

A CASE REPORT OF NECROTIZING FASCIITIS OF THE NECK AND ANTERIOR CHEST WALL CAUSED BY ODONTOGENIC INFECTION IN ELDERLY: DIAGNOSIS AND MANAGEMENT IN RURAL AREA

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ABSTRACT

Introduction: Necrotizing Fasciitis (NF) is bacterial infection spreading rapidly affecting soft tissue and muscular fascia. It's life threatening and fatal, leads to tissue necrosis, sepsis, and death. It has high mortality number especially in elderly.

Purpose: To report a rare case of odontogenic NF in elderly patient extending to the neck, left upper limb and anterior chest wall, diagnosed and treated in district hospital with limited facilities.

Case Report: A 65 years old male with painful left neck swelling and fluctuating gangrenous appearance start form the mastoid bone to infraclavicular area crossing to the right close with sternal area. Swelling and fluctuating area also found in left axillar and left arm. Thirteen hours after hospital admission, the patient was sent to operating room to do the wound debridement. Wound care was carried out daily in intensive care unit and inpatient ward. 14 days postoperatively patient was send out to continue the wound care in outpatient department. 28 days postoperatively, skin grafting was done.

Conclusion: Fourteen days postoperatively patient was sent to outpatient department to continue his wound care. After wound care in order to wound prepare for skin grafting. 28 days postoperatively, 14 days after patient discharge from hospital, skin grafting was done to close the wound defect.

Keywords: Necrotizing fasciitis, odontogenic, elderly

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INTRODUCTION

Necrotizing Fasciitis (NF) is bacterial infection spreading rapidly affecting soft tissue and muscular fascia. It's life threatening and fatal, leads to tissue necrosis, sepsis, and death. It has a high mortality rate, around 25% and increasing to 50% with ICU admission^{1,2}. However without surgical intervention the mortality rate is 100%. Another study conducted by *Losanoff et al* (2002) showed that NF has 60% mortality rate especially in elderly².

NF can occur in any part of body, but neck location is uncommon with only 10 percent of reported cases. When neck NF happen it usually has thoracic extension via anatomical conduits including carotid sheath, paratracheal fascia, retropharyngeal nerve, or paravertebral fascia and increase the mortality rate until 60%. NF has characteristic sign such as presence of subcutaneous gas on the infected site^{3,4}.

Since it becomes surgical emergency case, NF requires prompt diagnosis with aggressive debridement to lower the mortality rate and determine the prognosis. Here we report a rare case of odontogenic NF in elderly patient extending to the neck, left upper limb and anterior chest wall, diagnosed and treated in district hospital with limited facilities.

CASE REPORT

A 65 years old male with lack of medical history came to emergency room with painful left neck swelling and fluctuating gangrenous appearance start from the mastoid bone to infraclavicular area crossing to the right close with sternal area. Swelling and fluctuating area also found in left axillar and left arm. He had severe trismus with maximal opening only one index finger (12mm). From medical history taking found that patient had toothache around 30 days ago and gradually deteriorated for 10 days into swelling of left maxilla area. The patient refused to go to the doctor, took amoxicillin by himself for 7 days and gave traditional medicine sown into his swelling skin. The patient also had a bad oral hygiene, history of smoking, and alcohol. Seven days before hospital admission, the

swelling got worse, and expanded inferiorly to sternal, left axillar and left arm area.

Patient had no decrease of conscious and sign of respiratory distress, blood pressure 90/60 mmHg, temperature 38.1°C, pulse 100x/minute and respiratory rate 22x/minute. Oral examination showed that 17 and 19 teeth were badly putrid. Wound examination revealed a fluctuating and crepitation area on gangrenous and swelling part with odour (figure 1). Laboratory test revealed white blood cell count 34.000, neutrophil 84% with normal blood sugar level, normal liver function and normal kidney function. Thorax X-ray examination revealed gas appearance on left neck extended to left thoracic area. CT-scan can't be done in the hospital because of limited facility.

Antibiotic started were ceftriaxon 2000 mg and metronidazole 500 mg intravenously. He was given ringer lactate infusion, injection of painkiller and omeprazole. The patient was fasting for 12 hours before the surgery. The nasogastric tube and urine catheter also inserted.



