

E. coli and *E. faecalis*: A Rare Cause of Necrotizing Fasciitis after Undergoing Liposuction

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Abstract Necrotizing fasciitis is a considerably rare post-liposuction complication and *E. coli* and *E. faecalis* are exceedingly rare pathogens in a patient presenting with this life-threatening soft tissue infection. Although an uncommon liposuction complication, its prompt recognition is key, as it is a severe, insidiously advancing bacterial infection that can lead to high mortality if overlooked or misdiagnosed. A high index of clinical suspicion should prompt immediate treatment as imaging tools and lab markers can lead to rapid progression and are poorly specific for necrotizing fasciitis. We describe a case of a patient with post-liposuction necrotizing fasciitis associated with *E. coli* and *E. faecalis*, the first reported case in the literature. The patient presented with abdominal pain, fevers, and abdominal erythema with notable necrosis and bullae one day after surgery and underwent successful debridement and treatment with IV antibiotics. This case highlights a rare cause of necrotizing fasciitis and suggests the need for further study. In addition, it emphasizes the importance of cultures in necrotizing fasciitis cases and close follow-up in order to monitor bacterial organism prevalence, treatment options, and follow resistance patterns.

Keywords: necrotizing fasciitis, liposuction, plastic surgery, *E. faecalis*, *E. coli*

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1. Introduction

Liposuction is one of the most common cosmetic procedures performed in the world [1]. This esthetic procedure focuses on remodeling the body contour through removal of undesired adipose tissue [1]. It represents approximately 15-20% of surgical procedures performed worldwide [2]. However, despite its common use for esthetic purposes, liposuctions do present with risks. Common complications include pulmonary embolism, lidocaine toxicity, and thromboembolic disease [2]. Moreover, in a review performed of 2,398 cases between 1995 and 2008 of complications after liposuction procedures, the overall complication rate was 8.6% with irregular contour reported as the most common complication. Nonetheless, it also reported four cases of skin necrosis and two cases of cellulitis [3].

Necrotizing fasciitis is an infection of the skin and subcutaneous tissue that rapidly spreads to the intramuscular fascia with increased risk for mortality [4]. Although more common in the extremities, the mortality rate of necrotizing fasciitis is greatest when it affects the trunk [4,5]. Moreover, necrotizing fasciitis after esthetic procedures is relatively rare. Another literature review of

3,782 patients on necrotizing fasciitis discovered only 18 cases of necrotizing fasciitis after an esthetic procedure. The majority of these cases were after liposuction procedures and were type II necrotizing fasciitis meaning a single bug caused the infection. *S. pyogenes* was the most common pathogen making up approximately two-thirds of the cases reported [4,6].

Immediate surgical debridement is necessary in order to diagnose and treat necrotizing fasciitis. While computed tomography (CT) may serve as a useful adjunct for diagnosis, in the postsurgical patient, non-invasive approaches are limited; clinicians and radiologists may experience difficulty reaching a diagnosis due to incomplete understanding of the normal and abnormal findings that can be seen after a liposuction procedure. Normal findings include infiltrative lesions with fluid and with or without air bubbles in the subcutaneous layer on CT. Abnormal findings include air bubbles in the muscle layers [7]. Likewise, laboratory data provides clinical clues but lacks concrete evidence for diagnosis. The standard of care is to treat with intravenous antibiotics.

Nonspecific CT imaging should not rule out necrotizing fasciitis as delays in treatment could lead to mortality. If clinicians suspect necrotizing fasciitis, emergent surgical exploration and debridement provides a means of diagnosis and treatment [8]. Previously, the Laboratory

Risk Indicator for Necrotizing Fasciitis (LRINEC) score was used to facilitate diagnosis of necrotizing fasciitis. Recent data shows the LRINEC score has poor sensitivity and should not be utilized to rule-out necrotizing soft tissue infections. Thus, due to nonspecific imaging findings and poorly sensitive lab markers, necrotizing fasciitis requires a high index of suspicion based on clinical findings and history in order to request prompt surgical consultation and reach a definitive diagnosis.

2. Presentation

A 50-year-old male with a past medical history of essential hypertension and hyperlipidemia presented to the emergency department on post-operative day 6 after an outpatient elective liposuction procedure for severe abdominal pain and subjective fevers. The fevers began on postoperative day 3 with worsening progression. He described 10 out of 10 abdominal pain with associated chills, generalized malaise, nausea, and vomiting. He also reported swelling and erythema near the abdominal area with notable necrosis and bullae appearing one day after surgery. According to the operative report, the patient received extensive liposuction from the anterior abdomen and chest. The patient had undergone multiple liposuction procedures in the past without any post-surgical complications.

On admission, vital signs were notable for a maximum temperature of 102.9°F and a heart rate of 112 beats per minute. Physical examination demonstrated a toxic appearing male with severe abdominal tenderness to palpation and pain out of proportion to the examination on abdominal palpation, severe necrotic bullae, abdominal wall cellulitis (Figure 1), and erythema extending to the neck, axilla, and inguinal regions. No drainage or lymphadenopathy was noted.



