Case report

Reconstruction of a large cervical necrotizing fasciitis defect by supraclavicular flap: a case report

Klibngern H and Ruenmarkkaew D

Division of Head and Neck Surgery and Oncology and Hyperbaric Oxygen Therapy, Department of Otolaryngology, Faculty of Medicine, Chiang Mai University

Cervical necrotizing fasciitis, a severe soft tissue infection characterized by rapidly progressive necrosis of the fascia and subcutaneous tissues at the face and neck area, is a life-threatening condition. The main treatment includes surgical debridement, broad-spectrum intravenous antibiotics and controlling the immunocompromised status (1-3). Post-surgical debridement defects on the head and neck area may be significantly extensive and require flap reconstruction.

This case report describes a new application of a supraclavicular flap for reconstruction of a large neck defect resulting from cervical necrotizing fasciitis debridement. The flap is easy to harvest, involves a single-staged operation and has minimal donor site morbidity. **Chiang Mai Medical Journal 2020;59(2):115-9.**

Keywords: Flap reconstruction, Necrotizing fasciitis, Supraclavicular flap

Introduction

A 54-year-old woman with rheumatoid arthritis and adrenal insufficiency comorbidities was referred to the emergency department with a high-grade fever and rapidly progressive swelling of the left lower mandible area. During hospital transfer, her consciousness deteriorated rapidly resulting in a cardiac arrest. The patient underwent orotracheal intubation and cardiopulmonary resuscitation in the ambulance. After three cycles of resuscitation at the emergency department, spontaneous circulation returned and the otolaryngologist was consulted to evaluate her condition. Head and neck examination revealed an ill-defined border of black necrotic skin swelling extending from the left lower border of the mandible to the thyroid cartilage level of the neck with crepitation on neck palpation. The intraoral examination showed swelling at the left buccal mucosa and retromolar trigone. Multiple decayed teeth were also noted. Laboratory investigation results were Hb 8.1 g/dL, Hct 28.9%, WBC 5,970 cells/mm^3, neutrophils 69.9%, lymphocytes 19.7%, platelets 73,000 cell/mm3, blood sugar 314 mg/dL, BUN 35 mg/dL, creatinine 2.77 mg/dL, sodium 129 mmol/L, potassium 7.1 mmol/L, chloride 88 mmol/L and CO2 9 mmol/L.

A CT scan of her neck found a heterogeneous enhancing lesion associated with multiple air bubbles, minimal fluid and extensive fat clouding mainly at the left masseter muscle extending to involve the left temporal, left parapharyngeal and left submandibular spaces. The most likely diagnosis was cervicofacial necrotizing fasciitis. Intraoperatively, the necrotic skin and soft tissue were debrided until there was good skin bleeding. All abscesses in the neck spaces were drained by blunt finger dissection through the opened skin defect; the decayed teeth were also extracted. The wound was irrigated and packed with povidine-

Correspondence: Hanpon Klibngern, MD., Department of Otolaryngology, Faculty of Medicine, Chiang Mai University, Chiang Mai 50200 Thailand.
E-mail: hanponk@gmail.com

Received: January 15, 2020, Revised: February 25, 2020; Accepted: March 2, 2020.

soaked gauze. Empirical antibiotic therapy was started with piperacillin/tazobactam (Tazocin) 2.25 gm IV every six hours and clindamycin 600 mg IV every 8 hours. The pus culture results were *Pseudomonas aeroginosa* and *Burkholderia cepacia* which were susceptible to her current antibiotics. After a second and third surgical debridement, her clinical condition improved dramatically. The defect after debridement consisted of an exposed mandible, orocutaneous fistula from the left buccal mucosa, an exposed carotid sheath and a 25 x 13 cm cutaneous defect. A supraclavicular flap was planned for neck defect reconstruction. The recipient site was prepared by curetting the necrotic and granulation tissue. The orocutaneous fistula was closed by a buccal advancement flap and a 28 x10 cm supraclavicular flap was harvested and rotated to cover the cutaneous defect. The donor site was closed primarily by undermining the skin to the chest and back. The total operative time was 90 minutes. Her symptoms improved and she was discharged after three weeks.

