

Research Article

Postoperative Enterocutaneous Fistulas in Children at the Albert Royer Children's Hospital: A Series of 7 Cases

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Abstract

Introduction: The aim of this study was to determine the epidemiological, diagnostic, therapeutic and outcome features of postoperative enterocutaneous fistulas at the Albert Royer National Children's Hospital Center (CHNEAR).

Patients and methods: This was a 3-year retrospective study (1 January 2023 to 31 December 2025). We studied epidemiological, diagnostic, therapeutic and outcome parameters.

Results: Seven patients developed a postoperative enterocutaneous fistula during the study period. All were male. Mean age was 3.72 years [6 months-10 years]. The causal surgery was performed as an emergency in most cases (n=6). According to the Altemeier classification, the procedures were dirty (n=3) and contaminated (n=2). The most frequent procedure was intestinal resection-anastomosis (n=4), one of which was performed in a septic setting. Mean time to onset was 11.57 days [4-25 days]. Fistulas were direct in most cases (n=5). Two patients had a high-output fistula (>500 mL/day). Complications were sepsis (n=7), electrolyte disturbances (n=5) and malnutrition (n=4). All patients received medical treatment, which failed in one patient who required surgery. Mean length of hospital stay was 28.86 days [7-70 days]. Spontaneous closure occurred after a mean of 106.33 days [30-195 days]. There was neither recurrence nor death.

Conclusion: Enterocutaneous fistula occurs, in most cases, after emergency septic abdominal surgery. Its treatment is primarily conservative. The prognosis remains favorable.

Keywords: Enterocutaneous fistula; Child

Introduction

Postoperative Enterocutaneous Fistula (POECF) is a distressing surgical complication for the surgeon, as it is associated with high morbidity and mortality [1]. The triad of sepsis, malnutrition and fluid and electrolyte disturbances represents the most important complications to which patients with enterocutaneous fistulas are exposed [2]. Abdominal ultrasound or computed tomography is sometimes necessary to look for a deep collection, particularly in the presence of persistent sepsis. Fistulography may be performed in rare cases to define the anatomical location of the fistula [3]. The main components of medical management are control of sepsis, correction of fluid and electrolyte disturbances, control of fistula output, appropriate nutrition (preferably parenteral), and local care [4].

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The general objective of our study was to describe the epidemiological, diagnostic, therapeutic and prognostic features of postoperative enterocutaneous fistula in children. The study was conducted in the pediatric surgery department of the Albert Royer National Children's Hospital Center (CHNEAR).

Patients and Methods

This was a single-center, retrospective, descriptive study conducted from 1 January 2023 to 31 December 2025. We included all patients under 16 years of age who were hospitalized in the department for an enterocutaneous fistula complicating abdominal surgery during the study period. Seven patients were included and all seven records were usable (Figure 1).

We studied several parameters. Epidemiological variables were hospital frequency, age and sex. Diagnostic variables were medical and surgical history; multi-operated patients were those with at least two previous abdominal surgeries before the onset of the fistula. The other parameters studied were whether the causal surgery was urgent or not, surgical indications and explorations, the Altemeier classification, and the surgical procedures performed.

Among the numerical variables, we studied the time to onset (Figure 2), defined as the interval between the last abdominal surgery and the date of onset of the enterocutaneous fistula recorded in the file, and the fistula output, estimated in milliliters over 24 hours. Regarding output, patients were divided into three groups according

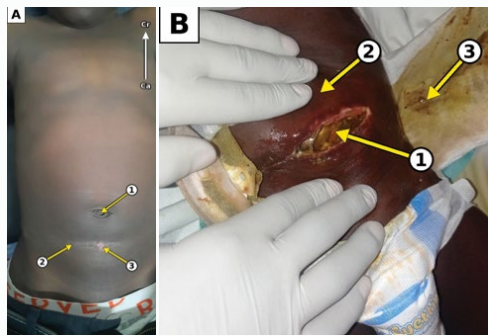


Figure 1: Direct enterocutaneous fistula.

A: overview of the abdomen (1: Umbilicus; 2: Infra-umbilical scar; 3: Punctiform orifice within the scar). B: Direct fistula with discharge of intestinal contents (1: Fistula orifice; 2: Inflamed peri-fistular skin; 3: Soiled dressing). Cr: Cranial; Ca: Caudal.

