

Abdominal Wall Necrotizing Fasciitis: A Survivor from “Meleney’s Minefield”

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Citation

M Akhtar, F Akhtar, D Bandyopadhyay, H Montgomery, A Mahomed. *Abdominal Wall Necrotizing Fasciitis: A Survivor from “Meleney’s Minefield”*. The Internet Journal of Surgery. 2009 Volume 22 Number 1.

Abstract

Necrotizing fasciitis (NF) is a surgical emergency characterized by a fulminant course and a high mortality rate. It is the deadliest form of soft-tissue infection. Early recognition and prompt aggressive debridement of all necrotic tissue is critical and has been demonstrated to improve the survival rate. However, since Meleney’s time, the mortality associated with this condition has remained high, with a reported cumulative mortality rate of 34% (range, 6% to 76%). The physicians confronted with this surgical emergency continue to thread through “Meleney’s minefield,” fraught with dangers of delayed or even missed diagnosis with catastrophic consequences due to the paucity of cutaneous findings early in the course of the disease (1, 2) We report a case of abdominal wall necrotizing fasciitis secondary to a perianal abscess in an elderly diabetic patient. We could not follow the golden principles of extensive debridement because of the extent of the disease and poor physiological reserves of the patient, instead we treated her with aggressive medical therapy and limited surgical debridement and she turned out to be a survivor from “Meleney’s Minefield”.

INTRODUCTION

Hippocrates described Necrotizing Fasciitis (NF) as a complication of erysipelas in the 5th century BC. British naval surgeons referred to NF as hospital gangrene in the 18th and 19th centuries. Fournier described NF in the genital and perineal regions in 1883 and later Meleney reported the first case of NF caused by a beta-haemolytic streptococcus in 1924. Wilson proposed the term necrotizing fasciitis in 1952 which is described as a rapid and progressive soft-tissue infection leading to necrosis of the fascia, subcutaneous tissue and overlying skin. Diabetes, drug addiction, alcoholism, obesity, malnutrition, tumours, immunodeficiency or other chronic medical conditions are the predisposing factors but no risk factor is apparent in about 10% of the cases. (3, 4)

CASE REPORT

A 69-year-old obese lady was brought to the emergency department after she was found on the floor by her daughter. She was hypotensive, confused, hyperglycaemic, sweating and complaining of abdominal pain when paramedics arrived. Her significant past medical history included Type 2 Diabetes Mellitus, Caesarean Section and Cholecystectomy. On examination, she looked dehydrated. Her observations showed a heart rate of 105/min, blood pressure of

82/41mmHg and Glasgow Coma scale was 14/15. Chest examination showed left-sided basal crepitations. Her abdomen was soft, non-tender but distended and perineal examination showed sacral cellulitis with perianal abscess.

Initial investigations showed a white cell count of $27.3 \times 10^9/L$, Urea 25.9 mmol/L, Creatinine 194 $\mu\text{mol/L}$ and Glucose 29.7 mmol/L. Her arterial blood gas analysis on 5 litres of Oxygen showed $pO_2 - 40.0$, $pCO_2 - 2.12$, $pH - 7.29$ and $HCO_3 - 13$. Her ECG showed a sinus tachycardia with atrial ectopics. Subsequently, she went into fast atrial fibrillation with hypotension, which was cardioverted with amiodarone. Chest x-ray showed a left lower lobe consolidation. Urinalysis showed a large number of ketones. The patient was diagnosed with Diabetic Ketoacidosis and admitted to ICU for further management.

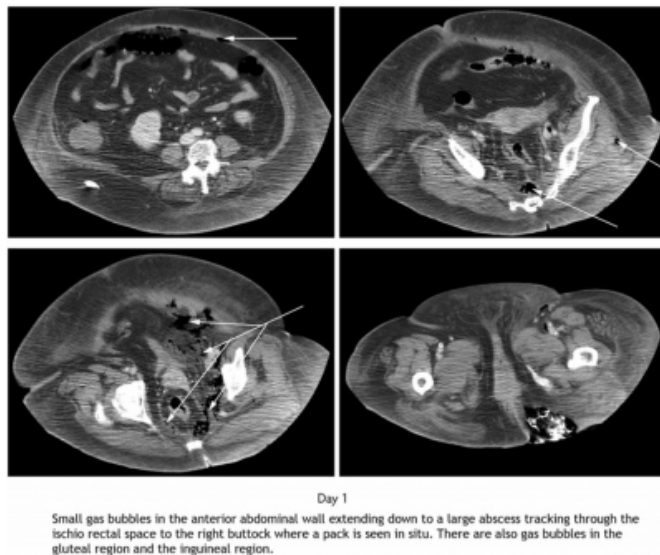
On local examination there was a 5x3cm area of discoloured, necrotic skin in the left perianal region and no obvious induration was felt in the surrounding area. Per-rectal examination was difficult due to pain and was not performed. She was resuscitated in the intensive care unit with fluids and insulin, before she went to theatre for examination under anaesthesia and debridement of perineum on the 2nd post-admission day. Sigmoidoscopy was normal up to 20cm. An area of necrotic skin was noted between the

