ORIGINAL ARTICLE

Retrospective evaluation of necrotizing fasciitis in university college hospital, Ibadan

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Abstract

Context: Cervicofacial necrotizing fasciitis (CNF), although a potentially fatal fulminant infection has been largely under-reported in the dental literature.

Aims: To report our experience with cases seen and treated at the University College Hospital, Ibadan, Nigeria.

Settings and Design: A descriptive retrospective clinical study.

Materials and Methods: A retrospective survey of cases treated between January 2002 and January 2007 was done. Diagnosis of CNF was established by fascia necrosis found on surgical exploration. Patients' age, sex, medical status, etiology of infection, bacteriology, and treatment received and complications were reviewed.

Statistical Analysis Used: SPSS version 15.

Results: Of the 48 cases of cervicofacial infection admitted during the study period, only 12 cases of CNF were found. Male:Female ratio was 4:8. The mean age of patients was 58.83 ± 11.91 years while the age range was 42–83 years. Those that had immunocompromised medical conditions included three cases each of diabetes mellitus and chronic nutritional anaemia and one case of retroviral infection. Mixed bacterial isolates of anaerobes and enterobacteriaceae were found in 10 cases while beta hemolytic streptococci were the sole isolate in two cases. All patients had serial debridement combined with intravenous antibiotic medications. Complications included anterior chest wall infection in three patients and one case of pleural effusion. The only mortality occurred in the patient with retroviral infection.

Conclusions: We advocate early recognition, surgical debridement and intensive medical care for treatment of CNF in order to reduce morbidity and mortality from this condition.

Key words: Cervicofacial, necrotizing fasciitis, infection, bacteriology

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Introduction

Necrotizing fasciitis is a potentially fatal bacterial soft tissue infection which has been described by several authors.[1] It was first described in 1871 by Joseph Jones who referenced more than 2600 during the American civil war.[2] Meleny in 1924 named the disease "streptococcal gangrene" and described the condition as a more generalized lesion when he isolated haemolytic streptococci in 20 cases studied.[3] However, recent studies are in support of the polymicrobial etiology of the disease.[4-6] Various names that has been ascribed to this lesion include hospital gangrene, necrotizing erysipelas, streptococcal gangrene and suppurative fasciitis.[6,7] The term necrotizing fasciitis was coined by Wilson in 1952 because of the characteristic fascia necrosis that is associated with the lesion.[8]

Necrotizing fasciitis is a worldwide condition with greater prevalence in the preantibiotic era.[9] It mainly affects the extremities, trunk and perineum and less commonly the cervical and facial region.[4-6] Although mortality from

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the disease has been reported to have improved after the advent of antibiotics, it remains a common affliction in the developing and underdeveloped nations due to poverty and lack of awareness.[9,10] Young *et al*.[11] reported a mortality rate of 30% in 2005 indicating that management of the condition is still suboptimal. Cervicofacial necrotizing fasciitis [CNF] result mainly from dental infections and has been largely underreported.[4,5,10] It is associated with high morbidity because of the airway and other vital structures in the neck including the great vessels. Several reports indicated that the rapid progression of the disease is responsible for the high mortality associated with this condition.[6,12]

Although some authors reported that co-morbid medical conditions like diabetes mellitus, alcoholism, vascular insufficiencies, retroviral infection or neutropenia are contributory to the poor prognosis of this disease.[10-14] On the contrary, Obiechina *et al*.[6] in a previous study done locally ruled out the importance of underlying medical condition in the etiology of CNF. However, more recent studies showed that immunocompromised medical diseases play significant role in progression and prognosis of CNF. Ndukwe *et al*.[9] in a study of craniocervical necrotizing fasciitis in Ile-Ife, Nigeria, reported that preexisting ill health was one of the factors responsible for the only mortality in their series. Periodic evaluation of CNF helps to identify prognostic indicators of the condition and plan aggressive intervention and preventive strategies. This informed the need for the present study which aimed to report our experience of twelve patients with CNF, highlighting comparison with previous studies especially those done locally.

Materials and Methods

The study setting was the Oral and Maxillofacial Surgery department of the University College Hospital Ibadan, a major referral centre for settlements in Oyo State and other adjoining states in Southwestern Nigeria.

A retrospective survey of cases of cervicofacial infections admitted to the department of Oral and Maxillofacial Surgery, University College Hospital, Ibadan, Nigeria between January 2002 and January 2007 was done. Parameters studied include age, sex, medical status, etiology and bacteriology of infection, antimicrobial treatment, and duration of symptom, surgical treatment and complications.

The data obtained from our records were summarized in a table. Statistical analysis was done with SPSS version 15.

