Cervical necrotizing fasciitis: Report of 6 cases and review of literature

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A B S T R A C T

Objective: Necrotizing fasciitis in the cervical region is a rare entity, characterized by a fulminant infection that causes extensive necrosis of the subcutaneous tissue and fascial planes, with high mortality and morbidity rates. The origin is generally odontogenic or pharyngeal, involving a mixed flora of microorganisms. Descending infection and mediastinal involvement are usually associated and are the main complications. The aim of the present study was to review the cases treated in our department and analyze diagnosis and treatment, supplementing the understanding of the disease.

Methods: A retrospective study was performed on the clinical records of patients admitted to our center between January 2005 and June 2010 with diagnosis of necrotizing cervical fasciitis.

Results: Six clinical records were reviewed. The origin of the infection was mainly oropharyngeal and odontogenic, with a mixed flora of Prevotella, Peptostreptococcus and coagulase-negative Staphylococcus. All patients presented mediastinal involvement: superior mediastinitis in 4 patients and superior and postero-inferior mediastinitis in 2 cases. All patients underwent early drainage by bilateral cervicotomy with mediastinal drainage by a cervical approach in those with superior mediastinal affection, and associated thoracotomy, in a single surgical step, for postero-inferior mediastinitis. Temporary tracheotomy was performed in all cases. All received broad spectrum antibiotics, with a medium hospital stay of 37 days. There were no deaths reported.

Conclusion: Concerning cervical necrotizing fasciitis, early diagnosis and surgical treatment associated to antibiotics and intensive medical care are essential to obtain a favorable outcome.

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1. Introduction

Cervical necrotizing fasciitis (CNF) is a fulminant infection of soft and connective tissues that spreads along the fascial planes, inducing posterior venous and arterial thrombosis, followed by necrosis of the skin and other adjacent tissues. It is associated with a high systemic toxicity and marked compromise of the general state of the patient, with elevated mortality and morbidity rate. It is an uncommon entity that generally presents in the abdomen or limbs, and much more rarely in the cervical region, with published reports of series of cases of no more than 40 patients [1,2].

It was first described in the American Civil War as “hospital gangrene”. Meloney, in 1924, identified β-hemolytic Streptococcus as the causative organism, but it was not until 1952 that Wilson used the term “necrotizing cervical fasciitis”, defined the pathogenesis and discussed the possible implication of mixed flora [3,4].

The origin is generally odontogenic or pharyngeal. Although it has classically been considered a β-hemolytic group A Streptococcus infection, it usually involves a mixed flora of anaerobes such as Prevotella, and aerobes [mostly Streptococcus and Staphylococcus aureus] [3,5]. Descending infection and mediastinal involvement are usually associated and are the main complications [3].

Prompt diagnosis and identification of the disease, with early surgery and broad spectrum antibiotic therapy, are the most important factors in improving prognosis.

2. Methods

We performed a retrospective study of clinical records of patients admitted to our center between January 2005 and December 2011 with a diagnosis of necrotizing cervical fasciitis. The
diagnosis was made according to clinical and imaging (CT) criteria and surgical findings of fascial and tissue necrosis.

A total of 6 cases of cervical necrotizing fasciitis were observed in our department. We present this series, and a review of age, sex, source of infection, microbiology, and management of the disease.

3. Results

One of the 6 patients was female and 5 were male. Mean age was 58 years (range, 36–77 years). None of the patients had associated comorbidity. The source of the infection was pharyngeal in 3 cases (posterior to a peritonsillar abscess or phlegmon), odontogenic in 2 cases, and 1 following bilateral cervical neck lymph node dissection for aryepiglottic fold neoplasia (T2N2c); this patient developed hematoma in the wound that induced secondary infection and necrosis. Two of the patients had previously received steroidal anti-inflammatory drugs.

Initial symptoms were cervical tenderness, erythema and edema. Leukocytosis and neutrophilia were present in all blood counts. All patients underwent CT examination, showing in most cases involvement of the parapharyngeal, retropharyngeal and pre-tracheal spaces. Presence of gas was found in 3 cases (Fig. 1). Mediastinal involvement was observed in all cases: superior mediastinum in 4 patients and postero-inferior mediastinum in the other 2.

