CASE REPORT

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Fatal Cervical Necrotizing Fasciitis (A Report of Two Cases of Confirmed Odontogenic Origin and One of Possible Odontogenic Origin)

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ABSTRACT: Three cases of cervical necrotizing fasciitis (CNF), two of confirmed odontogenic origin and one of probable odontogenic origin, were observed from 1993–1999. This is in addition to three cases previously reported by this office. A rare sequelae of dental infection, CNF can be a severe, rapidly progressing infection of the cervical tissues having a mortality rate of up to 50%. "Hospital gangrene" was first described during the Civil War. It was later to be described as necrotizing fasciitis and later yet was designated as a separate clinicopathological diagnosis.

KEYWORDS: forensic science, forensic odontology, necrotizing fasciitis, cervical necrotizing fasciitis, dental infection, periapical abscess

Cervical necrotizing fasciitis (CNF) is an uncommon, fulminant bacterial infection of the subcutaneous soft tissue of the neck. CNF causes extensive necrosis of the superficial and deep fascia, subcutaneous fat, and muscle. There may be rapid dissection along the fascial planes with potential extension into the mediastinum, pericardium, and other areas of the thorax.

Without early recognition, aggressive antibiotic therapy, surgical debridement, and/or hyperbaric oxygen therapy, the course of the infection is rapid with a significant mortality rate. Over 70 cases of CNF have been reported in the English language literature and of those 65 to 80% had an odontogenic focal point of infection. We present two cases of CNF of dental origin and a third that probably had an odontogenic origin, all having a fatal outcome.

A previous report by Sperry and McFeeley (1) documented five cases of necrotizing fasciitis of the neck, three of dental origin, and two as the result of trauma. This brings the total CNF cases of odontogenic origin seen by this office to six.

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Cases

Case 1

A 43-year-old female Caucasian diabetic was seen by a dentist for an abscessed lower left molar and placed on oral Penicillin prior to any dental intervention. She presented to a local hospital four days later with an eight-day history of painful swelling of her left face. Examination revealed substantial swelling of her left facies and buccal mucosa. No impending airway obstruction was noted but, because of the extent of tissue induration and hyperglycemia, she was transferred to a larger hospital in another city. At admission she had a rapidly progressing odontogenic infection and was in diabetic ketoacidosis. CT scan showed extensive edema and subcutaneous emphysema in the tissues of the cheek and left neck beginning at the level of the nose and extending to the level of the thyroid. She had an operative irrigation and debridement the night of admission, as well as two further debridements early in her hospital stay. Cultures of the wound revealed a mixed bacterial infection with gram positive, gram negative, and anaerobes as well as candida albicans. Sensitivity tests were run periodically during her hospitalization. Subsequently multiple tooth extractions were performed.

Throughout the hospitalization, the patient received multiple courses of antibiotics including Penicillin, Ancef, Clindamycin, Gentamycin, and Unasyn, followed by Timentin and Vancomycin. Acute renal tubular necrosis, sepsis, adult respiratory distress syndrome, pansinusitis, and anasarca complicated her postoperative course. Her condition continued to deteriorate, renal failure ensued, she became encephalopathic and unresponsive, and, three weeks after her admission with family consent, supportive care was discontinued.

Autopsy revealed a widely debrided area over the left mandible and face associated with necrotizing fasciitis, advanced periodontal disease, and dental abscess. The predominant microbes cultured from infected tissue were *Klebsiella* pneumonia and *Staphlococcus* alpha. Sepsis resulting from the necrotizing fasciitis caused multi-organ failure characterized by diffuse alveolar damage, anasarca, nephredema, and hepatic centrilobular necrosis. As in most cases of CNF, an underlying problem (diabetes mellitus in this instance), causing the patient to be immunocompromised, contributed significantly to the morbidity of this infection.

The pathologic diagnosis was cervical necrotizing fasciitis due to dental caries with concomitant periapical tooth abscess, which caused sepsis and multi-organ failure.

Case 2

The decedent was a 65-year-old Hispanic female with a long history of alcohol abuse. Two months prior to her death she began complaining of tooth pain, but refused to seek medical or dental attention. Most recently she had been complaining of throat ("flu-like") symptoms.

The decedent's sister spoke with her one morning and did not like the way she sounded. She attempted to call on her throughout the day but was unable to get an answer. A nephew went to her home and, getting no response, gained entry through a window and found the decedent lying unresponsive in the bathtub.

