Anterior abdominal wall necrotizing fasciitis due to strangulated umbilical hernia: a diagnostic dilemma

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Abstract

Necrotizing fasciitis of the abdominal wall is associated with high morbidity and mortality. Early recognition and aggressive debridement of necrotic tissue are essential to achieve good outcomes. We describe an unusual presentation of a woman who was diagnosed with infected wound on the abdomen and was initially treated with traditional therapies.

Keywords

Necrotizing fasciitis; perforated umbilical hernia; abdominal wall; resuscitation, antibiotics, radical debridement.

Introduction

Abdominal wall fasciitis as a complication of abdominal wall hernia occurs when there is a delay in management of associated bowel strangulation, and subsequent perforation. Perforation after bowel strangulation causes sepsis, which may cause peritonitis or spread to the soft tissue of the anterior abdominal wall. The sequelae of anterior abdominal wall infection may result in abscess, fistula or necrotizing soft tissue infection. Hernias that present as a Richter type may initially have a benign presentation as the partial involvement of the circumference of the bowel does not produce obstructive symptoms and signs. In such a situation, this condition may easily progress to strangulation\textsuperscript{[1]}. Similarly, necrotizing fasciitis initially may have mild cutaneous manifestations and notably the underlying infection and tissue necrosis spread far beyond the visible skin changes. Although the combination of these two presentations are rare, its occurrence has a severe outcome\textsuperscript{[2]}. Delay in the diagnosis of these conditions may be contributed to by the lack of a high index of suspicion among clinicians due to its rarity, the mild and atypical presentation of strangulated Richter hernia and the lack of early cutaneous signs in necrotizing fasciitis.

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Case report

A 47-year-old woman was referred from a rural primary hospital. She was too sick to give a history and there were no accompanying staff or family to assist. There was a brief referral note, which did not mention her previous history and explained that she had been treated a presumed abdominal wall wound infection of unknown duration with traditional herbal medicine for 3 days before attending the primary hospital. The referral note stated that she spent 24 h at the initial hospital and was treated with intravenous fluids, antipyretic (paracetamol) and oral antibiotics (cloxacilline 500 mg 8 hourly). This institution had no surgeon or advanced imaging facilities such as computed tomography (CT) scan, after 24 h with no improvement, the patient was referred to the tertiary hospital, 800 km away, with a diagnosis of abdominal wall abscess. On arrival at the tertiary hospital, she had clinical features of advanced sepsis with confusion, hypothermia (34.8°C) and shock (blood pressure 94/67 mmHg and pulse rate of 90 beats/min). Her abdomen was distended, and she had a 20-cm diameter infected wound in the centre of the anterior abdominal wall with erosion of her umbilicus. The wound had a necrotic centre that was surrounded by hyperaemic and oedematous skin. There was foul-smelling faeculent effluent coming from the centre of the wound (Fig. 1).

Laboratory results revealed haemoglobin level of 12.6 g/dl, leucocytosis (white cell count 27.97 × 10^9/ml), neutrophilia (88.8%), hyponatremia (Na⁺ 117 mmol/l) and deranged renal function (serum creatinine and urea of 223 μmol/l and 37.9 mmol/l, respectively). The patient tested negative for HIV serology.

A diagnosis of a strangulated, perforated umbilical hernia complicated by necrotizing fasciitis of the anterior abdominal wall was made. The patient was resuscitated with intravenous fluids and antibiotics and prepared for emergency surgery. A damage control procedure was performed by resecting a segment of necrotic mid ileum and suturing the two ends closed without anastomosis. Debridement of the necrotic anterior abdominal area and the more extensively involved underlying fascia was undertaken (Fig. 2). The wound and the peritoneal cavity were rinsed with copious amounts of saline. Due to the degree of sepsis and tissue loss, the abdomen was left open and temporary cover was achieved with a Bogota bag (Fig. 3). Postoperatively she was admitted to the intensive care unit. Unfortunately, she died 25 h postoperatively secondary to irreversible septic shock.

Discussion

Umbilical hernia is a common condition among Africans[^3^,^4^]. Generally, repair of umbilical hernias is indicated when there is a failure of the hernia to close spontaneously by the age of 5 years[^3^].
However, emergency surgery is carried out when the hernia becomes irreducible or if complications such as bowel obstruction or strangulation occur.

When there is bowel obstruction, the whole circumference of the bowel may be involved and patients present with signs of obstruction such as abdominal pain, constipation, abdominal distension and vomiting. When there is a tight constriction that compromises the blood supply to the herniated segment, strangulation occurs and gangrene may occur once intervention is delayed. The diagnosis of strangulation in umbilical hernias is often overlooked or made late during the course of the illness\[^5\]. Richter hernia is a specific complication in which only a part of the circumference on the anti-mesenteric border of the bowel is trapped in the hernia. In this situation, the symptoms of bowel obstruction may not manifest and the progression to strangulation and subsequent infarction and perforation is insidious and often rapid. This leads to a delay in diagnosis and to higher mortality compared with other hernias\[^1,6\]. Although Richter hernias occur rarely, they are common causes of strangulation. In a study conducted at a rural hospital in Kenya, most patients presenting with strangulation of a hernia (16 of 21) had a Richter hernia. Diagnosis was delayed by 6 days to 2 months and mortality was reported to be 17%\[^1\]. When Richter hernia is complicated by abdominal wall necrotizing fasciitis, mortality of 34% was reported\[^1\]. When a complicated hernia presents with necrotizing fasciitis, the former may be overlooked as much of the attention is often given to the rapidly spreading fasciitis. A careful history to establish the presence of the hernia is important and could be an early clue to a
suspicion of a strangulated hernia as the initiating factor. Imaging such as ultrasonography and CT scan can be useful to confirm the diagnosis of abdominal wall hernias in these difficult situations\[2,7\]. It is likely that our patient presented with Richter hernia because of the absence of symptoms of bowel obstruction. The diagnosis of strangulation was delayed for several days until she was referred to the tertiary hospital.

