

## Cervical necrotizing fasciitis: An unusual sequel of odontogenic infection

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### Abstract

Cervical necrotizing fasciitis is a rare infection of the fascial planes, which is less common in head and neck, because of the rarity and higher vascularity in the region. We reviewed five patients with cervical necrotizing fasciitis of odontogenic infection managed at a teaching hospital at Chennai, India. There were four men and one woman, of whom four patients were diabetic and hypertensive, with a mean age of 53 years. Mandibular molars (periapical or pericoronal abscess) were found to be the source of infection in all of the cases. The treatment involved incision and drainage and debridement. Anti-microbial drugs were given for all the patients, which included cephalosporins, metronidazole and gentamycin. In four patients the wound healed by contracture and one patient required split skin grafting. Due to the smaller extent of the necrosis, better control of the systemic disease and small size of the sample, there was neither a major complication nor death. This paper reminds us that cervicofacial necrotizing fasciitis (CNF) remains one of the potential complications of long standing odontogenic infections in patients with immune-compromised status, particularly in lower dentition.

**Key words:** Cervical, necrotizing fasciitis, odontogenic, mandibular.

### Introduction

Necrotizing fasciitis was first described in 1848. In 1920, Meleney identified 20 patients in China in whom hemolytic streptococcus was the sole organism. Wilson coined the term necrotizing fasciitis in 1952 and found no specific pathologic bacteria related to the disease (1).

Necrotizing fasciitis is characterized by fulminating, devastating and rapidly progressing condition, with a high morbidity and mortality rate. The disease is caused by a polymicrobial or mixed aerobic-anaerobic infection (2). Patients with immunocompromised status like diabetes mellitus, cancer, alcoholism, vascular insufficiencies, organ transplants, HIV, or neutropenia are prone to this type of infection (3,4).

Organisms spread from the subcutaneous tissue along the superficial and deep fascial planes, presumably facilitated by bacterial enzymes and toxins. This deep infection causes vascular occlusion, ischemia, and tissue necrosis. Superficial nerves are damaged, producing the characteristic localized anesthesia (5,6). Septicemia ensues with systemic toxicity.

Necrotizing fasciitis seen commonly seen in the extremities, trunk and perineum. They require aggressive treatment to combat the associated high morbidity and mortality. However, cervicofacial necrotizing fasciitis (CNF) of odontogenic origin were being reported from few countries (1-8). These infections can be difficult to recognize in their early stages, but they rapidly progress.

The purpose of this article was to share the experience in a teaching institute in India, with five patients of cervical necrotizing fasciitis of odontogenic origin and its management.

### Material and Methods

Of all the cases of orofacial infection admitted to the Department of Oral and Maxillofacial Surgery, Sri Ramachandra Dental College and Hospital, Chennai, India, during the period between 2000 and 2005, we found five cases of cervical necrotizing fasciitis in our records. All clinical parameters like patient's age, sex, medical status, etiology, bacteriology, region involved, systemic diseases, time taken to report to our hospital, antimicrobial treatment, hospital stay period, surgical treatment and complications were systematically analyzed.

### Results

There were 4 male and 1 female patients. The mean age was 53.2 years, ranging from 38 years to 69 years. In all these patients, the offending teeth were lower molars. Four of the patients had associated systemic disease diabetes mellitus, hypertension and obesity. None of the patients gave a positive history of dental extraction. All the patients gave a positive history of dental pain of considerable duration (range 19 – 34 years). The buccal and submandibular regions were the commonly involved region on the face. In three of the patients, necrosis involved the neck (Table 1).

On admission, 4 patients presented with extensive fascial swelling, while one patient reported with necrosis of the skin and superficial fascia of the submandibular region. In those patients with swelling, it was clinically mimicking space infection of odontogenic origin, with symptoms like erythema, warmth, tense, tender and fever.

All the patients were hospitalized. The treatment involved incision and drainage and debridement. Anti-microbial drugs were given for all the patients, which included cephalosporins, metronidazole and gentamycin, which was reevaluated after culture and sensitivity tests.

*Streptococcus* species was identified in all the cultures, but gram negative aerobes were isolated in none of the patients. The strains of bacteria cultured were *S. pyogenes*, *S. aureus* and *S. pneumoniae*. Anaerobes were seen in 2 patients (*Prevotella* and *Peptostreptococcus*) (Table 2).

Incision and drainage was done for four patients (Figure 1). One patient reported with necrosis and pus discharge from the affected region (Figure 2). The necrotic tissue was excised carefully not to damage the major blood vessels, at the same time not leaving any dead tissue. Dissection was carried out until fresh bleeding occurred. Three patients needed fasciotomy and radical excision (Table 3). The wound was irrigated with 2% hydrogen peroxide and metronidazole solution. Dressings were changed every six hours with gauze soaked in gentamycin solution. The

offending tooth was extracted once the general condition of the patient was deemed fit. In four patients, the wound healed by contracture (Figure 3). One patient required split thickness graft which was done 1 week after hospitalization. All the patients recovered in an average of 15 days, without any major complications.



**Fig. 1.** Patient with skin necrosis and purulent discharge in mandibular region. Incision and drainage was done and multiple drains in place (case number 1).



