

# Cervical Necrotizing Fasciitis Caused by Oral Cavity Infection: A Case Report Considering Therapeutic Approach and its Morphofunctional Implications

Fasciitis Necrosante Cervical Causada por Infección de la Cavidad Oral. Reporte de un Caso Considerando el Abordaje Terapéutico y sus Implicaciones Morfofuncionales

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**SUMMARY:** Cervical necrotizing fasciitis (NF) is a rare complication of oral cavity infection with high morbi-mortality. Given its low prevalence, adequately reporting cases of NF, its therapeutic management, and associated morphofunctional modifications to the clinical and scientific community is pivotal. To that end, we herein describe a case of cervical NF in a 60-year-old patient with comorbidities and patient presented large, painful cervical swelling associated with a necrotic ulcer lesion in the anterior neck region. Intraoral examination indicated a periodontal abscess in the right mandibular area, while computed tomography indicated the lesion's extension from the right mandibular to the submandibular region. Following empirical intravenous antibiotic treatment, a broad surgical debridement was performed, and the foci of oral infection were removed. Debridement revealed communication between deep and superficial anatomical regions in the submandibular area, where we subsequently placed a Penrose drain. Biopsies showing acute inflammatory infiltrate associated with necrotic and hemorrhagic regions confirmed the diagnosis of NF. When an antibiogram revealed resistance to the empirical treatment, the antibiotic scheme was replaced with an adequate alternative. After a second debridement, we closed the defect with fascio-mucocutaneous advancement flaps with a lateral base while maintaining suction drainage. Having reacted positively, the patient was discharged 10 days after the operation. Despite an extensive morphofunctional change generated in the treated area, the patient showed no difficulties with breathing, phonation, swallowing, or mobilizing the area during control sessions. Altogether, this report contributes to the highly limited literature describing morphological aspects that can facilitate or delay the spread of infection or the morphofunctional disorders associated with the size and depth of surgical interventions for cervical NF, information that is relevant for the comprehensive, long-term prognosis of the treatment of NF.

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**KEY WORDS:** Necrotizing fasciitis; Head and neck surgery; Maxillofacial surgery; Head and neck anatomy.

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## INTRODUCTION

Necrotizing fasciitis (NF), also known as streptococcal gangrene, necrotizing erysipelas, and Fournier's gangrene (Sahoo & Tomar, 2014; Ord & Coletti, 2009; Rajanikanth *et al.*, 2018), is a rare, aggressive infection that compromises the subcutaneous cellular tissue, fascia, and, in advanced stages, muscles and deep vessels, thereby generating significant systemic toxicity (Ord & Coletti, 2009). The literature describes a variable prevalence of NF depending on the population studied, along with a mortality

rate ranging from 17 % to 64 % (Whitesides *et al.*, 2000; Hohlweg-Majert *et al.*, 2006; Ord & Coletti, 2009; Al-Ali *et al.*, 2018). To better delineate NF, four types of NF have been defined in light of infectious etiology: type 1 (i.e., polymicrobial), type 2 (i.e., monomicrobial or polymicrobial, associated with *Streptococcus* spp. group A), type 3 (i.e., caused by *Vibrio* spp., usually *Vibrio vulnificus*), and type 4 (i.e., associated with fungal infections) (Chen *et al.*, 2011; Misiakos *et al.*, 2014).

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Concerning the head and neck, the literature reports that cervical NF constitutes between 2.6 % and 5.0 % of all NF (Martínez *et al.*, 2016), with dental and pharyngeal infections being the most frequent causes (Elander *et al.*, 2016; Barria *et al.*, 2018; Rajanikanth *et al.*, 2018). The late diagnosis and treatment of cervical NF can lead to several complications, the most frequent being sepsis and mediastinitis (Lanisnik & Cizmarevic, 2010; Cortese *et al.*, 2017; Alegbeleye, 2018). Given NF's low prevalence in the head and neck, it is essential to adequately report such cases, including their presentation, diagnosis, morphofunctional aspects, therapeutic management, evolution, and prognosis, to the clinical and scientific community. To that end, this report describes a clinical case of odontogenic cervical NF that considers its interdisciplinary therapeutic management and the morphofunctional implications of the approach.

## CASE REPORT

A 60-year-old female patient was admitted to the Emergency Department of the Hospital Militar del Norte (Antofagasta, Chile) due to large, painful swelling in the anterior region of the neck, with a change in skin color, plus dysphagia and odynophagia with at least four days of evolution according to family members' reports. The patient also presented multiple comorbidities currently under treatment, including high blood pressure, type 2 diabetes mellitus, moderate overweight, major depressive disorder, venous insufficiency in the lower limbs, rheumatoid arthritis, and hip osteoarthritis. The patient was referred to the intensive care unit, and a multidisciplinary team addressed the case.