Culture identified mixed flora in the majority of cases. Among the aerobes, coagulase-negative *Staphylococcus* was the most prevalent, and *Prevotella* species and *Peptostreptococcus* were predominant in the anaerobe group. Only 1 patient had exclusive *Streptococcus intermedius* infection, and cultures in 1 case were negative, probably because of previous treatment for a peritonsillar abscess by intravenous antibiotics. Antimicrobial therapy, included amoxicillin-clavulanic acid and third generation cephalosporins as empiric treatment and, following the culture results, was replaced by broad spectrum antibiotics: vancomycin, piperacillin-tazobactam and clindamycin.

After diagnosis, early surgery (less than 12 hours) was performed. Bilateral cervicotomy was the choice in all patients; superior mediastinitis was managed with a cervical approach, and inferior and posterior mediastinum involvement were managed by associated posterolateral thoracotomy in the same surgical step. The patient treated for aryepiglottic fold neoplasia required total laryngectomy and debridement of all cervical spaces because of necrosis extension. Temporary tracheotomy was performed in all patients to manage and secure the airway, except for the patient undergoing total laryngectomy who had a permanent tracheostoma. Daily washes through the surgical wound with saline and iodine solution were performed until the infection was controlled.

Two patients required reoperation for wash-out and new debridement because of progression of the necrosis. Major complications occurred in 4 patients: extensive mediastinitis in 2 patients (requiring repeated thoracotomy for wash-out and debridement), 1 septic shock and 1 respiratory distress. There was no mortality, with a mean hospital stay of 37 days (Table 1).

4. Discussion

Necrotizing fasciitis is a rare condition in the cervical region. McHenry et al. [6] reported a series of 65 cases with only 2 involving the neck. Reports of CNF are sporadic, the largest series being 34 cases by Lanišnik et al. [2] and 21 cases by Mora et al. [7].

Odontogenic and pharyngeal origins are the most common in the literature as in the present report. Although it has been commonly considered a group A β-hemolytic *Streptococcus* infection, more recent reports show involvement of mixed flora of anaerobes such as *Prevotella* and aerobes such as *S. aureus* and *Streptococcus*,

![Fig. 1. CT scan with presence of gas involving all cervical spaces.](image)

**Table 1**

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Origin</th>
<th>Complications</th>
<th>Microbiology</th>
<th>Surgery</th>
<th>Outcome</th>
<th>Length of stay</th>
</tr>
</thead>
<tbody>
<tr>
<td>77</td>
<td>F</td>
<td>Odontogenic</td>
<td>Superior mediastinitis</td>
<td><em>Streptococcus anginosus</em></td>
<td>Cervicotomy</td>
<td>Survived</td>
<td>65 days</td>
</tr>
<tr>
<td>57</td>
<td>M</td>
<td>Pharyngeal</td>
<td>Superior mediastinitis</td>
<td>*Staphylococcus coagulase (-)</td>
<td>Tracheotomy</td>
<td>Survived</td>
<td>25 days</td>
</tr>
<tr>
<td>60</td>
<td>M</td>
<td>Pharyngeal</td>
<td>Superior mediastinitis</td>
<td>*Staphylococcus coagulase (-)</td>
<td>Tracheotomy</td>
<td>Survived</td>
<td>34 days</td>
</tr>
<tr>
<td>36</td>
<td>M</td>
<td>Odontogenic</td>
<td>Superior and postero-inferior mediastin</td>
<td><em>Propionibac. acnes</em></td>
<td>1 reoperation</td>
<td>Survived</td>
<td>40 days</td>
</tr>
<tr>
<td>56</td>
<td>M</td>
<td>Pharyngeal</td>
<td>Superior and postero-inferior mediastin</td>
<td><em>Salmonella enteric</em></td>
<td>Cervicotomy</td>
<td>Survived</td>
<td>24 days</td>
</tr>
<tr>
<td>62</td>
<td>M</td>
<td>Postoperative</td>
<td>Superior mediastinitis</td>
<td><em>Peptostreptococcus</em></td>
<td>Cervicotomy</td>
<td>Survived</td>
<td>36 days</td>
</tr>
</tbody>
</table>
with S. intermedius being the most frequently reported microorganism nowadays [3,5].

