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Prophylactic drainage does not appear to be necessary in robotic-assisted eTEP Rives–Stoppa, retro-rectus retromuscular hernia repair

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Abstract

BACKGROUND: The role of prophylactic drains in retromuscular ventral hernia repair remains controversial. Although drains have traditionally been used to prevent seroma or hematoma formation, evidence regarding their necessity in minimally invasive robotic extended totally extraperitoneal (eTEP) Rives–Stoppa (RS) repairs is limited. This study evaluates the need for prophylactic drain placement following robotic-assisted eTEP RS hernia repair.

METHODS: A retrospective review of 53 patients who underwent robotic-assisted eTEP RS hernia repair at a single high-volume hernia center between July 2021 and December 2022 was conducted. No prophylactic drains were placed. Postoperative evaluation included 30-day follow-up visits, and computed tomography (CT) scans were obtained 30–60 days postoperatively, which were reviewed for retromuscular fluid (RMF) accumulation and classified by severity.

RESULTS: Of the 53 patients, 41 (77%) underwent postoperative CT scanning. Among these, 27 (66%) had no RMF, 9 (22%) had minimal RMF, 4 (10%) had moderate RMF, and 1 (2%) had large RMF. All fluid collections resolved spontaneously within approximately 5.5 months without intervention. No cases of infection, seroma-related morbidity, or recurrence were identified during the follow-up.

CONCLUSION: Prophylactic drain placement may not be necessary in robotic-assisted eTEP RS hernia repair. Most patients in this series demonstrated no or minimal postoperative fluid accumulation, and all observed collections resolved without intervention. These findings support omitting routine drain use in robotic eTEP RS repairs.

Keywords:

eTEP, prophylactic drain, retromuscular hernia, Rives–Stoppa, robotic hernia repair, robotic surgery, seroma, ventral hernia

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Introduction

Ventral hernias are a common surgical pathology that may occur following trauma, prior operations, and increased intra-abdominal pressure. There is a wide range of options in the surgical management of ventral hernias. It has been well established that hernia repair with a prosthetic mesh significantly reduces recurrence rates when compared to primary repair without a prosthetic mesh.[1-7] Open ventral hernia repairs are often performed using the Rives–Stoppa (RS) technique, where the mesh is placed in the retromuscular space behind the rectus abdominus muscle. A retromuscular repair offers a robust vascular space for mesh integration with a lower complication profile compared to other methods, such

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Figure 1: Computed tomography scan demonstrating minimal (A), moderate (B), and large (C) retromuscular fluid collections. Arrows indicate fluid accumulation

as onlay repair.[8,9] Minimally invasive laparoscopic repairs, such as intraperitoneal onlay mesh, were later developed, but they led to problems with pain related to fixation methods as well as intestinal obstruction and erosion issues due to placement of the mesh within the peritoneal cavity. Extended totally extraperitoneal (eTEP) is a minimally invasive approach that uses the RS technique to provide a retromuscular repair without the need for a large incision.

Prophylactic drain placement has been traditionally employed in ventral hernia repairs to prevent complications such as seroma or hematoma. Several studies have found that this is a safe and effective way to prevent these complications without increasing the infection rate.[10,11] Others have found that prophylactic drain placement may not be necessary, suggesting no clear correlation between drain duration and the incidence of seromas or wound infections.[12,13] The decision for prophylactic drainage remains controversial, and limited research addressing drain placement for robotic eTEP ventral hernia repair is available. Historically, a subset of patients undergoing retromuscular repair at our institution has presented postoperatively with retained hematomas or seromas that were clinically undetectable in the early postoperative period. These collections can be clinically difficult to detect, particularly in patients with an elevated body mass index. As a result, we systematically imaged patients during a defined postoperative period to assess for symptomatic or asymptomatic retromuscular fluid (RMF) accumulation. The primary objectives of this study were to characterize postoperative changes within the retromuscular tissue plane and evaluate the necessity of drain placement for this specialized type of minimally invasive hernia repair.

Materials and Methods

A total of 53 patients undergoing hernia repair surgery at a high-volume hernia center by two surgeons from July 2021 to December 2022 were evaluated. All patients underwent a robotic eTEP retro-rectus dissection with single-side docking. A mid-weight uncoated polypropylene mesh was used for all patients without fixation. In-person 30-day postoperative visits were conducted. Patients were offered computed tomography (CT) scans between 30 and 60 days postoperatively, which were reviewed for the presence of RMF accumulation.

CT scans were classified according to the severity of RMF: no RMF, minimal RMF, moderate RMF, or large RMF. Minimal RMF was defined as the fluid being limited to the midline posterior linea alba or retro-umbilical area [Figure 1A]. Moderate RMF was defined as the fluid extending behind the rectus muscle, being less than 1 cm in thickness [Figure 1B]. Large RMF was defined as the retro-rectus fluid being greater than 1 cm in thickness [Figure 1C]. If RMF was present, patients were offered a repeat CT scan to assess for resolution.

Results

Among the 53 patients, the average hernia defect size was 13 cm craniocaudal × 6 cm wide, and the average mesh size used was 32 cm × 18 cm. Thirty-six out of 53 patients (68%) underwent abdominal CT scan between 30 and 60 days postoperatively. Five patients (9%) visited the emergency room within 2 weeks of the operation due to abdominal pain and received CT scans at that time, none of which revealed RMF. A repeat CT scan was not performed at the 30-day postoperative visit for these specific patients. Nine patients (17%) declined follow-up CT but denied symptoms at the postoperative visit. Three patients (6%) did not attend the 30-day follow-up visit [Table 1].

