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CASE REPORT

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# Cervico-thoracic necrotizing fasciitis in an adolescent: Delayed presentation, staged treatment, and long-term follow-up

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## Abstract

Necrotizing fasciitis (NF) is a severe soft tissue infection characterized by rapid progression and significant morbidity and mortality. It predominantly affects immunocompromised adults, with cases in previously healthy adolescents are relatively rare. This case report describes the clinical presentation, diagnosis, and successful staged management of necrotizing fasciitis in a previously healthy 15-year-old male. The purpose of this report is to highlight the importance of early recognition, prompt surgical intervention, and multidisciplinary management in achieving a favorable outcome in pediatric patients with NF. By sharing this case, we aim to increase awareness and facilitate early diagnosis, ultimately improving patient outcomes.

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## Introduction

Necrotizing fasciitis (NF) is considered uncommon in the field of pediatric surgery, and there is limited knowledge regarding this condition in pediatric patients (1-3). Among the various sites of infection, head and neck necrotizing fasciitis accounts for approximately 3% of cases, while lower limb involvement is the most prevalent (63%), followed by upper limb and trunk involvement (13% each) (3). Cervical necrotizing fasciitis is recognized as a distinct form of the disease, distinguished by its unique clinical features, sources, etiologic agents, and treatment approaches (2,4,5). Mortality rates range from 14.3% (1) to 70% (5). Survivors frequently face substantial tissue loss, leading to disability, contractures, and physical deformities (5).

The aim of this case report is to present the delayed presentation, complex staged treatment, and favourable long-term functional and cosmetic outcome of cervico-thoracic necrotizing fasciitis in an adolescent, emphasizing management challenges in resource-limited settings.

## Case description

A 15-year-old male was admitted with clinical feature of septicemia, and a widespread skin infection on his neck and upper chest, which severely affected his mobility. 10 days prior to admission, he had complained of a sore throat, and this was followed by appearance of the skin lesion. No antibiotics had been prescribed and the lesion progressed in severity. Eventually, due to the progression of the necrotizing process and ineffective treatment, the child was transferred to a hospital associated with Médecins Sans Frontières (MSF).

Upon admission, the patient looked septic and malnourished. Initial blood tests indicated leukocytosis and mild anemia, with a hemoglobin level of 10mg/dl. After receiving intravenous fluid resuscitation and stabilizing the patient's vital signs, he was taken for debridement under general anesthesia. Intraoperative examination revealed extensive necrosis of the skin and subcutaneous tissue, extending from the mandible down on the chest to the xiphoid process. The anterior aspect of the neck, including the skin, subcutaneous fat, superficial fascia, and platysma was completely absent, exposing of the bony part of the lower jaw, neck muscles and major blood vessels. Furthermore, there was a fistula in the floor of the mouth, with saliva leaking from the oral cavity (**Figure 1**). Surgical debridement was carried out, involving the removal of necrotic tissues and drainage (**Figure 2**).

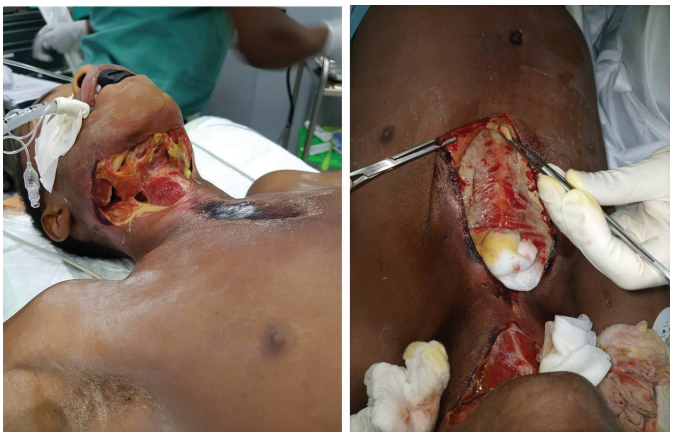

**Figure 1:** Initial intraoperative findings

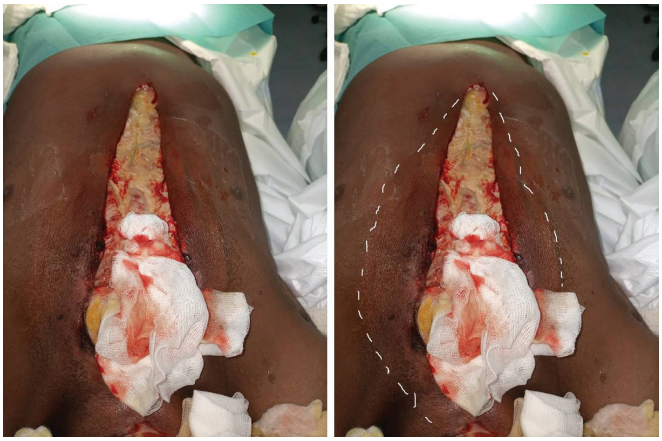

**Figure 2:** Erythematous swelling over upper thorax, representing ischemic area of potential necrosis, requiring decompressive notches.

