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CASE REPORT

# Retroperitoneal necrotising fasciitis – perils of obesity and acute appendicitis

**BJM Bornman,[1] J Plaskett,[1] SR Thomson[2]**

[1] *Department of Surgery, Victoria Hospital, South Africa*
[2] *Department of Gastroenterology, Faculty of Health Science, University of Cape Town, South Africa*

***Corresponding author, email:*** *bornmanbernhard@gmail.com*

**Summary**
Obesity complicates clinical evaluations of acute abdominal conditions like appendicitis, with excess fat limiting the accuracy of physical examinations and delaying diagnosis. This report presents a case of a 49-year-old morbidly obese female with uncontrolled diabetes who developed acute peritonitis secondary to retrocaecal appendicitis, which presented as retroperitoneal necrotising fasciitis (NF). Diagnostic delays were attributed to atypical clinical signs and limitations of ultrasound in obese patients. A computed tomography (CT) scan eventually revealed extensive retroperitoneal fluid collections, confirming the diagnosis. Surgical intervention, including appendicectomy, drainage, and debridement, was complicated by septic shock, requiring intensive care. This case highlights the diagnostic complexity of NF in high-risk patients, emphasising the role of advanced imaging modalities and diagnostic scoring systems. Improved diagnostic strategies and early imaging are crucial for managing life-threatening conditions in obese populations.
**Keywords:** acute appendicitis, necrotising fasciitis, obesity

## Case report

A 49-year-old female with uncontrolled type-2 diabetes mellitus (HbA1c 10.7%) and class III obesity presented to our referral hospital with a 3-day history of lower abdominal pain, nausea, vomiting, dysuria, and constipation. She had no prior surgical history. On admission, she was tachycardic, normotensive, hyperglycaemic, and afebrile, with a normal white cell count (WCC). Abdominal examination revealed suprapubic and right iliac fossa tenderness with guarding but no signs of peritonism. Pelvic examination identified cervical excitation tenderness, prompting empiric antibiotic therapy targeting both appendicitis and pelvic inflammatory disease. Ultrasound of the abdomen and pelvis failed to demonstrate features of appendicitis or pelvic pathology, though the assessment was limited by the patient's body habitus and overlying bowel gas.

A lack of clinical resolution, coupled with the extension of pain to the right flank and back, prompted a computed tomography (CT) scan of the abdomen seven days after initial presentation, marking the first referral to our surgical unit. The CT scan revealed extensive fluid collections with gas locules involving the retroperitoneal perinephric spaces bilaterally, lower anterior abdominal wall, pelvis, upper aponeurosis of the gluteal muscles, and areas anterior to the urinary bladder and surrounding the right hip joint (Figures 1 and 2). These findings suggested retroperitoneal necrotising fasciitis (NF) of unknown origin. To exclude rectal perforation as a potential source, a flexible sigmoidoscopy was performed,

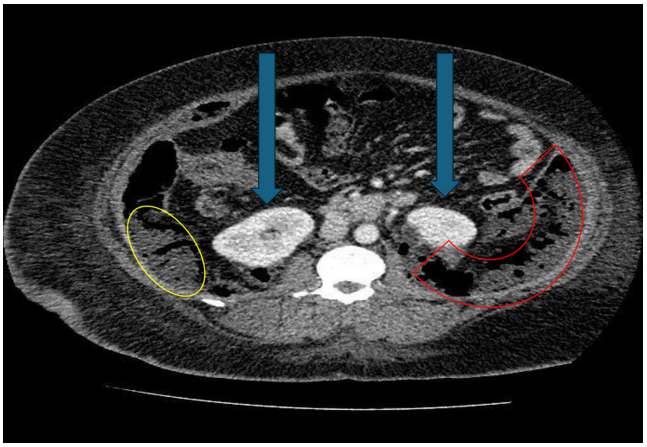

*Figure 1: Axial abdominal CT scan view demonstrating extensive fluid collections (yellow outline) in the right paracolic gutter, and gas locules around the perinephric spaces (red outline). Arrows indicating kidneys.*

