

# Faecal (Lower Enterocutaneous) Fistula after Colonic Surgery (Analysis of Its Occurrence & Recurrence)

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## **Abstract:**

**Background:** One of the major complications of colonic resections is anastomotic leak that may convert in some cases into permanent faecal fistula, presented with discharge of faecal material from the site of the wound or drain.

**Objective:** To know the incidence of faecal fistula after colonic surgery, and to analyse the associated factors that enhance or reduce its formation and its recurrence.

**Method:** A prospective study of one hundred and thirty seven patients who were undergone colonic surgery in the period from Jan.1996 to Jun.2005. Those patients were followed up for at least one month after the operation of the anastomosis of the colon. The operations were done for different pathologies or lesions. All of the operations in this study were elective with bowel preparation, while 126 patients (92%) had previous colostomy because of an urgent operation in the past.

**Results:** It had been found that the majority of the operations on the colon were closure of the colostomy (92%), especially that due to missile injuries (75.5%). Anastomotic leak appeared in 14 cases (10.2%) of the total operations, ten of them closed spontaneously with conservative treatment and the remaining 4 cases (2.9% of the total) transformed into faecal fistulae. All of these fistulae were in the patients originally injured by high energy missiles. Re-operation for those four patients, after bowel preparation, included excision of the fistula with resection of the affected segment of the colon and reanastomosis. The fistula disappeared in three of them but recurred in the fourth.

**Conclusions:** Although mortality reduced markedly in elective colonic operation, by the modern surgery, faecal fistula still remains a challenge to the surgeons. Bowel preparation, prophylactic antibiotics, good vascularity of the ends of the colon, proper approximation of the ends of the colon without tension, delicate suturing, prevention of perioperative hypotension, and good nutrition of the patient; all are prophylactic measures against formation of the fistula. Once the fistula was formed, then simple suture closure of the fistula alone is not beneficial, preferably resection of the affected segment of the colon is indicated.

**Key Words:** Anastomotic leak, faecal fistula, colonic surgery.

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## **Introduction:**

Faecal fistula (FF) or lower enterocutaneous fistula or external large bowel fistula all have the same meaning, which represent abnormal communication between colorectal mucosa and the skin; that result in discharge of gas, stool and pus in quantities depends on the size of the fistula<sup>(1, 2, 3)</sup>.

It may be simple, with a direct communication between the gut and the skin, or complex when there are more than one tract associated with an intervening abscess cavities<sup>(4)</sup>.

The most common cause of FF is previous surgery. Nearly 90% of fistulae are postoperative, and 10% are spontaneous due to underlying malignancy, vascular insufficiency, Crohn's disease, tuberculosis, diverticulosis and appendicitis<sup>(1, 2, 4, 5, 6)</sup>.

Postoperative FF is usually due to anastomotic failure that occur in the following conditions: the bowel is ischaemic, inadequately mobilised (tension), poor technique, severe malnutrition, intraabdominal sepsis, loss of bowel continuity, distal obstruction,

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intestinal wall defect > 1cm and the presence of foreign body<sup>(1, 7, 8, 9)</sup>.

There is misconception of the terms 'leak', 'fistula' and 'disruption' which represent anastomotic complications. These terms are often intermingled in the literatures; and to clarify them, it is best to categorised them into four principal types<sup>(7)</sup>:

1. Asymptomatic leaks, which are discovered accidentally in laparotomies for other causes.
2. Leaks associated with generalised peritonitis and septicaemia. These are usually due to anastomotic disruption, i.e.: loss of bowel continuity.
3. Leaks associated with localised infection or abscess formation.
4. Leaks associated with or lead to enterocutaneous fistulae, one of which is FF, the core of this study.

Enterocutaneous fistulae are either high-output fistulae (>500ml/day), or low-output fistulae (<500ml/day); FF is regarded low-output fistulae, which rarely cause metabolic problems, but it cause extensive excoriation of the skin and may be sepsis<sup>(1)</sup>. Low-output fistulae, like FF, have lower mortality rate and three times more likely to achieve spontaneous closure than high- output fistulae<sup>(1)</sup>.

Spontaneous closure rates of FF is 70 – 90%, which is better than gastric fistula (30 – 50%) and ileal fistula (<40%) postoperatively<sup>(1, 2, 6, 10)</sup>. The average time of this spontaneous closure is within 4 – 6 weeks of conservative treatment<sup>(1, 8, 11)</sup>.

