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Review Article

Challenging treatment of enterovesical fistula: a scoping review of pros and cons

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ABSTRACT

Enterovesical fistula (EVF) is rare, morbid conditions primarily caused by diverticulitis. However, Crohn's disease and pelvic malignancies present distinct operative challenges. Objectives were to evaluate current EVF management strategies, highlighting clinical benefits, limitations, and evidence gaps. We performed a PRISMA-ScR-guided scoping review of PubMed and Scopus (January 2000-February 2026), including English-language clinical studies. We analyzed data on etiology, surgical approach [open vs. minimally invasive surgery (MIS)], bladder management, and patient outcomes. Elective colorectal resection with primary anastomosis is the preferred approach for benign EVF, achieving high closure rates with acceptable morbidity. MIS is increasingly adopted in experienced centers, decreasing length of stay and wound complications. However, conversion to open surgery remains common in hostile pelves (e.g., dense phlegmon, prior surgery). Bladder management favors a selective, organ-preserving approach using intraoperative leak testing, often safely omitting formal cystotomy and routine postoperative cystography. Regarding specific etiologies: Crohn's-related EVF may initially respond to biologics but typically requires definitive surgery; malignant EVF necessitates en bloc resection, with prognosis driven by oncologic stage and patient frailty. Current management converges on elective one-stage resection, selective bladder preservation, and judicious use of MIS. The persistent heterogeneity in perioperative care underscores the need for prospective, multicenter trials to standardize pathways and optimize outcomes.

Keywords: Enterovesical fistula, Colovesical fistula, Diverticulitis, Crohn's disease, Minimally invasive surgery, Scoping review

INTRODUCTION

Enterovesical fistula (EVF) is uncommon but clinically significant pathological communications between the gastrointestinal tract and the urinary bladder. Despite their relative rarity, these conditions are associated with substantial morbidity due to recurrent urinary tract infections, pneumaturia, fecaluria, and progressive deterioration in quality of life. Advances in MIS have expanded therapeutic options in recent years, with early reports demonstrating that laparoscopic approaches can achieve effective fistula closure with reduced postoperative morbidity and shorter hospital stay compared with traditional open surgery.[1]

A key challenge in EVF management lies in determining the optimal timing and strategy for intervention. While definitive surgery is generally considered the treatment of choice, earlier clinical studies suggested that conservative management may be appropriate in selected patients with significant comorbidities or minimal symptoms.[2] However, prolonged nonoperative management may expose patients to persistent infection, recurrent hospitalizations, and ongoing urinary contamination. The

clinical presentation itself can vary widely, although pneumaturia, fecaluria, and recurrent urinary tract infection remain the most characteristic symptoms prompting diagnostic evaluation and therapeutic planning.[3]

The etiological spectrum of EVF is heterogeneous and plays a central role in determining management strategy. Although benign inflammatory conditions, particularly diverticular disease, account for the majority of cases, malignant invasion of the bladder by gastrointestinal or urological tumors represents a smaller but clinically challenging subgroup. In such cases, the fistula may be the initial manifestation of advanced malignancy, requiring oncologically sound resection and multidisciplinary treatment planning.[4] Inflammatory bowel disease, particularly Crohn's disease, constitutes another important cause of EVF, typically affecting younger patients with transmural inflammation and complex intra-abdominal disease. Although biologic therapy may induce fistula closure in selected cases, surgical intervention is frequently required to achieve durable remission and restore intestinal continuity.[5]

Surgical management of EVF has evolved substantially over the past decades. Institutional experiences have demonstrated that most patients ultimately undergo resection of the diseased bowel segment combined with selective bladder management, although operative techniques and perioperative strategies vary considerably between centers.[6] In malignant EVF, en bloc resection of the involved organs may be necessary to achieve adequate oncologic control, and outcomes are largely influenced by tumor stage and patient physiological reserve rather than fistula closure alone.[7]

Diverticular disease remains the predominant cause of EVF in contemporary surgical series and forms the basis of current treatment paradigms favoring elective colorectal resection with primary anastomosis in optimized patients. Several clinical studies have reported favorable outcomes with definitive resection in diverticular fistulas, particularly when performed in an elective setting following resolution of acute inflammation.[8] In contrast, fistulas arising from malignant disease often require more extensive surgical strategies aimed at oncologic clearance, emphasizing that EVF represents a spectrum of diseases rather than a single uniform entity.[9]

Despite increasing clinical experience and the growing adoption of minimally invasive techniques, significant variability persists in the management of EVF. Differences remain regarding operative timing, surgical approach, bladder repair strategies, and postoperative urinary diversion protocols. Moreover, the available evidence is largely derived from retrospective studies, case series, and isolated case reports, limiting the ability to establish standardized treatment algorithms.

