

NECROTIZING FASCEITIS IN THE CERVICOTHORACIC REGION: A CASE REPORT

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Abstract: Necrotizing fasciitis (NF) is an infection that affects the fascia and subcutaneous tissue, with a progressive evolution and a high potential for severity. Its involvement in the thoracocervical region is rare and more common in immunosuppressed patients, with odontogenic origin being one of the main triggering factors. Recent studies point to two microbial categories, mono and polymicrobial, but 70% have a polymicrobial profile, with aerobic and anaerobic organisms in their constitution. Treatment consists of rapid clinical diagnosis and surgical intervention, early aggressive debridement, broad-spectrum intravenous antibiotic therapy, daily dressings and clinical stabilization. The analysis of the patient's chart was carried out and the necessary information was obtained to carry out the work, associated with literary research about this pathology in the available means to better describe the theoretical part and obtain broad data about it.

Keywords: Necrotizing fasciitis 1; odontogenic abscess 2; infection 3.

INTRODUCTION

The first description of necrotizing fasciitis was introduced in 1952 by Ben Wilson, described as a rare soft tissue infection induced necrosis of the subcutaneous tissue and muscle fascia by bacteria.¹

Currently, the incidence of NF is 0.3 to 15.5 per 100,000 people, with a higher prevalence in blacks and Hispanics and a lower prevalence in Asians. The incidence of this infection is caused by mono- and polymicrobial organisms, with aerobic and anaerobic organisms in its constitution, more frequent by bacteria of group A *Streptococci* and less by acinetobacteria. Failure to treat this comorbidity has a high mortality rate due to the high capacity for dissemination, especially in immunosuppressed and diabetic

individuals, but with clinical and surgical treatment, this lethality ranges from 25-35%.¹

NF is more commonly written in the literature affecting regions of the abdominal wall, extremities and perineum, however, it is estimated that 1 to 10% (2 per 1,000,000 people) of this fasciitis occurs in the cervical and thoracic area, commonly associated with processes untreated dental infections. This comorbidity has a wide variety of signs and symptoms, which can make its diagnosis difficult, usually presenting acutely with fever, tachycardia, signs of dehydration, hypotension, local cyanosis, mottling and increased skin tension, cellulitis and necrosis, extending from the mandibular region to the clavicle and the anterior trapezius.^{2,3}

Rapid diagnosis followed by early intervention reduces the morbidity and mortality of this disease, with surgical debridement and broad-spectrum antibiotic therapy, given its etiological variability, being the two main pillars of treatment, which have proven to reduce the complications of NF, such as the advancement of necrosis, sepsis and death. Other therapies have been implemented to help and intensify the treatment, such as intravenous immunoglobulins and hyperbaric oxygen therapy.⁴

JUSTIFICATION

The present case report study was developed due to the rarity of the pathology in question and the rarity of involvement in the topography of the cervicothoracic region and its rapid potential for dissemination and mortality. In addition to the need for early diagnosis and interventions to achieve favorable outcomes.

OBJECTIVES

GENERAL OBJECTIVE

A case report-type clinical study was carried out, based on the daily clinical experience of

the general surgery team at HCTCO while the patient remained in hospital and on the analysis of medical records. We report the case of a young patient, previously without comorbidities, with a favorable evolution of necrotizing fasciitis in the cervicothoracic region of odontogenic origin, after early and aggressive clinical and surgical interventions.

SPECIFIC OBJECTIVES

- Expand knowledge about necrotizing fasciitis through literature review
- Document a rare and satisfying experience
- Prove the effectiveness of early and aggressive treatment in cases of necrotizing fasciitis

METHODOLOGY

This is a descriptive study of the case report type, and made through information obtained during the hospitalization of a patient at the Hospital das Clínicas de Teresópolis. Data were analyzed by anamnesis, physical examination, image examination, surgical approach and postoperative follow-up.

CASE REPORT

G.D.S.B, male, brown, 18 years old, smoker, previously healthy, admitted by the General Surgery Service of the Hospital das Clínicas de Teresópolis Constantino Ottaviano (HCTCO), after being referred by the Emergency Care Unit (UPA) of Teresópolis-RJ on the 1st /07/2021 with a complaint that, six days before admission, he started with toothache, with subsequent evolution to submandibular abscess, without improvement despite the oral use of amoxicillin with potassium clavulanate prescribed in a basic health unit by the dentistry team.