3 and 6 o’clock position. The cavity extended medially to the anal sphincter and laterally to the ischium. The cavity was deroofed and necrotic skin and fat was excised. The cavity was packed with betadine-soaked dressing. The patient was started on Imipenem and Clindamycin, and later Metronidazole was added. The patient remained systemically unwell with worsening metabolic acidosis.

A computerized tomographic (CT) scan was arranged which showed an extensive gas cavitation from left ischio-rectal fossa through pelvic floor into anterior abdominal wall. Gas was tracking down her left femoral sheath. There was no evidence of abscess in the pelvis. The intra-abdominal tissue was normal but the rectal wall was surrounded by the gas cavities (Fig. 1).

Figure 1

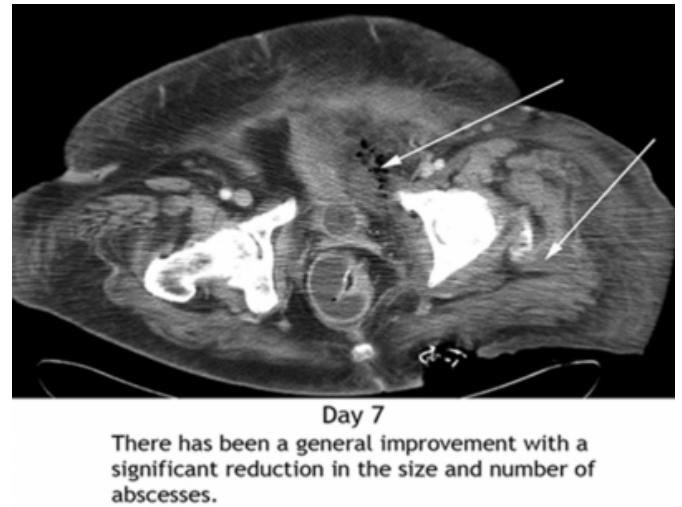
Fig. 1



The patient was treated conservatively with intravenous antibiotics as she had an extensive area of necrotic tissue on CT scan not amenable to surgery; clinically, there was no indication for fasciotomy over the abdominal wall. The patient’s condition improved but remained critical. She was taken to theatre for further debridement of the ischio-rectal wound on the 7th post-admission day as there was general improvement on the CT scan (Fig. 2).

Figure 2

Fig. 2



Pus swab showed mixed coliforms and anaerobes, while blood culture showed Group C haemolytic streptococcus.

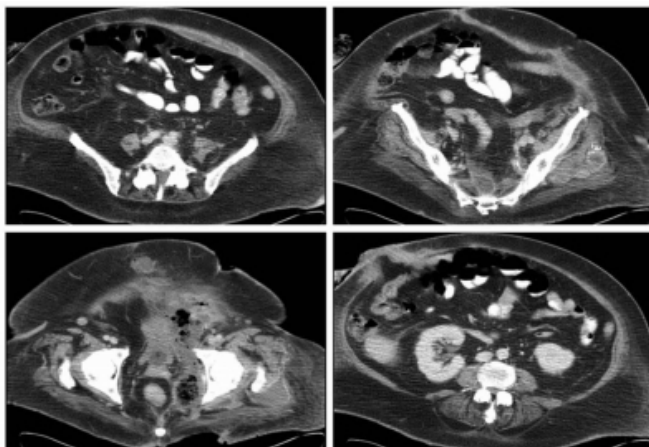
The patient went to theatre on the 13th post-admission day for a transverse loop colostomy, to prevent faecal soiling of the sacral wound. On the 14th post-admission day, the patient had multi-organ failure and the suggestion was to keep her comfortable if she could not survive the extensive debridement of the necrotic tissue as suggested by the CT scan, but on clinical grounds the decision was taken to treat her with extensive conservative treatment with IV antibiotics.

