Case Report

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A rare case of necrotizing fasciitis secondary to a perforated appendix

Rana Sikandar Iqbal, MBBS[a], Ali Gohar, MBBS[a], Rida Azhar, MBBS[b], Seemal Tahir, MBBS[a], Usama Afzal, MBBS[c], Ahmed Ayyan, MBBS[a], Masab Ali, MBBS[d], Muhammad Husnain Ahmad, MD[e,*]

Introduction and importance: Acute appendicitis is a common emergency, but its variable presentation can delay diagnosis and treatment, leading to severe complications. Necrotizing fasciitis, although rare, can arise as a life-threatening consequence of perforated appendicitis. Prompt recognition and intervention are crucial to prevent fatal outcomes.

Case summary: A 23-year-old male presented with right iliac fossa pain and vomiting. Physical examination revealed tenderness and rebound tenderness in the right iliac fossa, with an Alvarado score of 7/10 and leukocytosis, suggestive of acute appendicitis. Emergency laparotomy revealed a perforated appendix with purulent fluid, which was drained, and abdomen was irrigated. Postoperatively, the patient initially stabilized but deteriorated on the second postoperative day. A CT scan revealed multiple abscesses and necrotizing fasciitis of the abdominal wall. Re-exploration with abscess drainage and debridement was performed, but the patient developed septic shock and multiple organ failure, leading to his death.

Discussion: This case underscores the potential for severe complications like necrotizing fasciitis following perforated appendicitis, even in previously healthy individuals. Delays in diagnosis and imaging, as well as reliance solely on clinical judgment, can contribute to adverse outcomes. Early recognition of necrotizing fasciitis and aggressive management, including broad-spectrum antibiotics and surgical debridement, are essential to improve survival in such cases.

Conclusion: Delayed diagnosis and management of acute appendicitis can result in rare but fatal complications such as necrotizing fasciitis. This case emphasizes the importance of timely intervention, imaging, and a high index of suspicion to mitigate mortality in these uncommon but severe presentations.

Keywords: abscess, abscess drainage, acute appendicitis, emergency laparotomy, multiple organ failure, necrotizing fasciitis, perforated appendicitis, septic shock

Introduction

Acute appendicitis is one of the most common emergent conditions presented in the emergency department[1]. It occurs in 90 to 100 cases per 100 000 per year, with the highest incidence in the second and third decades of life and a mortality rate of 1%[2,3]. The etiology of acute appendicitis includes fecalith, impacted stool, gallstones, tumors, viral infections causing lymphoid hyperplasia, or intestinal parasites leading to luminal obstruction[2]. Based on inflammation, appendicitis is classified as complicated or uncomplicated[2]. Complications of acute appendicitis include perforation, abscess formation, hemorrhage, and necrotizing fasciitis[1].

Diverticular disease of the appendix, a rare pathology, is one of the differential diagnoses of acute appendicitis[4]. Necrotizing fasciitis (NF) is defined as a deadly infection of the skin and subcutaneous tissue with a mortality rate of 13.6%. It is a serious complication that spreads rapidly through the skin, fascia, and subcutaneous tissues. While it is often linked to trauma or immunosuppression, NF can also develop due to perforated appendicitis, with the infection extending to nearby structures[5,6]. The retroperitoneal spread of abscesses or inflammation, particularly through anatomical vulnerabilities like the lumbar triangles, further contributes to disease progression. This life-threatening condition was first recognized in the 18th century[7]. Necrotizing fasciitis involving the abdomen is termed Meleney's gangrene, while necrotizing fasciitis affecting the perineum and genitalia is called Fournier's gangrene. Early diagnosis, immediate surgical debridement, and the use of broad-spectrum antibiotics are critical to preventing systemic sepsis and reducing mortality in such cases[7].

The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) is a scoring guideline for necrotizing fasciitis[3]. Imaging studies, particularly ultrasonography and computed tomography (CT), are widely used in emergency departments to diagnose life-threatening complications such as necrotizing fasciitis[1].

