



Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Cervical necrotizing fasciitis by dental abscess treated with negative pressure wound therapy: Case report

Veronica L. Campana^{a,*}, Federico M. Braun^b, Carina Giuliani^c^a Department of Maxillofacial Surgery Clinica de Imagenes, Neuquen City, Argentina^b Department of Maxillofacial Surgery of Pedro Moguillansky Hospital, Cipoletti, Rio Negro, Argentina^c Department of Head and Neck Surgery of Castro Rendon Hospital, Neuquen City, Argentina

ARTICLE INFO

Article history:

Received 24 April 2020

Received in revised form 25 October 2020

Accepted 25 October 2020

Available online 27 November 2020

Keywords:

Necrotizing fasciitis

Cervical

Negative pressure wound therapy

Vacuum technique

Odontogenic infection

ABSTRACT

Necrotizing fasciitis is a severe soft tissue infection very uncommon in head and neck. This infection could be very aggressive involving subcutaneous tissue and fascial planes and can be rapidly fatal. Negative pressure wound therapy (NPWT) has emerged recently and became very popular in treating complicated wounds. A case of necrotizing fasciitis in cervical region from an odontogenic infection is presented. After surgical debridement, a NPWT device was installed. NPWT provides advantages compared to conventional debridement and drainage. This method is recommended as an alternative in treating necrotizing fasciitis in head and neck, because it eradicates infection and provides comfort to the patient.

© 2020 Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Necrotizing fasciitis (NF) is an uncommon highly progressive severe soft tissue infection that causes destruction and necrosis of the skin and subcutaneous tissue. A 2003/2004 study describing the rates of Group A-streptococci in Europe showed an incidence of 2.79/100,000 per year, with a slightly higher number of male patients (53%) [1]. Head and neck localization are very rare, the incidence of CNF is not commonly described. The most common etiology in this site is due to odontogenic infections [2]. However, only 2.6% of all odontogenic infections develop a NF. Patients who have an impaired immune system are prone to developing this kind of infection [3].

NF could be a life-threatening complication, because of its rapid dissemination to adjacent tissues, causing significant tissue loss, mediastinitis, organ failure or death. Although sepsis is the initial presentation, airway obstruction causes mortality sooner. Early diagnosis and surgical treatment are essential to prevent a fatal outcome. Surgical treatment may be challenging to the maxillofacial surgeon because of the vital organs that could be involved.

NPWT has emerged recently as a very promising treatment for complex soft tissue infections that cause several damages. It is based on the application of negative pressure through an adhesive

film that covers the wound. This vacuum-assisted technique induces a physical and biological response that accelerates wound healing. It eliminates the exudate and bacterial toxin, providing oxygen and nutrients that are essential for this process. It increases wound perfusion and stimulates granulation tissue growth [4].

To date, this technique has been growing up in the management of wound complication. However, few literatures describe the use of vacuum system in head and neck, and far less frequently the application in necrotizing fasciitis [5]. Hereunder is presented a case report of severe CNF, caused by a dental infection and treated only with NPWT. This work has been reported in line with the SCARE criteria [6].

2. Presentation of case

A 47-year-old man presented to the emergency room with pain and massive cervical swelling. The pain started two weeks back, and during that period of time he was under oral antibiotic therapy. Physical examination revealed that swelling extended through cervical region, with evident necrotic soft tissue areas and pus presence (Fig. 1). The patient reported difficulty in breathing and swallowing. After admission, routine examination and laboratory tests were taken. He had no medical history.

Computed tomography of neck and chest revealed extensive soft tissue emphysema. Left third molar was determined to be the cause of the infection. There was no evidence of mediastinal inflammatory involvement (Fig. 2).

* Corresponding author.

E-mail addresses: verocampana85@hotmail.com, verocampana@gmail.com (V.L. Campana).



Fig. 1. Extended swelling and necrotic soft tissue area.

The patient was immediately admitted and taken to the operating room by the maxillofacial surgery staff. Under general anesthesia, the procedure included extraction of third molar, drainage and an extended surgical debridement of necrotic tissue. A gauze dressing was used as a wound contact layer to evaluate exudate. The diagnosis of necrotizing fasciitis was based on clinical and intraoperative findings. On postoperative day 1 (12 h later), although exudate was decreasing, the patient had an unfavorable

development: he raised fever and there was necrotic tissue on wound margins. A second-look surgery was carried on, inducing to a more aggressive surgical debridement to remove all necrotic tissue. During operative time, a handcrafted vacuum device was made with gauze, a sander connected to the central extraction system and an adhesive film sealing the injure (Fig. 3). NPWT is a therapeutic method that allows stimulating healing and removing bacterial exudate using a closure dressing and negative pressure application. During intensive care unit, the drainage tube was connected to a central negative pressure system with a magnitude of 70–100 mmHg, continually for 24 h.