**Fig. 2.** Necrotic skin covered with slough and pus, exposing underlying fascia (case number 1).



**Fig. 3.** Satisfactory healing by contracture was seen after surgical debridement and antibiotics in 6 weeks (case number 1).

**Table 1.** Distribution of cases according to age, sex, regions involved, etiology and the duration of pain.

Case No	Age/sex	Region involved	Etiology	Duration of dental pain
1	54 / M	Submandibular, Buccal	Radicular abscess in 38	28 days
2	69 / M	Submandibular, Buccal	Radicular abscess in 46, 47	19 days
3	38 / F	Submandibular, neck	Pericoronal abscess in 38	26 days
4	47 / M	Submandibular, neck	Radicular abscess	32 days
5	58 / M	Buccal,	Periodontal abscess 48	34 days

**Table 2.** Distribution of patients with necrotizing fasciitis according to the bacteriology seen in the culture, antibiotics used and the duration of hospitalization that required.

Case no	Bacteriology	Antibiotics	Hospital stay
1	<i>Str. Pyogenes</i> <i>Str. Aureus</i> <i>Fusofacterium spp.</i>	Ceftazidime metronidazole	12 days
2	<i>Str. Pyogenes</i> <i>Str. Epidermis</i>	Ceftazidine Metronidazole	19 days
3	<i>Str. Pneumoniae</i> <i>Peptostreptococcus</i>	Cefuroxime Metronidazole	16 days
4	No growth	Ceftazidime Metronidazole	9 days
5	<i>Str. Pyogenes</i>	Ceftazidime metronidazole	21 days

**Table 3.** Distribution of cases with necrotizing fasciitis according to the existing systemic disease, surgical treatment performed and their complications.

Case no	Systemic disease	Surgical treatment	Complications
1	Diabetes mellitus	Incision and drainage, Debridement	-----
2	Diabetes mellitus, Hypertension, Chronic renal failure	Incision and drainage, Debridement, Fasciotomy	Mediastinitis
3	None	Incision and drainage, Debridement	-----
4	Diabetes mellitus	Incision and drainage Debridement Fasciotomy	-----
5	Diabetes mellitus, Hypertension	Incision and drainage, Debridement, Fasciotomy	-----

## Discussion

Cervical necrotizing fasciitis is a rare infection of the fascial planes, which is less common in head and neck, because of the rarity and higher vascularity in the region (4,5). The etiology in most of the cases reports being radicular abscess due to extensive caries, periodontal diseases and pericoronitis (6-10). Whitesides et al. (3) and Fliss et al. (7) found that the mandibular second and third molars were the commonest cause for this disease. These findings correspond with our experience where the offending teeth were mandibular second and third molars. However, various other causes of CNF were also reported like trauma, tonsillar and pharyngeal abscess, cervical adenitis, salivary gland infections and tumor infections (7-10).

The predisposing factors for the development of CNF are diabetes, hypertension, obesity, malnutrition, peripheral vascular diseases, severe liver disease, alcoholism and AIDS (2,3,6). In our series of patients, diabetes mellitus, hypertension and renal failure were the systemic disease present. The hyperglycemic state of the diabetic patient impairs the leukocyte function and thereby suppresses the host's immune system. These patients have less circulating lymphocytes and T cells, compromised antibody response and polymorphonuclear cell function, thus being unable to respond to infection. None of our patients were HIV positive.

CNF has to be differentiated from a typical odontogenic infection based on the patient's history, presenting condition and sign of an acutely spreading infection. The characteristic features of necrotizing fasciitis (NF) are accumulation of gas in the tissues, odontogenic infection spreading below the neck and anterior chest and an orange-peel appearance of the skin involved, which may change to a dusky discoloration (3). Investigations like standard radiographs, computed tomography scans and magnetic resonance imaging were found to be valuable especially when there is mediastinitis and pleural and pericardial effusions (11,12).

In agreement with the earlier findings, the body and angle region of the mandible were commonly involved in our series of patients (6,7). The probable reason could be due to the aggressiveness of the disease, delay in intervention and complex anatomy of the region. In all our cases, the infection started in the mandibular region and progressed downwards, the infective exudates collecting beneath the skin. Soon the skin breakdowns, exposing the hyperemic superficial fascia and muscles. The importance of early intervention had been consistently emphasized (7,8,11-14). Hyperbaric oxygen was found to be useful by some authors (3,9).

The morbidity and mortality seems to be related to the promptness of medical and surgical intervention. The mortality rate reported in the literature ranges from 19% to 40% (9-14). The higher mortality rate is related to pre-existing systemic illness, late surgical intervention, septicemia

within 24 hours, old age and mediastinal and thoracic extension of the infection (8,9). In our experience with five cases, we did not encounter any serious complications. This could be explained due to lesser region of necrosis involved, better management of systemic disease and less sample size of the series.

This paper reminds us that CNF remains one of the potential complications of long standing odontogenic infections in patients with immune-compromised status, particularly in lower dentition. With the recent reports on the complications and morbidity of CNF, the need for preventive therapy and prompt intervention by the maxillofacial surgeons in immune-competent patients could not be overemphasized.

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