Figure 1. Patient with odontogenic of the neck and chest wall NF before Surgery

Thirteen hours after hospital admission, the patient was sent to operating room to do the wound debridement. The patient was put under general anesthesia with previous central venous catheter on left femoral vein. Norepinephrine was given intravenously to prevent blood pressure deterioration prior to propofol administration. This surgery also involved otolaryngologist

and dentist. Teeth 17 and 19 were extracted by the dentist. The gangrenous part was excised and exploration to the suprasternal, right infraclavicular, and inferior part of sternal was done bluntly using clamp and surgeon's index finger. Incision to the right infraclavicular and inferior sternal area were carried to ease the surgeon doing the wound exploration and debridement. The exploration continued to the left axillar and left arm area where we found nonviable tissue and skin, the surgeon decided

to excise all the non viable tissue and skin to prevent any future gangrenous area (Figure 2A). All spaces contained purulent exudate with odour and necrotic fascia. All the necrotic fascia was excised. The wound area was irrigated using hydrogen peroxide and povidone iodine solution. The wound left open and covered with povidone iodine gauze. The patient was transferred to intensive care unit where he was kept intubated for next 72 hours.

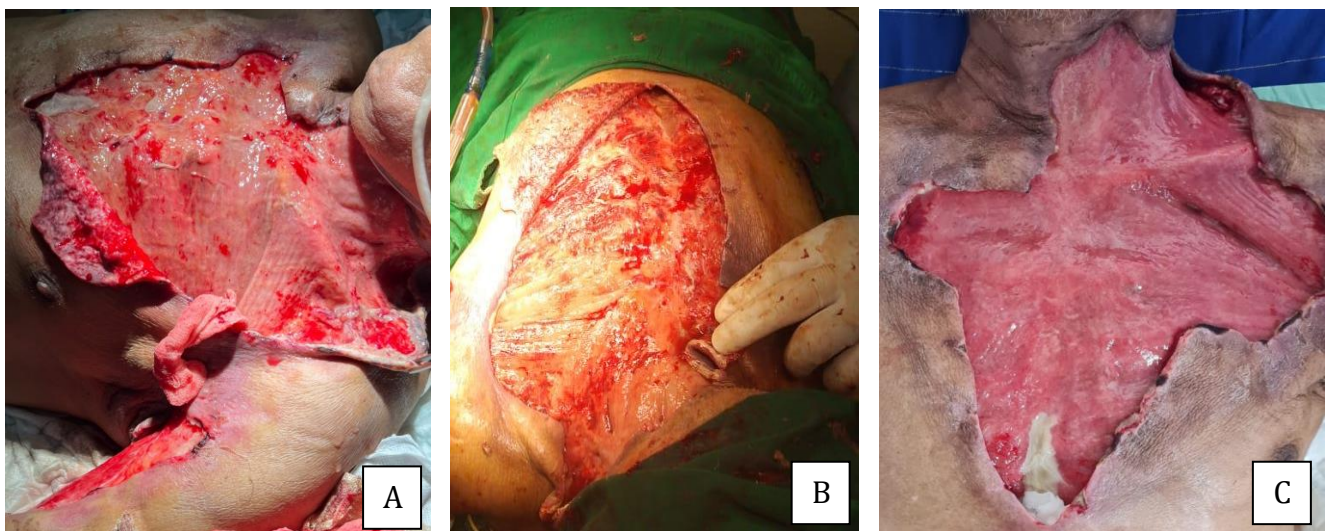


Figure 2. (A) Intraoperative picture of debridement, excised of gangrenous part and exploration large abscess area. (B) Wound care carried out in intensive care unit 1 day after surgery. (C) Wound condition 14 days postoperatively

Wound care was carried out daily in intensive care unit with light sedation using ketamine and propofol (Figure 2B). Wound care was done carefully to prepare wound bed for skin grafting to close large defect. White blood cell count revealed 24.000 day one and 22.000 day two post operatively. Because Microbiological culture test can't be done due to limited facility, the surgeon decided to elevate the antibiotics level into Meropenem and Levofloxacin. White blood cell count revealed 16.000 one day after meropenem and levofloxacin administration. Five days

postoperatively, the patient was sent to inpatient department with reduced exudate, leaving small amount of slough tissue. Debridement of slough tissue and wound care using povidone iodine gauze continued. Fourteen days postoperatively, the patient discharge from the hospital to continue the wound care in outpatient department (Figure 2C). Wound care in outpatient department was done using normal saline gauze and ozonated olive oil to enhance the tissue granulation for skin graft preparation (Figure 3).