Upon admission, leukocytosis with left shift and increased inflammatory evidence (leukocytes 27,200/sticks 17%) were

evidenced by complementary laboratory tests and physical examination detected edema and necrosis of soft tissues in the submandibular region, trismus and crepitation in the anterior thoracic region. Computed tomography of the sinuses, mandible, chest and neck was requested, showing cutaneous and platysma thickening, with subcutaneous densification, associated with intermingled gas foci, submandibular, more pronounced on the right. Note the formation of collections, predominantly peripheral, the largest anterior and lateral to the right sternocleidomastoid, which measures approximately 59 x 21 mm. The aspect is evident throughout the neck up to the most anterior region of the upper third of the thorax. There are also gas foci in the deeper spaces of the neck. With the diagnostic hypothesis of necrotizing fasciitis in the cervicothoracic region of probable odontogenic origin, an urgent surgical approach was chosen in conjunction with the bucomaxillofacial for the extraction of elements 37 and 47 with synthesis of the dental alveolus, a probable infectious focus. Followed by aggressive debridement in the operating room of affected structures of the skin, subcutaneous tissue and fascia in the cervicothoracic region. Under the following surgical description:

- Dorsal recumbency
- Placement of interscapular cushion
- Asepsis and antisepsis
- Skin debridement from the mandibular border to the Angle of Louis region to the muscle layer.
- Output of large amounts of purulent secretion
- Debridement of necrotic tissue
- Wound washing with 0.9% saline solution and degerming chlorhexidine
- Occlusive dressing with Kollagenase

Started with medical prescription in the immediate postoperative period vancomycin

and piperacillin + tazobactam, both administered intravenously, for 14 days. Drug treatment associated with washing and daily dressing of the wound with chemical debriders. On the fourth postoperative day, extension of debridement was required, due to the presence of dry necrosis at points on the edge of the wound, a procedure performed at the bedside with a number 15 scalpel blade.

Dressing performed daily at the bedside, in the first six days of hospitalization, performed with 0.9% saline solution and degerming chlorhexidine for abundant washing and occlusive dressing with Kollagenase. From the seventh day onwards, dersani was used in granulation areas and 10% papain was used in areas with fibrin and wet necrosis. On the twelfth day after surgical debridement, the wound was healed, granulated and suitable for skin grafting, the dressing was maintained and the wound was washed daily with dersani only.

Computed tomography of the mandible, neck and chest was performed on 07/18/2021, showing a significant reduction in skin thickening and platysma associated with the previously described intermingling gas foci. There was also no more formation of important collections in the neck, as well as in the thorax.

The patient remained hospitalized for eighteen days under the care of the multidisciplinary team, with laboratory and radiological improvement being evidenced. Daily physical examinations with gradual improvement in the appearance of the wound, remaining hemodynamically stable throughout the period, without the need for invasive measures and/or support in intensive care. Then, due to the unavailability of a Plastic Surgery service capable of total skin grafting in the municipality, the patient was transferred to a unit with availability of the service in question, to perform the

reconstructive procedure.

DISCUSSION

Necrotizing fasciitis (NF) is characterized as an infection of deep soft tissues that results in progressive destruction of muscle fascia and superimposed subcutaneous fat. The infection usually evolves along the muscular fascia because of its relatively poor blood supply, muscle tissue is often preserved because of its better blood supply. Decreased tissue sensitivity may precede the onset of skin ischemia and provide a clue to the presence of NF. At first, the underlying tissue may appear uninvolved, so NF is difficult to diagnose without direct visualization of the fascia.

NF can be classified into two microbiological categories: polymicrobial infection (type I) and monomicrobial infection (type II). Polymicrobial (type I) necrotizing infection is caused by both aerobic and anaerobic bacteria. Generally, at least one anaerobic species (most commonly *Bacteroides*, *Clostridium* or *Peptostreptococcus*) is isolated in combination with Enterobacteriaceae (for example, *Escherichia coli*, *Enterobacter*, *Klebsiella*, *Proteus*) and one or more facultative anaerobic streptococci (unlike *Group A Streptococcus* [GAS]). Obligate aerobes (such as *Pseudomonas aeruginosa*) are hardly a component of such conjoint infections. Rarely, fungi (*predominantly Candida species*) are recovered in polymicrobial necrotizing infections (type I). Monomicrobial necrotizing infection (type II) is usually caused by GAS or other beta-haemolytic streptococci. Infection can also occur as a result of *Staphylococcus aureus*. Infection with no clear port of entry occurs in about half of cases, in such situations, the pathogenesis of infection it is likely characterized by hematogenous translocation of GAS from the oropharynx (asymptomatic or symptomatic pharyngitis) to a site of blunt trauma or muscle strain.