The patient underwent with changing dressing twice a day, and additional irrigation with saline solution. After 24-h treatment we decided to place calcium alginate within the wound for further healing stimulation (Fig. 4).

The patient was evolving favorably and two days after the second debridement, NPWT device was installed. It allowed the patient to have free movement and be easily reinserted in society. When the results of bacteriological examination and antibiogram became available, the patient was released from hospital and continued with ambulatory treatment (Fig. 5). The result isolated methicillin-sensitive *Staphylococcus aureus* (MSSA) sensible to Clindamycin.

The NPWT unit was changed every four days during the first week. And every seven or ten days after the second week. On post-operative day 35, the wound noted to be completely healed. It has reduced its size enterally and the healing tissue covered the injure. No skin graft or reconstruction surgery was needed. In order to reduce the scar, we recommended the use of a silicone scar sheet, but bear growth and location of the wound made it difficult to wear. The patient was very pleased with the final result (Fig. 6).

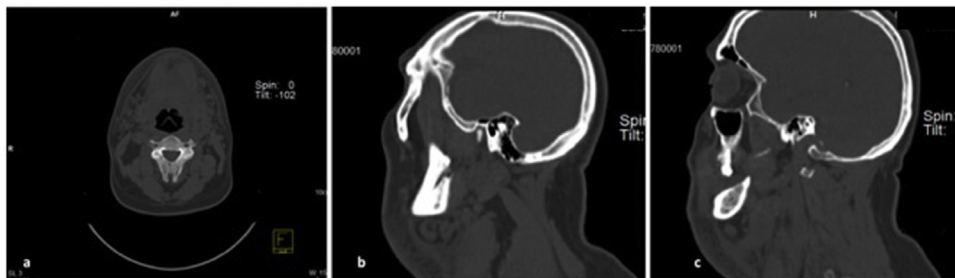


Fig. 2. Tomographic images: a) axial image, b and c) sagittal image demonstrate spread of infection within submandibular area.



Fig. 3. a) Second debridement, before application of NPWT. b) domestic vacuum device.



Fig. 4. 24 hs of negative pressure wound therapy.



Fig. 5. First control after being released from hospital.



Fig. 6. Follow-up outpatient after 18 months.

3. Discussion

NF is common to secondary odontogenic infection [7], given the anatomic region and noble structures the spread could be quickly along fascial planes into the neck or even the chest, causing mediastinitis, and increasing the comorbidity up to 50% [8]. Early and aggressive medical and surgical intervention is necessary to have success [9]. Even using NWPT for healing as a primary intention, it is required to have adequate surgical debridement in order to avoid infections complication [10].

Several reports demonstrated that massive spread infection and wound complication could be commonly caused by systematic illness, such as diabetes, vascular deficiency, HIV, obesity or bad nutrition [2]. In contrast with the case report presented, the patient developed an extended NF in head and neck with no associated disease.

NWPT is a technic that treats wound healing applying controlled sub-atmospheric pressure [11], and has many advantages compared to standard necrotizing treatment. Traditional treatment requires extensive incisions and more changing dressings [12], that could be painful or bring further complications along. It provokes large scars and end up being a long-term treatment, sometimes skin graft or several esthetic surgeries are required.

NWPT demands less dressing changing because it eliminates the exudate, reduces local edema and stimulates perfusion and granulation tissue. The continuous negative pressure promotes the arrival of growth factors and enzymes regenerating the epithelial surface. Furthermore, it stimulates angiogenesis and arterial dilatation [12] around the wound supplying oxygen in high-concentration. Because of this process and the antibiotic therapy, the wound micro-environment is altered [13]. This suppresses original anaerobic bacterial growth and reduces new infections. The vacuum dressing also sealed the wound from outside contamination.

Indication in head and neck are not well defined. There are few reports that described the use of NWPT in head and neck area, but they commonly outlined the use in reconstruction surgery or trauma [14]. There is no evidence in using negative pressure as a treatment for healing in maxillofacial area. In this case vacuum therapy proven to be favorable in necrotizing fasciitis, because no plastic surgery was required.

4. Conclusion

The vacuum system changed the management of head and neck necrotizing fasciitis. This therapy eradicates edema and bacterial infections, promoting healing and increasing patient comfort, because once the infection is under control, treatment can continue on an outpatient basis.

This technique has enabled the surgeon to perform less complex reconstructive procedure for soft tissue defects and it reduces comorbidity. NWPT continues to expand in maxillofacial application, because it can be used in managing chronic and acute wounds, benefiting patients with a wide range of injures.

Declaration of Competing Interest

All the authors declare no conflict of interest.

Sources of funding

This study did not receive any funding from private or public organizations.

Ethical approval

The study is exempt from ethical approval in our institution.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Veronica Campana: Manage the patient and wrote the manuscript, data interpretation and analysis.