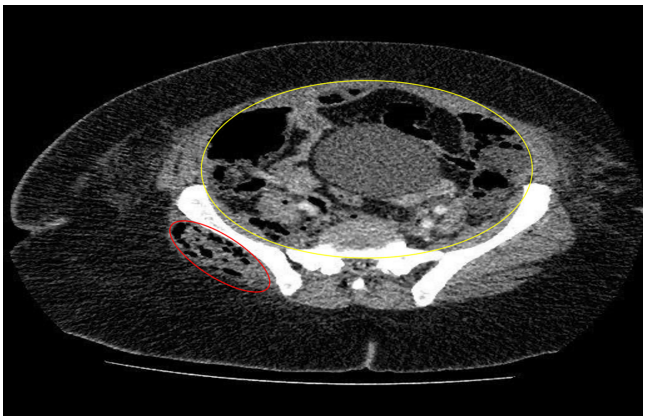

*Figure 2: Axial abdominal CT scan view demonstrating extensive fluid collections (yellow outline), and gas locules around the right gluteal region (red outline).*

yielding unremarkable results and allowing progression to exploratory laparotomy. The laparotomy confirmed a diagnosis of perforated retrocaecal appendicitis with abscess formation extending into the right retroperitoneum, crossing the midline below the arcuate line (preperitoneal space), and involving the left retroperitoneum.

An appendicectomy was performed, accompanied by drainage and washout of the bilateral retroperitoneal and perinephric spaces using saline and hydrogen peroxide, followed by the placement of surgical drains on both sides. Due to septic shock necessitating inotropic support, the procedure was curtailed, with only limited surgical debridement performed.

Postoperatively, the patient required five days of intensive care support and underwent a relook laparotomy 48 hours later for further debridement and drainage. Tissue cultures revealed pseudomonas aeruginosa and candida tropicalis. After initial recovery, the patient was discharged with follow-up arranged at our clinic. Complications from residual retroperitoneal collections were managed through staged percutaneous pigtail drains and targeted antibiotic therapy, necessitating two additional hospital admissions.

## Discussion

The global increase in obesity presents a major public health challenge,[1] with South Africa ranking among the countries with the highest rates of overweight and obesity. According to the 2023 National Health and Nutrition Security Survey, nearly 50% of adult South Africans are classified as overweight or obese.[2] Obesity complicates the clinical evaluation of patients presenting with acute abdominal conditions, such as appendicitis. Excess intra-abdominal and subcutaneous fat impairs the accuracy of physical examinations and the ability to identify typical signs, making diagnosis more difficult. As a result, delays in recognising and managing potentially life-threatening conditions can occur. This underscores the need for additional diagnostic tools, such as imaging, to ensure timely and accurate diagnosis.[3]

Our case underscores the challenges associated with the early diagnosis of complicated acute appendicitis manifesting as NF in a morbidly obese patient.

Previous studies indicate that approximately 85% of NF cases are not recognised at the initial diagnosis, with NF often overlooked in the differential diagnosis.[4] The early symptoms of NF are usually atypical, with many patients primarily reporting nonspecific pain, and some lacking a clear history of trauma. While the classic triad of NF – pain, tenderness, and erythema – remains widely recognised in the literature, it has been reported that over 50% of patients present with only one of these signs, with only a minority exhibiting all three features.

Risk factors, such as those identified in our patient, are crucial for raising the clinical suspicion of NF. Common predisposing factors for NF include immunocompromised states, such as diabetes mellitus (DM), HIV, chronic steroid use, malignancy, chronic renal failure, chronic liver failure, obesity, and chemotherapy.[4] Notably, there is no specific risk factor identified for retroperitoneal NF.[5]

In morbidly obese patients, diagnostic uncertainty often leads to increased reliance on imaging modalities. A challenging clinical examination such as in our case prompts the need for a CT scan and enhances diagnostic accuracy. The role of CT in the assessment of acute abdominal conditions has become increasingly important. A CT scan significantly improves diagnostic certainty and informs initial treatment plans as reported by Tsushima et al.[6]

The use of CT in patients with higher body mass index (BMI) is particularly valuable. Sokolovskaya et al.[7] compared the utilisation rates of abdominal and pelvic CT scans in patients with elevated BMI versus those with normal BMI, finding a positive correlation between higher BMI and increased CT utilisation in patients presenting with gastrointestinal symptoms. Interestingly, the percentage of acute significant CT findings was similar in both groups, suggesting that CT remains an effective diagnostic tool regardless of BMI.