**Clinical examination.** In a general clinical examination, the patient exhibited lethargy, fever, tachycardia, dehydration, and pale skin and mucous membrane. The anatomical region characteristics included normocephaly, a round face, and a short neck, while the relation between the head, neck, and thorax was determined to be aligned and normal. The anterior cervical area showed extensive swelling, associated with a necrotic skin lesion with irregular, sloughed edges, pain on palpation, and an odor (Fig. 1A). The elliptical lesion showed a maximum anterior–posterior extension of 9 cm and a maximum horizontal extension of 14 cm. Intraoral examination revealed oral sepsis, multiple dental root remnants, generalized periodontal disease, and a periodontal abscess in the right mandibular region.

**Complementary and preoperative testing.** A contrast-enhanced computed tomography of the neck revealed a lesion area of  $43.4 \times 23.2 \times 47.2$  mm (Fig. 2) consisting of partly confluent hypodense foci and mild peripheral hyperemia in the right submandibular region involving the adjacent cortical bone of the mandible. A blood examination also revealed mild leukocytosis with a shift to the left and elevated C-reactive protein levels. Beyond that, the score of 7 on the Laboratory Risk Indicator for NF (LRINEC), obtained based on laboratory tests routinely performed to evaluate severe soft tissue infections (Wong *et al.*, 2004; Sandner *et al.*, 2015; Barria *et al.*, 2018), suggested a diagnosis of NF (Table I).

**Diagnosis.** Considering the extra- and intraoral clinical observations and complementary tests, we diagnosed the condition as cervical NF, caused by a right mandibular periodontal abscess, the infection of which had spread to the submandibular region and adjacent areas.



Fig. 1. Preoperative situation of the patient. A large swelling with a change in skin color is observed corresponding to a necrotic skin lesion in the cervical anterior area that crosses the midline. B: During preparation for surgical drainage, spontaneous rupture of the irregular sloughing edges of the lesion's margins occurred (red arrows).

