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CASE REPORT
Reconstructive

Case Report of Gas Gangrene after Reconstructive Surgery with Anterolateral Thigh Flap for Resection of Oral Cancer

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Summary: Necrotizing fasciitis (NF) type I is an acute subcutaneous tissue infection that can promptly disseminate generating crepitus. If not accurately diagnosed and expeditiously treated, it becomes a life-threatening infection. In this report, we present a 65-year-old man who developed a case of NF after a hemiglossectomy resecting a tumor in the dorsal surface of the tongue. A biopsy was performed, and he was pathologically diagnosed with squamous cell carcinoma (T2N1M0). The patient underwent preoperative oral cleaning. Right hemiglossectomy was performed by cervical dissection, pull-through style, with tooth removal on the right mandible and a left anterolateral femoral flap reconstruction. Routine intraoperative lavage was performed with 2000 mL of saline solution. Cefazolin 1gr was administered two times per day postoperatively. Four days after primary surgery, the flap circulation was inadequate; therefore, a computed tomography scan was taken, which indicated gas in the ventral neck area. Tooth extraction was the suspected etiology. Debridement was performed; the abscess was drained and cultured, indicating the presence of *Staphylococcus haemolyticus* and *Escherichia coli*. It seems that the abscess was not formed by NF, but rather by leachate reservoir associated with the head and neck tumor. After debridement, re-reconstruction was performed with a deltopectoral flap and pectoralis major myocutaneous flap. When NF is present after a neck dissection, there is a risk of disruption due to the direct invasion and inflammation into the carotid artery. Therefore, it is important to provide adequate oral cleaning care before the surgery and early suspicion of the diagnosis. *(Plast Reconstr Surg Glob Open 2023; 11:e5381; doi: 10.1097/GOX.0000000000005381; Published online 13 November 2023.)*

In recent years, free flap transfer has been the gold standard for head and neck cancer resection in reconstructive surgery.[1] However, there is a risk of flap failure and re-intervention, and the physical, mental, and financial burden is enormous for the patient. Therefore, postoperative management is extremely important.

It is common for patients with head and neck cancer to have poor oral hygiene, which sometimes results in intraoperative tooth extraction. This procedure is associated with risk of cervical abscess due to recent infection of the root of the tooth.[2,3] Because head and neck cancer surgery is usually accompanied by cervical dissection, infection of the exposed carotid artery can become life-threatening.

In this study, we performed free flap reconstruction surgery for the resection of oral cancer and simultaneously extracted carious teeth. Then, we experienced a postoperative cervical abscess with gas gangrene. We describe our measures and discussion.

CASE REPORT

A 65-year-old man presented with pain in the right dorsal surface of the tongue with presence of a tumor (1.5 cm × 1.5 cm). Computed tomography (CT), magnetic resonance imaging, and needle biopsy were performed to confirm the diagnosis of squamous cell carcinoma (T2N1M0).

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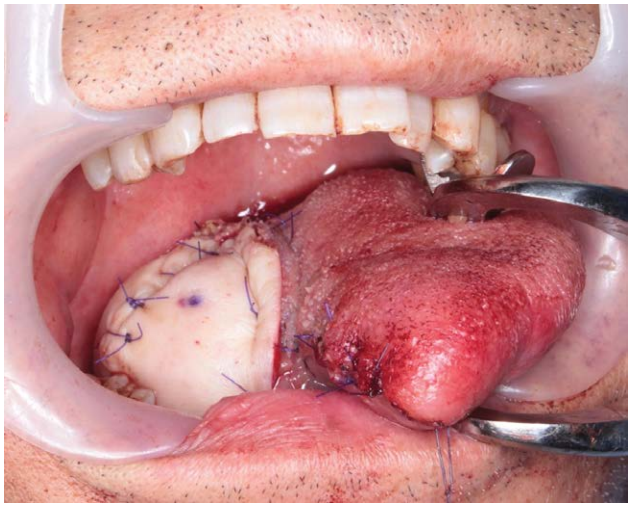

Fig. 1. Primary surgery. Right hemiglossectomy for resection of the tumor with cervical dissection and reconstruction with an ALT flap.