Results

Of the 48 cases of orofacial infection identified during the study period, only 12 were diagnosed as CNF. There were 8 female and 4 male patients with a mean age of 58.83 ± 11.91 years. The age range was 42–83 years. Odontogenic infection was the etiology of CNF in all cases with periodontal infection constituting 66.7% [n=8] while apical infection from dental caries made up 33.3% of the cases [n=4]. Mandibular molar was the offending tooth in 10 cases while the maxillary molar teeth were involved in only two lesions. None of the lesions developed after tooth extraction. All patients gave a positive history of dental pain and swelling which initially mimicked odontogenic space abscess. Submandibular/upper cervical region was more commonly involved than other sites [Table 1].

All patients were admitted and placed on intravenous infusion of 0.9% normal saline alternated with 4.3% dextrose saline. All patients presented with cervicofacial swelling which was warm, erythematous and associated with fever. The average temperature on admission was 38.1°C. In those patients with swelling, bullae formation became evident within 48 h of admission. Purulent exudate was also observed from the wound at this stage. All patients had incision and drainage with debridement under local anesthesia and fascia necrosis was demonstrated during exploration. Broad spectrum antibiotics were administered intravenously along with metronidazole immediately after pus was obtained for culture.

Streptococcus pyogenes was the sole isolate in two of the cases while it was among the mixed isolates in three other cases. Anaerobes were mainly in mixed isolates and these include culture of Fusobacterium sp. in three patients and two cases where Bacteroides melaninogenicus was cultured. Pseudomonas sp., klebsiela sp., E coli, and *Staphylococcus aureus* are other bacteria that were cultured from the lesions. The organisms were cultured from pus exudates and necrotic fascia. No organism was cultured in two cases probably because the patients had been on systemic antibiotic medication before presentation.

Following incision and drainage, rubber drains were inserted and necrotic tissues were excised as they appear [Figures 1-3]. Fasciotomy was done and wound were dressed 12 hourly with gauze soaked with dilute hydrogen peroxide. All patients had extraction of the offending teeth.

Complications were seen in patients who had co morbid conditions; these include mediastinitis and pleural effusion in two patients with diabetes mellitus and chest infection in a patient with nutritional anaemia. The only mortality occurred in the patient who was found to have HIV infection in the course of investigation. He developed overwhelming infection and later died of septicaemic shock.

Discussion

Necrotizing fasciitis is a severe, potentially fatal infection involving the subcutaneous soft tissues. It may involve any part of the body, but commonly affect the

Table 1: Demography of the patients, etiology, bacteriology, and treatment offered. It also showed the systemic illness present in some of the patients

Age (years)	Sex	Site	Aetiology	Symptoms (days)	Bacteriology	Antibiotic medication	Type of operation	Systemic disease	Temperature on admission (°C)
62	F	Left submandibular buccal and cervical.	Apical abscess of 48	18	*S. aureus, E. coli, Klebsiela spp*	Cefuroxime Metronidazole	Debridement Fasciotomy	Diabetes mellitus	37.8
59	M	Left parotid temporal and infraorbital.	Apical abscess of 28	21	*Fusobacterium, Pseudomonas*	Cefuroxime Metronidazole	Debridement	Nil	37.6
83	F	Right submandibular cervical.	Periodontal Abscess of 46,47.	28	*E. coli Fusobacterium*	Cefuroxime Metronidazole	Debridement Fasciotomy	Anemia	38.1
64	F	Left submandibular buccal	Periodontal abscess 37	15	*S. pyogenes Pseudomonas E. coli*	Amoxyl	Debridement	Anemia	38.0
50	M	Bilateral sub mandibular space	Apical abscess of 46	10	*Nil*	Ceftriaxone	Debridement	HIV	38.3
55	F	Right submandibular	Periodontal abscess of 47,48	17	*S. pyogenes Pseudomonas B melaninogenicus*	Perfloxacine	Debridement	Nil	37.8
44	F	Left parotid buccal	Periodontal abscess27,28	26	*Fusobacterium S aureus B melaninogenicus*	Cefuroxime	Debridement fasciotomy	DM	38.0
73	F	Bilateral submandibular	Periodontal abscess 46,47	8	*S. pyogenes*	Perfloxacine	Debridement	Anaemia	37.3
42	M	Left submandibular	Periodontal abscess 35,36	23	*No growth*	Amoxyl Clavulanate	Debridement fasciotomy	Nil	37.2
68	M	Right submandibular	Periodontal Abscess 47	18	*S. pyogenes*	Ceftriaxone	Debridement	Nil	38.2
52	F	Bilateral submandibular	Apical abscess 36	21	*E coli Pseudomonas*	Amoxyl Clavulanate	Debridement fasciotomy	DM	38.0
54	F	Left buccal left submandibular	Periodontal abscess 26,36	14	*Spyogenes S. aureus Pseudomonas*	Cefuroxime	Debridement	Nil	37.6