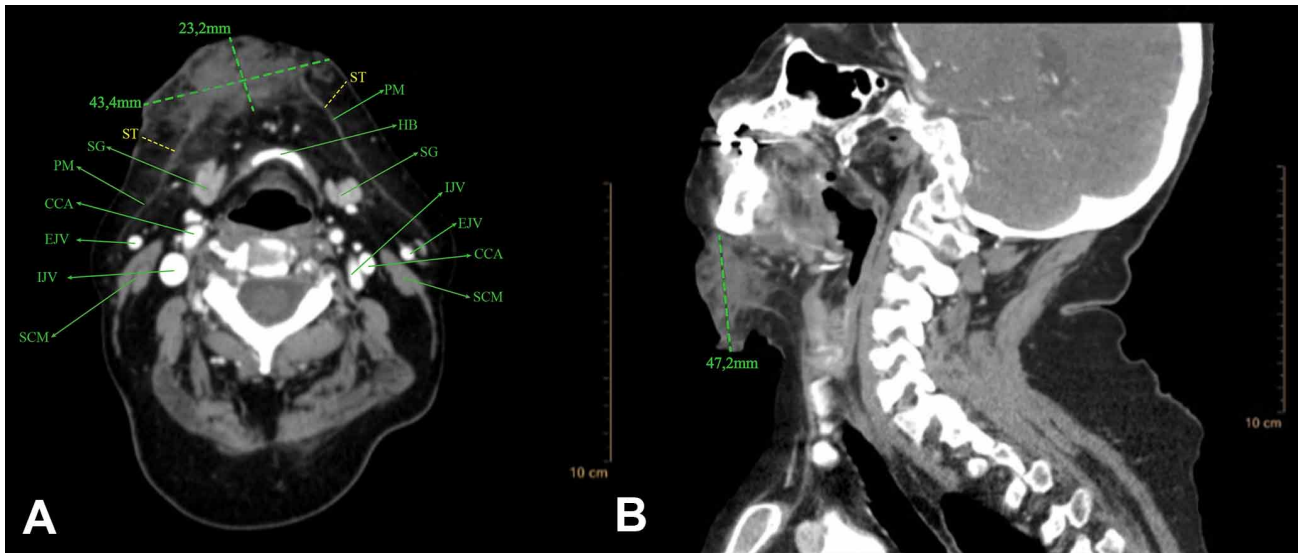


Fig. 2. Contrast-enhanced computed tomography of the neck. A: Horizontal submandibular section shows confluent hypodense foci with slightly hyperemic areas in the submental, right submandibular, and adjacent soft tissue regions. Loss of continuity of the platysma muscle is observed. Hyoid Bone (HB), Sternocleidomastoid Muscle (SCM), Platysma Muscle (PM), Submandibular Gland (SG), External Jugular Vein (EJV), Internal Jugular Vein (IJV), Common Carotid Artery (CCA), Subcutaneous Tissue (ST). B: Parasagittal section, right side, showing a hypodense area that compromises the cortical bone and adjacent soft tissues. It extends from the lower margin of the mandible to the anterior region of the neck.

Table I. Results of patient's laboratory tests and LRINEC score applied. Adapted by Barria *et al.* (2018).

Laboratory tests values obtained from patient	Values considered by LRINEC	LRINEC Score	Patient score
C-Reactive protein (mg/dL)	PCR (mg/dL)		
160	<150	0	4
	>150	4	
Total white blood cell count (1000 cells/ $\mu$ L)	Total white blood cell count (1000 cells/ $\mu$ L)		
10.1	<15	0	0
	15-25	1	
	>25	2	
Hemoglobin (g/dL)	Hemoglobin (g/dL)		
7,37	>13,5	0	2
	11-13,5	1	
	<11	2	
Sodium (mmol/L)	Sodium (mmol/L)		
144	>135	0	0
	<135	2	
Glucose (mg/dL)	Glucose (mg/dL)		
122	<100	0	1
	>100	1	
Creatinine (mg/dL)	Creatinine (mg/dL)		
0,69	$\leq$ 141	0	0
	>141	2	
		Final score	7

LRINEC risk assessment:

Final score  $\leq$ 5: Low risk and <50 % probability for presence of NF.

Final score 6–7: Medium risk and 50–75 % probability for presence of NF.

Final score  $\geq$ 8: High risk and >75 % probability for presence of NF.

**Treatment.** Concerning the management of comorbidities, special emphasis was given to diabetes mellitus, a pathology associated with up to a nine-fold greater risk of mortality in cases of cervical NF due to odontogenic causes (Gore, 2018). In our patient's case, empirical intravenous antibiotic therapy was administered, which included 600 mg of clindamycin every 8 hours, 2 g of clindamycin every 24 hours, and 1 g of metronidazole every 8 hours. Moreover, 100 mg of ketoprofen was administered orally every 12 hours. The following day, the patient was admitted to the operating room to undergo extensive surgical debridement under general anesthesia. According to the classification proposed by Thakur *et al.* (2013), the injury was level II at the time of the initial examination (i.e., black discoloration of skin, crepitus, and dermis exposure). However, as the surgical procedure was being prepared, it rose to level III (i.e., deep fascia, muscle, and vessel exposure) due to the spontaneous rupture of the irregular sloughing edges of the lesion's margins

(Fig. 1B). Once necrotic tissue and purulent exudate were removed, the subcutaneous cellular tissue of the right submandibular and submental regions, part of the carotid region, and the muscular triangle could be observed, as could communication between the submandibular regions and the sublingual space (Fig. 3). A microbial sensitivity test (i.e., antibiogram) was performed using the culture of exudate and tissues samples obtained from the lesion. As for the oral cavity, the root remains were removed, and the mandibular periodontal abscess was drained, with the mucosal plane sutured using Vicryl 3-0. At the end of the first debridement, a Penrose drain was placed in the submandibular region (Fig. 3b), and the surgical defect was covered with paraffin gauze (i.e., Jelonet) plus dressings. Two days later, a second surgical debridement was performed, and then the surgical defect was covered with laterally based fascio-mucocutaneous advancement flaps that achieved total coverage. The deep planes were sutured with Vicryl 4-0 and the superficial cutaneous plane with Prolene 4-0. A suction drain was placed in the caudal area of the surgical site (i.e., surgical wound) for 2 days (Fig. 4a). Due to resistance to clindamycin and ceftriaxone observed in the antibiogram, intravenous antibiotic therapy was changed to 4.5 g of tazonam every 6 hours and 1 g of vancomycin every 12 hours, while 1 g of metronidazole every 8 hours was maintained. The patient proceeded to our satisfaction, and hospitalization following the closure of the defect and extraction of the suction drain was 10 days. Afterward, the patient received several postoperative checkups—the first at 24 hours, the second at 48 hours, then weekly for a month and monthly for a year—but never showed any evidence of complications.

