ABSTRACT Necrotizing Fasciitis (NF) is a severe soft tissue infection characterized by rapidly progressing necrosis, involving skin, fascia, fat and subcutaneous tissue. NF can develop at the head and neck region. This rare condition requires prompt diagnosis, emergency treatment, and precise wound dressing selection. The objective of this study is to describe early management and wound dressing selection in cervical NF case. A 48-years-old female came with swelling and spontaneous drainage at both sides of lower jaw, chin, and neck region. The patient was diagnosed with necrotising fasciitis at cervical region. Aggressive necrotomy debridement was done to manage infection. The wound was treated by modern dressing without requiring skin graft procedure. The patient did not have any complaint and fully satisfied with the treatment result. Necrotising fasciitis is a life-threatening, single or polymicrobial infection of soft tissue. This disease rarely involves the head and neck region; if it occurs, it is usually due to the spread of infection from the teeth or pharynx. Satisfying outcomes can be achieved with early diagnosis, aggressive surgical, empirical antimicrobial therapy, and post-operative management with an appropriate dressing. There are many kinds of wound dressing available that challenges operator to choose an appropriate one to treat NF. A correct dressing can decrease healing time, provides cost-effective care, and improves patient quality of life. In conclusion, early management and appropriate wound dressing selection are critical to improve the clinical outcome and decrease patient’s long term morbidity.

KEYWORDS necrotising fasciitis, cervical, early management, wound dressing

Introduction

Necrotising fasciitis (NF) is a severe soft tissue infection which characterised by rapidly progressing necrosis, involving fascia and subcutaneous tissues.[1] Cervical NF is a fulminant infection with high mortality and necrosis of connective tissue that spreads along the facial plane.[2] Giuliano et al. classified NF into two subtypes: polymicrobial infection (usually caused by a combination of Gram-positive cocci, Gram-negative rods, and anaerobes), and monomicrobial infection (caused by Streptococcus and/or Staphylococcus aureus). Polymicrobial infection is often diagnosed in immunocompromised patients and usually occurs in the perineum and trunk area.[3]

NF is generally limited in the subcutaneous tissue and muscle involvement is rare. The disease causes tissue necrosis and spreads rapidly along the facial plane due to its being polybacterial and the synergistic effect of enzymes formed by the bacteria. The most common factor is pathogen streptococcal. Involvement of head and neck area are rare and more common in extremities, genital region, and abdomen.[4]

The main reasons for the disease are odontogenic infections...
and trauma. It is commonly seen in middle-aged individuals. The early stage of the disease looks like abscess and cellulitis. The covering skin is usually red and taut. Hyperesthesia or anaesthesia can be identified by touch. The benign nature of the disease is the most crucial reason for late diagnosis. The diagnosis can be made by subcutaneous gas formation.[5] The present of immune compromising conditions predisposes to cervical NF as well as increase morbidity and mortality. Satisfactory outcomes can be achieved with early diagnosis and aggressive surgical therapy in concert with empirical antimicrobial therapy.[6]

Case report

A 48-years-old female patient was referred from a general hospital in Bandung area with swelling and spontaneous drainage at both sides of lower jaw, chin, and neck region. Approximately a month before admission, patient complained toothache at her right lower jaw, but she did not seek any treatment. In the past 14 days, patient complained a swelling at her right lower jaw and went to private clinic to be treated. She was given antibiotics and analgesic medicines. About nine days later, the swelling got more significant and widespread along chin, left lower jaw and neck region. The swelling followed by spontaneous drainage and unpleasant odour. Patient’s condition was getting worse since 3 hours ago so that she was brought to general hospital in Bandung then referred to Hasan Sadikin hospital for further treatment afterwards.

Patient felt pain on swallowing with stiffness in the neck. There was no sign of hoarseness, hot potato voice, and altered voice. History of systemic disease was denied. Examination of vital signs in emergency room showed patient’s blood pressure rate 110/70 mmHg, heart rate 110 times/minutes, body temperature 36.6 C, respiratory rate 20 times/minutes, and SpO2 rate 99% (free air). Extraoral examination revealed the presence of asymmetrical face, necrotic tissue and spontaneous drainage at both sides of submandible region, submental, and anterior neck region with 10x5x2 cm in size. The swelling is localized, reddish coloured, followed with febrile temperature and pain on palpation.

Intraoral examination revealed generalised hyperemia of gin-
Figure 5: Pus swab for culture resistance test.