Given these challenges, a comprehensive synthesis of the available therapeutic literature is needed. This scoping review was therefore undertaken to map reported management strategies for EVF, evaluate their advantages and limitations, and identify key evidence gaps across different etiological contexts. By examining open, laparoscopic, robotic, staged, conservative, and bladder-directed approaches within the same framework, this review aims to clarify current patterns of care and support a more structured, evidence-informed approach to this difficult surgical problem.

LITERATURE SEARCH

Inclusion criterias of this study were: adult patients (≥18 years) diagnosed with EVF or colovesical fistula; studies reporting management strategies for EVF, including conservative management, surgical treatment (open, laparoscopic, or robotic), endoscopic approaches, sealant-based therapies, interpositional tissue techniques urinary diversion; studies conducted in any clinical setting, including tertiary or academic hospitals; management involving urology, digestive surgery, or a multidisciplinary approach; study design like case reports, case series, or retrospective observational studies; english languange articles published in peer-reviewed journals from January 2000 onwards.

Studies are excluded if they met any of the following criteria: pediatric populations (<18 years); non-EVF s (vesicovaginal fistula, ureterointestinal fistula, rectovaginal or other genitourinary fistulas not involving the bladder); studies not describing management or treatment strategies; articles focusing solely on diagnosis, imaging, or pathophysiology without therapeutic data; narrative or systematic reviews, animal or experimental studies, conference abstracts without full-text availability, editorials, letters, expert opinions without original data; duplicate publications or overlapping datasets (most complete report included). The search for this scoping review was executed in Scopus and PubMed covering the period between January 2000 to February 2026.

The search strategy used variants and combinations of search terms related to EVF, etiology of EVF, and management of EVF. Duplicates, articles published before 2000, and studies published in non-English languages were then removed.

A total of 359 studies were obtained from the PubMed and Scopus databases. Duplicates (n=22) were removed, and 337 studies entered the title and abstract screening stage.

Further, a full-text review of 131 studies was conducted according to eligibility criteria, leaving 61 studies included. The reasons for exclusion at the full-text stage were documented and summarized in the PRISMA-ScR flow diagram in (Figure 1).