**Morphofunctional aspects associated with the injury and surgical treatment.** In modifying the cervical cutaneous and subcutaneous tissue, the necrotic lesion and

extensive surgical debridement destroyed a part of the platysma muscle and nearby fasciae (Figs. 1 and 2). As a consequence, the anatomical limits of the submandibular, submental, a part of the carotid triangle, and muscular regions were altered. The associated vascular components (i.e., anterior jugular veins and tributaries) were also modified in relation to the adjacent anatomical spaces and fasciae. Although the level of vascular damage could not be established, the mylohyoid muscle and adjacent fasciae had been visibly compromised, which had caused communication between the right submandibular region and the sublingual compartment (Fig. 3). However, no significant functional alteration was observed in the suprahyoid or lingual muscles actions after surgery. Closing the surgical defect required a wide displacement of the lateral skin tissue of the neck both anteriorly and medially (Fig. 4), which altered the distribution of the muscle fascicles of the remaining platysma and compressed the anatomical structures of the neck's anterior sector. Although such outcomes may slightly limit the action of the suprahyoid and infrahyoid muscles during swallowing and chewing, they were apparently compensated by the presence of the remaining subcutaneous fatty tissue, which is abundant in the anatomical sector (Figs. 3 and 4) and can lubricate the movement of tissues. In the postoperative control session performed in Week 4, the vitality of the cervical flaps was observed without any signs of infection or dehiscence, with a slightly retractile paramedian scar in the formative state (Fig. 4b). During the following control sessions, the patient reported no difficulties with performing neck movements or discomfort during chewing, phonatory functions, or swallowing, only a slight perception of skin tension generated by the retractable scar. No complications related to venous vascular damage in the anatomical area were observed during the postoperative control period either.

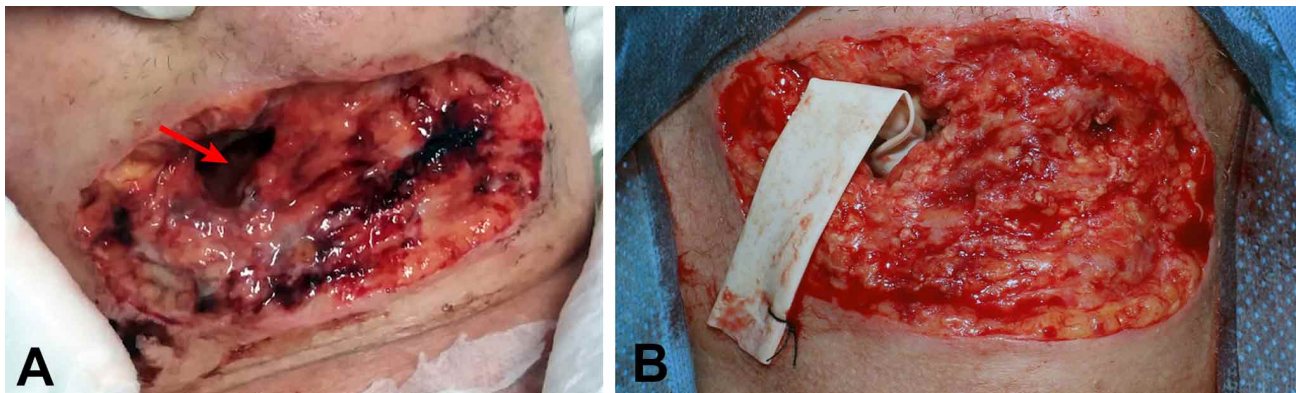


Fig. 3. Surgical intervention, and debridement. A: condition of the tissues after initial debridement under general anesthesia. The communication between the submandibular region and the sublingual space is observed (red arrow). B: Condition of the tissues after extensive debridement and installation of a Penrose drain at the site of communication between the submandibular area and the sublingual compartment.



Fig. 4. Closure of the surgical defect and evolution. A: closure of the defect with a laterally based fascio-mucocutaneous advancement flap performed after the second surgical debridement, two days after the initial debridement, achieving total coverage. In the lower part of the image, the placement of two cannulas for suction drainage can be seen. B: post-surgical control at week 4, paramedian scar in the process of healing, slightly retractable from the lower and lateral areas.