The gluteal cavity kept discharging greyish-black fluid. The patient’s systemic condition slowly improved. Later her wound swab from the site of the laparoscopy performed before colostomy showed heavy growth of pseudomonas.

The patient was transferred to the ward on the 29th post-admission day, after she continued to make good progress. Her repeat CT scan on the 37th post-admission day (Fig. 3) showed peri-rectal abscess spreading to the contours of recto-sigmoid junction and left iliac fossa.

Figure 3

Fig. 3



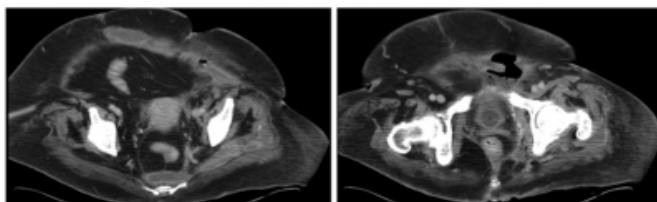
Day 37

The patient now has a loop colostomy. The infection in the ischio rectal space and the gluteal region persists. A small collection persists in the anterior sacral space but the anterior abdominal wall infection is reduced.

The repeat CT scan on day 50 showed abscesses recurring in the anterior abdominal wall and persisting in the anterior sacral space and gluteal region (Fig. 4). She was taken to theatre on day 54 and both abdominal and perineal wounds were explored and a Vac-pump dressing was inserted.

Figure 4

Fig. 4



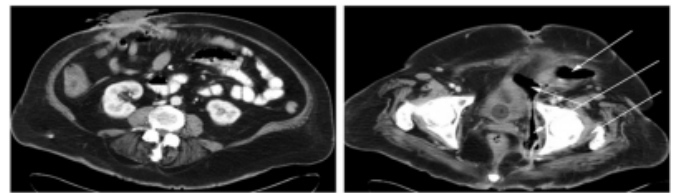
Day 50

Recurring abscesses on the anterior abdominal wall and persisting in the anterior sacral space and gluteal region.

The patient was well enough to go to the rehabilitation ward on the 127th post-admission day. She had a gastrogastric enema which showed a high anal fistula. The repeat CT scan at day 144 (Fig. 5) showed a minimal collection in an anal fistula which was not drainable.

Figure 5

Fig. 5



Day 144

A more localised collection persists in the ischio rectal space and a small gluteal collection. A gas bubble persists in the lower abdominal wall but the other abscesses have resolved.

She continued to make good progress and was able to go home on the 178th post-admission day. Her perianal wound looked healthy and was only 2cm deep. The Vac-pump was discontinued after 3 months. She had an ultrasound scan of the abdominal wall which did not show any collection.

She was reviewed 3 months following her discharge from the hospital. Her stoma was working and her wounds were healing.

DISCUSSION

Necrotizing fasciitis is a surgical emergency. Survival depends on early recognition and aggressive surgical debridement along with targeted antibiotic therapy. Joseph Jones gave the first clear definition of necrotizing infections of soft tissues in 1871, as hospital gangrene. Wilson used the term necrotizing fasciitis for the first time in 1952. (5)

Fournier's gangrene or necrotizing perineal infection is an uncommon but lethal complication of an ischio rectal fossa abscess and is associated with a high mortality, especially in immunocompromised individuals and diabetics (6)

Necrotizing fasciitis has been divided on the basis of microbiological cultures into distinct groups. Type-I and Type-II infections affect different subgroups of patients. Type-I infections occur in immunocompromised hosts and are polymicrobial synergistic infections that usually are caused by non-group-A streptococci, aerobic organisms, and anaerobic organisms. Type-II infections tend to occur in individuals with no underlying co-morbidities and are usually caused by *Streptococcus pyogenes* alone or with staphylococci. (2)

Early recognition of necrotizing fasciitis remains a challenge for both physicians and surgeons. A high index of clinical suspicion is the most important skill to acquire as the early diagnosis can dramatically reduce the mortality and morbidity associated with this condition. Patients admitted to the medical units with soft-tissue infections should be

reviewed by the experienced surgical team. However, early necrotizing fasciitis has been missed even by experienced surgeons. (1) This may be due to the “iceberg effect” which represents the destructive course of the infection through the underlying tissue planes without a corresponding devitalisation of the overlying skin until much later in the disease. Typically, the presence of gas in soft tissues has been associated with necrotizing fasciitis; however, this is not pathognomonic for the disease. In fact, most strains of *Staphylococcus* or *Streptococcus* species do not produce gas. Anaerobic organisms, such as *Clostridium*, *Bacteroides*, and *Peptostreptococcus*, are usually responsible for gas production. (9). Crepitus, which is the clinical manifestation of subcutaneous gas, is seen on presentation in 50% of patients. Pain is severe, but the area of black, gangrenous skin is far smaller than the widespread infection in the underlying fascial planes. Other presenting signs and symptoms include fever, leukocytosis, shock, and altered mental status.

