

# Necrotizing Fasciitis of Head and Neck Region

Nabeela Riaz,<sup>1</sup> Tooba Saeed,<sup>2\*</sup> Samreen Younas<sup>1</sup>

## ABSTRACT

**Objective** To document clinical presentation, treatment provided, morbidity and mortality in patients with necrotizing fasciitis (NF) of head and neck regions.

**Study design** Descriptive case series.

**Place & Duration of study** Department of Oral and Maxillofacial Surgery King Edwards Medical University / Mayo Hospital Lahore, from January 2015 to September 2017.

**Methodology** Patients diagnosed as necrotizing fasciitis of head and neck region were included. Variables analyzed were anatomical site, etiology, clinical presentation, organisms involved, hospital stay, surgical treatment and mortality.

**Results** Eleven patients were managed during the study period. There were seven males and four females with median age of 40 years. Six patients were diabetic and six had history of road side accident. The most common signs were cellulitis and skin discoloration in all patients. Group A streptococci were isolated in five patients. Eight patients underwent aggressive surgical debridement, while three were treated with multiple incision and drainage with conservative debridement. Mortality was 54%.

**Conclusion** Despite aggressive treatment more than 50% patients died in this series.

**Key words** Necrotizing Fasciitis, Head and neck, Debridement.

## INTRODUCTION:

NF is a rare, but rapidly spreading fatal infection of polymicrobial origin. While sparing skin and muscles, NF initially causes necrosis of superficial fascia and subcutaneous tissue. With the progression of disease, skin and muscles also become necrosed due to thrombosis of the feeding vessels.<sup>1,2</sup> NF rarely involves the head and neck area. But literature shows that recently, NF of head and neck is becoming more common with more atypical locations like eyelids, periorbital region, scalp and ear.<sup>3-5</sup>

Usually NF of face, occurs in patients with history of trauma, whereas NF secondary to dental infection, mainly affects the neck. Other possible causes, including peritonsillar abscess, insect sting, burns, surgical procedures, radiotherapy and local steroid injection, are reported in literature.<sup>6,7</sup> There are cases, where origin of infection is not known.<sup>3,8</sup> Preexisting factors are mainly related to systemic diseases that have immunosuppressive effects. Diabetes mellitus, acute or chronic renal failure, arteriosclerosis, hypertension, hypothyroidism, anemia, HIV infection and malignancy could be the predisposing causes.<sup>9,10</sup> Surprisingly, without any of the above-mentioned immunosuppressive factors, young healthy individuals have been reported with fasciitis.<sup>8,11</sup> Previously, group A beta-hemolytic streptococci and staphylococci were considered the main pathogens causing NF. But today this condition is actually considered the result of synergistic combination of aerobic and anaerobic bacteria. This became possible due to the use of more specialized culture techniques for anaerobic bacteria.

<sup>1</sup> Department of Oral and Maxillofacial Surgery, Mayo Hospital, Lahore.

<sup>2</sup> Department of Oral and Maxillofacial Surgery The University of Lahore.

## Correspondence:

Dr. Tooba Saeed <sup>2\*</sup>  
Department of Oral and Maxillofacial Surgery  
University of Lahore, Lahore  
E mail: drtoobasaeed@yahoo.com

Initial deceptive presentation of the condition hinders the early diagnosis of NF, a crucial component of its management.<sup>12</sup> Since, rapidly spreading life threatening systemic complications and sepsis can be the consequence of any delay in diagnosis and treatment. Thus, high index of suspicion and level of awareness are prerequisite to distinguish this infection from other less serious conditions.<sup>2,6</sup> The mainstay of successful treatment includes broad-spectrum intravenous antibiotics along with aggressive surgical debridement and removal of all necrotic tissues, intensive supportive care and management of complications.<sup>13,14</sup> In this study we discussed our experience of head and neck NF cases in order to document co morbid states, triggering factors, clinical presentation, treatment and mortality.

