

An Institutional Review: Evaluating the Effectiveness of Novel Regenerative Medicine Techniques in a Multidisciplinary Approach for the Treatment of Enterocutaneous Fistulae (ECF)

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ABSTRACT

INTRODUCTION

Enterocutaneous fistulae (ECF) are complex, heterogeneous complications often resulting from prior abdominal surgeries, inflammation, malignancy or radiation. Their management remains challenging due to high morbidity, risk of sepsis, and nutritional compromise. Quality of life is negatively impacted in this patient population. Conventional treatments frequently result in prolonged hospital stays and inconsistent outcomes. Recent advancements in regenerative medicine and the integration of multidisciplinary strategies, particularly interventional radiology (IR), endoscopy, and imaging-guided procedures, offer new therapeutic avenues. This institutional review evaluates the safety, feasibility, and outcomes of such approaches in the management of ECF.

METHODS AND PROCEDURES

This IRB approved, single-institution retrospective study (July 2024–September 2025) included 13 patients with postoperative ECF managed by a multidisciplinary team involving gastroenterology, general surgery, interventional radiology, and regenerative medicine. Treatment plans were individualized using cross-sectional imaging, fluoroscopic fistulography, and endoscopic evaluation. Therapeutic modalities included autologous biologic scaffolding (platelet-rich plasma, flowable biological wound matrix, fibrin glue), surgical debridement, endoscopic fistula closure, and fluoroscopic percutaneous interventions. Clinical variables and fistula characteristics including etiology, duration (short <4 weeks vs. long >4 weeks), output (low <500 mL/day vs. high >500 mL/day), location, size, complexity, and presence of bowel mucosa were evaluated.

RESULTS

13 patients (mean age 56 years; 65% female) underwent intervention for postoperative enterocutaneous fistulae. High-output fistulae (>500 mL/day) were observed in 58% (n = 7), and bowel mucosa present in 33% (n = 4). The mean fistula duration was 210 days (median, 180; range, 31–720), with 1 patient presenting at 4 weeks (31 days). Complete closure was achieved in 69% (n = 9) within a median of 7 days (range, 1–21). 1 patient demonstrated partial response with marked reduction in output, while 25% (n = 3) required surgical intervention for persistent high-output fistulae. Complications included sepsis requiring readmission (n = 1) and cellulitis treated with oral antibiotics (n = 1). Integration of regenerative biologics with imaging-guided and endoscopic techniques enabled targeted, anatomy-specific therapy. A review of treatment strategies and outcomes will be presented.

CONCLUSIONS

Integration of regenerative biologics with imaging-guided and endoscopic delivery facilitated targeted, anatomy-specific therapy, achieving favorable closure rates in a high-risk cohort. This multidisciplinary, personalized protocol demonstrates feasibility and safety, warranting further validation in larger patient population.

METHODS & PROCEDURES

PROCEDURAL OPTIONS

Fistula diameter, length and output determines modalities used:

1. Regenerative biologics
2. Plug placement and regenerative biologics
3. Therapeutic endoscopy and regenerative biologics

Regenerative Biologics:

- Autologous PRP
- PRP with flowable biological wound matrix and or fibrin glue

PRP PROCESSING PROTOCOL

- 60 mL venous blood draw utilizing PurePRP II Platelet Concentrating System®
- Horiba Hemolytic Analyzer™ whole blood analysis
- Centrifugation to remove RBCs
- Further centrifugation of plasm to pellet 10 cc PRP
- Final Horiba Hemolytic Analyzer™ PRP analysis
- Following literature guidelines, PRP > 3-5 x Whole Blood Platelets



REGENERATIVE BIOLOGICS

Uses: Output <50 cc day, length ≤5 cm, ≤1.5 cm diameter, no communication with bowel

1. Fistulography to characterize fistula.
2. Surgical debridement of fibrous tract to a healthy bleed.
3. Injection Options:
 - Flowable wound matrix mixed to desired consistency with PRP and injected in and along debrided tract site
 - Fibrin glue and PRP on 3-way stopcock injected along debrided ECF tract in alternating fashion
4. Biologic wound sheet placed at cutaneous site and secured with Monocryl suture.

FISTULA PLUG & REGENERATIVE BIOLOGICS

Uses: Output <200 cc day, length ≥15 cm, ≤5 cm diameter, + communication with bowel

1. Fistulography and CT to characterize fistula and measure for appropriate plug placement. (Figure 1)
2. Through and through access of fistula with wire then debridement of tract with a biliary brush to a healthy bleed.
3. At enteral site, PRP and fibrin injected prior to plug placement.
4. Surgical debridement of fistula at skin site to a healthy bleed.
5. Image guided plug placement per protocol.
6. Back fill plug with injection of PRP and fibrin glue in alternating fashion using 3-way stopcock.
7. Secure plug. (Figure 2)



Figure 1



Figure 2



Regenerative Biologics:
PRP, Fibrin Glue, Flowable Wound Matrix, Wound Matrix Sheet

ENDOSCOPY, FISTULOGRAPHY & REGENERATIVE BIOLOGICS

Uses: ECF from previous Gastrostomy or Jejunostomy Tube Placement: <500cc/day, ≤15 cm in length, ≤1.5cm in diameter