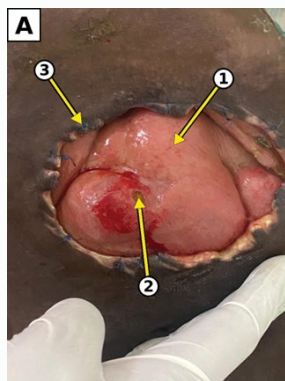


Figure 2: Enterocutaneous fistula complicated by free evisceration.

A: Eviscerated small-bowel loops (1: Small-bowel loops; 2: Fistula orifice; 3: Sutures on the skin edges). B: intraoperative view (1: Exteriorized small-bowel loops; 2: Forceps; 3: Retractor).

to the Berry and Fischer classification [5].

- low-output fistulas (< 200 mL/day)
- moderate-output fistulas (200 to 500 mL/day)
- high-output fistulas (> 500 mL/day)

POECFs with fixed evisceration were called “direct” fistulas, whereas those without fixed evisceration were called “indirect” fistulas [6].

The rate of paraclinical investigations was assessed, mainly ultrasound, total protein and/or serum albumin. We studied the qualitative (nominal) variables of medical management: antibiotic therapy, correction of electrolyte disturbances, the means used to control fistula output and to protect the skin. We also studied the type of nutrition used (parenteral nutrition was not available). The variables studied for surgical treatment were the timing of surgery, its indication, the procedures performed and the postoperative course (Figure 3).

Regarding outcome parameters, we studied length of hospital stay, time to spontaneous closure, recurrence and mortality.

Discussion

Over a three-year period, we identified 7 cases of Postoperative

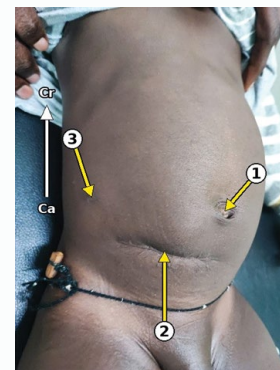


Figure 3: Scar after spontaneous closure of an enterocutaneous fistula in an infant.

1: Umbilicus; 2: Transverse infra-umbilical scar; 3: Punctiform scar; Cr: Cranial; Ca: Caudal.

Enterocutaneous Fistula (POECF), i.e. a frequency of 2.3 cases per year, identical to that reported by Amjad, et al. in Pakistan [7] and Touré, et al. [8], and lower than the 6.4 cases per year reported by Uba et al. in Nigeria [9]. The mean age in our series was 3.72 years, ranging from 6 months to 10 years (Table 1) three patients were under two years of age (42.9%). Enterocutaneous fistula occurs more frequently in early childhood, which is explained by the fragility of the body at this age. However, our mean age is lower than the 7.1 and 6 years found respectively in the pediatric literature [10].

Table 1: Characteristics of patients with postoperative fistula (n=7).

Variables	Number
Mean age	3.72 years [6 months – 10 years]
Sex	
Male	7
Female	0
Surgical history	
Multi-operated patients	3
None	4
Causal surgery	
Emergency	6
Elective	1
Mean time to onset	11.57 days [4 – 25 days]
Fistula output	
Low (< 200 mL/day)	2
Moderate (200-500 mL/day)	3
High (> 500 mL/day)	2
Paraclinical work-up	
Low total protein	3
Total protein not measured	4
Complications of the fistula	
Sepsis	7
Electrolyte disturbances	5
Malnutrition	4
Outcome	
Spontaneous closure	6
Surgical closure	1
Mean length of hospital stay	28.86 days [7-70]
Mean time to spontaneous closure	106.33 days [30-195]

In our study, three patients were multi-operated. The literature reports that multi-operated patients are at higher risk of developing enterocutaneous fistulas [9].

In our study, most causal surgical procedures were performed as emergencies (n=6), which is consistent with the literature, which

reports that more than three quarters of causal procedures are performed as emergencies [6]. In emergency settings, the risk of inadvertent bowel injury is high.

In line with the literature in both adults and children, we found a predominance of resection-anastomosis (n=4) (Table 2) over other surgical procedures [3,4]. Performing this delicate procedure as an emergency and in a septic environment would explain the leaks observed. However, we performed fewer adhesiolyses (n=2) than Amjad (n=6); this procedure, if not performed meticulously, increases the risk of enterocutaneous fistula through occult bowel injuries (Table 3) [3].

