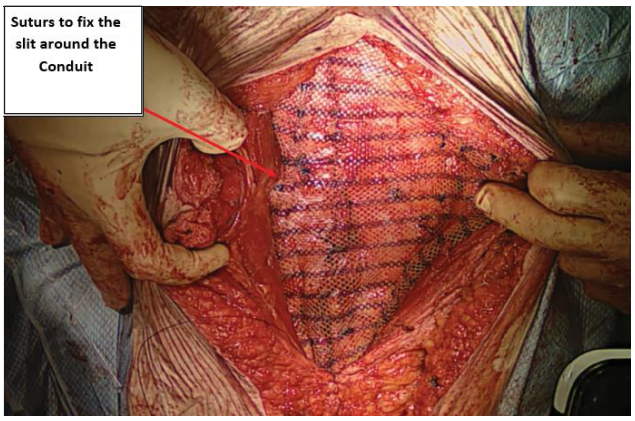

Figure 4: Sutures to fix the Mesh and reinforce the Slit of the Mesh after fascia tissue reinforcement with non-absorbabile suture.

Figure 5: Post-surgery, 3 months after – no Hernia bulge.

diabetes mellitus (10%), and active steroid use (10%). One patient (10%) was an active smoker at the time of surgery.Most patients (70%) presented with multiple defects in the midline, while 30% had single defects. The mean hernia dimensions were 11.5cm in length (range: 7-20cm) and 9.8cm in width (range: 3-16cm). According to the European Hernia Society classification, hernias ranged from M2 to M4 with W3 width classifications. The surgical field was classified as clean in 80% of cases and clean-contaminated in 20%. All patients received Ultrapro mesh placed in the retro-rectus position. No transversus abdominis release (TAR) procedures were performed Table 2. The median operative time was 4 hours (range: 165-360 minutes). The mean length of hospital stay was 6.4 days (range: 4-10 days). All patients received postoperative pain management through IV patient-controlled analgesia, with no requirement for epidural analgesia.Early postoperative complications included surgical site seroma in 4 patients (40%), surgical site hematoma in 1 patient (10%), and surgical site infection in 1 patient (10%). Two patients (20%) required readmission and subsequent reoperation. The follow-up period ranged from 12 to 24 months. Clinical hernia recurrence was observed in 2 patients (20%), while radiological recurrence was detected in 3 patients (30%). Two patients developed radiological and clinical recurrence during the follow-up period. Table 3; The first patient, aged 78 years with a BMI of 31.9 kg/m², developed a parastomal recurrence at 14 months post-surgery. This patient had three previous surgeries and experienced a postoperative seroma. The second patient, aged 66 years with a BMI of 25.0 kg/m², developed a parastomal recurrence at 12 months post-surgery. This patient was an active smoker with five previous surgeries and experienced a surgical site infection postoperatively Table 4.Quality of Life Outcomes Postoperative pain scores showed significant

improvement, with median HerQLes and PROMIS® pain intensity scores improving by 34 points and 17.5 points respectively from baseline. In terms of patient satisfaction, three patients reported high satisfaction with the procedure, two were moderately satisfied, and one expressed regret due to poor overall condition and oncological pain.

7. Discussion

Parastomal hernias represent a significant challenge in stoma management, with an incidence of up to 50% among stoma patients. These hernias impact the quality of life due to symptoms such as discomfort, appliance difficulties, and risks of bowel obstruction. The recurrence rates following repair remain high, attributed to factors like increased intra-abdominal pressure, obesity, and suboptimal tension distribution in traditional repair techniques [1-3]. Various approaches, such as keyhole, Sugarbaker, and laparoscopic repairs, have been explored in the literature. Keyhole repair, while straightforward, is associated with high recurrence rates due to inadequate reinforcement around the stoma [7,9]. Conversely, the Sugarbaker technique offers lower recurrence rates but is technically demanding and associated with complications such as bowel obstruction [11,16].Studies focusing on ileal conduit patients, particularly following radical cystectomy, highlight the vulnerability of these patients to parastomal hernias. Prophylactic mesh placement during initial surgery has been shown to reduce hernia formation; however, mesh-related complications, such as erosion and infection, remain a concern [13-16]. In our study, the retromuscular repair technique achieved comparable recurrence rates (20% clinical and 30% radiological) to those reported in other studies, affirming its efficacy and safety [10-13].Midline ventral hernias, common after complex abdominal surgeries, pose a challenge due to their high recurrence rates and association with comorbidities such as obesity and chronic pulmonary disease [13-15]. Traditional repairs include simple suture closure, onlay mesh repair, and retromuscular approaches. Simple suture repairs are limited to small defects and have high recurrence rates, while onlay repairs, although technically less demanding, are associated with higher infection rates and reduced durability [16,9]. Retromuscular mesh placement, such as the Rives-Stoppa technique, is considered the gold standard for larger defects due to its robust reinforcement of the abdominal wall while preserving critical structures [7,9,16]. The coexistence of parastomal and midline hernias presents unique challenges, including anatomical complexity and the need to preserve stoma functionality while addressing multiple defects [13,20,22]. Simultaneous repair offers the advantage of reducing the need for multiple surgeries but requires meticulous planning to minimize tension and avoid stoma relocation. Techniques combining retromuscular repair with tailored mesh placement have shown promise in achieving durable outcomes while addressing both defects [7,9,16]. Our approach, involving a retromuscolar repair, avoids stoma relocation, reducing the associated morbidity and complications. By tailoring the mesh around the stoma and reinforcing both midline and peristomal defects, this technique provides a comprehensive solution. The mesh positioning in the retromuscular plane optimizes reinforcement while minimizing the risks of erosion and adhesions [8,11,16]. Studies focusing on ileal conduits post-radical cystectomy demonstrate high recurrence rates for parastomal hernias, with many authors advocating for prophylactic mesh placement. Liedberg et al. reported a reduction in hernia incidence with lightweight mesh but highlighted the risks of infection and erosion in long-term follow-ups[14,15]. Our findings align with these studies, with comparable recurrence rates and a focus on mesh safety. Unlike studies advocating for stoma relocation, our approach prioritizes preservation of the stoma's location while achieving reinforcement through tailored mesh placement.The retromuscular repair technique utilized in our study offers several advantages over traditional approaches. By employing the retro