### **METHODOLOGY:**

This was a descriptive case series conducted in the Department of Oral and Maxillofacial Surgery KEMU / Mayo Hospital Lahore. Patients with necrotizing fasciitis were who were managed from January 2015 to September 2017 were included. Variables noted included patients' demographic details, co-morbidity, affected area, initial presentation, etiology, microbiology, hospital stay and surgical treatment provided with outcome. Descriptive statistics were used to present data.

### **RESULTS:**

A total of 11 patients were managed that included seven males and four females. Their age ranged from 21 year to 60 year (median 40 year). Two patients gave the history of odontogenic infection, two had tooth extraction while two had the complaints of toothache. Six patients had history of trauma. Four had abrasions while one female patient gave the history of application of some homemade dressing on her wounds. One patient had facial fractures and necrotic skin at the site of injury on cheek at the time of presentation.

The most common signs were cellulitis and skin discoloration. In the affected area diffuse edema along with dilated and poorly differentiated fat layers were evident on CT scan that attributed to exudation. Five patients had sign evidence of subcutaneous gas. The C-reactive protein values were between 266 and 5012 nmol/L with an average of 2879nmol/L. Leukocyte count ranged between 4.7 to 27.3 thousand cells per microlitre and was characterized by neutrophilia.

Duration of illness before admission to hospital ranged from 2 to 7 days (mean 4.5 days). Eight of

the eleven patients underwent aggressive surgical debridement. Debridement was done by removing all the necrotic tissue till the fresh bleed came from the tissues. In all patients it created a large defect to be reconstructed later on. Five out of eight patients had serial of debridements under general anesthesia. Three required ventilator support after debridement. One male patient who had necrotizing fasciitis of cheek and temporal region after trauma, had extensive myonecrosis as well. His eye also got involved and had to be exenterated. After serial debridements patient had defect till the bone of more than half of the face. Patient could not survive due to septicemia and multiorgan failure.

One female patient presented with the cellulites and edema of the submental area with a patch of a necrotic tissue on chin. Cellulitis and change in skin color involved whole of the perioral tissue. Considering the morbidity of the aggressive debridement minimal or conservative debridement was done with commencement of triple regimen antibiotics with good glycemic control as she was diabetic. Triple regimen antibiotics included ceftriaxone, metronidazole and gentamicin. Her erythema settled down in few days and she survived with minimal defect of skin on the chin.

Out of 11 patients 5 survived. Of them 2 patients were referred to plastic surgery department for further reconstruction of major defects. Clinical and laboratory features of the patients are given in table I.

### **DISCUSSION:**

Our study substantiates the perception that necrotizing fasciitis of the head and neck region is a rare condition with high mortality and devastating morbidity in terms of disfigurement. 0.40 cases per 100,000 people is the documented incidence of necrotizing fasciitis.<sup>15</sup> It is relatively rare in head and neck region than other body areas.<sup>16</sup> In a large series of 128 cases of NF, only five of them involved the head and neck region.<sup>17</sup> Similarly, another series comprises only 3 cases (3.26%) of head and neck NF out of 92 cases.<sup>8</sup>

In our study the age and sex distribution were in accordance with other studies.<sup>5,8,18</sup> In our study, there was absence of predisposing factors in 36 % of cases. This is in accordance with the study of Widjaja where 33.70% patients had no co morbid state.<sup>8</sup> Interestingly, there was no significant association between diabetes and mortality, despite relatively high rates of diabetes among patients with NF.<sup>4</sup>

<b>Table I: Clinical and Laboratory Parameters</b>	
<b>Parameters</b>	<b>No. of patients n (%)</b>
<b>Gender</b>	
Male	7 (64%)
female	4 (36%)
<b>Comorbid / Risk factors</b>	
Diabetes mellitus	
Type I	1 (9%)
Type II	6 (54%)
No Comorbid	4 (36%)
Smokers	6 (54%)
alcoholic	3 (27%)
<b>Etiology</b>	
Odontogenic infection	4 (36%)
Trauma road side accident	6 (54%)
Unknown	1 (9%)
<b>Site of involvement</b>	
Cheek and temple region	4 (36%)
Cheek and submandibular region	4 (36%)
Lateral neck	2 (18%)
Anterior chin	1 (9%)
<b>Presenting signs</b>	
Cellulitis	11 (100%)
Edema	10 (91%)
Cutaneous gangrene	5 (45%)
Skin discoloration	11 (100%)
Crepitations	5 (45%)
Vesicle and bullae	3 (27%)
Pain	8 (73%)
<b>Microbiology</b>	
Group A streptococcus	5 (45%)
Streptococcus milleri and bacteroides	2 (18%)
Klebsiella and enterobacter	2 (18%)
No organism identified	2 (18%)
<b>Surgical treatment</b>	
Immediate surgical exploration and aggressive debridement	8 (72%)
Multiple incision and drainage with conservative debridement	3 (27%)
Deaths	6 (54%)
Survival	5 (46%)