Empirical antibacterial therapy was initiated with the aim of targeting predominantly gram-positive and anaerobic flora, as the lesions were suspected to be caused by a polymicrobial type of NF. Meropenem and Metronidazole (each 500 mg IV per 8 hour) were administered. Nutritional support was provided through a nasogastric (NG) tube (oral intake was impossible due to the presence of a fistula). The patient received a diet of liquid pureed food along with peanut paste enriched with milk solids (Plumpy'nut®) to ensure an adequate calorie intake. The NG tube was replaced every two weeks.

Over the course of the initial 20 days, a total of 15 cleansing and debridement surgeries were conducted under general anesthesia. In the first week, dressings were changed daily, and subsequently, the frequency was reduced to every 48 hours. During the next few dressing changes, minor debridement was necessary to halt the spread of the ischemic-necrotic process. To promote decompression, and to enhance local

microcirculation, as well as to facilitate drainage, a few notches were made through all layers of the skin and the swollen subcutaneous tissues on the border of the affected areas (**Figure 3**).

**Figure 3:** Post-debridement appearance with notches.

At the 11th day after admission, antimicrobial therapy was adjusted based on culture reports (Streptococcus A and Aeromonas hydrophila). The treatment regimen included Cloxacillin (2 gram IV per 6 hour) and Gentamicin (5 mg/kg IV per day).

When the wound had been thoroughly cleaned and sufficient granulation tissue had formed, the wound edges were brought together and approximated by mattress sutures (**Figure 4**). The oro-cutaneous fistula closed spontaneously after a month of treatment, and oral feeds were gradually introduced. The residual skin defect was covered using free pie-crusted split-thickness skin grafts. However, Pseudomonas infection developed, leading to the failure of most of the skin grafts. Ciprofloxacin (500 mg bid p.o.) was administered for 5 days. After obtaining negative culture results from wound swabs, a second skin grafting procedure was attempted using preserved skin. Some of the grafts were adherent and viable, though there were residual skin defects, and it was decided to dress these wounds and delay closure. The patient was discharged after 42 days with a weight increase of 6 kg.

After three weeks of recovery at home the patient was readmitted attempted wound closure. Due to the orientation of the wound, bilateral advancement flaps were elevated to allow for delayed primary closure of the chest wound. A z-plasty was included in the flap design to decrease longitudinal tension and improve neck movement. A full thickness skin graft was placed in the submental region (**Figure 5**).

After a two-year period of follow-up the results were evaluated as generally satisfactory. Patient scars were minimally hypertrophic, and there were no contractures or limitations to movement although there were some remaining cosmetic defects (**Figure 6**).

**Figure 4:** Wound edge approximation.

**Figure 5:** Local presentation following skin grafting and advancement flap closure with z-plasty

## Discussion

The presented case exemplifies the core principles of the staged management of NF that we adhere to vacuum-assisted closure has been shown to be beneficial in the treatment of NF (5). However, in low-resource or non-specialized hospitals this approach is often not feasible. Early necrectomy, following by approximation of the skin edges during the granulation phase can minimize the tissue deficit and promote optimal healing. Achieving proximity and apposition of the skin edges is crucial for improved cosmesis, even if further reconstructive procedures are necessary.

Techniques such as mattress sutures with alternating strips or pledgeted mattress sutures can help prevent cutting through swollen and strained tissue.

**Figure 6:** Overall outlook after two years.

Appropriate and aggressive antibacterial therapy plays a crucial role in reducing mortality rates in NF, following established guidelines for sepsis management. Additionally, nutritional support is vital for successful treatment as NF is a highly catabolic process (6).

The incidence of NF has recently seen a notable increase in European countries (7). Seasonal variations in incidence have also been reported in many countries (7,8), including our observations in sub-Saharan countries where the highest peak occurs during the summer. Given the increasing incidence of NF, it is important to establish standardized protocols and classifications specific to pediatric forms of the disease (9). Moreover, implementing preventative measures becomes imperative to mitigate the occurrence and severity of NF cases.

## Conflict of interest

The authors report no conflict of interest.


## Funding source

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## Ethical Approval

Ethical approval is not required for this study. This study is a case report

## Informed consent

Written informed consent was obtained from the parents of this patient for publication of data and photos.


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## Peer-review

Externally. Evaluated by independent reviewers working in at least two different institutions appointed by the field editor.

## Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Contributions

Research concept and design: SK

Data analysis and interpretation: SK, AR, YY

Collection and/or assembly of data: SK, AR, YY, SSJ, AM, FM

Writing the article: SK, AR

Critical revision of the article: AR, YY

Final approval of the article: SK, AR, YY

All authors read and approved the final version of the manuscript.

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