**Microbiological and histopathological findings.** A microbiological analysis revealed type 1 polymicrobial infection according to the etiological classification of NF (Chen *et al.*, 2011; Misiakos *et al.*, 2014), with the presence of *Actinomyces* spp., *Propionibacterium* spp., and *Enterococcus faecalis*. Histopathological findings were

consistent with cervical NF (Fig. 5), a condition characterized by abundant acute inflammatory infiltrate associated with extensive necrotic and hemorrhagic areas, liquefied fatty tissue, and polymorphonuclear cells plus phagocytic mononuclear cells infiltrated in the subcutaneous tissue and adjacent fascia (Caballero *et al.*, 2012).

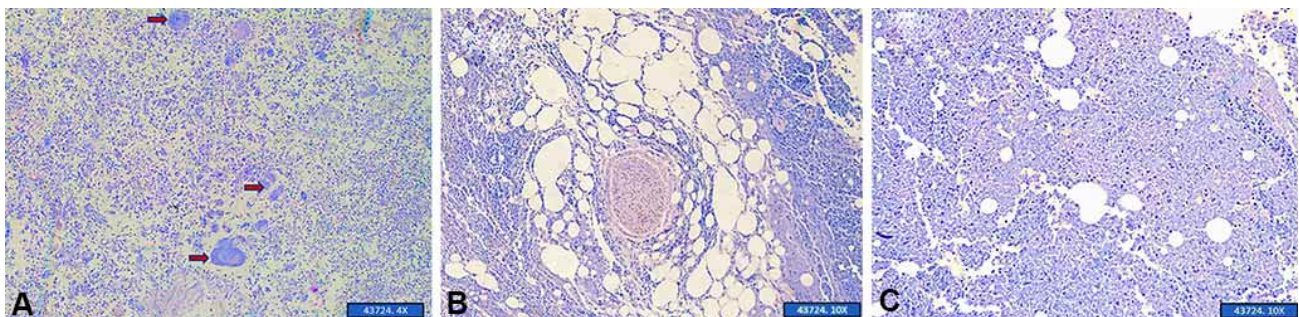


Fig. 5. Histology of three lesion sites. A: The image shows an abundant acute inflammatory focus, composed mainly of neutrophils, where foci with aspects of bacterial colonies are observed (red arrows). B: A stroma made up of adipocytes (fatty tissue) is observed, associated with an abundant acute inflammatory infiltrate. C: necrotic areas where a large number of inflammatory cells are observed. Stain: Hematoxylin-Eosin.

## DISCUSSION

Presenting in different forms and progressing rapidly, cervical NF caused by oral cavity infection is a disease with limited prevalence but considerable complexity. The case described herein was treated following clinical consensus, which implies the adequate management of the patient's comorbidities, the application of broad-spectrum empirical antibiotic treatment plus an antibiogram, early surgical intervention involving extensive surgical debridement, and

the elimination of oral infection (Voros *et al.*, 1993; Mohammadi *et al.*, 1999; Ord & Coletti, 2009; Al-Ali *et al.*, 2018; Gore, 2018; Rajanikanth *et al.*, 2018). We also calculated the LRINEC score (Table I), which can allow the early detection of cases of NF (Wong *et al.*, 2004). In various studies, LRINEC scores have been calculated in association with cases of cervical NF and demonstrated a high negative predictive value and a low positive predictive value (Sandner

*et al.*, 2015; Barria *et al.*, 2018). In our patient's case, the score was consistent with the severity and evolution of the cervical NF diagnosed.

### **Morphofunctional aspects of NF and its treatment**

The primary anatomical pathways that NF-associated microorganisms use to disseminate, advancing at a rate of 2-3 cm per hour (Zhang *et al.*, 2020), are anatomical spaces formed by the fasciae, which explains the risk of septicemia if NF is not diagnosed and treated early. However, in our patient's case, the infection had spread between the skin and the superficial layer of the cervical fascia, thereby causing extensive skin necrosis and compromising part of the platysma muscle without dissemination to deep cervical spaces. In such cases, knowledge of neck anatomy is necessary to understand the potential and dangerous routes of microbial dissemination in cervical NF. For example, in the reported case, the infection could have spread through the space between the pretracheal lamina and superficial lamina of the cervical fascia to the carotid sheath. From there, it could later reach what is called the "danger space" or "retropharyngeal danger space," which lies between the alar fascia and the prevertebral lamina of the cervical fascia (Snosek *et al.*, 2021) and spans from the base of the skull to the mediastinum (Lanisnik & Cizmarevic, 2010; Cortese *et al.*, 2017). However, for some reason, the infection in the case described had concentrated in the anterior superficial zone of the neck without spreading into deeper spaces, which contributed to the good prognosis of the surgical intervention performed. In fact, the literature describes an average of 3.2 surgeries and 23.8 days of hospitalization for cervical NF (Barria *et al.*, 2018), whereas the case described here required two surgeries and only 10 days of hospitalization, with the consequent reduction in morbi-mortality and associated costs. In our opinion, studies that correlate NF's clinical manifestation with certain morphological aspects of patients (e.g., anatomy, biotype, and sexual dimorphism) could elucidate how those variables influence NF's spread into the deep regions of the neck. Some authors have concluded that if skin necrosis is not observed, then NF may be underestimated because its extension into deeper spaces is less clinically perceptible (Ord & Coletti, 2009; Martínez *et al.*, 2016). However, those authors did not include the morphological aspects of the affected anatomical region in their analysis.