Of those who underwent CT scans (41 patients), 27 (66%) had no RMF, 9 (22%) had minimal RMF, 4 (10%) had moderate RMF, and 1 (2%) had large RMF. All patients with minimal or moderate RMF who underwent follow-up CT demonstrated complete resolution of the postoperative fluid. The single patient with a large RMF also showed complete resolution by 2 months [Table 2]. Patients without follow-up imaging were contacted by phone and reported no complications, symptoms, or wound issues.

Table 1: Patient follow-up and compliance

Criteria	Number of patients	Percentage (%)
Total patients	53	100
Attended 30-day postoperative visit	50	94
Missed 30-day postoperative visit	3	6
Underwent 30–60 day postoperative CT	36	68
Declined CT, but asymptomatic	9	17
Visited ER within 2 weeks (no RMF)	5	9

CT = computed tomography, RMF = retromuscular fluid. , ER = emergency room

Table 2: Retromuscular fluid (RMF) incidence and resolution

RMF severity	Number of patients	Percentage (%)	Resolved
No RMF	27	66	N/A
Minimal RMF	9	22	Yes
Moderate RMF	4	10	Yes
Large RMF	1	2	Yes

Discussion

The decision to use prophylactic drains for ventral hernia repair using a retromuscular technique remains debated. Retromuscular repairs are more forgiving in the setting of seroma formation compared with onlay repairs; however, due to the potential effects on mesh integration, many surgeons still prefer drain placement. For smaller retromuscular repairs limited to the retrorectus space, data are limited and conflicting.[10-13] More data are needed to determine the true need for drains following these repairs.

Our findings demonstrate that most patients undergoing a robotic eTEP RS repair did not develop an RMF collection, even without prophylactic drain placement. Of those who developed a fluid collection, resolution was evident in all of them within 6 months postoperatively. Fluid collection was not associated with significant morbidity in our patients. Based on these findings, we do not recommend routine CT imaging in asymptomatic patients. Additionally, these data provide further evidence that routine drain placement may be unnecessary in selected patients undergoing eTEP RS repair.

Miller *et al*.[11] reported that drain placement in retromuscular ventral hernia repair was associated with lower rates of seroma formation, while rates of superficial surgical site infection and surgical site occurrences requiring procedural intervention were similar between patients with and without drain placement. These findings suggest that postoperative fluid collections following retromuscular hernia repair do not necessarily translate into increased wound morbidity. Notably, patients with drain placement experienced longer hospital stays compared with those without drain placement. Along with improved patient comfort, these findings represent the potential advantages of omitting routine drain placement in selected patients.

Our study demonstrates that the vast majority of patients do not develop RMF collections following eTEP RS repair, and those that do seem to resolve. This observation is consistent with the findings of Miller *et al*.,[11] who reported seroma and hematoma rates of 15.17% and 1.90%, respectively, in patients managed without drain placement.

A recent systematic review and meta-analysis by Marcolin *et al*.[10] demonstrated seroma rates of 15.86% in patients without drain placement compared with 6.01% in those with drain placement.[12] Despite this difference, no statistically significant difference was observed in surgical site occurrences requiring procedural intervention. While a theoretical risk of complications related to seroma formation exists, the available evidence supporting clinically meaningful adverse outcomes remains limited. This is further supported by data from Wilters *et al*.,[14] who found no significant differences in postoperative complications, including fluid collections, between patients undergoing eTEP hernia repair with or without drain placement.

There are some limitations to our study. Ideally, having follow-up CT imaging at the same postoperative time intervals for all patients would be valuable; however, patient compliance with postoperative visits remains unpredictable. A postoperative CT scan was not performed in every patient included in this study, which potentially leads to the underestimation of the true incidence of asymptomatic RMF. Despite this limitation, the impact of fluid accumulation up to 6 months postoperatively did not have a significant impact on patient morbidity or repair of the hernia. Evaluation of the long-term durability of the repair requires further investigation.

Conclusion

Patients undergoing robotic eTEP RS hernia repair without prophylactic drains did not develop persistent postoperative seromas or hematomas. These results suggest that drains may be unnecessary in reducing postoperative seromas following robotic eTEP RS hernia repair.

Author contributions

Conceptualization: AM, RJ, and IA; methodology: AM, RJ, and IA; data collection: AM, MH, and KA; formal analysis: AM, RJ, and IA; writing—original draft: AM,

MH, IB, KA, and AB; writing—review and editing: IB, RJ, and IA.

Ethical policy and institutional review board statement

This study received ethical approval from the Corewell Health East William Beaumont University Hospital IRB (IRB #2023-100) on 04/2023. All patient information was de-identified, and patient consent was not required.This study was conducted in accordance with the ethical standards of the institutional and national research committees and with the 1964 Declaration of Helsinki and its later amendments.

Declaration of patient consent

All patient information was de-identified and patient consent was not required.

Data availability statement

The data underlying this article cannot be shared publicly due to institutional policy, but are available from the corresponding author upon reasonable request.

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Conflicts of interest

There are no conflicts of interest.

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Not applicable.

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