Etiology and Surgical Management of Enterocutaneous Fistula: Current Approaches in Gastrointestinal and Postoperative Care

Dr. Ádám Kovács[1]*
[1]Semmelweis University Faculty of Medicine, Department of Gastrointestinal Surgery and Clinical Nutrition, Budapest, Hungary

Abstract:
Objective: *To investigate the different causes, common location and different treatment methods of enterocutaneous fistula.*
Study design: *A Descriptive study.*
Place and Duration: *In the Surgical department of Liaquat National Hospital Karachi for one year duration from June 2018 to June 2019.*
Methods: *Twenty-two patients underwent enterocutaneous fistula following trauma surgery, abdominal tuberculosis, ileal perforation, gynecological cause, perforated appendicitis, gastric perforation and stoma conversion. Patients with malignant disease were excluded from the study. All patients were initially treated conservatively. Patients who did not respond were operated. All patients were followed up after discharge and closely monitored for recurrent leaks and other complications.*
Results: *Of the 22 patients, 14 (64%) were male and 8 (36%) had a M: F ratio of 1.7: 1. Their ages ranged from 18 to 62 years, with an average of 40 years. Most of the patients belong to the 41-50 age group. Initial surgical indications were abdominal tuberculosis 10 (45%), gynecological surgery in 3 (14%) cases, reverse stoma 2 (09%), FAI (febrile arm injury) 2 (09%), closed abdominal trauma 2 (09%), perforated appendicitis 2 (09%) and gastric perforation 1 (5%). 16 (73%) fistulas were having high results and 6 (27%) have low. Nine (41%) patients responded to conservative treatment whereas 13 (59%) patients did not. The causes of enterocutaneous fistula (surgical findings) were anastomotic leak / repair in 7 (31%) patients and missed perforation in 6 (27%) patients. The most common fistula region was ileum in 13 (59%), colon in 4 (18%), blind in 2 (09%), jejunum in 2 (09%) and stomach in 1 (05%). Five patients died at a mortality rate of 23%.*
Conclusion: *Intestinal tuberculosis was the most common cause of enterocutaneous fistula affecting the small intestine. Anastomotic / repair leakage was the most common surgical finding after detection.*
Key Words: *Enterocutaneous Fistula, Tuberculosis, Anastomosis Leaks.*

INTRODUCTION:

Enterocutaneous fistula is a complex entity and despite significant progress in medical sciences, it still has significant morbidity and mortality [1]. In the 1950s, the mortality rate was around 50%. Mortality was significantly reduced from ten to twenty percent with the introduction of the central line, total parenteral nutrition, correct evaluation and maintenance of electrolytes, skin care, long-term respiratory support, and advances in antibiotic therapy [2-3]. Postoperative gastrointestinal fistula is a terrible complication of gastrointestinal surgery, reported in up to 27%. Primary fistulas are caused by a disease in the intestinal wall, e.g. for example, tuberculosis, crohn's disease and malignancy [4-5]. Secondary fistulas may result in a normal intestinal injury, e.g. surgical resection, postoperative fistulas, anastomotic collapse, sepsis, or an unrecognized lesion of the bowel wall [6-7]. Peritonitis, multiorganic insufficiency and enteric fluid secretion may occur from abdominal wounds due to fistula formation. In general, these patients receive conservative treatment through intestinal rest using NPT, somatostatin and fluid and electrolyte correction. Surgery is limited to toxic symptoms with peritonitis symptoms, inadequate conservative treatment, and significant leaks of the anastomosis site [8-9]. Factors preventing spontaneous closure include sepsis, malnutrition, Crohn's disease, radiation, chemotherapy, malignancy, foreign matter, total discontinuity between the intestinal ends and distal obstruction. Sepsis is an important cause of mortality and morbidity in all its forms and requires aggressive treatment [10]. Depending on the quantity within 24 hours, the fistula have low yield and high performance. In the low type, the drain amount is less than 1000 ml / 24 hours and in the high type the amount is greater than 1000 ml / 24 hours. They can be described as anatomically simple (by direct communication between the intestine and the skin) or complexes (related to the intermediate abscess cavity in one or more ways or in the middle of the canal). Detection of leakage is determined by small bowel enemas, barium enemas, fistulography and abdominal computed tomography [11].

MATERIALS AND METHODS:

This descriptive study was conducted in the Surgical department of Liaquat National Hospital Karachi for one year duration from June 2018 to June 2019. After trauma surgery, abdominal tuberculosis, ileal perforation, gynecological cause, perforated appendicitis, gastric perforation and stoma conversion, a total of 22 patients were analyzed with enterocutaneous fistula repaired in our unit or referred from outside were selected and with malignant diseases were excluded from the study. All patients, including nutritional assessment and CBC, blood glucose, urea, urine DR, serum electrolytes, viral marker LFT, and total protein A / G ratio were examined in detail including intestinal rest, NPT, somatostatin, antibiotics, skin care through the application of zinc oxide for exclusion and collection of bags in the fistula area. Dehydration and electrolyte imbalance were corrected. Three patients with diabetes corrected with insulin treatment. 5 patients were treated with impaired LFT treated with the advice of a physician and patients who did not respond with jaundice were re-operated. The non-responsiveness criteria were increased pulse rate, increased temperature, decreased urine output, and the same amount of fistula content. Tuberculosis was confirmed by histopathology. All patients were followed up after discharge and closely monitored for recurrent leaks and other complications.