At the same time, infection plus extensive surgical debridement associated with NF produces extensive tissue loss and large scars, which changes the morphology of the anatomical region and, in turn, modifies several functions. The literature describes how cervical NF can lead to jugular vein thrombosis, pharyngeal wall perforation, airway

obstruction, or major vessel perforation (Mohammedi *et al.*, 1999; Ord & Coletti, 2009). However, in research, the long-term consequences in terms of morphological and functional modifications derived from such extensive tissue loss have been poorly approached (Bonne & Kadri, 2017; Brengard-Bresler *et al.*, 2017; Urbina *et al.*, 2021). In our patient's case, surgical debridement generated the loss of skin, subcutaneous tissue, part of the muscle tissue (e.g., mylohyoid and platysma), and fasciae. The function of the platysma muscle in humans has been related to the movement of the lower lip, angles of the mouth and jaw, and the movement of the neck skin (Le Louarn, 2016; Hwang *et al.*, 2017; May *et al.*, 2018). In addition, its contraction generates the separation of the skin from deep tissues, thereby reducing the angle generated between the jaw and neck (Moore *et al.*, 2013). Therefore, the destruction of a portion of the platysma can alter the movement of the cutaneous plane of the lower third of the face, the venous permeability of the anterior region of the neck, and the sliding of the visceral axis (i.e., larynx-trachea) during swallowing, chewing, and phonation. Additionally, the elimination of extensive tissue was compensated by a large anterior displacement of the lateral skin tissue of the neck, which modified its position and relationship with the underlying structures. Although tissue tension and the compression of deep structures were observed (Fig. 4), the tissue healed adequately and formed an inferior retractile zone, and no functional complications were observed during the postoperative period. Therefore, studies that analyze the mid- and long-term effect of anatomical changes generated by the size of the lesion and the surgical treatment associated with cervical NF could contribute significantly to the comprehensive prognosis of treatment for NF.

In sum, cervical NF caused by oral cavity infection is a rare complication with high rates of morbidity and mortality, and its diagnosis presents a clinical challenge due to the wide variety of signs and symptoms. The case described herein involved an anatomically focused increase in the volume in the anterior neck region that had delayed the infection's spread to deeper anatomical spaces, which probably contributed to the success of the treatment performed. Following surgical treatment, the extensive anatomical modification of the anterior region of the neck did not generate significant alterations in functions such as swallowing, phonation, breathing, or vascular problems. In presenting those outcomes, this report contributes to the highly limited literature describing morphological aspects that can facilitate or delay the spread of infection during NF, as well as the morphofunctional disorders associated with the size and depth of surgical interventions for cervical NF, information that is relevant for the comprehensive, long-term prognosis of the condition's treatment.

**CALDERÓN, C.; LOO, M.; BOZÁN, F.; HUMERES, C.; PAVEZ, A.; VALDIVIA-GANDUR, I. & ASTUDILLO-ROZAS, W.** Fasciitis necrosante cervical causada por infección de la cavidad oral. Reporte de un caso considerando el abordaje terapéutico y sus implicaciones morfofuncionales. *Int. J. Morphol.*, 41(2):423-430, 2023.