Faecal fistula usually becomes evident between the fifth and tenth postoperative day, heralded by discharge of a mixture of pus, gas, and faeces through the site of the wound or surgical drains<sup>(1, 2, 6)</sup>.

The main phases of the management of FF are: recognition and stabilization (including skin care), investigation, decision, and then definitive management<sup>(1)</sup>.

Persistence of FF after two months from its appearance necessitates surgical intervention, with removal of FF and resection of the affected segment of the colon and reanastomosis of the colon<sup>(1, 2, 6, 7, 8, 11, 12)</sup>.

The aim of this study is to focus on FF as a permanent result from anastomotic leak which is the major complication of colonic anastomosis. To know its incidence, and to analyse the associated factors that enhance or reduce its formation and / or its recurrence.

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## **Patients and Methods:**

The patients with colonic surgery were consecutively studied in the period from Jan.1996 to Jun.2005. The total number was 139 patients. All these patients were followed up for at least one month after the operation, with exception of two patients died in the first week post- operatively. So the net was 137 patients were included in this study.

All patients had mechanical (fluid diet with laxative) and antibiotic - bowel preparation for four days preoperatively. In the last preoperative day, enema was given anally as well as to the proximal and distal part of the colostomy when present. Barium enema was mandatory to confirm no distal obstruction, and to verify the anatomy of the colon for surgical planning. Besides, the preoperative investigations were done for each patient to confirm the fitness for the operation.

The type of the colonic surgery in this study was either resection of pathological segment of the colon and anastomosis in one session or minor resection of the ends of the colostomy with anastomosis.

The anastomosis was end to end approximation of the intestinal cut ends and suturing them by open method using full thickness interrupted, single layer, vertical stitch by means of 2/0 silk. The details of

bowel preparation and the surgical technique of anastomosis are elucidated in textbooks of surgery<sup>(10, 13, 14)</sup>. The closure of all colostomies was intraperitoneal.

Tube - drains were put in all cases and removed in the third postoperative day, when there was no drainage. A broad spectrum antibiotic was mandatory for all patients, mainly a third generation Cephalosporin with Metronidazole. The antibiotics were given parenterally, peri- operatively and in the first five postoperative days, then given orally for one week.

Oral feeding was started on the fourth postoperative day, even if there was earlier positive bowel sounds and/or the patient passed flatus. The diet was fluid, in nature, in the first few days changed gradually to normal diet. The antibiotic course and feeding were modified individually, sometimes, according to the progress of the patient's condition.

Following up the patient was continuous for at least one month after the operation, with exception of the cases that had complications that needed longer follow up.

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## **Results:**

The age range of the patients was 12 – 73 years with a mean age of 37 years. Most of the patients were male: 122 (89%). The patients were classified into three groups according to the

pathology and the type of the operation; as shown in table – 1.

In group – I, the pathology was diagnosed preoperatively and the patients were submitted to preoperative bowel preparation, so their operations

were done in one stage (i.e.: resection of the pathological segment of the colon with an end to end anastomosis at the same time).

Although in groups – II and III, the patients had different pathologies, but they shared in the fact that their operations were urgent. So, their operations were in two stages, in other words: the first stage was a laparotomy to excise the pathological / unhealthy segment or to suture the injured colon finishing the operation with colostomy, and the second stage of the operations was after 3 months or more to close the colostomy; of course after bowel preparation. In this study, only the second stage of the operations was included, because the first operation was done mostly by other surgeons with little available information about their operations.

In group – II, the types of the colostomy and their managements are classified in table – 2.

In group – III, the types of the colostomy and their management are classified in table – 3.

One of the cases in group – II had features of acute abdomen and septicaemia, five days after closure of the colostomy. Re-exploration of the abdomen explained the cause; there was a plenty of Ascaris worms in peritoneal cavity which was the cause of anastomotic disruption. The peritoneal cavity was

cleaned and exteriorization of the colonic ends, i.e.: re-colostomy. Antihelminthic and broad spectrum antibiotic drugs were given to him. Closure of the colostomy was done after three months when the condition of the patient improved, no sequel detected.