Figure 3. Wound condition 28 days post operatively

Fourteen days after discharge from the hospital (28 days post operatively) and after serials of wound care, the surgeon evaluated the wound and decided that the wound was ready for skin graft. The skin graft was done to close the large defect of the wound (Figure 4). Skin grafting was done according to wound healing ladder and also wound bed⁵⁻⁸.



Figure 4. Wound condition after skin grafting

DISCUSSION

Necrotizing fasciitis is an uncommon and aggressive soft tissue infection. This infection often caused by microorganism that produce toxins such as bacteria. But some cases have been reported the association between NF and herpes zoster or herpes simplex⁹⁻¹¹. This infection could extend to neighboring tissues, causing necrosis, and formation of gas in subcutaneous tissue, fascia and deep tissue. NF could occur because of any invasive procedure, post-surgery or even minor procedure like phlebotomy. In fact, it's only 15 – 34 % of patient with NF could be correctly diagnosed on admission. Patient could be treated as simple cellulitis until its infection progress rapidly¹²⁻¹⁴. NF could lead to severe systemic toxicity and death if the treatment is inappropriate. If the diagnosis can be done properly and quickly, an aggressive surgical treatment can also be done immediately to reduce mortality and morbidity. In our case, the risk of NF in our patient is odontogenic infection that treated inappropriately, leading to spreading of infection to neck and chest wall^{1,14,15}.

Based on the microbiological etiologies, NF is classified into 2 types. The first types are an infection that caused by multiple organisms including gram-positive cocci, gram negative rods and also anaerobes organisms. These organisms include staphylococcal, streptococcal, bacteroides and gram-negative enterobacteria species. Meanwhile type 2 infections are defined by a

single organism infection, most commonly group A *Streptococcus* (GAS) or *Staphylococcus aureus*. Odontogenic infections are usually caused polymicrobially by aerobic and anaerobic bacteria. Recently, in NF patient without precursor factor also has been identified with methicillin-resistant-*staphylococcus aureus* infection. But in some cases, streptococcal bacteria take part to be the cause of this infection. *Streptococcus* unspecified (9,8%) and mixed anaerobes (9,8%) being the most common cause of death in NF cases due to odontogenic infections. In less cases *Actinomyces turincensis* can also cause infection even though it is physiologically in the oral cavity especially in some immunocompromised patient. In our case the microorganism causing NF can't be determined due to absence of bacterial culture facility⁹⁻¹¹.

In the United States, a total case of NF were collected from 2003 – 2013. From 9871 death, 4185 (42%) death was caused by NF and the rest NF as the underlying cause. Based on the review of hospital discharge diagnoses from the 60 acute tertiary-care centres within Cook Country, including Chicago and surrounding areas, sites of infection is also affect rate of mortality in NF patient. Of the total cases, the most common sites that caused mortality are extremities (18%) then to the trunk (14%) and perigenital (13%) (Dworkin et al., 2009). NF in head and neck origin is rare to suspected because it's origin is uncommon and also presenting with benign symptoms at the initial stage. But if its appeared, mostly the common origin is from odontogenic^{2,13}.

Diabetes melitus (21%) and heart disease (33%) still be the most comorbid factor that contributing death in NF patient. Followed by renal failure (17%), substance use (9%), liver disease (6%) and obesity (5%)¹⁰. However, the significant predictable factor that related to mortality in NF patients are age, immune status and streptococcal toxic shock syndrome. Mortality could be estimated based on the patient's decade of life (ie first decade 1 percent, second decade 2 percent, etc). This format can be used when there is no risk factors. Then the 4th, 5th and 6th decade have a mortality risk 6%, 9% and 14% respectively¹⁶. When the patient is in a condition of immunocompromised the risk is multiplied by

4. If the patients have a stable immune status but developed streptococcal toxic shock syndrome, the corresponding decade of life needs to be multiplied by 10. Finally when two independent risk factor are present, the multiply is 40. Advanced age has a higher risk of mortality in patients with necrotizing fasciitis. Age in older than 60 year or younger than 1 year are at a high risk of mortalities. Our patient age is 65 years old^{17,18}.