Acute appendicitis can be managed conservatively (delaying appendectomy for some time) or surgically, depending on the severity of the presentation[4]. Antibiotics can be initiated for complicated appendicitis without abscess formation[4]. If there

[a]Lahore General Hospital, Lahore, Punjab, Pakistan, [b]Punjab Institute of Neurosciences, Lahore, Pakistan, [c]Saira Memorial Hospital, Lahore, Pakistan, [d]Punjab Medical College, Faisalabad, Pakistan and [e]Tentishev Satkynbai Memorial Asian Medical Institute, Gagarina, Kant, Kyrgyzstan

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*Corresponding author. Address: Tentishev Satkynbai Memorial Asian Medical Institute, Gagarina St. 58, Kant, Kyrgyzstan. Tel.: +996 509895995. E-mail: husnainahmad601@gmail.com (M.H. Ahmad).

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is a poor response to antibiotics within 24 to 48 hours, surgical intervention should be performed[4]. For managing necrotizing fasciitis, initiation of antibiotics prior to surgery is the mainstay of treatment. However, some surgeons prefer immediate surgery[4].

We present a case of necrotizing fasciitis of the anterolateral abdominal wall secondary to perforated appendicitis. Our case report emphasizes early diagnosis and intensive management of acute appendicitis, while addressing the possible complications of such emergent conditions. It has been written in accordance with the SCARE guidelines[8].

Case summary

A 23-year-old male without any comorbidity presented to the acute medical unit of a tertiary care hospital with complaints of right iliac fossa pain, vomiting, and relative constipation for 4 days. The vital signs at presentation were: blood pressure 110/70 mmHg, pulse 108 beats per minute, respiratory rate 18 breaths per minute, body temperature 100°F, blood sugar level 98 mg/dL, and oxygen saturation 97% on room air. On examination, there was right iliac fossa tenderness and rebound tenderness. There was no visceromegaly or palpable mass. Alvarado's score was 7/10.

Laboratory data showed a total leukocyte count of 18×10^9/L. Radiographs of the abdomen and pelvis were unremarkable. An emergency laparotomy was performed, revealing 1,500 mL of purulent fluid, a perforated appendix at the tip, and pus pockets in the right lateral abdominal wall. A drain was placed, and the abdomen was washed with normal saline. Postoperatively, pus was collected, and drainage was approximately 350 mL of frank purulent fluid per day. Intravenous fluids and broad-spectrum antibiotics were initiated postoperatively.

Two days after laparotomy, abdominal tenderness worsened, and the total leukocyte count increased. Computed tomography (CT) of the abdomen and pelvis was performed, revealing an abscess in the right and left paracolic gutters and necrotizing fasciitis of the lateral abdominal wall on both sides. Re-exploration was performed (see Fig. 1). During re-exploration, 250 mL of pus was drained from the right and left paracolic gutters, necrotic tissue along the ileocecal junction (ICJ) was debrided, and necrotic patches along the lateral abdominal wall were excised. Cultures of the necrotic tissue and abscess revealed a polymicrobial infection, including *Enterococcus faecium, Escherichia coli, Clostridium septicum*, and anaerobic bacteria. The patient was shifted to the intensive care unit (ICU).

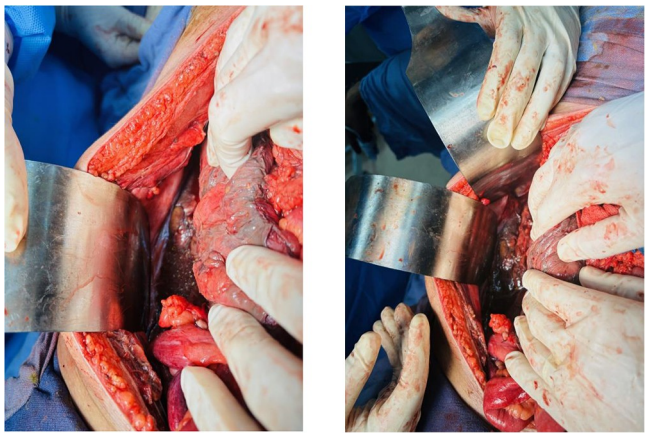

Figure 1. Intraoperative image showing findings from an exploratory laparotomy, revealing perforated appendicitis and necrotizing fasciitis.