Ultrasonography (US) can detect signs of NF, such as irregular thickening of the deep fascia due to oedema, abnormal fluid accumulation along the deep fascial plane, and the presence of gas in the subcutaneous soft tissues, markers that are relatively unique to NF. US has demonstrated a sensitivity of 88.2% and a specificity of 93.3% for diagnosing NF.[4] However, its limitations include a small field of view, dependence on the operator's skill and experience, and subjective interpretation, which can limit its diagnostic value. In contrast, CT is the primary imaging modality for diagnosing NF, offering higher spatial resolution and broader availability compared to radiography and US. Several studies have shown that CT has a sensitivity greater than 80% for diagnosing NF, making it an essential tool in the diagnostic process.[4]

Laboratory tests are essential in the diagnostic process for hospitalised patients. Changes in laboratory markers are indicative of the disease type and severity and are instrumental in distinguishing NF from non-NF conditions.

**Table I: Laboratory risk indicator score (LRINEC)**

| | Score in our patient | |
|---|---|---|
| **Variable** | **Index presentation** | **Day 7** |
| CRP (mg/l) | 0 | 4 |
| WBC (per mm$^3$) | 0 | 1 |
| Haemoglobin (g/dl) | 0 | 1 |
| Sodium (mmol/l) | 1 | 1 |
| Creatinine (µmol/l) | 0 | 0 |
| Glucose (mmol/L) | 1 | 1 |
| Risk interpretation | 2 = low risk | 8 = high risk |

**Table II: Site other than lower limb, immunosuppression, age, renal impairment, inflammatory markers (SIARI)**

| | Score in our patient | |
|---|---|---|
| **Variable** | **Index presentation hospital** | **Day 7** |
| Site of infection outside of lower limb | 3 | 3 |
| History of immunosuppression | 3 | 3 |
| Age < 60 | 2 | 2 |
| Creatinine > 141 µmol/l | 0 | 0 |
| White cell count > 25 per mm3 | 0 | 0 |
| C-reactive protein > 150 | Not done | 1 |
| Risk interpretation | 7 = high risk | 8 = high risk |

Diagnostic scoring systems, such as the Laboratory Risk Indicator for Necrotising Fasciitis (LRINEC) and the SIARI (Site, Immunosuppression, Age, Renal Impairment, Inflammatory markers) scoring system, have been proposed to assist in diagnosing NF. In 2005, Wong et al.[8] introduced the LRINEC score, which consolidates common laboratory markers, including CRP, WBC, haemoglobin, blood sodium, blood creatinine, and blood glucose, as diagnostic criteria for NF. A total score of ≥ 6 raises suspicion for NF, while a score of ≥ 8 strongly suggests its presence. However, recognising the limitations of the LRINEC score, Cribb et al.[9] proposed an alternative scoring system, the SIARI, in 2019. The SIARI score incorporates both clinical and laboratory factors, such as site of infection, immunosuppression, age, renal impairment, and inflammatory markers. When compared to LRINEC, the SIARI score demonstrated superior diagnostic performance. Furthermore, SIARI requires fewer laboratory variables and accounts for the patient's risk factors, making it more practical and accurate for diagnosis.

By comparing the laboratory investigations performed at the initial presentation at our referral hospital with those obtained seven days later at our institution and incorporating the LRINEC and SIARI scoring systems (Table I and II), we can retrospectively evaluate their utility and potentially validate their diagnostic accuracy. Based on the literature and our findings, the SIARI score would likely have provided a more accurate assessment in this case.

In conclusion, the global obesity epidemic poses significant challenges in diagnosing and managing acute abdominal conditions, particularly in morbidly obese patients. This case highlights the diagnostic complexities of acute peritonitis and retroperitoneal NF, emphasising the need for advanced imaging techniques, like CT, in obese patients where clinical examination may be unreliable. Diagnostic scoring systems such as SIARI demonstrate improved performance in identifying NF compared to traditional methods like LRINEC. This case underscores the importance of integrating clinical, laboratory, and imaging findings for timely diagnosis and management, especially in high-risk populations.

## *Conflict of interest*

The authors declare no conflict of interest

## *Ethical approval*

The case study has ethical approval from the Department of Health Sciences of the University of Cape Town, HREC REF: 265/2024.

## *ORCID*

BJM Bornman https://orcid.org/0009-0005-3879-9123
J Plaskett https://orcid.org/0000-0002-9917-3475
SR Thomson https://orcid.org/0000-0002-9485-997X

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