Anastomotic leaks occurred in 14 patients (10.2%), presented with discharge of faecal material and gases from the wound or the drain side, proved clinically by ingestion of small amount of charcoal that led to black staining of the dressings. The first appearance of this leak occurred in the period 7<sup>th</sup> – 13<sup>th</sup> day postoperatively, with the mean 8<sup>th</sup> day. Some of these leaks healed spontaneously (ten cases) with conservative management, and the others persisted and changed into FF (four cases), as shown in table – 4.

Investigations were done for those four cases with FF, which included fistulography, barium enema and sigmoidoscopy. Reoperation was done for them after two months from its occurrence. Also bowel preparation was mandatory. Laparotomy entailed resection of the affected segment including fistulous tract, cleaning the area and reanastomosis of the colon. Only one patient from the four cases (25%) had recurrent FF, but the discharge became less.

**Table – 1: classification of the total (137) patients according to the pathology & the type of the operation.**

	<i>No. (%)</i>	<i>Pathology</i>	<i>Type of the operation</i>
<b>Group – I</b>	11 (8%)	Tumours of the colon, Se constipation due to colonic inertia	Elective laparotomy (one stage operation)
<b>Group - II</b>	103(75 .2%)	Perforation or laceration of the colon by bullet or shell	Emergency (Two stage operations)
<b>Group - III</b>	23(16.8%)	Gangrene due to volvulus, vascular diseases, hernia. Malignancy of the colon causing intestinal obstruction	Emergency (Two stage operations)

**Table – 2: types of the colostomy in group – II, their percentage and management.**

<i>Type of the colostomy</i>	<i>No.</i>	<i>%</i>	<i>Type of the second stage operation</i>
<b>Loop colostomy</b>	90	87.4%	The site of colostomy is excised and the continuity of the colon is restored by end to end anastomosis
<b>Colostomy &amp; mucous fistula (divided colostomy)</b>	7	6.8%	Laparotomy, excision of the sites of colostomy and mucous fistula, mobilization of the colon and end to end anastomosis
<b>Hartman's colostomy (terminal colostomy &amp; closure of rectal stump)</b>	6	5.8%	Laparotomy, excision of the site of colostomy, opening of rectal stump, mobilization of the colon and end to end anastomosis
<b>Total</b>	<b>103</b>	<b>100%</b>	

**Table – 3: types of the colostomy in group – III, their percentage and management.**

<i>Type of the colostomy</i>	<i>No.</i>	<i>%</i>	<i>Type of the second stage operation</i>
<i>Colostomy &amp; mucous fistula</i>	9	39.2%	As in table - 2
<i>Hartman's colostomy</i>	11	47.8%	As in table – 2
<i>Vent colostomy (Rt. hemicolectomy with ileotransverse anastomosis)</i>	3	13%	locally, excision of the site of vent colostomy, simple closure of the colon
<b><i>Total</i></b>	<b>23</b>	<b>100%</b>	

**Table – 4: consequences of anastomotic leaks in colonic surgery after two months of follow up.**

<i>The group</i>	<i>Number of anastomotic leaks</i>	<i>Leaks that healed spontaneously</i>	<i>Leaks that transformed into FF</i>
<b><i>GROUP - I</i></b>	1	1	0
<b><i>GROUP - II</i></b>	10	6	4
<b><i>GROUP - III</i></b>	3	3	0
<b><i>TOTAL</i></b>	<b>14</b>	<b>10 (71.4%)</b>	<b>4 (28.6%)</b>

**Discussion:**

The bulk of the operations on the colon were closure of the colostomy, as shown in table – 1, especially in group – II, which formed three quarter of the cases. This can be explained to the numerous cases of high missile injuries. Group – I represented the only elective surgery on the colon as a single-not staged operation, and formed 8% of the total cases of colonic surgery, as shown in table - 1. The remaining 92% were originally emergency operations, which had been ended with colostomy and then later closed as an elective surgery. In other words, this study includes only elective operations for the three mentioned groups.

In group – II the main type of closure of colostomy was closure of loop colostomy (87.4%) as shown in table – 2. The main type of closure of colostomy, in group – III, was laparotomy for Hartman's colostomy (47.8%), as shown in table – 3.