Figure 1. View of the abdomen showing significant skin necrosis and bullae formation on initial presentation in the emergency department

Laboratory studies were notable for a sodium of 130 mmol/L [136-145mmol/L], a white blood cell count of $13.8 \times 10^3/\text{ul}$ [$4.4\text{-}10.5 \times 10^3/\text{ul}$], a C-reactive protein of 35.4 mg/L [0.8-3.0mg/L], and creatinine of 3.2mg/dL [0.6-1.2mg/dL]. CT angiography of the chest, abdomen, and pelvis showed diffuse mild edema in the subcutaneous fat consistent with prior liposuction without loculated fluid collection or gas.

Prior to further work-up, the patient received 2 grams of intravenous vancomycin and two doses of 1 gram

of intravenous aztreonam. Infectious disease was consulted and recommended ruling out necrotizing fasciitis. Thus, plastic surgery performed emergent wide surgical debridement of the anterior abdominal wall extending 23 centimeters by 15 centimeters and utilized wound vacuum-assisted closure. The procedure revealed full-thickness abdominal wall necrosis. During surgery, cultures were obtained from the anterior abdominal wall.

While awaiting culture results, the patient was started on empiric meropenem, clindamycin, and daptomycin. Blood cultures performed on admission were negative for growth of bacteria. Gram stain of the anterior abdominal wall cultures grew rare gram-negative rods with few white blood cells and the final report returned positive for *E. coli* and *E. faecalis*. Meropenem and daptomycin were continued for a total of nine days while clindamycin was discontinued on day 5 of treatment.

On day 10 of hospitalization, intravenous antibiotics were discontinued and the patient transitioned to oral levofloxacin. The patient subsequently underwent three abdominal wall washouts and wound vacuum replacements in the operating room performed on days 4, 8, and 12 of his hospital admission. Ultimately, the patient was discharged on oral levofloxacin 500 mg daily for a total of 7 days after the final abdominal washout. His white blood cell count and temperature normalized prior to discharge and he received appropriate outpatient follow-up with infectious disease.

3. Discussion

Delayed diagnosis and treatment of necrotizing fasciitis represents a life-threatening medical condition. Suspicion requires immediate surgical intervention serving as both diagnostic and therapeutic [9]. With the increased desire and greater access to esthetic procedures around the world, complications of liposuction procedures can lead to more cases of necrotizing fasciitis. Despite the rarity of this complication, patients should be educated and informed of appropriate clinical findings during wound healing stages as well as when to seek further treatment. In this case, the patient presented with symptoms three days after the procedure. Waiting for an outpatient postoperative follow-up would have placed the patient at greater risk of disease progression and possible death.

Although clinicians face challenges when diagnosing necrotizing fasciitis including nonspecific laboratory findings and limited sensitivity to clinical imaging, localized skin erythema, edema, and necrosis can assist with reaching a diagnosis, particularly in patients with a history of esthetic procedures [9]. Suspicion of necrotizing fasciitis necessitates immediate empiric antibiotic therapy along with surgical consultation. Review of the medical literature outlines that the source of infection after liposuction procedure tends to be monomicrobial with *S. pyogenes* reported as most common pathogen [4]. The same literature review only reported two cases of polymicrobial infection after undergoing liposuction with wound cultures positive for *E. coli* and *K. pneumoniae* [4].

To the best of our knowledge, this is the first reported case of culture positive *E. coli* and *E. faecalis* necrotizing fasciitis after a liposuction procedure. Furthermore, *E. coli*

and *E. faecalis* are common inhabitants of the gut flora and should be suspected in perineal and abdominal wall wounds and infections. For this reason, their prevalence in liposuction procedure complications should be monitored. Overall, polymicrobial necrotizing fasciitis cases are less common than monomicrobial cases, thus reporting this could raise awareness of other pathogens that contribute to necrotizing fasciitis. Enterococcus emerged as a leading hospital-associated pathogen in the late 1970s and 1980s [10]. Currently, in the United States, enterococci cause roughly 66,000 infections each year and have recently appeared as a prevalent multidrug-resistant nosocomial pathogen [11]. This case demonstrates the importance of culturing and identifying causative pathogens in addition to surveilling resistance in this high mortality infection.

Understanding factors that predispose patients to necrotizing fasciitis such as a recent liposuction procedure is critical for reaching a diagnosis and may prevent delays in care and initiating an appropriate treatment regimen. Likewise, it creates further understanding about liposuction predisposition to not only type II necrotizing fasciitis but also type I necrotizing fasciitis. Most importantly, this presentation reemphasizes the importance of employing appropriate clinical judgement with or without the assistance of imaging tools and lab markers in order to diagnose necrotizing fasciitis and provide prompt treatment.

4. Conclusion

Post liposuction necrotizing fasciitis is a rare but life-threatening disease process, and this is the first documented case of its kind to be caused by *E. coli* and *E. faecalis*. While radiologic imaging may assist in the diagnosis, normal anatomical postoperative changes make this technique fallible and places more onus on the physician to have a high level of clinical suspicion. If diagnosis is delayed and the organism is highly virulent

and multidrug resistant, morbidity and mortality can be high. Prompt initiation of treatment is critical for this disease process and may ultimately lead to better patient outcomes.

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