RESULTS:

Of the 22 patients, 14 (64%) were male and 8 (36%) were female with a M: F ratio of 1.7: 1 (Table I).

Table I. Sex incidence (n=22)

Male	**14**	**64**
Female	**8**	**36**

Their age ranges from 18 to 62 years, with an average of 40 years. The majority of patients belong to the 41-50 age group (Table II).

Table II. Age distribution (n=22)		
< 20 years	1	5
21-30 years	2	9
31-40 years	4	18
41-50 years	8	36
51-60 years	5	23
> 61 years	2	9

Initial surgical indications were abdominal tuberculosis 10 (45%), gynecologic surgery 3 (14%), reversed stoma 2 (09%), FAI 2 (09%), closed abdominal trauma 2 (09%) and perforated appendicitis. 2 (09%) and gastric perforation 1 (05%) Table III.

Age Group	No.	%
Abdominal Tuberculosis	10	45
Gynaecological Procedure	3	14
Reversal of Stoma	2	9
Fire Arm Injury	2	9
Blunt Abdominal Trauma	2	9
Perforated Appendicitis	2	9
Gastric Perforation	1	5
Total	22	100

Table III. Indication of first surgery (n=22)

Sixteen (73%) patients had high-performance fistulas and 6 (27%) had low localization (Table IV).

Table IV. Fistula types (n=22)

Type of Fistula	No.	%
Low Output	6	27
High Output	16	73

Nine (41%) patients responded to conservative treatment. Thirteen patients (59%) who did not respond were operated (Table V).

Causes	Conservative	Re-Operated	Total
Abdominal Tuberculosis	4	6	10
Gynaecological Procedure	1	2	3
Reversal of Stoma	-	2	2
Fire Arm Injury	1	1	2
Blunt Abdominal Trauma (Colonic Injury)	1	1	2
Perforated Appendicitis	1	1	2
Gastric Perforation	1	-	1
Total	9	13	22

Table V. Management of Entracutaneous Fistula (n=22)

The causes of enterocutaneous fistula (surgical findings) were anastomotic leakage in 7 patients (31%) and missed perforation in 6 patients (27%) (Table VI).

Table VI. Causes of Fistula after exploration (n=13)

Indication of Surgery	Anastomotic/ Repair Leakage	Missed Perforation	Total
Abdominal Tuberculosis	3	3	6
Gynaecological Cause	1	1	2
Reversal of Stoma	1	1	2
Fire Arm Injury	-	-	1
Blunt Abdominal Trauma (Colonic Injury)	1	-	1
Perforated Appendicitis	1	1	1
Total	7	6	13

The most common site of fistula was ileum in 13 patients (59%), colon in 4 patients (18%), blind in 2 patients (9%), jejunum in 2 patients (9%), in 1 patient (5%) gastric, Table VII). Five patients died at a mortality rate of 23%.

Site	No. Of Cases	Percentage
Ileum	13	59
Colon	4	18
Caecum	2	9
Jejunum	2	9
Gastric	1	5

Table VII. Common Site Fistula (n=22)

DISCUSSION:

Enterocutaneous fistulas are abnormal communication between the small or large intestines and may be covered by skin epithelium or associated with intra-abdominal sepsis. It is a serious complication of gastrointestinal surgery. Since 1970, the basis of fistula treatment has been intravenous nutrition to stabilize the patient and stimulate the rest of the gastrointestinal tract. The administration of TPN reduced mortality and increased the rate of closure. The patients included in this study were operated in our unit or referred from a peripheral region. The subjects admitted were malnourished and in sepsis[12]. Initially, all patients recovered by correcting fluid and electrolyte imbalance, providing nutrition, antibiotic coverage, and chest physiotherapy. The majority of patients were males with a M: F ratio of 1.7: 1, while other studies were between 18 and 62 years, mean age was 39 to 75, 16 to 65 years, and other studies were 0.6: 19 to 1.4: 1.10. The mean age was 36.10 and 33.9 years[13]. In this study, the most common enterocutaneous fistula was observed in patients with tuberculosis (45%). Hives also mentioned in the tuberculosis study, the most common cause of fistulas. Conservative treatment was successful in 41% of the patients. Different studies showed a conservative response rate of 77.7%, 71.1%, 13.1% and 14%. In this study, the most common site of fistula was ileum[14]. A study by Jamil revealed ileal fistula in 52% of cases. In this study, the majority of patients were found to be 73% high. In the Qurashi study, 67% of the fistulas were of the high type. The most common cause of enterocutaneous fistula was repair of anastomotic leakage in 7 (31%) patients[15]. Gondal also claimed that the most common cause of fistulas was anastomotic leak. While the mortality rate in this study was 23%, the mortality rate in other studies was 22.5%, 18% and 26.8%, respectively.

CONCLUSION:

The most common enterocutaneous fistula in the small intestine was due to intestinal tuberculosis. Anastomotic leak repair was the most common surgical finding after discovery.