Obviously, anastomotic disruption is more dangerous than simple leak, because the former means loss of continuity of the lumen of the colon with subsequent passage of ample intestinal contents into the peritoneal cavity. While in simple leak, the body defence mechanisms may convert the escaped colonic content from the site of the anastomosis to the outside. In other wards, the leak points through the tissue planes opened up by the surgery as the 'path of least resistance' to out side, so the patients are rarely develop severe sepsis<sup>(15)</sup>.

No patient with sepsis and without surgical intervention survived. But following surgical intervention mortality reaches 50% in patients who showed evidence of sepsis<sup>(16)</sup>. Prolonged intolerance of oral intake, vomiting, fever or protracted ileus may

indicate that anastomosis disruption occurred<sup>(13)</sup>. Surprisingly, Ascariasis was the cause of the single anastomotic disruption that occurred in this study (vide supra). Neither one of the fourteen cases of the anastomotic leak showed the features of septicaemia, nor the subsequent four cases of FF.

This anastomotic leak may heal spontaneously, as in 70 – 90% of cases, or become perm- anent as a FF<sup>(1, 2, 6, 10)</sup>.

As shown in table – 4: the anastomotic leak occurred in the three groups, with the average 10.5%, but it remained as FF only in four patients ( 2.9% of the total cases ). So, 10 out of 14 cases (71.4%) healed spontaneously, i.e.: without surgical intervention. Although this - 71.4% - of spontaneous healing was within the above mentioned range in literatures (70 – 90%), but it was in the lower side of this range. This might be due to the large number of colostomies caused by high velocity missile injuries that cause extensive damage to the tissues with sepsis.

Anyhow, external bowel fistula has better prognosis than internal fistula because the latter always require surgical operation<sup>(1)</sup>. But the patient is usually bothered more from external fistula, especially FF, as it causes soiling of the clothes and malodorous drainage discharge<sup>(5)</sup>. Postoperative fistula formation often results in prolonged hospitalisation, patient disability, social and psychological impact, and enormous cost as it may affect the patient's work or employment<sup>(1, 5)</sup>.

Although the four cases of FF formed 28.6% from the total leaks (14 cases), as shown in table – 4, but it formed 2.9% from the total living cases of operations on the colon (137 patients). In literatures

the incidence of FF after colonic surgery varies from 2% to 9.3% according to the type of the pathology, and to the site of resection<sup>(10, 17, 18, 19, 20, 21, 22)</sup>.

If the anastomotic leak heals, it will do so (i.e.: close spontaneously) within the first month of conservative treatment in 90% of cases<sup>(1, 8)</sup>. If this leak fails to heal within 2 – 3 months under conservative treatment, then surgical management must be applied, as the leak is unlikely to be healed or in other words it is transformed into permanent FF<sup>(1, 2, 11)</sup>. Some surgeons delay the operation for four months for clearer anatomic definition of structures to do resection and reanastomosis<sup>(6)</sup>.

In this study, two months interval after appearance of fistula was enough to confirm that no chance for spontaneous closure, besides the patient's embarrassment from the FF call for early operation. So, full investigations and assessment of the patient with bowel preparation were done after the two months, and then laparotomy was planned for fistula excision.

The following guide lines should be observed perioperatively whenever possible to reduce the incidence of FF: the creation of tension free anastomosis in well – perfused bowel; accurate placement of sutures or stapling devices to prevent unrecognised intraoperative leaks; careful sharp adhesolysis under bright lighting to prevent inadvertent enterotomy; preoperative oral bowel preparation in addition to luminal and systemic antibiotics to decrease the bacterial inoculum on opening the colon; careful haemostasis to prevent a nidus for postoperative abscess formation; and avoidance of perioperative hypotension, steroid therapy, and malnutrition – all of which compromise important host – resistance factors<sup>(1, 6, 8, 13)</sup>.

Nutritional factors that increase the risk of anastomotic breakdown are: weight loss < 10 – 15% of total body weight over 3 – 4 months, serum albumin < 3 gm/dl, and serum transferrin < 220mg/dl<sup>(1)</sup>. So nutrition is important in the prevention of FF formation.

The method of anastomosis, whether hand sewn or stapled, following colon resection does not affect the incidence of anastomotic leak and the choice should be the surgeon's preference<sup>(10, 12, 19)</sup>.

Type of the suture, single or double layers, does not affect the results, but single layer is preferable, as in this study, because it cause less ischaemia as well as tissue necrosis and narrowing of the lumen than a two layer method<sup>(13)</sup>.