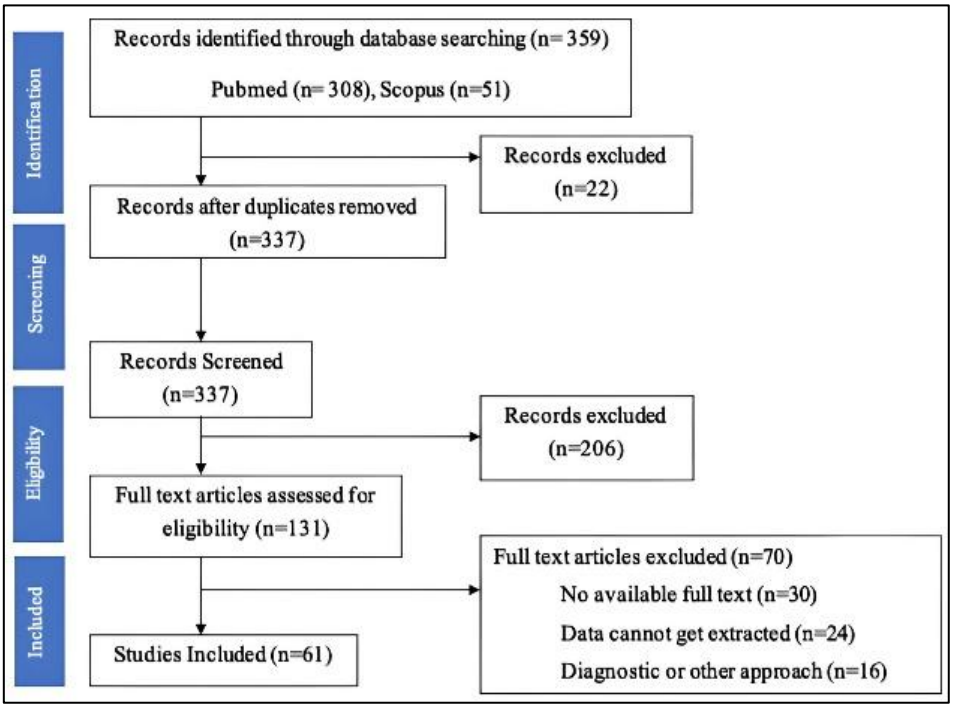

Figure 1: Flowchart of identification, screening, eligibility, and inclusion of studies in final analysis (PRISMA-ScR).

OBSERVATIONS

A total of 61 publications, comprising of case reports, case series, and retrospective cohorts, were included in the analysis of EVF. Most studies described elderly patients presenting with the classic triad of pneumaturia, fecaluria, and recurrent urinary tract infection. Diverticular disease was by far the most common underlying cause, followed by Crohn's disease, malignancy, and less frequently iatrogenic injury or foreign bodies. Contrast-enhanced abdominopelvic CT was the diagnostic workhorse in almost all series, while cystoscopy and colonoscopy were mainly used to localize the fistulous tract and to rule out an underlying malignancy rather than as primary screening tools.[1-61]

The evidence base on EVF management is dominated by high-income countries. Of the 61 included studies (Figure 2), the United States contributed the largest proportion (32.79%, n=20), followed by the United Kingdom (UK) (13.11%, n=8). Asian contributions were led by China, Japan, and Taiwan (total ~18%), while European output beyond the UK was primarily from Italy, Germany, and the Netherlands. Additional reports originated from Australia and Israel, with limited representation from the Middle East, Africa, and Latin America. Several multicenter and international collaborative studies were identified, and the inclusion of both national database analyses and single-center series provides complementary perspectives on the relative advantages and limitations of EVF management strategies.

Across 61 included studies (Table 1), diverticular disease/diverticulitis was the predominant etiology of EVF, accounting for nearly two-thirds of reports (n=38, 62.30%). Iatrogenic, traumatic, and foreign body–related causes were the second most common (n=10, 16.39%). Crohn's disease and other inflammatory bowel diseases comprised 8.20% (n=5), malignancy-related EVF accounted for 8.20% (n=5), and other rare benign or mixed etiologies represented 4.91% (n=3). This distribution underscores diverticular disease as the principal driver of EVF in contemporary practice while highlighting etiological heterogeneity requiring individualized management.

The evidence base was predominantly retrospective. Retrospective cohorts constituted 40.98% (n=25), case reports 27.87% (n=17), and retrospective case series 22.95% (n=14). Technical/general case series accounted for 4.92% (n=3). Only one prospective study (1.64%) and one mixed-design study (1.64%) were identified, indicating a scarcity of high-level prospective evidence to inform definitive clinical decision-making.

Publication output increased over time: 2000-2005 (16.39%, n=10), 2006-2010 (11.48%, n=7), 2011-2015 (19.67%, n=12), 2016-2020 (24.59%, n=15), and 2021-2026 (27.87%, n=17). This upward trend likely reflects growing clinical interest and the expanding use of minimally invasive/robotic techniques and multicenter data sources in recent years.

Among the 61 included studies (Table 2), management strategies for EVF were predominantly reported in the context of colorectal-origin EVF. Elective colorectal resection with primary anastomosis, performed via laparoscopic, robotic, or open approaches, constituted the

most frequently described strategy (n=42, 68.85%), reflecting its role as the standard definitive treatment in stable patients with suitable operative risk profiles. In contrast, emergency, urgent, or staged surgical strategies-including Hartmann's procedure and diversion stoma-accounted for 13.11% of studies (n=8), typically reserved for patients presenting with sepsis, pelvic abscess, or poor physiological reserve.