Table 1: Demographics and comorbidities.

Characteristic	Value (n=10)
Gender:	
Male: Female	02:08
Mean age (range)	73 years (66-79)
Previous ventral hernia repair	0
Mean BMI (kg/m²) (range)	26.98 (22-31)
Comorbidities	
Diabetes	1/10 (10%)
COPD	2/10 (20%)
IHD	2/10 (20%)
Active steroid use	1/10 (10%)
Active smoker	1/10 (10%)
Operation leading to hernia	Radical cystectomy with ileal conduit
Number of abdominal operations before hernia repair	
1	1/10 (10%)
2	2/10 (20%)
>3	7/10 (70%)
COPD- Chronic obstructive pulmonary disease	
IHD- Ischemic heart disease	

Table 2: Hernia Characteristics.

Patients	n=10
Type of defect:	
multiple	7/10 (70%)
single	3/10 (30%)
Hernias mean length in cm (SD)	11.5 (7-20)
Hernias mean width in cm (SD)	9.8 (3-16)
Surface area (cm²)	Not specified
EHS classification	M2-M4, W3
Surgical field	
Clean	8/10 (80%)
Clean-contaminated	2/10 (20%)
Mesh properties and position	Ultrapro, Retro-rectus
TAR	Not performed
LOS days (range)	6.4 (4-10)
LOS -Length of stay	
TAR- transversus abdominis release	

Table 3: Perioperative outcomes and recurrence rate.

Follow-up Duration (months)	12-24
Surgical site hematoma	1/10 (10%)
Surgical site infection	1/10 (10%)
Surgical site seroma	4/10 (40%)
Re-admission	2/10 (20%)
Re-operation	2/10 (20%)
Recurrence	
Parastomal (Clinical)	2/10 (20%)
Radiological	3/10 (30%)

Table 4: Patients with Recurrence.

	Patient 1	Patient 2
Gender	M	M
Age	78	66
Smoker	No	Yes
Steroid	Former	No
BMI	31.9	25
Previous Surgeries	3	5
Hernia Position	Midline	Midline
Initial Hernia Defect Size (cm)	15x20	16x22
Fascial Closure	Yes	Yes
Initial Repair Mesh Type	Ultrapro	Ultrapro
Index Surgery Postoperative Complications	Seroma	SSI
Time to Recurrence (months)	14	12
Recurrence Size	Not specified	Not specified
Recurrence Site	Parastomal	Parastomal

muscular method, we provide robust abdominal wall reinforcement while preserving neural and vascular integrity. Tailored mesh placement ensures functional outcomes and minimizes complications, offering a viable solution for managing concomitant midline and parastomal hernias. Our recurrence rates, within the range reported in the literature, affirm the method's reliability. However, the study's limitations, including its small cohort size and short follow-up duration, necessitate further research to validate these findings.In conclusion, our modified retromuscular approach offers an innovative and practical solution for managing complex abdominal wall defects, effectively addressing both midline and parastomal hernias without the need for stoma relocation. This technique combines simplicity and precision, preserving key anatomical structures while providing robust reinforcement with sublay mesh safely positioned away from the bowel. By resolving both defects simultaneously, it reduces surgical strain and avoids the complications associated with stoma relocation. With promising outcomes and acceptable recurrence rates, this approach represents a significant advancement in hernia repair. However, further studies with larger patient populations and extended follow-up are needed to establish its place as a standard method in abdominal wall reconstruction.

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