Necrotizing Fasciitis can develop even after three weeks of a dental extraction and after massive trauma to facial skeleton.<sup>19</sup> Even minor abrasions, lacerations, burns, and injections can act as a trigger for this serious disease. Minor trauma like application of heated medicinal leaves over the face can also incite this disease process.<sup>16</sup> Same was the cause in one of our patients. But the real trigger for NF is still disputed.<sup>20</sup> In our cases almost all patients related some initiating factor except one.

In NF, the mortality rate is between 20% and 72%.<sup>4,18</sup> Mortality is particularly high in head and neck region due to the proximity of many vital anatomical structures. The main predictor of mortality is the time of initiation of appropriate therapy.<sup>21</sup> In our study mortality was 54%, while most of our cases presented very late with wide spread necrosis of soft tissue, and features of septicemia. In such late cases, presentation is itself diagnostic.<sup>22</sup>

There are no agreed diagnostic criteria and, no standard definitions or categorizations to date but key to good prognosis is early diagnosis and aggressive surgical intervention.<sup>21-23</sup> Aggressive surgical intervention is required for survival often leaves patients with pronounced disfigurement. Ultimately, necrotizing fasciitis of head and neck has serious physical and psychological impact, as both the esthetic and functional results obtained in the reconstruction are far from optimal.<sup>11,24</sup>

Delay in getting consent that ultimately delays the surgical debridement, should also be considered an indirect predictor of mortality. In our series eight patients who underwent surgical debridement, four refused to give consent to remove their facial skin and muscles at initial stage when it was not totally discolored.

Hyperbaric oxygen therapy and intravenous immunoglobulin are also considered as adjunctive approaches, however, the outcomes for these treatments have thus far been inconclusive.<sup>25</sup> Three patients in this series with conservative approach, by making incisions at multiple sites with minimal debridement, allowing gases to discharge along with triple antibiotic therapy, responded. In these we were able to decrease the morbidity and mortality effectively.

#### **CONCLUSIONS:**

The aggressiveness in the management of NF is the key factor for success in selective cases when head and neck areas are involved. Morbidity associated with aggressive debridement is far

greater, and can be responsible of mortality. Incision and drainage at multiple sites and minimal debridement initially along with appropriate antibiotics help to decrease the devastating morbidity of head and neck NF.