Non-colorectal-origin EVF represented a smaller but clinically heterogeneous subgroup. Fistulas involving the small bowel or ileum, often related to Crohn's disease, foreign body, or malignancy, comprised 11.48% of studies (n=7) and were associated with more complex intra-abdominal pathology and a higher likelihood of tailored surgical planning. Appendicovesical, urological, traumatic, and iatrogenic fistulas accounted for the remaining 6.56% of studies (n=4), underscoring the diverse anatomical and etiological spectrum of EVF beyond colorectal sources. Overall, the predominance of elective colorectal resection with primary anastomosis highlights the central role of definitive surgical management in contemporary EVF care, while the presence of urgent, staged, and non-colorectal strategies illustrates the necessity for individualized, context-specific treatment pathways.

Management strategies reflected a pragmatic, patient-tailored approach. Conservative treatment was generally reserved for frail patients or those with prohibitive comorbidity, whereas medical therapy, particularly anti-tumor necrosis factor agents, was occasionally successful in Crohn's-related EVF. In most patients, however, definitive treatment consisted of resection of the diseased bowel segment, with bladder repair performed selectively. One-stage resection with primary anastomosis emerged as the preferred option in stable patients with benign disease, achieving high rates of fistula closure and low recurrence.[1,13,25] Minimally invasive approaches (laparoscopic, robotic, or hand-assisted laparoscopic surgery) were increasingly reported in more recent series and were associated with shorter hospital stay, fewer wound complications, and faster recovery when performed in experienced centers.[15,22.39-46]

Bladder management has evolved toward a more selective and less aggressive strategy. Intraoperative leak testing using saline or methylene blue was routinely employed to guide the need for bladder repair. Several series reported that when no leak was demonstrated, omission of formal bladder suturing was safe and did not translate into higher postoperative urinary leakage rates, while also allowing earlier catheter removal.[13,21,36] In contrast, malignant EVF or cases with extensive bladder wall involvement usually required en bloc resection with bladder repair or partial cystectomy.[7,9,31,38] Outcomes in this subgroup were largely determined by the underlying oncological disease, with morbidity remaining high despite definitive surgery.

Across the included studies, surgical management dominated the treatment landscape. Elective colorectal resection with primary anastomosis was the most frequently reported definitive strategy in physiologically stable patients and was performed through open, laparoscopic, hand-assisted laparoscopic, or robotic approaches. The growing adoption of MIS in contemporary series suggests a shift in practice, supported by lower blood loss, shorter length of stay, and comparable fistula closure rates relative to open surgery.[15,22,25,34,39-46]

Emergency or staged procedures, including Hartmann's procedure and diverting stomas, were mainly reserved for patients presenting with sepsis, pelvic abscess, hemodynamic instability, or limited physiological reserve. In these scenarios, damage-control diversion followed by delayed definitive resection was commonly adopted to control sepsis and improve operative conditions before reconstruction.[2,6,14,24,55]

Approaches to bladder management and urinary diversion varied widely between studies. Selective bladder repair guided by intraoperative leak testing was the most commonly described strategy, and several series suggested that routine suturing of the bladder wall was unnecessary in benign disease when no leak was identified. Interposition of omentum or other tissue was used selectively in hostile pelvic fields to reduce the risk of recurrence. Postoperative urinary diversion practices were inconsistent, with foley catheter duration ranging from early removal within one week after simple repairs to prolonged drainage in complex defects. Routine postoperative cystography showed limited additional diagnostic value in uncomplicated cases and was increasingly advocated only for complex repairs or when a leak was clinically suspected.[13,21,36]

Etiology-specific nuances were also evident. Diverticular disease dominated most series, with one-stage resection favored in optimized elective settings. In Crohn's disease, a subset of patients experienced fistula resolution with biologic therapy alone, although surgery was ultimately required in the majority. Laparoscopic approaches in Crohn's-related EVF shortened recovery in selected patients but were associated with higher conversion rates.[5,11,18,20] Malignant EVF, when resectable, required en bloc resection to achieve local control, while palliative stenting offered short-term symptom relief in advanced disease but carried higher complication rates in benign inflammatory strictures.[7,9,31,38] Adjunctive techniques such as near-infrared indocyanine green imaging for ureteral identification and perfusion assessment were occasionally reported to facilitate safer dissection in hostile pelvic anatomy, although supporting evidence remains limited to small series.[37,44]