REFERENCES:

1. Wilhelm, Peter, Andreas Kirschniak, Jonas Johannink, Sascha Kaufmann, Thomas Klag, Jan Wehkamp, and Claudius Falch. "Enterocutaneous fistula in severely active Crohn's disease: preoperative anti-TNF alpha treatment to limit bowel resection—report of a case." *International journal of colorectal disease*34, no. 2 (2019): 369-373.
2. Hagiwara, Toshiaki, Shinya Munakata, Shun Ishiyama, Goto Michitoshi, Rina Takahashi, Kazumasa Kure, Kumpei Honjo, Yurika Makino, and Kazuhiro Sakamoto. "Repeated Enterocutaneous Fistula in a Munchausen Syndrome Patient." *Case reports in gastroenterology* 13, no. 1 (2019): 173-177.
3. Hodgkinson, J.D., Oke, S.M., Warusavitarne, J., Hanna, G.B., Gabe, S.M. and Vaizey, C.J., 2019. Incisional hernia and enterocutaneous fistula in patients with chronic intestinal failure: prevalence and risk factors in a cohort of patients referred to a tertiary centre. *Colorectal Disease*.
4. Sunday-Adeoye, Ileogben, Uche E. Eni, Kenneth C. Ekwedigwe, Maradona E. Isikhuemen, Babafemi C. Daniyan, Emmanuel N. Yakubu, Monday O. Eliboh, and Israel E. Uguru. "Enterocutaneous fistula coexisting with enterovesical fistula: a rare complication of ovarian cystectomy." *African journal of reproductive health* 23, no. 1 (2019): 150-153.
5. Li, Betty, Steven Shamah, Eric Swei, and Christopher G. Chapman. "Endoscopic closure of a refractory enterocutaneous fistula by use of a fistula plug with fixation and mucosal oversewing." *VideoGIE* 4, no. 5 (2019): 203-205.
6. Hashiguchi, Shin-ichiro, Hideaki Rikimaru, Yukiko Rikimaru-Nishi, Youkou Ohmaru, Hisashi Migita, Youichiro Morihisa, Keigo Morinaga, and Kensuke Kiyokawa. "Closure of

Intractable Enterocutaneous Fistula with a Rectus Abdominis Musculocutaneous Flap." *Plastic and Reconstructive Surgery–Global Open* 7, no. 6 (2019): e2258.

7. González, J.A.J., Sánchez, C.Q. and Rodríguez, F.M., 2019. Catastrophic Abdominal Wall After Repair of Enterocutaneous Fistula: A Case Study. *Journal of Wound Ostomy & Continence Nursing*, *46*(4), pp.337-342.
8. Brooke, Jillian, Amanda El-Ghaname, Karen Napier, and Laureen Sommerey. "Executive Summary: Nurses Specialized in Wound, Ostomy and Continence Canada (NSWOCC) Nursing Best Practice Recommendations: Enterocutaneous Fistula and Enteroatmospheric Fistula." *Journal of Wound Ostomy & Continence Nursing* 46, no. 4 (2019): 306-308.
9. Rothkopf, M. and Alley, W., 2019. Enterocutaneous Fistula (ECF) Resolution with Isonitrogenous Parenteral Nutrition (PN), L-Carnitine (LC) and Ramped Infusion of Octreotide (Oct)(P12-054-19).
10. Niu, Dong-Guang, Fan Yang, Wei-Liang Tian, Yun-Zhao Zhao, Chen Li, Lian-An Ding, Hong-Chun Fang, and Qian Huang. "A technique to establish fistuloclysis for high-output jejunocutaneous fistula through percutaneous enterostomy: A case report." *Medicine* 98, no. 10 (2019).
11. Bannon, Michael P., Stephanie F. Heller, Mariela Rivera, Ann L. Leland, Cathy D. Schleck, and William S. Harmsen. "Reconstructive operations for enteric and colonic fistulas: Low mortality and recurrence in a single-surgeon series with long follow-up." *Surgery* (2019).
12. Sinha, Mithilesh Kumar, Sudipta Mohakud, Tushar Subhadarshan Mishra, and Apurba Barman. "An unusual presentation of gastric fistula following peptic perforation repair: A case report." *International journal of surgery case reports* 56 (2019): 29-31.
13. Deskur-Śmielecka, Ewa, Mateusz Sopata, Michal Chojnicki, and Maciej Sopata. "Gastrointestinal fistula with thigh extension and intractable pain." *BMJ supportive & palliative care* (2019): bmjspcare-2018.
14. Rodrigues-Pinto, Eduardo, Rui Morais, and Guilherme Macedo. "Combined over-the-scope clip and detachable snare placement for closure of an enterocutaneous fistula." *Endoscopy* (2019).
15. Kamada, Yasuyuki, Tomohide Hori, Hidekazu Yamamoto, Hideki Harada, Michihiro Yamamoto, Masahiro Yamada, Takefumi Yazawa et al. "Treatment of Labial Fistula Communicating with the Duodenal Stump After Gastrectomy." *The American journal of case reports* 20 (2019): 851.