Table 2: Etiological diagnosis and surgical procedures performed (n =7).

Variables	Number
Etiological diagnosis	
Acute generalized peritonitis due to ileal perforation	1
Peritoneal tuberculosis with superinfection of ascitic fluid (clinical presentation of peritonitis)	1
Acute intussusception	2
Acute intestinal obstruction with ileal necrosis	1
Restoration of digestive continuity after ileostomy	1
Evisceration and ileocolic anastomotic leakage	1
Surgical procedures performed during the causal surgery	
Resection-anastomosis	4
Adhesiolysis	2
Reduction of intussusception	2
Suture of cecal perforation	1
Appendectomy	3
Lymph node biopsy	1
Drainage	6

Table 3: Means of medical treatment of enterocutaneous fistula.

Variables	Number
Nutrition	
High-protein diet	6
Therapeutic milk (F75/F100)	2
RUTF (Plumpy'Nut®)	2
Parenteral multivitamin complex (Astigmin®)	1
Parenteral nutrition	0
Transit regulation	
Constipating diet	5
Antimotility agent (Tiorfan®)	3
Local care	
Dressings	5
Bepanthen® ointment	2
Colostomy bag	2
Other	
Antibiotic therapy	7
Transfusion	3
Iron (syrup)	1

Enterocutaneous fistulas occurred on average 11.57 days after surgery, ranging from 4 to 25 days. This interval is similar to that of Touré, et al. [6] but longer than that of the Nigerian study (Table 4). According to the preceding data, sepsis is associated with the occurrence of enterocutaneous fistula; control of sepsis in our series may explain this longer time to onset.

In line with the literature, we found a predominance of direct enterocutaneous fistulas (n=5). Bowel loops become fragile because of their exposure at the surface, which favours the occurrence of fistulas.

According to recent studies, the treatment of enterocutaneous fistula is primarily medical and involves six steps: correction of fluid and electrolyte disturbances, treatment of sepsis, control of fistula

Table 4: Comparison of time to onset of postoperative enterocutaneous fistulas.

Country	Authors	Population	Time to onset
Senegal	Our series	Pediatric	11.57 days
Senegal	Touré, AO. [26]	Adult	10.8 days
Nigeria	Uba, FA. [27]	Pediatric	5 days
Italy	Dionigi, G. [7]	Adult	54 days

output, optimization of nutritional status, skin care and, finally, psychological support [6]. These measures have reduced mortality from 50% to 3.5% over recent decades. Ultrasound-guided drainage of a deep abscess is one of the medical measures used to control sepsis.

Local care aims to protect the skin from the proteolytic action of digestive juices; it includes abundant irrigation and local application of skin-protective products or devices [7]. Upfront surgical treatment is rare and should be delayed as much as possible to allow resolution of peritoneal inflammation, optimization of nutritional status and control of sepsis. The timing of surgery is set at 4 to 6 weeks after nutritional support for high-output fistulas, and delayed by 3 to 6 months for low-output fistulas [2,8,9].

In our series, one patient underwent surgery: this was a free evisceration occurring 60 days after the last operation. Resection-anastomosis and parietoplasty were performed as an emergency, with an uneventful postoperative course. Our approach complies with the recommendations of the literature detailed in the preceding paragraph.

In our study, spontaneous closure was achieved in most patients (n=6), i.e. 85.7%. This success of medical treatment is consistent with the literature [6]. Spontaneous closure occurred after a mean of 106.33 days, ranging from 30 to 195 days. With the use of parenteral nutrition Uba, et al. reported shorter times: a mean of 72 days for ileal fistulas and 42 days for colonic fistulas [2]. All series in the literature recorded at least one death [3,8]. We recorded no deaths. Our multidisciplinary approach contributed to this result, but, given the size of our series, selection bias may also explain it.

Conclusion

Postoperative enterocutaneous fistula is a rare surgical complication at the Albert Royer Children's Hospital; it occurs more frequently in early childhood. Most causal abdominal surgeries are performed as emergencies. Medical treatment is the "gold standard", with a favorable prognosis. In the face of this complication, recourse to surgery should remain cautious and be delayed.

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