Necrotizing fasciitis results from microbial invasion of the subcutaneous tissues or fascia either from external trauma or through direct spread from a perforated viscus; the spread of infection is usually fast and associated with little overlying skin change\[8\]. In the early stages, patients present with severe pain that is out of proportion to the physical examination findings. Often, symptoms worsen rapidly with fever and sepsis occurring later in the course of the disease. Clinical findings include erythema, swelling and pain or tenderness beyond the margins of erythema\[8,9\]. Skin changes occur in the late stage of the disease; they include crepitus, skin anaesthesia, and skin necrosis/discholoration\[8\].

To diagnose necrotizing fasciitis early is a challenge for clinicians because of the non-specific clinical presentations, which are the only early features. Early diagnosis of necrotizing fasciitis and aggressive resuscitation and surgical debridement lead to better outcomes\[8,9\]. A number of decision tools have been developed to aid earlier diagnosis. The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINF) is one of these tools. LRINF is based on standard laboratory tests including white blood cell count and levels of haemoglobin, serum creatinine, sodium and glucose\[9\].

Imaging techniques are widely used in the diagnosis of necrotizing fasciitis, although they are non-specific. When used to evaluate necrotizing fasciitis, magnetic resonance imaging tend to overestimate involvement of deep fascia as it has more sensitivity than specificity\[10\]. A CT scan is able to show inflammatory changes, such as fascial oedema and thickening, abscesses, deeper fascial gas and fluid collections. Plain radiography is still used, although it has poor sensitivity because it relies on the presence of subcutaneous emphysema to diagnose necrotizing fasciitis. However, the absence of subcutaneous emphysema does not rule out necrotizing fasciitis\[8\]. Ultrasonography can demonstrate features of necrotizing fasciitis and differentiate it from cellulitis. Ultrasonography can also guide aspiration and therefore aid in early accurate microbiological diagnosis\[11\].

The mortality rates associated with necrotizing soft tissue infections are high and range from 25% to 46%\[12,13\]. The range in these figures is likely to be due to the variations in the time to make the diagnosis and the subsequent implementation of adequate surgical management. The key to good outcomes are high clinical suspicion leading to early diagnosis, aggressive fluid resuscitation and early administration of broad spectrum intravenous antibiotics followed by emergency aggressive surgery to debride all necrotic tissues beyond visible skin changes. When bowel pathology is the initiating factor, a damage control approach is favoured because of the severe physiological derangements related to the accompanying sepsis. Resection of the involved segment should be performed quickly, the bowel ends ligated and an expeditious temporary abdominal closure should be used. A second-look operation should take place at 48h as further debridement may be required. Restoration of bowel continuity and definitive abdominal closure can be delayed until the patient improves\[14\].

The Bogota bag is a widely used method to provide temporary abdominal closure aimed to allow serial peritoneal opening. It is often used for large abdominal wall defects that cannot be closed in a single stage, abdominal compartment syndrome and in damage control surgery\[15\]. In the present patient, we performed damage control surgery because of her physiological derangement and used the Bogota bag as the abdominal wall defect was large and we could suture the bag to the skin and not the possibly involved fascia. Vacuum-assisted closure and a polyglycolic acid mesh may also be used in such cases\[15,16\]. Where a large abdominal wall defect is encountered, the wound can be left to granulate and later a skin graft applied. The inevitable abdominal wall hernia is initially accepted. Later on, a reconstruction of the abdominal wall is usually undertaken using a prosthetic mesh\[17\].

**Teaching points**

Strangulated abdominal wall hernia complicated with necrotizing fasciitis requires a high index of suspicion to make the diagnosis and ensure timely resuscitation and surgery. A careful history to describe the previous hernia history may be the key to an early diagnosis in resource-limited settings.
A Richter type hernia can be difficult to diagnose and they rapidly lead to strangulation of the hernia contents.

Necrotizing fasciitis is associated with high morbidity and mortality. The keys to achieving good outcomes are

- Clinical suspicion, leading to an early diagnosis; imaging may be helpful if available but the findings can be non-specific.
- Diagnosis must be followed by rapid resuscitation and intravenous antibiotics and emergency aggressive surgical debridement of all necrotic tissues.
- When the bowel is involved, a damage control approach is appropriate in the presence of physiological derangement.
- Good intensive care and subsequent staged surgical reconstruction completes the management.

Conflict of interest

The authors declare to have no direct or indirect financial interests on the case presented.

References