After the patient underwent preoperative oral cleaning, right hemiglossectomy with a cervical dissection pull-through style surgery was performed. Simultaneously, the removal of a tooth on the right mandible (6th) and reconstruction with a free anterolateral thigh (ALT) flap were done (Fig.1). After vascular anastomosis, lavage was performed with 2000 mL of saline solution. Operative time was 9 hours. Cefazolin 1gr was administered two times per day postoperatively. After surgery, a pin prick test showed good bleeding.

On postoperative day 4, negative pinprick test was perfomed, and erythematous neck was noted. Infection was suspected; a CT scan was taken and showed gas in the ventral neck area (Fig.2).

Fig. 2. CT scan of head and neck on postoperative day 4. Yellow arrows indicate the presence of gas in the necrotic tissues.

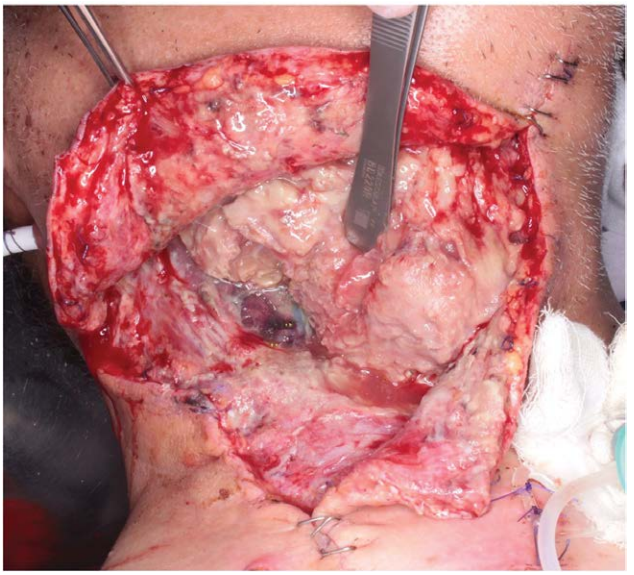

Fig. 3. First debridement and removal of cervical abscess. Findings when the neck was opened after gas was seen on CT. Presence of white necrotic tissue and an ALT flap.

Emergency debridement radiated a large quantity of exudate with a foul odor. The secretion was cultured, and *Staphylococcus haemolyticus* and *Escherichia coli* were isolated. On postoperative day 2 of the second procedure, white blood cells were ⟦ 20,010/mm⟧^3 and C-reactive protein (CRP) was 4.65. On day 4, they were ⟦14,600/mm⟧ ^3 and CRP was 6.51. Vital signs were stable. Antibiotics were changed to cefozopran hydrochloride 500 mg × 3 per day and ceftriaxone sodium hydrate 1g × 2 per day, and emergency debridement was performed due to white necrotic tissue on the neck. (Fig.3).

When the signs of infection subsided, necrotic fatty tissue and fascia of the ALT flap paddle were removed and reconstructed with a deltopectoral (DP) flap and pectoralis major myocutaneous (PMMC) flap (Fig. 4). (**See Video 1 [online],** which shows the progress of the patient.) Meropenem hydrates 0.5g x 2 per day for 5 days for postoperative antibiotics. The patient was thriving. After 12 days of the debridement, he started eating. Five years have passed since, and the patient has no cancer recurrence, infection, or neck contracture (**See Video 1 [online]**).

DISCUSSION

Necrotizing fasciitis (NF) can be presented due to inoculation in surgical manipulation and trauma. NF incidence in head and neck area is low and is lower related to cancer resection[4]. We can classify NF into three types. Type I is polymicrobial and normally presents after a surgical procedure or injury in older adults with comorbidities. Type II is monomicrobial, associated with *Streptococcus* and methicillin-resistant *Staphylococcus aureus*, presents with trauma, and can end in toxic shock syndrome. Type III is due to *Clostridium* and presents with inoculation with trauma, IM injections, or bacteremias. It has a very rapid progression. In this case, we presented a type I.[5] The