Discussion

Necrotizing fasciitis is an infection that rapidly spreads along the fascial plane, causing subcutaneous tissue necrosis with a mortality rate ranging from 19 to 40%. Early signs include cellulitis or abscess. As the disease progresses, the skin becomes numb and has a dusky appearance. Necrotizing fasciitis is more common in the trunk and extremities, but it is uncommon in the head and neck area. The usual source of infection is odontogenic infection and pharyngitis so immunocompromised patients are at greater risk. The ability to spread rapidly along the fascia and to cause tissue necrosis are secondary to polymicrobial infection and have a synergistic effect with bacterial enzymes. Treatment involves airway protection, broad-spectrum systemic antibiotic treatment, surgical debridement and controlling the immunocompromised status (1-4).

It is important to determine the right time to perform reconstructive surgery. The natural course of a necotizing fasciitis infection usually involves multiple surgical debridements. If the surgeon immediately covers the actively infected wound bed with a flap, chronic relapsing infection will ensue. In this case, the wound was left open and loosely packed with iodine-soaked gauze which was changed 3-4 times a day. Reconstructive surgery was considered once the wound bed was stable and covered by new healthy granulation tissue (2).

There were several options for repair of the neck defect in this patient. Because of her poor medical condition, the ideal reconstruction needed to be simple, reliable and involve a short operative time. The simplest reconstructive option was to do a wound dressing and wait until the wound contracted, then put on the skin graft once the wound was covered by healthy granulation tissue.

Figure 1. Black necrotic skin swelling at left lower mandible and upper neck area

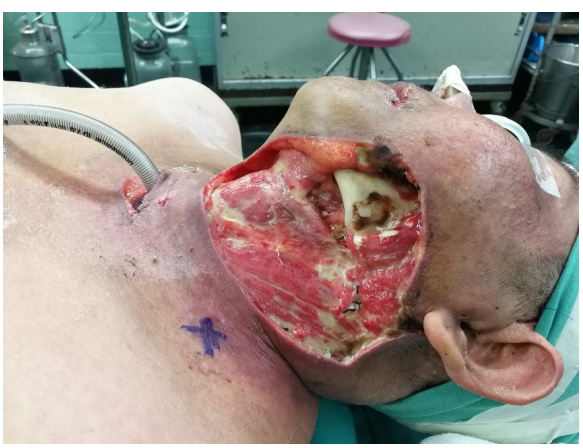

Figure 2. Surgical defect after the third debridement

However, that option would have prolonged the hospital stay and required another donor site area to harvest the large skin graft. There was also the possibility of a secondary neck contracture from the skin graft. Additionally, the exposed carotid sheath and periosteal stripped mandible were potentially unsuitable for skin grafting.

A large fasciocutaneous free flap such as a radial forearm free flap or an anterolateral thigh free flap can provide large defect coverage, although the recipient vessel in the ipsilateral neck may not be available due to damage from infection and debridement. This requires vascular anastomosis outside the zone of injury, e.g., the use of the contralateral side of the neck vessels, the transverse cervical system, or the internal mammary system. These also extend the operation time and increases the complexity in medically morbid patients. Additionally, the skin color of some free flaps such as the anterolateral thigh flap may not match the face and neck skin color.

Figure 3. Left supraclavicular flap (28 x10 cm)

In this case, we found the pedicle flap was the optimal reconstructive option as the patient had multiple medical comorbidities. The pectoralis major myocutaneous flap can provide neck defect coverage; however, its thick musculocutaneous component makes the flap too bulky for a solely cutaneous defect. It is more suitable for composite defects in oncologic neck surgery where there is also a loss of muscle coverage or exposed carotid sheath. Some authors have reported using a pedicle trapezius or lattisimus dorsi flap to cover the defect, a procedure which requires a secondary operation to divide the pedicle and remove excessive tissue (3,4). A deltpectoral flap is another alternative to cover the neck defect as it is thin and pliable, but it requires a two-staged operation to divide the pedicle and also needs a skin graft to cover the donor site defect.