Overall, definitive resection achieved high fistula closure rates with low recurrence in benign disease. Morbidity, however, remained substantial, particularly in open and

emergency procedures, and mortality was driven more by patient frailty and malignant etiology than by urosepsis alone. Important knowledge gaps persist, including the lack of standardized criteria for bladder repair, optimal duration of urinary catheterization, and the routine role of postoperative cystography.[1,13,21]

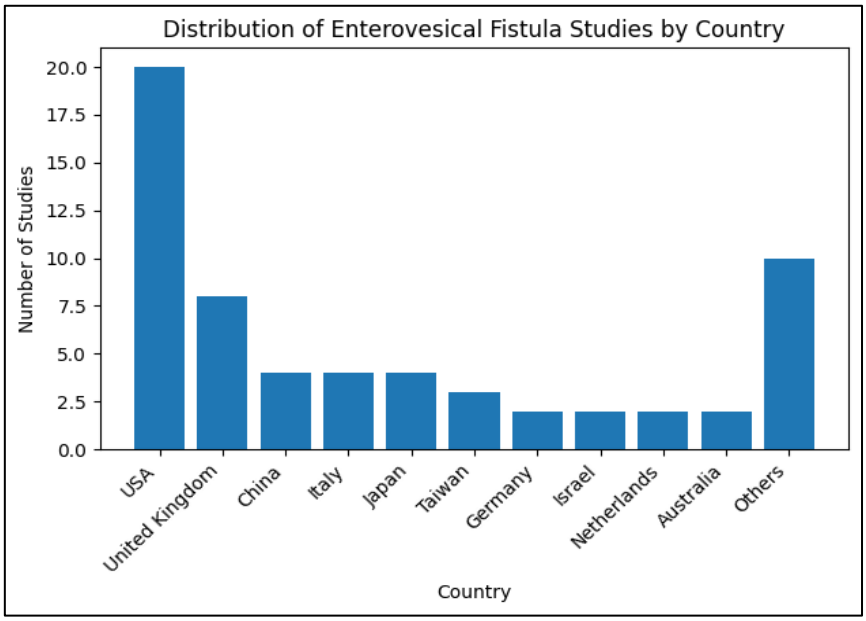

Figure 2: Distribution of EVF studies by country.

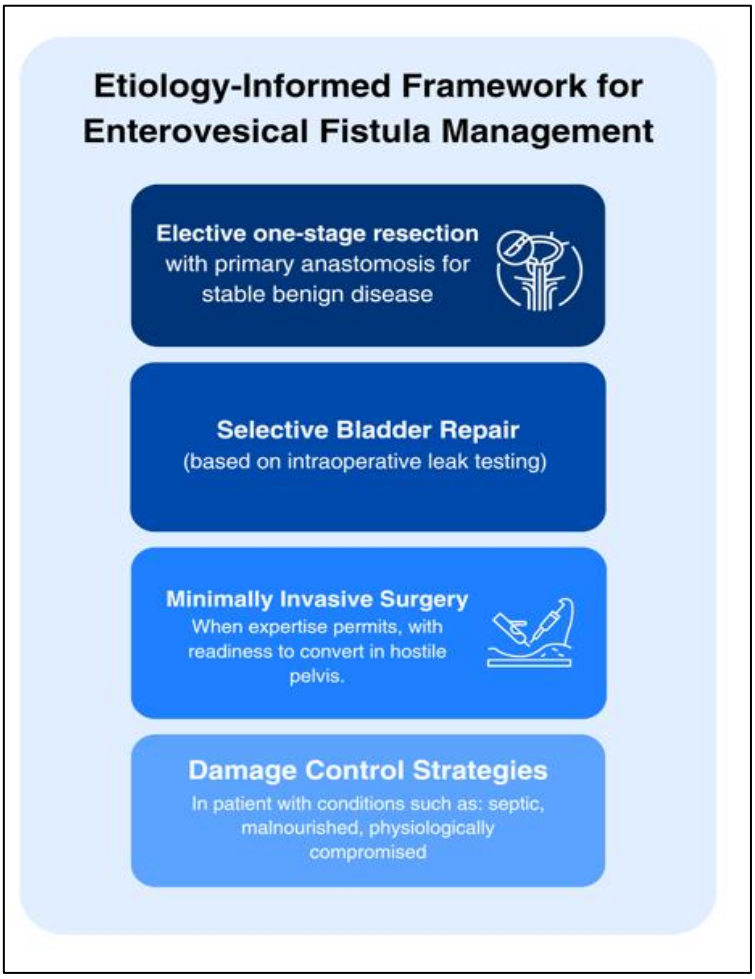

Figure 3: Etiology-informed framework for enterovesical fistula management.