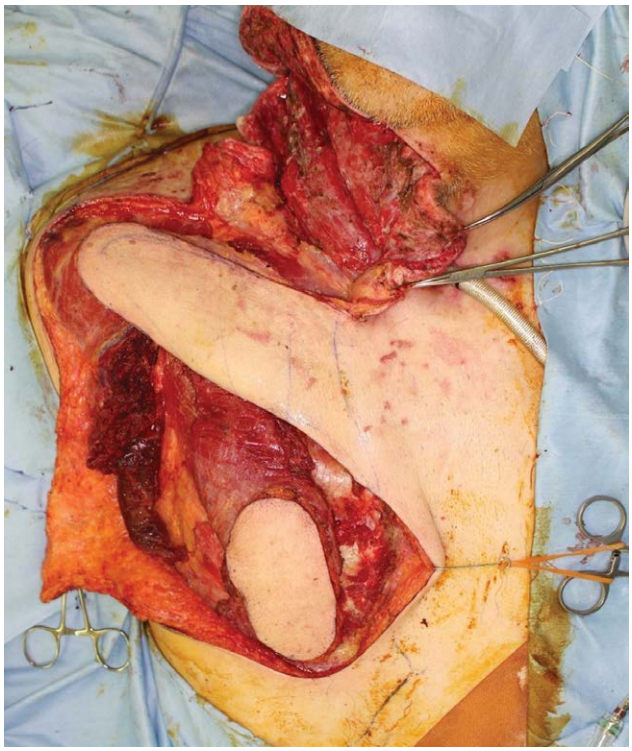

Fig. 4. Reconstruction of the neck with DP and PMMC flap. The perforator of the internal thoracic artery between ribs two to four was confirmed by handheld Doppler before surgery, and PMMC flap elevation was performed taking care not to damage that area. After confirming that the blood flow of the skin paddle of the PMMC flap and tip of DP flap was satisfactory, the PMMC flap was sutured in the oral cavity, and the DP flap was sutured on the neck.

common causes of this type of NF are gram+, gram- and anaerobic microorganisms, which result in gas gangrene with the formation of crepitus from methane and CO_2.

NF has become a concern for patient safety even though its incidence is low, but complications are severe and difficult to diagnose in early stages. In this case, identifying an infectious process was considerably difficult before the exudate became cloudy, as intense neck erythema and laboratory findings in blood are usually high after surgery and can be considered normal. Cervical NF is associated with mortality rates of 7%–20%, and the most frequent primary origin is dental infection.[6,7] The risk is probably even higher with cervical dissection.

In this case, reconstruction was performed by a surgeon (T.T, C.M.) who has experience with more than 200 head and neck reconstructive procedures, and the incidence of SSI has been 5%. Therefore, we believe that the problem is not with the surgical procedure itself. For postoperative care, we focused on the appearance of the flap, pinprick test, blood tests, and drain exudate. Later on, when the flap showed alterations, CT led to a diagnosis. Additionally from our results, detecting cervical abscesses early may benefit from daily neck ultrasound. Otherwise, the patient's history contributes to the diagnosis when there is history of recent dental procedures, dental or maxilla trauma, or dental neglect.[8]

Another important factor for preventing NF in head and neck reconstruction is adequate cleaning. It starts in preoperative care with skin disinfection of the surgical intervention site, cleaning the oral cavity, and evaluation of dental caries. Intraoperatively, enough wound cleaning has to be performed to remove any debris related to the surgery.[9]

In this particular case, even though preoperative oral cleaning was performed, the tooth extraction seemed to be the most likely cause of the inoculation of the bacteria that caused the NF. Usually in cervical abscesses, when the source of the SSI is unknown, *Staphylococcus aureus* is often reported. Therefore, the possibility of methicillin-susceptible and methicillin-resistant *Staphylococcus aureus* should be considered, and it is imperative to administer an anaerobic-susceptible antimicrobial agent and avoid waiting for cultures to be taken. Therefore, we strongly suggest considering a preoperative extraction before the tumor resection if there is any presence of a cavity. Also, necrotic tissue pathology findings would likely have provided more detailed information.

CONCLUSIONS

To prevent NF after head and neck reconstruction, it is important to perform preoperative cleaning of the oral cavity and intraoperative wound cleaning, and then keep an eye out for signs of infection in the postoperative management.

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DISCLOSURE

All authors have no financial interests to declare in relation to the content of this article.

PATIENT CONSENT

The patient was properly informed and gave written consent for the study and use of photographs.

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This investigation was conducted according to the principles expressed in the Declaration of Helsinki.

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