Figure 1: Same patient after the initial debridement of the wound and fasciotomy. The hemorrhagic appearance showed that the debridement was extended to vital tissues

Figure 2: Same patient after completion of serial wound debridement. The wound has healed leaving an area devoid of skin cover. She was subsequently referred to plastic surgery division for skin graft

extremities. Reports of CNF in the literature were mostly case reports. The condition is regarded as a surgical emergency due to associated high rate of morbidity and mortality.[1,4-6]

In our series, the etiology of CNF was odontogenic with the mandibular molars being the worst culprit. This is in agreement with other studies where mandibular molars were

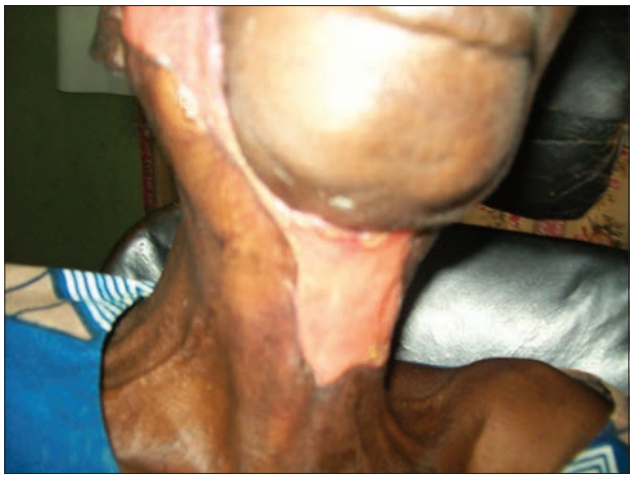

Figure 3: One of the patients in our series. Image shows extensive necrosis and sloughing of the cervical fascia

implicated in the etiology of the disease.[4-6] Other authors have also reported other causes of CNF such as trauma, tonsilar, and pharyngeal infections, cervical adenitis and tumor infections.[5,10,15]

Our study showed a female preponderance with a male:female ratio of 4:8. However, earlier studies from Southwestern Nigeria by Ndukwe *et al*.[9] and Obiechina *et al*.[6] showed higher male preponderance [5:2 and 5:3, respectively]. Increasing female population and better healthcare seeking attitude of the female gender may explain this change in trend.

The role of co morbid diseases in the etiology and prognosis of CNF has been well documented in the literature.[5,9,10] Only diabetes mellitus [$n=3$], nutritional anaemia [$n=3$] and one case of HIV infection were the systemic diseases present in our series. On the contrary, Obiechina *et al*.[6] reported that none of the patients in their series had underlying medical condition and therefore suggested that medical conditions may not have an important role in the etiology of necrotizing fasciitis of odontogenic origin. However, findings from the present study and other recent ones showed that underlying medical conditions are major contributory factors.

CNF typically mimics odontogenic infection at the early stage and the mode of presentation can be misleading. However, the presence of an unusual erythema on a dark skin with accompanying vesicle formation is a pointer to the diagnosis of CNF. Subcutaneous crepitations precede gangrene and sloughing of the fascia. Other features include rapid spread to the neck areas, severe pain and radiographic finding of subcutaneous gas. In agreement with earlier studies, the submandibular space is the most commonly involved site in our series. This may be due to the proximity of the apices of the mandibular molar teeth to the submandibular space which favors a direct spread of infection to this region from the offending teeth. The infection typically spreads downward to involve other areas in the neck. Early recognition and aggressive serial debridement is beneficial at this stage. Hyperbaric oxygen [HBO] therapy has been advocated because of its beneficial effect.[16] HBO delivers 100% oxygen to the tissues thereby warding off anaerobe and aiding tissue healing.

Morbidity and mortality from CNF have been reported to be directly related to a number of variables such as preexisting systemic disease, delayed referrals, financial constraints, age and extent of spread of the lesion. The only mortality in our series involved the patient with retroviral infection who developed overwhelming infection and died of septicaemic shock. Other patients with underlying medical conditions were successfully co managed with the physicians in the relevant specialties.

Conclusion

CNF remains a health burden in our population and its prognosis can be worsened by co morbid medical diseases. Its progression and complications can be halted if the condition and its etiologic agents are identified early and treated with aggressive surgical intervention, appropriate empiric antimicrobial cover with readjustment based on microbiologic findings.

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