Table 1: Distribution of studies by characteristics.

Study design	N	Percentage (%)
Retrospective cohort	25	41
Case report	17	27.9
Retrospective case series	14	22.9
Case series (general/technical)	3	5
Prospective trial	1	1.6
Mixed (case reports + retrospective cohort)	1	1.6
Total	61	100
Year of publication		
2000-2005	10	16.4
2006-2010	7	11.5
2011-2015	12	19.7
2016-2020	15	24.6
2021-2026	17	27.8
Total	61	100
EVF etiology		
Diverticular disease/diverticulitis	38	62.3
Iatrogenic, trauma, and foreign body	10	16.4
Crohn's disease/inflammatory bowel disease (IBD)	5	8.2
Malignancy (primary/secondary)	5	8.2
Other rare benign/mixed cases	3	4.9
Total	61	100

Table 2: Treatment strategy of EVF by category.

Treatment strategy category		Studies, (N)	Percentage (%)
Colorectal-origin EVF	Elective resection and primary anastomosis (laparoscopic, robotic, open)	42	68.8
	Emergency/urgent/staged surgery (Hartmann's, diversion stoma)	8	13.1
Non-colorectal EVF	Small bowel/ileal involvement (Crohn's, foreign body, malignancy)	7	11.5
	Appendix/urological / other (appendicovesical, trauma, iatrogenic)	4	6.6
Total		61	100

Table 3: Etiology-stratified summary of management patterns and outcomes in EVF.

Domain	Diverticulitis	Crohn's disease	Malignancy
Typical clinical context	Predominant elective presentation after recurrent UTIs, pneumaturia, fecaluria	Younger; complex inflammatory milieu; may coexist strictures/abscesses	Less frequent but high-risk subgroup; often advanced local disease or invasion
Preferred definitive strategy (stable patients)	One-stage colorectal resection with primary anastomosis in optimized elective settings	Definitive resection in most; biologic therapy in a subset	En bloc resection to achieve local control
Role of MIS	Increasingly adopted; shorter LOS and fewer wound complications; conversion in hostile pelvis	Feasible in selected patients; higher conversion rates due to inflammatory burden	MIS limited by oncologic extent; approach dictated by resectability and margins
Bladder management	Selective repair guided by intraoperative leak testing	Similar selective strategy; repair tailored to defect size/inflammation	Formal repair/partial cystectomy commonly required
Urinary diversion and cystography	Early catheter removal after simple repairs; routine cystography low yield in uncomplicated cases	Catheter duration individualized; selective cystography in complex repairs	Prolonged drainage, selective cystography more common due to complex defects
Outcomes (benign vs malignant)	High fistula closure; low recurrence in elective settings	Durable remission usually requires surgery; higher morbidity/ conversion rates	Outcomes driven by oncologic stage and frailty rather than fistula closure alone
Key limitations/ risks	Dense phlegmon, posterior bladder involvement, prior pelvic surgery, obesity	Higher conversion rates; relapse risk without definitive resection	High morbidity; palliative strategies appropriate in advanced disease
Representative evidence	1, 13, 15, 21, 25, 34, 39-46	5, 11, 18, 20	7, 9, 31, 38

*Table contrasts preferred strategies, feasibility of MIS, bladder management practices, and outcome drivers across diverticulitis, Crohn's disease, and malignant etiologies.

DISCUSSION

This scoping review synthesizes contemporary evidence on the management of enterovesical and colovesical fistula and demonstrates a clear consolidation of practice toward definitive colorectal resection with primary anastomosis in optimized elective settings, particularly for benign diverticular disease. Across multiple cohorts, elective one-stage resection has achieved high rates of fistula closure with acceptable morbidity, supporting its role as the preferred definitive strategy in physiologically stable patients when local inflammation is controlled.[1,13,21] The growing body of MIS literature further indicates that laparoscopic and robotic approaches can deliver comparable fistula closure with reduced length of stay and wound morbidity in selected patients treated in experienced centers.[15,22,25,34,39-46] However, consistently reported predictors of conversion-dense phlegmon, posterior bladder involvement, prior pelvic surgery, and obesity-underscore that MIS is not universally applicable and that a low threshold for conversion remains integral to operative safety.[15,22,39-46]