Patients are severely affected, with signs of sepsis. The pathogenesis of the illness begins with liquefaction of the subcutaneous tissue with disintegration of the fascial planes, followed by venous thrombosis, inflammatory cell infiltration (abscess), extension in deep cervical spaces, and arterial compromise due to endarteritis obliterans of the nutrient vessels. Although this illness can affect healthy patients, it seems that immune-depressed patients are most commonly affected, with associated vascular disease, alcoholism, HIV, leukemia and use of illicit drugs as predisposing factors [3,4,8]. Diabetes is the systemic illness most frequently associated with cervical fasciitis, being reported in 72% of patients by Lin et al. [9], 45% by Whitesides et al. [10], and 34% by Wong et al. [11].

Clinical features generally do not correspond to the timing of pathogenesis. The symptoms onset occurs when there is already extensive infection. Initially, CNF presented as neck cellulitis, with cervical tenderness, edema and erythema. As the infection progresses, local ischemia and necrosis are associated, inducing crepitation or emphysema [from gas] and finally paleness and necrosis of the skin. Descending infection and mediastinal involvement are usually associated and are the main complications [8,12].

Although recent studies show that neither white blood cell count or risk factor scales based on laboratory results are useful in identifying CNF or for prognosis [13], complete blood count and microbiology tests should be performed to maintain a record of the evolution of each case [3,4]. CT scan is the complementary imaging examination of choice, being the most sensitive and reliable for diagnosis and postoperative control.

Mortality before the advent of antibiotics exceeded 50%. The use of intravenous antibiotics and advances in care techniques, however, did not drastically reduce mortality, which was reported as 36% between 1960 and 1980, 33% between 1980 and 1990 and 25% to 40% in recent decades. There was no mortality in the present series, but in larger series, mortality ranged from 9.5% [7] to 15% [14], and was 6% in the largest series of 34 patients, reported recently by Lanisnik et al. [2].

Given the pathogenesis of the illness, with ischemia and necrosis as the final result, the bioavailability of medical drugs in the devitalized tissue is reduced, which is why early surgery with debridement and wash-out of the cervical spaces is the only factor which improves prognosis and mortality, and is nowadays the first-line treatment of choice.

Basically, it consists in an extended incision (bilateral cervicotomy) allowing complete excision and debridement of the fascia, subcutaneous and all devitalized tissues. If mediastinal involvement is associated, a sternal approach should also be performed for antero-inferior mediastinitis, and posterolateral thoracotomy for posteroinferior mediastinitis. We recommend control of the airway by tracheotomy in all cases [3,8].

Besides surgical treatment, broad spectrum empiric antibiotics should be initiated. Although regimens vary from country to country, initial treatment should cover the most commonly involved microorganisms, such as group A Streptococcus and anaerobes, and nowadays is extended to gram-negatives and Staphylococcus. Usually the regimen begins with a triple therapy associating a beta-lactam, an aminoglycoside and clindamycin or metronidazole. In reported series, the most widely used medications were amoxicillin/clavulanate [1,5], penicillin [1,7,14], imipenem [2], aminoglycosides [1,14,15], clindamycin [1,7,13] and metronidazole [14], associated to daily washes through the surgical wound.

In the present series, empiric treatment was initiated with amoxicillin/clavulanate or third generation cephalosporins, and was immediately replaced, in the light of the culture results, by imipenem or vancomycin associated to clindamycin, or piperacillin-tazobactam.

Recently, in a series using adjunctive therapy with hyperbaric oxygen, a decrease in hospital stay was reported, although randomized trials are needed to prove efficacy [16]. Monitoring and management in intensive care is generally required for several days until surgical approaches and sepsis have been brought under control [3,10].

5. Conclusion

Necrotizing cervical fasciitis is a severe and fulminant infection. Early diagnosis and treatment are necessary to reduce mortality. Aggressive and prompt surgery associated to antibiotic therapy is the most important factor in improving prognosis.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References