**RESUMEN:** La fasciitis necrosante (FN) cervical es una rara complicación de una infección proveniente de la cavidad bucal asociada a una alta morbimortalidad. Por lo anterior, es fundamental informar a la comunidad clínica y científica los casos de FN, su manejo terapéutico y las modificaciones morfofuncionales asociadas. Se describe un caso de FN cervical en una paciente de 60 años quien presentó una gran tumefacción dolorosa asociada a una lesión ulcerosa necrótica en la región anterior del cuello. El examen intraoral mostró un absceso periodontal en el área mandibular derecha y la tomografía computarizada mostró la extensión de la lesión hacia la región submandibular. Tras el tratamiento antibiótico empírico, se realizó un desbridamiento quirúrgico extenso y se extirparon los focos de infección oral. El desbridamiento reveló comunicación entre las regiones anatómicas profundas y superficiales del área submandibular, donde se colocó un drenaje Penrose. Las biopsias mostraron un infiltrado inflamatorio agudo asociado con regiones necróticas y hemorrágicas, confirmando el diagnóstico de FN. El antibiograma reveló resistencia al tratamiento empírico, por lo que el esquema antibiótico se sustituyó. Tras un segundo desbridamiento, se cerró el defecto con colgajos de avance fascio-mucocutáneos de base lateral manteniendo drenaje aspirativo. El positivo progreso del paciente permitió su alta 10 días después. Aun cuando se generó una gran modificación morfofuncional en el área tratada, la paciente no presentó dificultades para respirar, hablar, deglutir o movilizar el área cervical intervenida durante las sesiones de control. Este informe contribuye a la limitada literatura que describe los aspectos morfológicos que pueden facilitar o retrasar la propagación de la FN y las consecuencias asociadas a los trastornos morfofuncionales provocadas por el tamaño y profundidad de las intervenciones quirúrgicas requeridas por la FN, información relevante para el pronóstico integral a largo plazo del tratamiento de la FN.

**PALABRAS CLAVE:** Fasciitis necrosante; Cirugía de cabeza y cuello; Cirugía Maxilofacial; Anatomía de cabeza y cuello.

## REFERENCES

- Al-Ali, M. A.; Hefny, A. F.; Idris, K. M. & Abu-Zidan, F. M. Cervical necrotizing fasciitis: an overlooked diagnosis of a fatal disease. *Acta Otolaryngol.*, 138(4):411-4, 2018.
- Alegbeleye, B. J. Deep neck infection and descending mediastinitis as lethal complications of dentoalveolar infection: two rare case reports. *J. Med. Case Rep.*, 12:195, 2018.
- Barria, E. T.; Abarca, S. A.; Cancino, C. M.; Chávez, S. C.; Parra, P. J. & Rahal, E. M. Fasciitis necrotizante cervical: Consideraciones para el manejo precoz. *Rev. Otorrinolaringol. Cir. Cabeza Cuello*, 78(3):294-9, 2018.
- Bonne, S. L. & Kadri, S. S. Evaluation and management of necrotizing soft tissue infections. *Infect. Dis. Clin. North Am.*, 31(3):497-511, 2017.
- Brengard-Bresler, T.; De Runz, A.; Bourhis, F.; Mezzine, H.; Khairallah, G.; Younes, M.; Brix, M. & Simon, E. Postoperative quality of life of patients with a bacterial necrotizing dermis-hypodermis or necrotizing fasciitis, a ten-year study. *Ann. Chir. Plast. Esthet.*, 62(1):31-44, 2017.
- Caballero, P.; Pérez, S.; Patiño, M.; Castañeda, S. & García, J. Actualización en fasciitis necrotizante. *Semin. Fund. Esp. Reumatol.*, 13(2):41-8, 2012.
- Chen, I. C.; Li, W. C.; Hong, Y. C.; Shie, S. S.; Fann, W. C. & Hsiao, C. T. The microbiological profile and presence of bloodstream infection influence mortality rates in necrotizing fasciitis. *Crit. Care.*, 15(3):R152, 2011.
- Cortese, A.; Pantaleo, G.; Borri, A.; Amato, M. & Claudio, P. P. Necrotizing odontogenic fasciitis of head and neck extending to anterior mediastinum in elderly patients: innovative treatment with a review of the literature. *Aging Clin. Exp. Res.*, 29(1):159-65, 2017.
- Elander, J.; Nekludov, M.; Larsson, A.; Nordlander, B.; Eksborg, S. & Hydman, J. Cervical necrotizing fasciitis: descriptive, retrospective analysis of 59 cases treated at a single center. *Eur. Arch. Otorhinolaryngol.*, 273(12):4461-7, 2016.
- Gore, M. R. Odontogenic necrotizing fasciitis: a systematic review of the literature. *BMC Ear Nose Throat Disord.*, 18:14, 2018.
- Hohlweg-Majert, B.; Weyer, N.; Metzger, M. & Schön R. Cervicofacial necrotizing fasciitis. *Diabetes Res. Clin. Pract.*, 72(2):206-8, 2006.
- Hwang, K.; Kim, J. Y. & Lim, J. H. Anatomy of the platysma muscle. *J. Craniofac. Surg.*, 28(2):539-42, 2017.
- Lanitsnik, B. & Cizmarevic, B. Necrotizing fasciitis of the head and neck 34 cases of a single institution experience. *Eur. Arch. Otorhinolaryngol.*, 267(3):415-21, 2010.
- Le Louarn, C. A new approach to functional anatomy of the lower face: Role of the hyoplatysmal ligament, of the platysma and of the depressor labii lateralis. *Ann. Chir. Plast. Esthet.*, 61(2):101-9, 2016.
- Martínez, A. Y.; McHenry, C. R. & Rivadeneira, L. M. Cervicofacial necrotizing fasciitis: A rare disease with a high mortality requiring early debridement for survival. *Rev. Esp. Cir. Oral Maxilofac.*, 38(1):29-34, 2016.
- May, A.; Bramke, S.; Funk, R. H. W. & May, C. A. The human platysma contains numerous muscle spindles. *J. Anat.*, 232(1):146-51, 2018.
- Misiakos, E. P.; Bagias, G.; Patapis, P.; Sotiropoulos, D.; Kanavidis, P. & Machairas, A. Current concepts in the management of necrotizing fasciitis. *Front. Surg.*, 1:36, 2014.
- Mohammedi, I.; Ceruse, P.; Duperré, S.; Vedrinne, J. & Bouléreau, P. Cervical necrotizing fasciitis: 10 years' experience at a single institution. *Intensive Care Med.*, 25(8):829-34, 1999.
- Moore, K. L.; Dalley, A. F. & Agur, A. M. R. *Clinically Oriented Anatomy*. 7ª ed. Barcelona, Wolters Kluwer, 2013.
- Ord, R. & Coletti, D. Cervico-facial necrotizing fasciitis. *Oral Dis.*, 15(2):133-41, 2009.
- Rajanikanth, B. R.; Madhuri, B.; Prasad, K.; Vineeth, K. & Munoyath, S. K. Odontogenic infection progressing to necrotizing fasciitis: An unusual clinical emergence. *Oral Maxillofac. Surg. Cases*, 5(1):100084, 2018.
- Sahoo, N. K. & Tomar, K. Necrotizing fasciitis of the cervical-facial region due to odontogenic infection. *J. Oral Maxillofac. Surg. Med. Pathol.*, 26(1):39-44, 2014.
- Sandner, A.; Moritz, S.; Unverzagt, S.; Plontke, S. & Metz, D. Cervical necrotizing fasciitis--The value of the laboratory risk indicator for necrotizing fasciitis score as an indicative parameter. *J. Oral Maxillofac. Surg.*, 73(12):2319-33, 2015.
- Snosek, M.; Macchi, V.; Stecco, C.; Tubbs, R. S.; De Caro, R. & Loukas, M. Anatomical and histological study of the alar fascia. *Clin. Anat.*, 34(4):609-16, 2021.
- Thakur, J.; Verma, N.; Thakur, A.; Sharma, D. & Kumar, N. Necrotizing cervical fasciitis: prognosis based on a new grading system. *Ear Nose Throat J.*, 92(3):149-52, 2013.