The segment of the bowel containing the fistula should be resected and a careful end to end anastomosis created. Simple suture closure of the fistulous tract alone is inadequate and associated with a 41% failure rate<sup>(6)</sup>. During abdominal closure, the omentum should be placed between the anastomosis and the midline wound if possible; this may prevent recurrence of fistulization<sup>(1, 6)</sup>.

Performance of one stage resection and anastomosis of the colon without preoperative bowel preparation is risky<sup>(1, 10)</sup>. Some studies proposed that elective colon and rectal surgery can be safely performed without

preoperative mechanical bowel preparation, and that the incidence of FF didn't change, remained between 5 – 6%<sup>(23, 24)</sup>. Yet, some used on table orthograde bowel lavage, to perform one stage operation and to save the patient from colostomy. Intraoperative colonic lavage adds significantly to the operating time and may be inappropriate in operations on unfit patients<sup>(13)</sup>.

A questionnaire was sent to the members of the US – Society for Surgery of the Alimentary Tract, showed that one third of the responders would perform a one stage resection and anastomosis in 'good – risk' patients with left colonic obstruction or perforation, but in 'poor – risk' patients most responders preferred a staged procedure<sup>(25)</sup>.

Some medical centers, preferred primary repair of penetrating colon injuries, without colostomy (i.e.: one stage operation), and showed that there was no difference in the incidence of sepsis or fistula formation<sup>(26, 27)</sup>.

There is relation between sepsis, nutrition and anastomotic healing. As a matter of fact, there is vicious circle of sepsis that contributes to hypercatabolism and malnutrition leading to decreased immunity with subsequent more sepsis and poor anastomotic healing. So, enteral feeding as early as possible resulted in fewer anastomotic complications than total parenteral nutrition (TPN)<sup>(1, 13, 28, 29)</sup>.

Fistulas that are more than 2.5cm in length increase the likelihood of closure over shorter tracts because these are less likely to epithelialize to the skin and cause more resistance to flow<sup>(8)</sup>. This may explain the low incidence of FF with intraperitoneal anastomosis, in comparison with extraperitoneal anastomosis. All cases in this study had intraperitoneal anastomosis.

New experiments of intraperitoneal lavage with taurididine solution, derived from a natural amino acid – taurine, showed that it may reduce the risk of complications associated with primary colonic anastomosis in patients with secondary peritonitis<sup>(30)</sup>. Some used fibrin glue to occlude the FF by injection of it through fistuloscopy, provided that no distal obstruction, and reported success rate of 64%<sup>(6)</sup>. But closure of the exit of FF may be dangerous, as it will lead to abscess formation or sepsis<sup>(15)</sup>.

Mortality rate of colonic surgery has been reduced in last decades due to the advanced surgical technique, intensive post operative care, use of broad spectrum antibiotics and the introduction of parenteral nutrition. However, the number of patients suffering from FF has not declined substantially. This can be partially explained by the fact that with improved care, more complex surgery is being used on patients with more advanced or complicated diseases / injuries, who are generally at higher risk. Therefore, FF remains an important complication following colonic surgery<sup>(5)</sup>.

High missile energies, with their effects of shock wave and temporary cavitations, have especial impact on the body. The resultant tissue damage and microvascular thrombosis will lead to extensive

fibrosis and adhesions in the area that may have an effect on the colonic anastomosis in the future. This may explain the occurrence of the FF in group – II only.

Besides, the solitary recurrence of the FF was of a patient formerly with Hartman's colostomy and had extensive pelvic damage. In literatures, the

### **Conclusions & Recommendations:**

A faecal fistula is a permanent sequel of unresolved anastomotic leak. Bowel preparation (mechanical and antibiotic) is still preferable in colonic surgery. Single layer suture is safe. Adherence to proper surgical techniques is important, with careful attention for the vascularity and the release of the ends of the colon

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most common pathological causes of FF formation, postoperatively, were malignancy and Crohn's disease<sup>(1, 5, 22)</sup>. No patient in this study had distal obstruction, including stenosis, at least proved by barium enema.

before the anastomosis, to prevent tension and ischaemia at site of the anastomosis. Prophylactic broad spectrum antibiotics, peri-operatively and postoperatively, are useful. Further studies on the pathophysiological changes, caused by missiles, in perfusion of the tissues are needed.

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