Despite rigorous management, the patient developed multiple organ failure and septic shock, further complicated by acute respiratory distress syndrome (ARDS) with respiratory failure, disseminated intravascular coagulation (DIC) with severe anemia, and acute coronary syndrome. The patient remained in the ICU for 10 days and eventually died on the 11th day of admission. Table 1 illustrates the sequence of events, including the onset of symptoms, diagnosis, surgical interventions, and postoperative management.

Discussion

The variability in presentation and vague diagnostic data often lead to delays in the diagnosis and management of acute appendicitis. Unusual complications can usually only be identified via imaging studies; however, in our case, ultrasound was "unremarkable," highlighting the limitations of plain radiographs. A CT scan was not performed before the initial surgery due to the high clinical suspicion of acute appendicitis, as reflected in an Alvarado score of 7/10, and the urgency to prevent septic complications. This justified the surgical team's reliance on clinical presentation rather than imaging.

Necrotizing infection is a rapidly progressing soft tissue infection that causes inflammation and necrosis. Immunocompromised patients, alcoholics, IV drug users, and diabetics are more prone to this condition, but it can also affect healthy young individuals without comorbidities. Our case is an example of necrotizing fasciitis in a healthy young individual with no known comorbidities. A similar case of necrotizing fasciitis of the chest and right abdominal wall caused by acute perforated appendicitis was reported by Rebai *et al*[9]. Commonly affected sites include the abdomen, perineum, and extremities. Anaya *et al* reported that necrotizing fasciitis most commonly affects the extremities (8%), followed by the abdomen and perineum[10].

Necrotizing fasciitis is further divided into polymicrobial (Type 1) and monomicrobial (Type 2). In our case, it was Type 1, as multiple organisms were detected in culture reports. Hua Jie *et al* reported a similar case in China[5]. Broad-spectrum antibiotics and early debridement are the mainstays of treatment for necrotizing fasciitis. The recommended antibiotic treatment duration is 4 to 6 weeks[7].

Few cases in the literature have reported necrotizing fasciitis secondary to perforated appendicitis. Huang *et al* described a case of ruptured appendicitis complicated by necrotizing fasciitis of the abdominal wall in a patient with Still's disease. Despite medical and surgical management, the patient died of septic shock[11]. Suleimanov *et al* reported a case where prompt intravenous antibiotic therapy and surgery resulted in full recovery[4]. Siren Falconi *et al* described a case of enterocutaneous fistula secondary to complicated appendicitis that led to abdominal wall necrotizing fasciitis; despite broad-spectrum antibiotics and multiple debridements, the patient failed to recover and died[2]. Similarly, WC Thomas and colleagues in Hong Kong reported a case of necrotizing fasciitis leading to multiple organ failure and mortality[6].

Management strategies for necrotizing fasciitis secondary to perforated appendicitis vary depending on disease severity and

Table 1

Sequence of events, including the onset of symptoms, diagnosis, surgical interventions, and postoperative management

Day	Clinical status	Vital signs	Laboratory results	Diagnostic imaging	Surgical intervention	Postoperative management
Day 1: initial presentation	Fever, right lower quadrant abdominal discomfort, nausea, vomiting, constipation	Tachycardia (pulse > 110 bpm)	Increased white blood cell count	Abdominal ultrasound: Unremarkable	Emergency laparotomy with appendectomy	Intravenous fluids, broad-spectrum antibiotics, placement of abdominal drain
Day 2: postoperative course	Drainage of serosanguinous fluid with mild pus	Persistent tachycardia	Stable white blood cell count	-	-	-
Day 3: ongoing management	Drainage of purulent fluid	Persistent tachycardia, fever spikes over 101°F	Slightly elevated white blood cell count	-	-	-
Day 4: deterioration	Increased abdominal tenderness and guarding	-	Significant increase in white blood cell count	CT scan: Abdominal wall necrosis in right iliac fossa	Re-exploration and debridement of necrotic tissue	Transfer to ICU for close observation
Day 5: multiorgan failure	Septic shock with failure of multiple organs	Unstable	Coagulopathy, acute renal injury, elevated liver enzymes	-	-	-
Day 6: fatal outcome	Death from septic shock and multiorgan failure despite aggressive treatment	-	-	-	-	

