



**CASE REPORT**

# Carotid blow-out: A potentially fatal complication of cervical necrotizing fasciitis

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## Abstract

Necrotizing fasciitis is a potentially fatal soft tissue infection characterized by extensive necrosis of the subcutaneous tissue and fascia. Head and neck involvement is rare, being usually associated with dental or pharyngeal infections. This report presents a case of an alcoholic patient with dental infection progressing to necrotizing fasciitis in the cervical region and carotid necrosis with subsequent vessel rupture and death. The rupture of the carotid artery and cervical involvement by necrotizing fasciitis are uncommon and generally have unfavorable outcomes despite the advances in diagnosis and intensive care that reduced the morbidity and mortality rates of these diseases.

**Keywords** carotid artery injuries; case reports; fasciitis, necrotizing

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## Introduction

Necrotizing fasciitis is a potentially fatal soft tissue infection characterized by extensive necrosis of the subcutaneous tissue and fascia. Head and neck involvement is rare, being usually associated with dental or pharyngeal infections. The disease has a rapid progression, secondary to its polymicrobial nature and the synergistic effect of bacterial enzymes. A preexisting systemic disease may predispose or even aggravate necrotizing fasciitis, most notably diseases causing immunodepression<sup>1</sup>.

Clinical presentations are nonspecific, but a typical clinical status facilitates diagnosis and commonly includes fever, tachycardia, and dehydration. Moreover, the skin on the affected tissue presents hyperemia and tension on palpation. Management includes rapid identification of necrotic tissue and aggressive surgical debridement, since it is associated with high morbidity and mortality, and high-dose antibiotic therapy associated with support measures and sepsis treatment<sup>2</sup>.

This report presents a case of an alcoholic patient with dental infection progressing to necrotizing fasciitis in the cervical region and carotid necrosis with subsequent vessel rupture and death.

## Case Report

A 36-year-old homeless, alcoholic, and smoker male patient, visited the emergency department complaining of an increasing neck edema and pain

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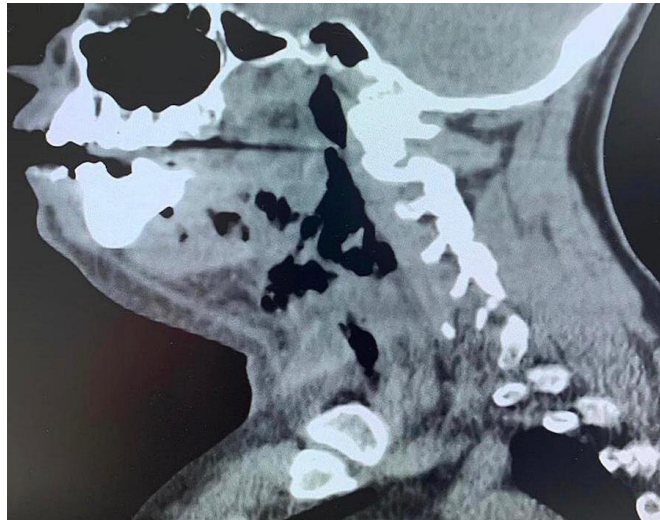
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The study was carried out at Hospital Municipal São José, Joinville, Brasil.



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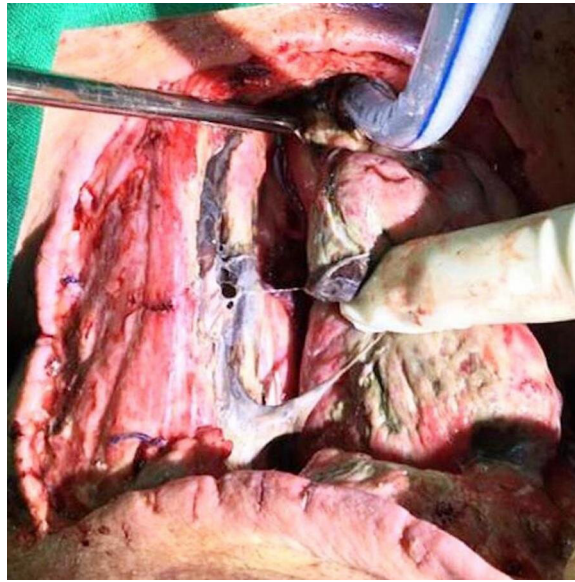
for the last 3 days. He denied other symptoms, including fever, vomiting, or nausea. He also reported a history of dental infection awaiting treatment. Admission tests showed leukocytosis of  $13,610/\text{mm}^3$ , with 1% band neutrophils, lactate level of 5.6 mmol/l, and C reactive protein level of 33.6 mg/dl, and a CT-scan of the neck showed a large amount gas spaces in the subcutaneous tissue. (Figure 1)



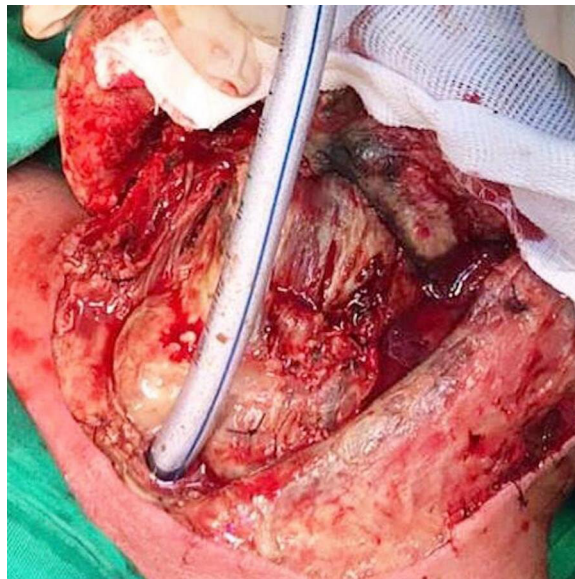
**Figure 1.** Neck CT-Scan, sagittal cut. Presence of subcutaneous gas.