Subtitle: Presentation of the signs



Subtitle: Intraoperative debridement

Polymicrobial (type I) necrotizing fasciitis (caused by both aerobic and anaerobic bacteria) typically occurs in older adults and/or in individuals with associated comorbidities. The most important risk factor is diabetes mellitus, especially with associated peripheral vascular disease. Monomicrobial (type II) necrotizing fasciitis (most commonly caused by GAS) can arise in any age group and in individuals without underlying comorbidities. In the US, it is estimated that there are 3.5 cases of invasive GAS infections per 100,000 people. Necrotizing infections constitute approximately 6 percent of these total numbers.

NF may associate the epidermis, dermis, subcutaneous tissue, fascia and muscle. Necrotizing infection most commonly affects the extremities (lower extremity more commonly than upper extremity), especially in patients with diabetes mellitus and/or peripheral vascular disease. Necrotizing infection usually evolves acutely (over hours), and more rarely, it may present subacutely (over days). Rapid progression to extensive tissue destruction can occur, leading to systemic toxicity, loss of limbs, and/or death. Therefore, early recognition of necrotizing infection is essential.

The subcutaneous tissue may be firm and hard, so that nearby muscle tissues cannot be palpated distinctly. The accentuated edema of the affected site can evolve with a compartment syndrome, with complication of myonecrosis, requiring fasciotomy.

Subtitle: Immediate postoperative debridement

In NF, there is a reduction in the sensation

of pain in the area involved, due to thrombosis of small blood vessels and destruction of superficial nerves in the subcutaneous tissue. This may precede the development of skin necrosis and provide a clue to the presence of NF. Subcutaneous tissue gas is usually present in the polymicrobial (type I) form of NF, especially in patients with diabetes mellitus.

NF most commonly involves the extremities, as previously reported. Other presentations involve necrotizing fasciitis of the perineum (Fournier syndrome), head and neck region, and neonatal infection.

Head and neck NF may result from a disruption in oropharyngeal tissue integrity following surgery or instrumentation in the setting of odontogenic infection.

NF must be suspected in patients with soft tissue infection (erythema, edema, heat) and signs of systemic involvement (fever, hemodynamic instability) associated with crepitation, rapid evolution of clinical manifestations and/or severe pain (disproportionately to the cutaneous findings in some situations). Early recognition of necrotizing infection is very important, rapid progression to extensive destruction can occur, leading to systemic toxicity, loss of limbs or death.

The diagnosis of necrotizing infection is established through surgical exploration of the soft tissues in the operating room, with the evaluation of the skin, subcutaneous tissue, fascial planes and muscle. Surgical exploration is important to establish the presence of necrotizing infection, assess the level of involvement, and debride devitalized tissue. Surgical exploration must not be delayed when a necrotizing infection is suspected pending test results.

Imaging studies can be very useful to help determine whether necrotizing infection is present, but they must not delay surgical intervention when there are signs of crepitus

or rapid evolution of clinical manifestations.

Surgical exploration is the only way to determine the diagnosis of necrotizing infection. Examination findings include edema and gray appearance of the fascia, exudate without purulence, and easy division of tissue planes by dissection.

Early debridement is related to better results. Survival is significantly higher among patients referred for surgical treatment within 24 hours of admission compared with those in whom surgery is delayed. Survival improves further with early surgical intervention (within six hours).



Subtitle: Final phase of treatment with daily dressings and antibiotics

The best initial imaging test is computed tomography. The most useful finding is the presence of gas in the soft tissues, most often seen in the context of clostridial infection or polymicrobial necrotizing fasciitis (type I). This sign is highly specific for necrotizing soft tissue infection and must require immediate surgical approach. Other radiographic signs may include fluid collections, absence or heterogeneity of tissue enhancement with intravenous contrast, and inflammatory changes beneath the fascia.

The treatment of necrotizing infection is characterized by early and aggressive surgical

exploration and debridement of the necrotic tissue, associated with broad-spectrum antibiotic therapy and hemodynamic support, when necessary. The use of antibiotics in the absence of debridement is associated with a mortality rate of nearly 100 percent.



Subtitle: After tissue grafting

The objective of surgical treatment is to perform aggressive debridement of all affected necrotic tissue until the level of healthy and viable tissue is reached. Debridement of necrotic tissue in the operating room must be performed every one to two days until this same tissue is no longer present.

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FINAL CONSIDERATIONS

Necrotizing fasciitis (NF) is a disease with a high mortality rate and high prevalence in our society, characterized by a rapid and aggressive evolution, invading the subcutaneous tissue and the muscle fascia itself, of multibacterial etiology and associated with comorbidities such as diabetes and immunosuppression, early diagnosis, using its clinical, laboratory and radiological characteristics, is of enormous importance to indicate and initiate early treatment, with the use of broad-spectrum antibiotics, associated with surgical debridement and daily dressings, to modify the course of the disease and reduce the complications associated with it, such as sepsis and death in almost 100% of cases.