At autopsy, on the skin of the anterior neck, a 5 × 3 in. area of green discoloration crossed the midline and extended in a superior direction to involve the skin underlying the lower jaw. Examination of the soft tissues of the neck revealed extensive tissue destruction, with necrotic material along the fascia posterior to the sternocleidomastoid muscles and within the strap muscles and inferior pharyngeal muscles. There was gross necrosis of the left submandibular gland and the left lobe of the thyroid gland. The necrotizing process appeared to cross from left to right at the level of the thyroid, then extend downward, anterior and to the right of the esophagus and posterior to the trachea, terminating in the posterior mediastinum. Gram stain was suggestive of aerobic and anaerobic infection and cultures were positive for *Streptococcus sp.* and coagulase positive *Staphylococcus.* Postmortem radiographic examination revealed a periapical abscess of the lower left second molar tooth with bony destruction of bone around this tooth and the adjacent third molar tooth. There was evidence of much bone loss in the mandibular anterior area related to periodontal disease. The lungs showed bronchopneumonia.

As in Case 1, the decedent's risk factor (chronic alcoholism) compromised her immune system and was a significant factor in the aggressiveness of this infection.

The cause of death was bronchopnuemonia arising in the setting of cervical necrotizing fasciitis secondary to a periapical abscess of a lower molar tooth.

Case 3

The deceased was a previously healthy 18-month-old Mexican male who was brought to the family physician in Palomas, Mexico, by his parents, presenting with a warm mass on the right side of his face. A mixture of Ampicillin, Amikacin, and Penicillin was prescribed and subsequently administered intramuscularly by the father. The swelling spread to the neck and the patient had two episodes of generalized seizures. His parents then took him to a hospital in the U.S., where upon arrival he had another seizure and was in respiratory distress. He was intubated and transferred to a regional medical center. Upon arrival he was hypotensive and a diagnosis of "high output septic shock" was made.

During his brief stay he developed anasarca with severe generalized blisters, acute respiratory distress syndrome, renal failure, and myocardial dysfunction requiring pressor support. He suffered additional seizures and subsequently died.

The original site of this infection was not established due to the face being spared at autopsy, although a dental infection, upper respiratory infection, tuberculosis, or infection in the fascial spaces of the neck were considered. The contents of the right neck revealed advanced infection and were grossly edematous. Cultures produced *Candidal sp* and *Serratia sp*. Gram negative rods were seen in the tissue sections. All other findings were compatible with the medical findings noted during his brief stay. Death was attributed to multi-system organ failure due to *Serratia* sepsis and disseminated *Mucormycoses.*

Discussion

Jones first described "hospital gangrene" during the Civil War in 1871 (2). The term necrotizing fasciitis (NF) was coined by Wilson in 1952 to emphasize the fact that fascial necrosis was the most consistent feature of the disease (3). NF most commonly affects the trunk, perineum, and limbs, but head and neck NF does occur. Head and neck NF was considered to be a homogeneous group until 1996 when it was demonstrated that cervical necrotizing fasciitis and craniofacial necrotizing fasciitis were two distinct clinicopathological conditions (4).

CNF is a polymicrobial infection involving obligate anaerobes and aerobes, which act synergistically to cause a fulminant infection. Underlying conditions that impair the immune response (diabetes and alcoholism) are a major contributing factor in the morbidity of this infection. Odontogenic infection is the most common etiology in CNF (up to 80%) followed by skin trauma, tonsillar infection, furuncles, and osteoradionecrosis (4,5), as well as insect bites, local trauma, burns, or surgery (6).

When CNF is initiated by a dental infection, it is usually associated with a lower molar periapical abscess. If left untreated, the path of infection begins at the lower molar root apices, which are below the attachment of the mylohyoid muscle and can extend to the inner border of the mandible, allowing the infection to perforate the lingual mandibular cortical plate extending into the submandibular space, and into the retropharyngeal, pretracheal and visceral spaces, having access to the carotid sheath and upper mediastinum. This direct extension of the infection and associated with sepsis results in the high morbidity of this disease. NF of other areas of the body has a mortality of 25 to 30% while CNF has a mortality rate of 22 to 37%. All cases exhibit a mortality increase in individuals over the age of 40 up to 50% (7). Although still considered rare, CNF is a well-described process predominately occurring in males. Herein are presented three cases, two of which are female. The practice of good oral hygiene and having regular dental examinations to intercept oral infections would probably prevent most of those cases where a dental focal point was the initiating factor.

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