Antibiotic treatment with Ceftriaxone and Clindamycin was initiated, and he was promptly referred to the operating room (OR) for an exploratory cervicotomy, debridement of necrotic/purulent tissue and tracheotomy. Surgical findings showed an extensive necrotizing fasciitis involving the subcutaneous tissue of the neck, multiple muscles, the thyroid gland and vascular spaces, with a slight purulent secretion, and no evidence of mediastinitis. The patient was referred to the ICU, but because of the COVID-19 pandemic, no beds were available, and he was admitted to the ward. The culture of the debrided tissues showed *Enterobacter cloacae* growth, sensitive to ongoing treatment. On the fourth day of hospitalization, the patient underwent a second surgical debridement of necrotic tissue involving the pretracheal area and submandibular muscles. (Figure 2, Figure 3)

Chest tomography (CT) performed the following day showed bilateral cervical emphysema extending to the mediastinum and right upper paratracheal space, and a smooth thickening of the interlobular septa in the bilateral apical portions of both lungs due to an interstitial edema. On the ninth day the patient presented some sentinel bleeding from the surgical area. At the same day, a third procedure identified an increase of necrotic areas requiring debridement near the left vascular space, and the carotid artery was covered by a sternocleidomastoid muscle flap. The patient was referred to the recovery room and immediately developed extensive bleeding from the operative wound, rapidly progressing to hypovolemic shock and cardiorespiratory arrest (CRA). Return of spontaneous circulation was observed after two cycles of cardiopulmonary resuscitation and massive transfusion of blood products.



**Figure 2.** Cervicotomy. Evidence of necrotic tissue.



**Figure 3.** Cervicotomy. Evidence of extensive muscular necrosis.

The patient was transferred to the OR, where a blow-out of the carotid artery was diagnosed, but an attempt to control the bleeding from the ruptured necrotic vessel was unsuccessful, followed by another CRA and death.

### Discussion

Necrotizing fasciitis has high morbidity and mortality and commonly presents with involvement of the abdominal wall, extremities, perineum, and groin. Involvement of the head and neck region is relatively rare, due to its extensive

vascularization, and accounts for only 1% to 10% of cases. Risk factors for the development of the disease include immunocompromised states, such as diabetes mellitus, alcoholism, liver cirrhosis, atherosclerosis, HIV, prolonged steroid therapy, chronic renal failure, malignancy, injection drug use, and obesity. Diabetes and alcoholism are the most frequent factors<sup>1</sup>.

Imaging examinations are crucial in the management of patients with suspected necrotizing fasciitis and can help in the diagnosis, surgical planning, evaluation of the therapeutic response, and, eventually, confirmation of suspected etiology. The presence of gas in radiography, ultrasonography, and CT is observed in 31–64% of cases, being a pathognomonic sign of the disease<sup>1</sup>.

The pillars of necrotizing fasciitis treatment, regardless of the involved site, are volume resuscitation, surgical debridement, and immediate broad-spectrum antibiotic therapy which should not be postponed in any cases, since they are the therapies with the highest degree of evidence in reducing complications and mortality<sup>2</sup>. Hyperbaric oxygen therapy is an adjuvant therapy that has been indicated for decades due to its considerable possibility of reducing complications and general disease mortality, but the absence of robust scientific evidence prevents the widespread use of this treatment for the disease<sup>1</sup>.

The mortality of this disease is a noticeable feature, showing rates as high as 50% in older reports<sup>3</sup>. With early diagnosis and advanced intensive therapies, new series of cases showed a decreasing tendency in the number of deaths associated with the condition<sup>4</sup>. A recent analysis of 1,235 cases of cervical necrotizing fasciitis reported a general mortality rate of 13.36%. The aforementioned analysis reported the most severe complications, descending necrotizing mediastinitis and major vascular complications (thrombosis, hemorrhage, and necrosis), which developed in 31.56% and 8.17% of cases, respectively<sup>1</sup>.

In turn, carotid artery rupture is a rare and clinically devastating condition, most commonly associated with malignant head and neck diseases treated with surgery or radiotherapy, which has a mortality rate of 40% and a neurological morbidity rate of 60%. The condition can be treated with surgical repair, although endovascular treatment is preferable because it is associated with lower mortality<sup>5</sup>. However, when there is a greater infectious involvement of the vessel as occurred in the case reported, both techniques have a low probability of success.

In conclusion, necrotizing fasciitis in the cervical region is an uncommon clinical presentation for a disease feared in clinical practice, mainly due to its rapid progression and high mortality. Advances in both diagnosis and intensive care significantly reduced the morbidity and mortality rates of the disease<sup>1</sup>. However, in some cases with catastrophic complications, therapeutic options become limited and progression to death seem inevitable. It is also important to note that the current global health crisis situation due to the COVID-19 pandemic or any other scenario of limited care for critically ill patients may considerably increase mortality from diseases that depend on quality intensive care, including necrotizing fasciitis.

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