Figure 6: A. Post operative day I, B. POD II, C. POD III, D. POD IV.

Figure 7: Post operative day XV.

Figure 8: Two months after procedure. The wound completely healed.
Figure 9: Cadexomer iodine powder 0.9%[17].

Figure 10: Polyurethane foam absorbent dressing[18].

giva, gangrene of pulp teeth 35, 44 and gangrene radices of tooth 17, 15, 27, 28, 36 and 46. There were plaques and calculus with mouth opening was about 2 cm wide.

The laboratory findings showed white blood count 9.170 /mm3, Hemoglobin (13.7 g/dL), timely blood glucose (95 mg/dL) and other laboratory findings were within normal limit without any signs of systemic disease. Some radiographic examinations were performed in the emergency room such as chest x-ray, neck soft tissue AP and lateral x-ray. From the chest x-ray, there was no sign of tuberculosis and cardiomegaly. The neck soft tissue AP and lateral x-ray showed appearance of soft tissue radiopaque density with radiolucency inside located in submandible and submental region with the suspicion of abscess. There was also narrowed air column figure as high as vertebrae cervical 3 to 4.

The patient was also consulted to ENT Department, and the examination result showed there was no sign of retropharyngeal abscess, parapharyngeal abscess, and upper airway obstruction. Based on all of the examination performed, the diagnosis referred to Necrotizing Fasciitis at cervical, both side of submandible and submental region due to gangrene radices of teeth 36, 46 and gangrene of pulp teeth 34, 45. It was confirmed that there was no sign of sepsis in this patient but mild dehydration. After the diagnosis was made, mild rehydration was done to patient and urine catheter inserted to evaluate the urine output. Pus swab performed for culture resistance test and to sensitivity of antibiotic test. While waiting for the laboratory results, empirical antibiotics (Ceftriaxone 1 gram, Metronidazole 500 mg) and analgesic (Ketorolac 30 mg) were given through intravenous infusion. Ranitidine 50 mg IV also provided to decrease stomach acid production. The involvement of infected tissue evaluated and performed complete necrotomy debridement. The wound washed by copious irrigation and antiseptic. Teeth 34, 36, 45, 46 were extracted to control the source of infection which was cervical necrotizing fasciitis. The patient was hospitalized for three days to improve the general condition.

After necrotomy procedure was done, the wound treated with modern dressing which was cadexomer iodine 0.9% and polyurethane foam absorbent dressing from day I. Dressing selection was based on wound characteristic. In this case, the wound still contained purulent exudate after the surgery. For this kind of wound, cadexomer iodine 0.9% was chosen as an antiseptic and polyurethane foam absorbent dressing as an absorber. After the wound cleaned, the antiseptic dressing was sown with thickness about 3 mm and absorber attached to the wound. The dressing could be changed after three days or whenever the dressing full of exudates. The wound needs to wash with copious irrigation in each dressing replacement. This dressing used until all the purulent exudate disappears. The laboratory results came in 7 days after procedure and showed the causes of infection was Streptococcus agalactiae and still sensitive to almost all kind of antibiotics.

After all of the purulent exudate disappear, the patient instructed to apply hydrocolloid gel on the wound (raw surface) to accelerate wound healing.

Two months after procedure, the wound completely healed, the edges of raw surface completely fused and minimized scar tissue formation. The wound healing process occurred by secondary healing without need of skin grafts. There were no residual raw surface, skin contracture, hyperesthesia or anaesthesia. There was also no limitation of head movements so it could be in extension position rightly. The patient did not have
any complaint and fully satisfied with the treatment result.

**Discussion**

Cervical necrotising fasciitis is an infection that rapidly progresses in the facial region. It tends to occur in males. The mortality rate is about 19-40%.[4] The common cause of cervical necrotising fasciitis is a dental infection which may progress ascending to the base of skull, and descending to the thorax and mediastinum.[7] Immunocompromised patients and those who suffer from systemic illnesses such as diabetes mellitus are at an increased risk of developing this infection. It may also affect previously healthy individuals (13-31%)[4,8]. Significant complications from NF are mediastinal involvement, septic shock, pleural effusion, lung empyema, airway obstruction, rupture of vital vessels, brain abscess, disseminated intravascular coagulation (DIC), sepsis, acute renal failure, and respiratory failure[9,10].