Definitive diagnosis can often be made at operative exploration. The features of necrotizing fasciitis are the presence of foul-smelling dish-water pus, greyish necrotic fascia, demonstration of a lack of resistance of normally adherent deep fascia to blunt dissection and lack of bleeding of the fascia during dissection. Histologic examination is important for confirming the diagnosis of necrotizing fasciitis. Intraoperatively, tissue should be taken for cultures and histologic examination. (1)

At times there is a considerable delay in the diagnosis of necrotizing fasciitis due to its non-specific clinical signs and the reason that the overlying skin is completely intact. Necrosis of the subcutaneous tissues, oedema and inflammation are only later followed by skin necrosis due to interrupted blood supply. Imaging modalities like contrast-enhanced computed tomography (CT) can hasten the diagnosis and facilitate proper treatment by defining the extent of disease and the possible complications. (3)

The presence of soft-tissue gas dissecting along fascial planes is suggestive of necrotizing fasciitis as in our case and this characteristic CT appearance is important for establishing the diagnosis, even without the characteristic clinical findings. Liberal use of CT might lead to earlier diagnosis and surgical intervention in patients with necrotizing fasciitis. However, it should not delay the operative debridement. The main radiologic differential diagnosis is other causes of soft-tissue gas, such as myonecrosis and soft-tissue oedema (7)

The key to NF treatment includes adequate surgical debridement, intravenous antibiotics, and supportive care. Broad-spectrum antibiotics are needed for type 1 NF, until culture, Gram stain, and sensitivity results are available. A common regime is a combination of penicillin for gram-positive cocci, an aminoglycoside for gram-negative aerobes, a third-generation cephalosporin, and clindamycin or metronidazole for anaerobes. Single antibiotic coverage against anaerobes and *Pseudomonas* in the form of imipenem-cilastatin can be considered. (4) These medications do not stop the progress of necrosis initiated by the toxins released by the organism. (8)

Aggressive surgical debridement is the cornerstone in the management of NF. Early and extensive incision of the skin and subcutaneous tissue wide into healthy tissue, followed by excision of all necrotic fascia and non-viable skin and subcutaneous tissue is mandatory. This has to be repeated as often as is necessary. (3)

Frequent postoperative dressing changes and wound inspections are recommended. Pain management is important especially during dressing changes. The clinician should look for secondary infections and concurrent toxic shock syndrome or multisystem organ failure. Psychologic support is integral to the treatment along with counselling and medication. Heparin therapy helps reduce vasculitis and thrombosis. Hyperbaric oxygen (HBO) is often employed in the treatment of NF which may be more effective in cases involving anaerobes. (4)

The role of faecal diversion has not been clearly determined although formation of a diverting colostomy appears to favour survival as in our case. Faecal diversion has been recommended in cases of necrotizing perineal infection, especially where the source of infection is from the colon/rectum. (6)

CONCLUSION

Necrotizing fasciitis of the abdominal wall is still Meleney’s Minefield. In order to survive this minefield a high index of suspicion and regular review is important in these patients. A bulla or blistering of the skin are important diagnostic clues and should raise the index of suspicion. Early exploration is advisable in the operating room if there is any doubt. Computed tomography can be a helpful adjunct in indeterminate cases but should not delay operative exploration in patients in whom the suspicion is sufficiently high. (1)

Advanced age, immunocompromise, and streptococcal toxic shock syndrome have been identified as independent predictors of mortality from necrotizing fasciitis (10) All diabetics and older patients with ischiorectal fossa abscesses should be admitted; for a prompt and detailed examination of the affected ischiorectal fossa, perineum and scrotum. Emergency drainage and adequate derroofing of the abscess cavity should be carried out by an experienced surgeon. These patients should be closely monitored and a diverting colostomy should be carried out in the presence of spreading perineal necrosis. (6)

This case report highlights the importance of good supportive care and appropriate antibiotics in cases with poor physiological reserves who cannot tolerate general anaesthesia. Close monitoring of the necrotic area with regular clinical examination and CT scan should be carried out in these cases. Despite the high mortality associated with this condition there may be a few survivors from this minefield, who can lead us to believe the remarkable healing capacity of nature.

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