Some conditions may be associated with NF like local trauma, recent surgery, chronic venous ulceration, superficial skin infection and injection of drug use. The systemic factors that could be associated with NF include chronic renal failure, diabetes mellitus, immunosuppression patient and peripheral vascular disease. Diabetes and aging is the most common predisposing factors of NF. Aging skin (thinning of skin, poor wound healing, loss of elasticity) combined with environmental factors (photoaging) has contributed in occurrence of the disease. Chronic pruritis, masseration from incontinence, immobilitation, poor handling care further predisposed elderly to infection. Patients with this conditions and have a soft tissue infection should be considered as NF. The diagnosis of NF in elderly patients is sometimes delayed because of some factors. It could appear in non-specific symptoms, subtle in silent features and accompanied with geriatric syndromes. Also there are some multiple confounders like drug-related effects and pre-existing chronic illness. Low cognitive impairment from the patients and low suspicion from the doctors are also contribute in underdiagnosed of NF in elderly. In our case, the patient has unclear history of the disease followed by inappropriate treatment in early stage of NF and odontogenic infection^{3,17,18}.

To diagnose NF, it requires more data and clinical experience to differentiate with another soft tissue infection as fast as possible. The most important point to be found in patient with NF is the presence of necrotic components which can lead the treatment to be surgical debridement. Clinical characteristic is the first tools that used to confirm the NF. However, more data about the history and laboratories will strengthen the diagnosis. Early common symptoms are like pain, edema,

tachycardia, hypovolemia, erythema. From the laboratory can be found with hypocalcemia due to calcium sequestration into areas of fat necrosis, hyperglycaemia because of increasing of gluconeogenesis from protein and hypoproteinemia. When the infection gets worse, the symptoms can appear more specific like tense edema outside the disturbed skin, areas of skin infarction and severe pain that may appear disproportionate to the initial clinical appearance, ecchymosis, bullae/blisters and necrotic area of skin, crepitation or subcutaneous gas, discharge or "dishwater" fluid, severe sepsis and multi organ failure. Although these findings is typically referred to NF, the sensitivity is low and it's only appear in 10-40% of patients. Also, the worsening of this disease occurs progressively and unrecognized; made the diagnosis even more difficult to confirm (1). The radiograph examinations are sometimes needed to confirm the severity of the disease. CT Scan is more sensitive than other radiographs examination because it can detect the inflammatory such as abscess or thickening of the tissue. CT scan could show the fluid accumulation area without rim enhancement and bizarre shaped hypodense area; contrast to abcess. Abcess could appear as single or multilobulated area of fluid attenuation and showing peripheral rim enhancement. The bizzare shaped area is sometimes caused by rapid spreading of the liquefaction across the multiple layer of fascia^{1,15,17}. In our case, the NF diagnosed with only Chest X-ray, with the presence of gas in subcutaneous tissue. CT-scan can't be done due to lack of facility.

Odontogenic necrotizing fasciitis is an uncommon cases found in society but life-threatening and rapidly progressive illness. Mortality rate of this odontogenic NF is 9,8% but increased about 30,3% in patients with diabetes mellitus. The management of odontogenic NF should be aggressive include surgical debridement, antibiotics, resuscitation and controlling systemic conditions such as diabetes. Rehabilitation and reconstructive procedures may also be needed^{1,13,14}.

CONCLUSION

Fourteen days postoperatively patient was sent to outpatient department to continue

his wound care. After wound care in order to wound prepare for skin grafting. 28 days postoperatively, 14 days after patient discharge from hospital, skin grafting was done. Managing NF of the neck and chest wall requires an invasive approach especially in elderly. Debridement of the abscess and necrotic tissue is important to eliminate source of infection. A proper antibiotic should be administered to prevent any complication.

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