A supraclavicular artery flap is an axial fasciocutaneous flap based on the supraclavicular branch of the transverse cervical artery. Pualla et al. first introduced this flap, using it to resurface a post mentosternal burn (5). Several authors have reported its use for head and neck oncologic reconstruction (5-7). However, there has been only one report of its use in repairing a cervical necrotizing fasciitis defect (1). We found the supraclavicular flap was the most appropriate flap choice in the present case because of its simplity,

Figure 4. Flap insetting

Figure 5. One month postoperative

the short operative time and the minimal dornor site morbidity. Its large skin paddle can cover most of the neck defects. A skin graft can also cover the peripheral defects that the flap cannot reach. The advantages of a supraclavicular flap are the ease of harvest, the one-staged reconstruction, the large flap dimension and the excellent skin color match with the face and neck area. Moreover, most donor sites can be closed primarily, avoiding the need for an additional skin graft. The only shortcomings are a low risk of distal tip necrosis and the inability to use this method in cases where the transverse cervical vessels have been sacrificed. In summary, a supraclavicular flap can be an excellent reconstructive option for a cervical necrotizing fasciitis defect.

Conclusions

Cervical necrotizing fasciitis is a rapidly spreading infection along the fascial plane of the neck which, if left untreated, leads to high morbidity and mortality. Early diagnosis and management with surgical debridement and broad-spectrum antibiotic coverage are essential for controlling the disease. After the wound is stable, the surgical defect can be reconstructed with various flaps such as the supraclavicular flap.

Abbreviations

BUN: blood urea nitrogen; cm: centimeter; dl: deciliter; g: gram; Hct: hematocrit; Hb: hemoglobin; L: liters; ml: milliliter; mm3: cubic millimeter; mmol: millimol

Ethics approval and consent to participant

Our ethics committee waived the requirement for ethics approval because all medical and laboratory procedures were routinely carried out and did not affect decisions concerning treatment.

STUDY CODE: ENT-2562-06776

Acknowledgments

Chiang Mai University Hospital

Consent for publication

Patient/guardian consent was obtained for publication of this case report.

Competing interests

No competing interests

Conflict of interest

The authors declare that we have no conflict of interest.

Funding

Not applicable

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รายงานการใช้ supraclavicular flap เพื่อซ่อมเสริมแผลผ่าตัดโรค necrotizing fasciitis บริเวณคอ

หาญพล ขลิบเงิน และ ดนยรัตน์ เรือนมากแก้ว
หน่วยศัลยกรรมศีรษะและคอมะเร็งวิทยาและศูนย์บำบัดด้วยออกซิเจน ภาควิชาภาควิชาโสต ศอ นาสิก
คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่

โรค necrotizing fasciitis เป็นภาวะติดเชื้อบริเวณเนื้อเยื่ออย่างรุนแรงทำให้เกิดการเน่าตายของเนื้อเยื่อพังผืดและชั้นไขมันใต้ผิวหนัง ผู้ป่วยมีโอกาสเสียชีวิตจากโรคสูง การรักษาประกอบด้วย การผ่าตัดเนื้อตายออก การให้ยาปฏิชีวนะ และการรักษาสาเหตุของการติดเชื้อ บาดแผลหลังการตัดเนื้อตายบริเวณศีรษะและคอมักมีขนาดใหญ่และจำเป็นต้องใช้เนื้อเยื่อบริเวณอื่นมาซ่อมเสริมแผลหลังผ่าตัด

บทความชิ้นนี้รายงานการใช้ supraclavicular flap ในการซ่อมเสริมแผลผ่าตัดเนื้อตายในผู้ป่วยโรค necrotizing fasciitis บริเวณคอ การผ่าตัดเลาะยก flap ทำได้ง่ายในการผ่าตัดครั้งเดียว และมีผลกระทบต่อเนื้อเยื่อที่หายไปน้อย **เชียงใหม่เวชสาร 2563;59(2):115-9.**

คำสำคัญ: flap reconstruction, necrotizing fasciitis, supraclavicular flap