progression. In our case, laparotomy, abscess drainage, and re-exploration for necrotizing fasciitis were performed, but the patient succumbed to septic shock and multi-organ failure. Suleimanov *et al* reported full recovery with early antibiotics and surgery[4], while Rebai *et al* highlighted successful outcomes with timely debridement[9]. However, cases by Huang *et al* and Falconi *et al* involved similar management strategies but resulted in fatal outcomes due to complications[2,11]. Early diagnosis and prompt management are critical for improving survival in this rare condition. Table 2 summarizes relevant case reports from the literature, including clinical presentation, management, and outcomes.

Due to the vague symptomatology of necrotizing fasciitis, delays in diagnosis are common. The only cure for this fatal condition is early diagnosis, immediate initiation of antibiotics, and excision of non-viable tissues. Adjunctive therapies such as hyperbaric oxygen and vacuum-assisted closure therapy are increasingly being used for rapid recovery.

Conclusion

Though acute appendicitis is a commonly encountered condition with less morbidity and mortality, its complications are proven to be fatal, increasing the mortality rate. Necrotizing fasciitis, a complication of perforated appendicitis, poses a significant risk to life if not promptly addressed. Our case emphasizes the necessity of early detection and immediate intervention to

Table 2

Summarizing relevant case reports from the literature, including clinical presentation, management, and outcomes

Author(s) & year	Clinical presentation	Management	Outcome
Our case	Right iliac fossa pain, fever, vomiting, necrotizing fasciitis, sepsis, abscesses.	Emergency laparotomy, re-exploration, debridement, broad-spectrum antibiotics, ICU care.	Death due to septic shock, multiple organ failure, ARDS, and DIC.
Falconi *et al*, 2023[2]	Abdominal wall necrosis, abscess, systemic infection.	Multiple debridements, IV antibiotics.	Death due to multiple complications.
Suleimanov *et al*, 2022[6]	Abdominal tenderness, fever, sepsis.	IV antibiotics, surgical debridement.	Full recovery.
Oh J., 2021 [3]	Severe abdominal pain, fever, bladder perforation.	Laparotomy, debridement, bladder repair, broad-spectrum antibiotics.	Successful recovery.
Rebai *et al*, 2018[8]	Right abdominal and chest pain, abscess formation.	Surgical debridement, IV antibiotics.	Recovery reported.
Chin *et al*, 2018 [5]	Abdominal pain, necrotizing infection, signs of systemic infection.	Surgical intervention, ICU care, antibiotic therapy.	Recovery after extensive management.
Huang *et al*, 2018[7]	Abdominal pain, fever, skin necrosis.	Laparotomy, debridement, broad-spectrum antibiotics.	Death due to septic shock.
Hua Jie *et al*, 2015[4]	Abdominal pain, fever, leukocytosis.	Emergency laparotomy, debridement, broad-spectrum antibiotics.	Death due to septic shock.
Naqvi *et al*, 2009[10]	Lower extremity necrosis, sepsis.	Emergency debridement, IV antibiotics.	Full recovery.

improve patient outcomes. The rapid progression of necrotizing fasciitis, particularly in postoperative patients, requires clinicians to maintain a high level of suspicion. Early imaging, followed by urgent surgical debridement and initiation of broad-spectrum antibiotics, is critical in managing this condition. Increased awareness and timely action, along with a multidisciplinary approach involving surgical and critical care teams, are essential to minimize the high mortality and morbidity associated with this life-threatening complication.

Ethical approval

Not applicable.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Author's contribution

R.S.I.: validation; visualization; writing – original draft; A.G.: project administration; supervision; validation; visualization; writing – original draft; R.A.: visualization; writing – original draft; S.T., A.A.: validation; data curation; writing – original draft; U.A.: visualization; data curation; writing – original draft; M.A.: validation; visualization; writing – original draft; writing – review and editing; M.H.A.: visualization and validation.

Conflict of interest

All the authors declare to have no conflicts of interest relevant to this study.

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