1. Access to fistula via endoscopy and fluoroscopically. (Figure 1)
2. Fistula track identified fluoroscopically. (Figure 2)
3. Fistula tract appreciated via endoscopy. Wire introduced via percutaneous tract. (Figure 3)
4. Resection and purse string suture of gastric opening with PRP injected into the surgical site endoscopically. (Figure 4)
5. PRP injected into and along percutaneous tract. Fibrin glue injected in alternate fashion with PRP to create “plug”. Biomatrix sheet over cutaneous site. (Figure 5)
6. Tissue engrafting. Granulation tissue present. No drainage. (Figure 6)



Figure 1



Figure 3



Figure 5

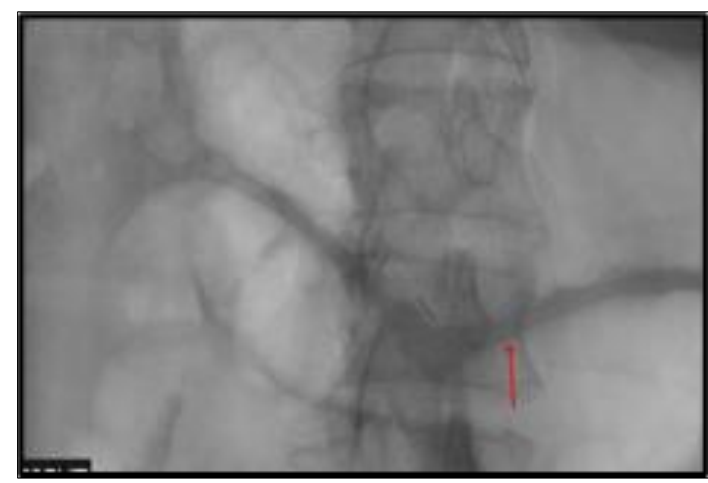


Figure 2

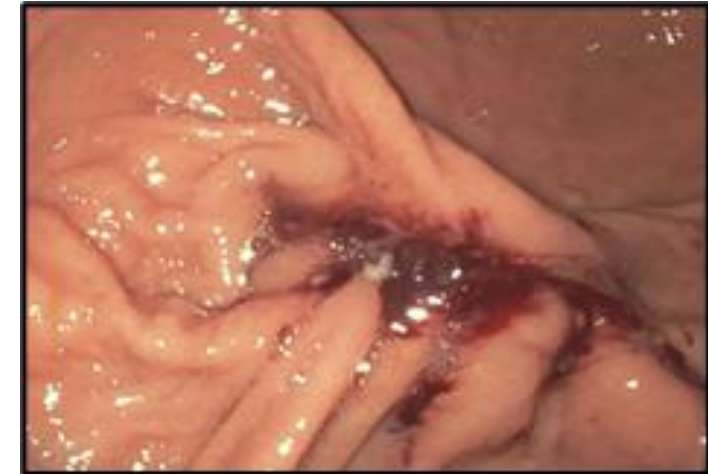


Figure 4



Figure 6

RESULTS

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- Mean fistula duration was 210 days (median, 180; range, 31–720), with 1 patient presenting at 4 weeks (31 days).
- Complete closure was achieved in 69% (n = 9) within a median of 7 days (range, 1–21). 1 patient demonstrated partial response with marked reduction in output.
- 25% (n = 3) required surgical intervention for persistent high-output fistulae.

CONCLUSIONS

- Minimally invasive techniques prove safe and successful in closure of enterocutaneous fistulae which are low volume (<500cc), ≤15cm in length, and ≤1cm in diameter.
- Integration of regenerative biologics with imaging-guided and endoscopic techniques enables targeted, anatomy-specific therapy.
- Regenerative biologics aid in the closure of ECF and should include autologous PRP in combination with fibrin glue or flowable wound matrix.
- Surgical revision should be considered when ECF are high volume output, have mucosa present and are >15 cm in length, and/or >1.0 in diameter

REFERENCES

1. Gribovskaja-Rupp I, Melton GB. Enterocutaneous Fistula: Proven Strategies and Updates. Clin Colon Rectal Surg. 2016 Jun;29(2):130–7. doi: 10.1055/s-0036-1580732.
2. Haack CI, Galloway JR, Srinivasan J. Enterocutaneous Fistulas: A Look at Causes and Management. Curr Surg Rep. 2014 Sep 16;2(10):71. doi: 10.1007/s40137-014-0071-0.
3. Kumar P, Namrata, Ahmad S. Enterocutaneous Fistula: Different Surgical Intervention Techniques for Closure along with Comparative Evaluation of Aluminum Paint, Karaya Gum (Hollister) and Gum Acacia for Peristomal Skin Care. J Clin Diagn Res. 2015 Dec;9(12):PC16–20. doi: 10.7860/JCDR/2015/16303.6981.
4. Williams LJ, Zolfaghari S, Boushey RP. Complications of enterocutaneous fistulas and their management. Clin Colon Rectal Surg. 2010 Sep;23(3):209–20. doi: 10.1055/s-0030-1263062.
5. Ghimire P. Management of Enterocutaneous Fistula: A Review. JNMA J Nepal Med Assoc. 2022 Jan 15;60(245):93-100. doi: 10.31729/jnma.5780. PMID: 35199684; PMCID: PMC9157672.
6. Matthew A. Fuglestad, John RT Monson. Medical and surgical management of enterocutaneous fistula, Sem in Colo Rectal Surg. 2023 Dec; 34(4):1043-1489. doi: 10.1016/j.scrs.2023.100987.

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