This evolving emergency state requires prompt diagnosis (both clinical and radiological), implementation of pharmacological measures (broad-spectrum IV generation antibiotic therapy based on blood and wound cultures), and emergent surgery[5,8]. In this case, patient suffered from necrotizing fasciitis, which spread to the submandibular region after an infected second lower molar tooth and progressed over a broad region of the neck. A right radiological examination should be requested as soon as possible to determine the extent of the disease and to evaluate the airway correctly. Neck soft tissue x-ray performed to see the formation of subcutaneous gas and abscess also to evaluate the sign of retropharyngeal and parapharyngeal abscess.

The first step of treatment is to check the airway. Medical treatment requires a broad range of antibiotics together with fluid and electrolyte replacements. Emergency surgical debridement of affected tissue is the primary management modality for NF. Surgical debridement, necrotomy, and fasciotomy are the main aspects of surgical treatment [5,11,12]. Surgical intervention is life-saving and must be performed as early as possible since a delayed treatment beyond 12 hours in fulminant forms of NF can prove fatal. Emergency surgical debridement should be performed in all patients within 12-15 hours after admission. In any case, over 24 hours delay is unacceptable, as the mortality rate can be nine times greater when primary surgery is performed 24 hours after onset of symptoms. Surgical debridement should be repeated during the next 24 hours or later, depending on the clinical course of necrotizing infection and vital functions [13,14]. In this case, surgery performed to the patient 3 hours after admission. Four areas must be addressed at the first debridement. These are (1) confirming the diagnosis of necrotizing fasciitis and isolating the causative organism; (2) delineating the extent of the infection; (3) complete surgical excision of infected tissue; and (4) post-excision wound care. Once culture results are obtained, antibiotic treatment should be modified to be effective on the effective organisms [15]. The extensive surgical debridement will result in large raw wounds. Patients, particularly those who are coagulopathic from sepsis, are at risk of postoperative hemorrhage. Besides, immunocompromised patients are at risk of secondary infection. Wound care aims to minimize both of these risks. Further dressing changes should be dictated by the condition of the debrided wound [15]. In this case, wound treated with modern dressing; cadexomer iodine 0.9% and polyurethane foam absorbent dressing. This dressing material is chosen considering the infected wound type with the presence of purulent exudate. Antimicrobial dressings include iodine-based preparations, and silver-releasing agents have been formulated to be non-cytotoxic. Cadexomer iodine is bactericidal to all gram-positive and gram-negative bacteria as well as fungi, and it facilitates a moist wound environment. It is a starch-based polymer bead that promotes the absorption of fluid, exudate, debris, and bacteria while facilitating the controlled release of iodine at levels that are not toxic to human skin cells. Cadexomer iodine is less cytotoxic than other iodine products locally at the wound site. However, it may be absorbed systemically and can be fatal to susceptible individuals (concomitant thyroid disease). A recent meta-analysis reported that cadexomer iodine dressings might be associated with improved healing compared to standard of care [16].

Foam dressings are made of polyurethane base and permeable to both gases and water vapor. Their hydrophilic properties allow high absorptive properties while they also provide thermal insulation. These highly versatile dressings are indicated for wounds with moderate to heavy exudates, granulating or slough covered partial and full-thickness wounds, donor sites, minor burns, and diabetic ulcers. They are not recommended in dry or eschar covered wounds and arterial ulcers due to their ability to dry wounds further.

They can be left in place for up to 4–7 days but should be changed once saturated with exudates. Their composition makes thematraumatic upon removal. If changed daily, they can also be used on infected wounds. In this case, the use of these two dressings has provided wound healing which gave a very satisfying result.[19]

**Conclusion**

Necrotizing fasciitis (NF) is a severe soft tissue infection which characterised by rapidly progressing necrosis, involving fascia and subcutaneous tissues. This evolving emergency state requires prompt diagnosis, implementation of pharmacological measures, and emergent surgery. Surgical intervention is a life-saving procedure that has to be performed immediately.

Another important thing is to treat the wound properly and select the right dressings regarding the type of wound. The wound requires a proper dressing to quicken healing time, prevent complications, and provide an ideal wound healing. The wound caused by necrotizing fasciitis is infected and contained purulent exudate. This type of wound requires a dressing that has anti-bacterial effect and can absorb purulent exudate. In this case, the use of cadexomer iodine 0.9% powder as an antibacterial dressing and polyurethane foam as an absorbent dressing of purulent exudate gave a satisfying result in healing the wound, maximized the complications, and decrease patient’s long term morbidity.

**Conflict of Interest**

There are no conflicts of interest to declare by any of the authors of this study.

**Funding**

None

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