Bladder management emerged as a major domain of practice variability and a key opportunity for standardization. Selective bladder repair guided by intraoperative leak testing has been repeatedly associated with low postoperative urinary leak rates in benign disease, allowing omission of routine cystotomy and facilitating earlier catheter removal without compromising outcomes.[13,21,36] These data support an organ-preserving paradigm in uncomplicated EVF, reserving formal repair or partial cystectomy for malignant disease or extensive bladder wall involvement.[7,9,31,38] The limited incremental value of routine postoperative cystography in uncomplicated repairs further argues for a selective, indication-driven approach to postoperative imaging.[13,21,36] Notably, evidence for adjunctive measures such as omental interposition remains underpowered and largely experiential, warranting prospective evaluation in hostile pelvic fields.

Etiology-specific considerations remain central to decision-making. In Crohn's disease-related EVF, a subset of patients may achieve fistula resolution with biologic therapy, yet most ultimately require definitive resection to secure durable remission, particularly in the presence of complex fistulation or concomitant intra-abdominal disease.[5,11,18,20] While MIS can shorten recovery in selected Crohn's cohorts, higher conversion rates reflect the inflammatory burden and reiterate the importance of careful patient selection and multidisciplinary planning.[5,11,18,20] Malignant EVF, when resectable, necessitates en bloc resection to achieve local control; outcomes in this subgroup are primarily driven by oncologic stage and patient frailty rather than fistula closure alone, and palliative strategies may be appropriate in advanced disease.[7,9,31,38]

Despite a discernible convergence of practice, the evidentiary foundation remains fragmented. The predominance of retrospective designs, heterogeneous definitions of "simple" versus "complex" bladder defects, and inconsistent reporting of catheterization protocols and postoperative imaging limit the strength of inference and impede guideline development.[1,13,21] Furthermore, patient results, urinary and sexual function, and cost-effectiveness are conspicuously underreported, leaving critical dimensions of value-based care insufficiently characterized. The variability in perioperative pathways across centers also suggests that institutional culture continues to shape care delivery in the absence of standardized algorithms.

These findings support a pragmatic, etiology-informed framework for EVF management (Figure 3).[1,13,21] Moving forward, prospective multicenter studies with standardized perioperative algorithms-covering criteria for MIS versus open surgery, indications for bladder suturing, catheter duration, and postoperative cystography-are needed to harmonize care. Embedding patient outcomes and economic endpoints into future registries and trials will be essential to translate technical success into demonstrable patient-centered benefit.[1,13,21]

CONCLUSION

Enterovesical and colovesical fistula remain uncommon but deeply burdensome conditions that impose a prolonged clinical journey on patients and demand nuanced, multidisciplinary decision-making from surgeons and urologists alike. Across contemporary practice, management has converged toward elective one-stage colorectal resection with primary anastomosis for benign disease, supported by selective, organ-preserving bladder strategies guided by intraoperative leak testing, and the judicious application of minimally invasive surgery in appropriately selected patients. These shifts reflect a growing emphasis on balancing definitive fistula closure with the minimization of operative morbidity and preservation of urinary function.

At the same time, important boundaries to these approaches persist. MIS offers clear perioperative advantages in experienced hands, yet conversion remains frequent in hostile pelvic conditions and should be embraced as a safety-preserving decision rather than a failure. Etiology continues to shape outcomes and strategy: Crohn's-related EVF often requires definitive resection despite occasional responses to biologic therapy, while malignant EVF necessitates oncologically sound en bloc resection when feasible, with prognosis driven largely by disease stage and patient frailty.

The current evidence base-dominated by retrospective series and heterogeneous reporting-limits the translation of technical success into standardized, patient-centered pathways. Priority areas for future work include harmonized criteria for bladder repair, evidence-based

catheterization protocols, and selective indications for postoperative cystography, alongside the routine incorporation of patient results and health-economic endpoints. Addressing these gaps through prospective, multicenter collaboration will be essential to move EVF care from experience-driven practice toward consistent, evidence-informed standards that meaningfully improve patient outcomes.

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