Surgical Management of Necrotizing Fasciitis of the Head and Neck

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Objective: The purpose of this study was to highlight risk factors and surgical treatments for necrotizing fasciitis (NF) of the head and neck in the literature. NF is rare but can rapidly progress.

Materials and Methods: A literature search was done using PubMed and SCOPUS. Articles that discussed NF of the head and neck and a specific surgical technique were included. A bivariate Pearson correlation was conducted using an α level of 0.05.

Results: The study included 31 articles enrolling 77 patients who presented with head and neck NF. Diabetes mellitus (23.4%) was the most common comorbidity observed. Surgical techniques, such as debridement (96.10%) and incision/exploration (97.40%), were common.

Conclusion: Immediate surgical intervention should be performed when treating patients presenting with NF of the head and neck.

Key Words: Head and neck reconstruction, hyperbaric oxygen, necrotizing fasciitis, risk factors, surgical interventions

Necrotizing fasciitis (NF) is a serious infection of the soft tissue, skin, and muscles. Staphylococci and streptococci invade the subcutaneous tissue and release toxins leading to necrosis and septic shock.1 Necrotizing fasciitis quickly advances to deeper fascial planes at a rate of 2 to 3 cm per hour. Therefore, early diagnosis and treatment is pertinent when evaluating patients.2 Necrotizing fasciitis typically presents with pain, skin changes, fever, diaphoresis, or altered mental status.3 Within the next few days, patients may have swelling, rash, or necrosis.4 If not treated appropriately, NF can rapidly progress to sepsis, carotid artery erosion, or pneumonia.3

Necrotizing fasciitis is relatively uncommon in the head and neck region. When present, it is usually due to an odontogenic infection in immunocompromised patients.5 Furthermore, NF is seen commonly among patients with obesity, a history of substance misuse, or peripheral vascular disease.6 In a study conducted by Lin et al,7 many patients had a history of diabetes mellitus (72.3%) and systemic disease (89.4%).

Previous studies have discussed treatment guidelines, which includes debridement, antibiotics, and supportive care. Early diagnosis is important due to the rapid nature of this infection.2,7 Bonne and Kadrí5 emphasized that surgical debridement should be used in the management of NF. Hyperbaric oxygen is used as an adjunct therapy in select cases. Some patients may require a split-thickness skin graft due to excessive skin loss.9

The purpose of this study was to review the literature for surgical treatments, identify risk factors that predispose patients to NF, and establish standardized treatments guidelines. The current literature lacks a review of surgical interventions used to treat NF. By understanding previous surgical approaches, we can make better recommendations to approach future NF cases.

MATERIAL AND METHODS

The literature search was conducted on March 29, 2020 using PubMed and SCOPUS. The search included different combinations of the following terms: “head and neck necrotizing fasciitis”, “treatment”, “procedure”, “therapy.” Articles discussing a case(s) of necrotizing fasciitis in the head and neck and a surgical treatment were included for a full article review. Articles that did not discuss individual patients or a surgical treatment for NF were excluded. The following filters were applied: articles in the English language and within the last 10 years. Initially, there were 452 articles, after filters were applied there were 197 articles. After removing 56 duplicates and filtering by the inclusion and exclusion criteria, there were 31 articles meeting criteria head and neck

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FIGURE 2. (A) A 69-year-old female with necrotizing fasciitis presenting with bruising and anesthesia overlying the anterior neck skin. (B) Necrotizing fasciitis defect following 5 debridements which included resection of several ribs, partial sternectomy, partial pharyngectomy, and laryngectomy. (C) Full coverage of a necrotizing fasciitis defect with a latissimus dorsi flap with a portion de-epithelialized and turned in to reconstruct the pharynx. (D) Favorable esthetic result following reconstruction of the defect.

NF (Fig. 1).
After identifying the papers, information about disease location, patient history, microorganism identification, surgical treatment description, and complications/survival was collected. A summary of the included articles is illustrated in Supplemental Table 1 (Supplemental Digital Content 1, http://links.lww.com/SCS/E117). Descriptive statistics, including frequencies, percentages, mean, and standard deviation were calculated. A bivariate Pearson correlation was conducted using an α level of 0.05. The data was then organized into supplemental tables (Supplemental Digital Content 1, http://links.lww.com/SCS/E117). The systematic review portion of this work was waived by the John Peter Smith Hospital IRB committee. However, we did obtain IRB approval to use the case example clinical content presented in this paper.