- Urbina, T.; Canoui-Poitrine, F.; Hua, C.; Layese, R.; Alves, A.; Ouedraogo, R.; Bosc, R.; Sbidian, E.; Chosidow, O.; Dessap, A. M.; *et al.* Long-term quality of life in necrotizing soft-tissue infection survivors: a monocentric prospective cohort study. *Ann. Intensive Care*, 11(1):102, 2021.
- Voros, D.; Pissiotis, C.; Georgantas, D.; Katsaragakis, S.; Antoniou, S. & Papadimitriou, J. Role of early and extensive surgery in the treatment of severe necrotizing soft tissue infections. *Br. J. Surg.*, 80(9):1190-1, 1993.
- Whitesides, L.; Cotto-Cumba, C. & Myers, R. Cervical necrotizing fasciitis of odontogenic origin: a case report and review of 12 cases. *J. Oral Maxillofac. Surg.*, 58(2):144-51, 2000.
- Wong, C. H.; Khin, L. W.; Heng, K. S.; Tan, K. C. & Low, C. O. The LRINEC (Laboratory Risk Indicator for Necrotizing Fasciitis) score: A tool for distinguishing necrotizing fasciitis from other soft tissue infections. *Crit. Care Med.*, 32(7):1535-41, 2004.
- Zhang, N.; Yu, X.; Zhang, K. & Liu, T. A retrospective case series of Fournier's gangrene: necrotizing fasciitis in perineum and perianal region. *BMC Surg.*, 20(1):259, 2020.

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