**REFERENCES:**

1. Norrby-Teglund A, Muller MP, McGeer A, Gan BS, Guru V, Bohnen J, et al. Successful management of severe group A streptococcal soft tissue infections using an aggressive medical regimen including intravenous polyspecific immunoglobulin together with a conservative surgical approach. *Scand J Infect Dis.* 2005;37:166-72.
2. Lanisnik B, Cizmarevic B. Necrotizing fasciitis of the head and neck: 34 cases of a single institution experience. *Eur Arch Otorhinolaryngol.* 2010;267:415-21.
3. VanderMeulen H, Pernica JM, Roy M, Kam AJ. A 10-Year Review of Necrotizing Fasciitis in the Pediatric Population: Delays to Diagnosis and Management. *Clin Pediatr (Phila).* 2017;56:627-33.
4. Proud D, Bruscano Raiola F, Holden D, Paul E, Capstick R, Khoo A. Are we getting necrotizing soft tissue infections right? A 10-year review. *ANZ J Surg.* 2014;84:468-72.
5. Wang YS, Wong CH, Tay YK. Staging of necrotizing fasciitis based on the evolving cutaneous features. *Int J Dermatol.* 2007;46:1036-41.
6. Holland MJ. Application of the Laboratory Risk Indicator in Necrotising Fasciitis (LRINEC) score to patients in a tropical tertiary referral centre. *Anaesth Intensive Care.* 2009;37:588-92.
7. McMahon J, Lowe T, Koppel DA. Necrotizing soft tissue infections of the head and neck: case reports and literature review. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2003;95:30-7.
8. Widjaja AB, Tran A, Cleland H, Leung M, Millar I. The hospital costs of treating necrotizing fasciitis. *ANZ J Surg.* 2005;75:1059-64.
9. Gordon NC, Connelly S. Management of head and neck infections in the immunocompromised patient. *Oral Maxillofac Surg Clin North Am.* 2003;15:103-10.
10. Singh G. Aggressiveness - the key to a successful outcome in necrotizing soft tissue infection: reply. *Med J Armed Forces India.* 2004;59:21-4.
11. Sepulveda A, Sastre N. Necrotizing fasciitis of the face and neck. *Plast Reconstr Surg.* 1998;102:814-7.
12. Wong CH, Chang HC, Pasupathy S, Khin LW, Tan JL, Low CO. Necrotizing fasciitis: clinical presentation, microbiology, and determinants of mortality. *J Bone Joint Surg Am.* 2003;85-a:1454-60.
13. Lancerotto L, Tocco I, Salmaso R, Vindigni V, Bassetto F. Necrotizing fasciitis: classification, diagnosis, and management. *J Trauma Acute Care Surg.* 2012;72:560-6.
14. Dellinger EP. Necrotizing soft-tissue infections. In: Davis JM, Shires GT, editors. *Principles and Management of Surgical Infections.* Philadelphia: Lippincott; 23-39 p.
15. Shaariyah MM, Marina MB, Mohd Razif MY, Mazita A, Primuharsa Putra SH. Necrotizing fasciitis of the head and neck: surgical outcomes in three cases. *Malays J Med Sci.* 2010;17:51-5.
16. Jain S, Nagpure PS, Singh R, Garg D. Minor trauma triggering cervicofacial necrotizing fasciitis from odontogenic abscess. *J Emerg Trauma Shock.* 2008;1:114-8.
17. Hsiao CT, Weng HH, Yuan YD, Chen CT, Chen IC. Predictors of mortality in patients with necrotizing fasciitis. *Am J Emerg Med.* 2008;26:170-5.
18. Wolf H, Rusan M, Lambertsen K, Ovesen T. Necrotizing fasciitis of the head and neck. *Head Neck.* 2010;32:1592-6.
19. Brunworth J, Shibuya TY. Craniocervical necrotizing fasciitis resulting from dentoalveolar infection. *Oral Maxillofac Surg Clin North Am.* 2011;23:425-32.

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20. Qazi SA, Mohammed AA, Saber EI, Mirza SM. Necrotizing fasciitis. Role of early surgical intervention. *Saudi Med J*. 2004;25:890-4.
21. Lee JW, Immerman SB, Morris LG. Techniques for early diagnosis and management of cervicofacial necrotizing fasciitis. *J Laryngol Otol*. 2010;124:759-64.
22. Pandey V, Gangopadhyay AN, Gupta DK, Sharma SP, Kumar V, Tiwari P. Neonatal necrotizing fasciitis managed conservatively: an experience from a tertiary centre. *J Wound Care*. 2014;23:270-3.
23. Anaya DA, Bulger EM, Kwon YS, Kao LS, Evans H, Nathens AB. Predicting death in necrotizing soft tissue infections: a clinical score. *Surg Infect (Larchmt)*. 2009;10:517-22.
24. Durrani MA, Mansfield JF. Anesthetic implications of cervicofacial necrotizing fasciitis. *J Clin Anesth*. 2003;15:378-81.
25. Park E, Hirsch EM, Steinberg JP, Olsson AB. Ascending necrotizing fasciitis of the face following odontogenic infection. *J Craniofac Surg*. 2012;23:e211-4.

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