**CASE REPORT**

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

Agnaldo José Graciano¹, Jéssica Horvat Pedro², Filipe Abel Ortolan², Djulia Adriani Frainer³, Heloiza Fiamoncini³

**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.

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.

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

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/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)

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.
Infectious Disease

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

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

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

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

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.

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. 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.

The mortality of this disease is a noticeable feature, showing rates as high
as 50% in older reports. With early diagnosis and advanced intensive
therapies, new series of cases showed a decreasing tendency in the number
of deaths associated with the condition. 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.

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

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