Federico Braun: Contribution in pre/post-operative management of the patient. Reviewing the manuscript.

Carina Giuliani: contribution in post-operative management of the patient.

Registration of research studies

Not applicable.

Guarantor

Veronica Laura Campana
verocampana@gmail.com

Provenance and peer review

Not commissioned, externally peer-reviewed.

References

- [1] T.L. Lamagni, J. Darenberg, B. Luca-Harari, et al., Epidemiology of severe *Streptococcus pyogenes* disease in Europe, *J. Clin. Microbiol.* 46 (7) (2008) 2359–2367.
- [2] V. Malik, C. Gadepalli, S. Agrawal, C. Inkster, C. Lobo, An algorithm for early diagnosis of cervicofacial necrotizing fasciitis, *Eur. Arch. Otorhinolaryngol.* 267 (August (8)) (2010) 1169–1177.
- [3] W. Tung-Yiu, H. Jehn-Shyun, C. Ching-Hung, C. Hung-An, Cervical necrotizing fasciitis of odontogenic origin: a report of 11 cases, *J. Oral Maxillofac. Surg.* 58 (December (12)) (2000) 1347–1352.
- [4] M.S. Ahsan Mir, B.S. Nicholas Guys, B.S. Khashayar Arianpour, M.D. Peter F. Svider, M.D. Hani Rayess, M.D. Giancarlo Zuliani, M.D. S. Naweed Raza, M.D. Hosheng Lin, Negative pressure wound therapy in the head and neck: an evidence-based approach, *Laryngoscope* 129 (March (3)) (2019) 671–683.
- [5] S.J. Chen, Y.X. Chen, J.R. Xio, X.Z. Wei, S.J.M. Chen, W.Z. Jiang, Negative pressure wound therapy in necrotizing fasciitis of the head and neck, *J. Oral Maxillofac. Surg.* 77 (January (1)) (2019) 87–92.
- [6] R.A. Agha, M.R. Borrelli, R. Farwana, K. Koshy, A. Fowler, D.P. Orgill, For the SCARE Group, The SCARE 2018 statement: updating consensus surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 60 (2018) 132–136.
- [7] Y. Rapoport, M.Z. Himelfarb, D. Zikk, J. Bloom, Cervical necrotizing fasciitis of odontogenic origin, *Oral Surg. Oral Med. Oral Pathol.* 72 (July (1)) (1991) 15–18.
- [8] Bettina Hohlweg-Majert, Nils Weyer, Marc C. Metzger, Ralf Schön, Cervicofacial necrotizing fasciitis, *Diabetes Res. Clin. Pract.* 72 (2006) 206–208.
- [9] George Ferzli, Daniel C. Sukato, Moustafa Mourad, Sameep Kadakia, Eli A. Gordin, Yadranko Ducic, Aggressive necrotizing fasciitis of the head and neck resulting in massive defects, *Ear Nose Throat J.* 98 (April–May (4)) (2019) 197–200.
- [10] C.M. Pikaitis, J.A. Molnar, Subatmospheric pressure wound therapy and the vacuum-assisted closure device: basic science and current clinical successes, *Expert Rev. Med. Devices* 3 (March (2)) (2006) 175–184.
- [11] M.J. Morykwas, L.C. Argenta, E.I. Shelton-Brown, W. McGuirt, Vacuum-assisted closure: a new method for wound control and treatment, *Ann. Plast. Surg.* 38 (6) (1997) 553–562.
- [12] T. Banasiewicz, M. Borejsza-Wysocki, W. Meissner, S. Malinger, J. Szmaja, T. Kościński, A. Ratajczak, M. Drews, Vacuum-assisted closure therapy in patients with large postoperative wounds complicated by multiple fistulas, *Wideochir. Inne Tech. Maloinwazyjne* 6 (September (3)) (2011) 155–163.
- [13] Yu Qiu, Yanfen Li, Binju Gao, Jun Li, Lizhen Pan, Zuo Ye, Yang Lin, Li Song Lin, Therapeutic efficacy of vacuum sealing drainage-assisted irrigation in patients with severe multiple-space infections in the oral, maxillofacial, and cervical regions, *J. Craneomaxillofac. Surg.* 47 (May (5)) (2019) 837–841.
- [14] S.A. Asher, H.N. White, J.B. Golden, J.S. Magnuson, W.R. Carroll, E.L. Rosenthal, Negative pressure wound therapy in head and neck surgery, *JAMA Facial Plast. Surg.* 16 (March–April (2)) (2014) 120–126.

Open Access

This article is published Open Access at [sciencedirect.com](https://www.sciencedirect.com). It is distributed under the [IJSCR Supplemental terms and conditions](#), which permits unrestricted non commercial use, distribution, and reproduction in any medium, provided the original authors and source are credited.