



Necrotizing Soft Tissue Infections in Laparoscopic Colectomy: A Case Report

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Abstract

Background: Necrotizing soft tissue infections (NSTI) are a major surgical complication relating to skin wounds. Although laparoscopic surgeries often cause minimal wound infection, NSTI is still a potentially fatal surgical complication. This article is going to report a case of necrotizing soft tissue infection (NSTI) following laparoscopic total colectomy.

Case Presentation: An otherwise healthy 65-year-old woman with early stage of colon adenocarcinoma underwent laparoscopic colectomy. A diagnosis of NSTI was made five days after primary operation. The culture grew *Enterococcus Faecalis* (sensitive to: ciprofloxacin, ampicillin, vancomycin, Gentamycin and linezolid). The patient was treated with broad-spectrum antibiotics and surgical debridement.

Conclusions: We report a case of NSTI with *Enterococcus Faecalis* following laparoscopic total colectomy. The isolated microorganism is not common in monobacterial NSTI. Administration of broad-spectrum antibiotics and surgical debridement help the patient to survive.

Keywords: Necrotizing Soft Tissue Infection, Laparoscopy, Colorectal Adenocarcinoma, Case Report

1. Background

Necrotizing soft tissue infection (NSTI) is a rapidly spreading infection of the deep fascia by toxin producing bacteria and secondary necrosis of the subcutaneous structures like muscles and adipose tissues (1). A timely care in association with surgical debridement and broad-spectrum antibiotics is the mainstay of treatment. However, during the initial stages of NSTI, the clinical presentation might be disproportionate and has minimal skin manifestations. Therefore, early diagnosis is not always obtained straightforward. In view of that, the mortality rate of NSTI could be as high as 15% to 52% (2).

NSTI is a major surgical complication related to skin wounds. Laparoscopic interventions are often associated with minimal skin damage; however, NSTI could be still an important cause of morbidity and mortality (3, 4). A few reports in the literature have addressed NSTI post laparoscopic colon surgeries. Here, we present a case of NSTI following laparoscopic total colectomy.

2. Case Presentation

The patient was a 65 year old obese woman (BMI = 36) with chronic abdominal pain and rectorrhagia that underwent colonoscopic examination which revealed 3 adenomatous polyps in the splenic curvature of the descending colon.

There was a healthy looking lady with normal vital sign and without any abnormal physical exam except a morbid obesity.

Microscopic investigations suggested moderately differentiated adenocarcinoma of colon. No metastasis or nodular involvement was detected on computed tomography scan (CT scan) and the cancer stage was determined as T_xN₀M₀. The patient was otherwise healthy.

The patient was scheduled for laparoscopic total colectomy and ileorectal anastomosis. The colon was prepared for the surgery both mechanically and chemically with three doses of oral metronidazole (1 g) and erythromycin (1 g), given on the day before surgery as well as ceftizoxim (1 g) and metronidazole (500 mg) administered intravenously 30 minutes before surgery that were continued till 24 hours post operation. The operation was successfully performed via classical medial approach for right, left

and transverse colectomy. Vessels were ligated by Hemo-Lock clips and specimens were extracted through a 5 cm midline incision. Anastomosis was performed by 29 mm Ethicon circular staples and a closed drain was inserted beside the anastomosis. All the trocars were disposable. The patient had a normal recovery course till the 4th day after surgery. However, she has developed severe abdominal pain and distension along with discoloration of abdominal skin including ecchymosis and necrotic patches on the 5th day after surgery. Furthermore, she has developed fever (38.5°C) and tachycardia (120 per minute) with normal blood pressure. She also reported loss of bowel movement for 24 hours. Blood cell counts indicated moderate leukocytosis (WBC: 12000 per microliter). The skin wound had no discharge. Possible anastomosis leak and abdominal collection were ruled out by using abdomino-pelvic CT scan with intravenous and oral contrast. An urgent surgical debridement was performed. broad-spectrum intravenous antibiotics including ceftizoxim 1 g q 12 hours, metronidazole 500 mg q 8 hours and penicillin 4,000,000 unit q 4 hours were prescribed, and she was transferred to the intensive care unit (ICU). Culture samples from wound swab and necrotic tissues grew *Enterococcus Faecalis* (sensitive to: ciprofloxacin, ampicillin, vancomycin, Gentamycin and linezolid). Second and third surgical debridement were performed on the 8th and 12th day of post-operation and the patient's vital signs became stable after the last debridement. she became normothermic and pulse rate became under 90 per minute and the white blood cell count became 5000 after 3rd operation. After 14 days of admission to the ICU, the patient was discharged in medically stable condition. She was trained for wound care and received oral ciprofloxacin 500 mg q12 hours to complete a 21-day course after the last debridement (Figures 1 - 4).

2.1. Follow Up and Outcome

Secondary wound closure was performed in three months. On the post operation follow ups 10 days and one month after the surgery, the patient didn't have any problem except an ugly scar on abdominal wall.

3. Discussion

NSTI initially as Fournier's gangrene after Jean Alfred Fournier, NSTI is a progressive extensive fascial necrosis that was first described in 1764 as a fulminant gangrenous infection of the scrotum (5). The term "necrotizing fasciitis" was first introduced in 1952 (6). Although the incidence of NSTI is quite low (1: 200,000), the mortality rate of up to 76% makes it a highly fatal surgical complication (7, 8).