RESULTS

There were 77 total patients with NF of the head and neck included in this systematic review. This patient population included 36 females and 41 males with a mean age of 52.79 ± 18.35 years. Of the articles that mentioned the number of hospital days, the average stay was 19.28 days. Complications occurred in 26 patients including septic shock (12.99%), multigorgan dysfunction (6.49%), and death (5.19%) (Supplemental Table 2, Supplemental Digital Content 1, http://links.lww.com/SCS/E117).

Among the entire cohort, an organism was isolated in 51.95% of cases. The most common organisms identified in NF of the head and neck were Streptococcus pyogenes (32.5%), Staphylococcus aureus (12.5%), and Bacteroides fragilis (10%) (Supplemental Table 3, Supplemental Digital Content 1, http://links.lww.com/SCS/E117).

Common presenting locations of NF included submandibular (27.27%), submental (19.48%), upper neck (6.49%), lower cervical (5.19%), periorbital (5.19%), sublingual (2.60%), lower neck (2.60%), while the remainder were unspecified (44.16%) (Supplemental Table 3, Supplemental Digital Content 1, http://links.lww.com/SCS/E117).

Common surgical techniques performed in these patients included debridement, incision/drainage/exploration and reconstructive techniques. Most patients received debridement (96.10%) and incision/drainage/exploration (97.40%). Comparatively, reconstructive techniques were conducted in 40.26% of patients (Supplemental Table 4, Supplemental Digital Content 1, http://links.lww.com/SCS/E117). Patients with diabetes had significantly worse patient outcomes (P = 0.011). Furthermore, treatment with hyperbaric oxygen improved patient outcomes significantly (0.210, P = 0.034).

We present an example of a 69-year-old with no history of comorbidities whom presented with bruising and anesthesia overlying the anterior neck skin (Fig. 2A). The patient was initiated on intravenous antibiotics and underwent initial incision and debridement of the skin and subcutaneous tissues. The underlying fascia and musculature appeared to be uninvolved initially. Over time, her clinical course worsened necessitating 5 subsequent debridements over 14 days which required resection of several ribs, partial sternectomy, partial pharyngectomy and laryngectomy (Fig. 2B). Following this, the patient underwent reconstruction with a latissimus dorsi flap. A portion of the flap was de-epithelialized and turned in to reconstruct the pharynx while the remainder provided full tissue coverage (Fig. 2C). Upon follow-up, the patient was well-healed with a favorable esthetic result (Fig. 2D).

DISCUSSION

Necrotizing fasciitis is an infection of the soft tissue and fascia layers. Particularly in the head and neck region, NF is extremely lethal, with a mortality rate of 40% to 76%.10 Patients with NF typically present with tenderness to palpation at infection site, cellulitis, and crepitus.11 Wong and colleagues developed a Laboratory Risk Indicator for Necrotizing Fasciitis score, which includes laboratory values for glucose, white blood cells, hemoglobin, and serum sodium. A score > 6 indicates an increased likelihood of NF and should be included in the differential diagnosis.12

This review focused on surgical treatment of NF in head and neck. Of the 77 patients included, most patients received surgical debridement (96.10%) and incision/drainage/exploration (97.40%). According to the guidelines released by the Infectious Diseases Society of America in 2014, surgical intervention is the mainstay approach for suspected NF. Debridement should be performed daily as needed.11 Nawijn et al14 found that immediate surgical treatment within 12 hours significantly decreased mortality. Therefore, immediate debridement and incision/drainage/exploration is recommended in all suspected cases of NF. Adjunctive therapies such as hyperbaric oxygen (24.68%) and reconstructive techniques (40.26%) were performed in select cases.

Common areas of head and neck NF included primary spaces, secondary spaces, cervical, and periorbital.15 Similarly, a retrospective study by Al-Ali et al16 found that NF of the submandibular triangle (100%) and the right side of the neck (83.3%) was common.

Potential risk factors for NF were analyzed through patient histories. Many studies identified diabetes mellitus as a serious comorbidity associated with NF.2,17,18 Likewise, our study found many patients with a history of diabetes (23.4%). Additional comorbidities include heart disease (3.9%), advanced age, misuse of alcohol (3.9%), and liver cirrhosis (2.6%).2,19

CONCLUSIONS

Necrotizing fasciitis of the head and neck is a rare but serious condition. The mainstay treatment is surgical debridement and incision/drainage/exploration, while adjunctive modalities include hyperbaric oxygen and reconstructive techniques. Hyperbaric oxygen has improved outcomes and should be considered for treatment of NF. In addition, chronic conditions worsened patient outcomes. Providers should consider potential factors when creating a treatment plan.

REFERENCES