The main predisposing risk factors for NSTI include diabetes, obesity, immunosuppression, malignancies, alcoholism and malnutrition. our patient was an obese woman and already had a GI cancer that were her predisposing factors for this fatal complication. Any bacterial inoculation in the sub-epithelial and sub-mucosal tissue could potentially cause NSTI. From microbiology standpoint, NSTI are classified to three subtypes (Table 1): 1-polymicrobial including anaerobes, 2- monomicrobial, mainly Group A β -hemolytic streptococci including *Streptococcus pyogenes* and *Staphylococcus aureus* and 3-Marine Gram-negative bacilli (1).

Table 1. Tim Line

	Description
Patient information	a 65 year old obese (BMI = 36) but healthy looking woman with chronic abdominal pain and rectorrhagia for several months
Diagnostic assessments	Three adenomatous polyps in the splenic curvature was seen on colonoscopy. CT scan was normal
Interventions and treatment	The patient was underwent laparoscopic total colectomy and ileorectal anastomosis
On the 4th day after surgery	Severe abdominal pain and distension was occurred along with discoloration of abdominal skin
The 5th day after surgery	Eccymotic and necrotic patch was appeared on abdominal skin and the patient became febrile and tachycard.
The 5th day after surgery	First surgical debridement was done and antibiotic initiated.
The 8th day after surgery	Second surgical debridement.
The 12th day after surgery	Third surgical debridement.
The 14th day after surgery	The patient discharged with medically stable condition with an open wound
Follow up: 10 days after discharge	The patient was stable and the wound was clean based
Follow up: 1 month after discharge	The patient was medically fit and the wound was ready to be closed
3 month's after surgery	The abdominal wound been closed secondarily.

While the rate of wound infection is compatible in laparotomy and laparoscopic incisions (9), the incidence of NSTI has been reported to be lower in laparoscopic colon surgeries compared to laparotomy (0.7% vs 4.1%) (10, 11). Iatrogenic perforations and low tissue oxygenation could contribute to NSTI following laparoscopic procedures (12).

The most crucial determinant in NSTI outcome is timely diagnosis. However, given that the skin is largely spared in laparoscopic surgeries; the early presentations

of NSTI could be difficult to distinguish from other non-necrotizing soft tissue infections such as cellulitis (13). Findings such as foul smelling “dishwater pus” like discharges and lack of tissue resistance to blunt dissection raise the suspicion for NSTI diagnosis (14).

The use of high T2-weighted magnetic resonance imaging (MRI) in early diagnosis of NSTI has been considered (15). Although, MRI could be useful in differentiating NSTI from other superficial soft tissue infections, the lack of specificity and the fact that it might not be available to many centers, make it an unavailable option for early diagnosis of NSTI (16). Differentiating the pathology of the soft tissue infection using frozen section biopsies could be also helpful for early diagnosis of NSTI. However, this could not be considered as a standard practice (13).

The laboratory risk indicator for necrotizing fasciitis (LRINEC) score is a simple tool and is easy to estimate in most clinical settings (17). It is based on C-reactive protein (CRP), hemoglobin level, Leukocyte count and serum levels of sodium, creatinine, and glucose. The LRINEC score has a positive predictive value and negative predictive value of 92% and 96% respectively (17).

Here, we presented a case of NSTI following laparoscopic total colectomy due to early stage colon adenocarcinoma. Our patient did not have any underlying predisposing factor except obesity and underlying cancer, and had not received any immunosuppressive anti-cancer therapy. We made the diagnosis as soon as five days after index operation based on our clinical observation. The LRINEC score in our patient was 6 (CRP > 150 and Hb < 11) (17). The responsible microorganism was found to be *Enterococcus faecalis*. Given that no anaerobic bacteria growth, we concluded that our case was a type II monomicrobial NSTI (1). However, *Enterococci* have not been reported as the main microbiological cause of the type II NSTI (Table 2).

3.1. Conclusions

Our patient underwent an uncomplicated laparoscopic colectomy and had a moderate risk for NSTI (LRINEC score of 6). By early diagnosis and use of broad spectrum antibiotics and repetitive surgical debridement, increases the survival chances for the patient. The wound swab culture grew *Enterococcus faecalis*, which is not a usual monobacterial NSTI. An important point in prevention of NSTI in patients like our patient is that the surgeon should be aware of immunity compromise in patients with malignant disease and increased risk of postsurgical infection (including NSTI) in these groups especially in obese patients - like our patients- and maybe the most important way to prevent this complication in this group of patients is high suspicion and early intervention.



Figure 1. Before Debridement on the 4th Day After Index Surgery, We Found Ecchymotic and Necrotic Tissue on the Patient's Skin

3.2. Ethical Consideration

Declaration of Helsinki (1975 revision) regarding patient's rights has been considered in all steps of performing the study, moreover, we inform the patient about this article after she cure and reassure her about her rights and patient consent was achieved.

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Table 2. Necrotizing Soft Tissue Infections Subtypes (1)

	Microbial Pathogens	Anatomical Location	Predisposing Factors	Clinical Clues
Type I	Polymicrobial, including anaerobes	Mostly trunk and genitalia	Age, Diabetes, IV drug abuse	Progressive pain, foul smelling wound, tissue crepitus, sepsis
Type II	Monomicrobial most commonly Group A β -hemolytic streptococci	Not specific	Trauma, IV drug abuse	Septic shock
Type III	Gram-negative marine organisms	Not specific	Sea food, direct wound exposure	Rapid multisystem organ failure

**Figure 4.** Ready for Secondary Closure, This is 2 Weeks After Discharge of Patient From Hospital**Figure 2.** 2 Days After Primary Debridement, There is Still Echymotic and Necrotic Tissue**Figure 3.** All Infected Tissue Debrided After 3rd Surgical Debridement

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