

# Vacuum assisted closure for descending necrotizing mediastinitis. A case report

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## Case Report

Head & Neck Surgery



### Background

Mediastinitis is a severe infection of the mediastinal connective tissue, great vessels, heart and surrounding structures, Descending necrotizing mediastinitis is the fatal form of mediastinitis an usually develops as a complication of peritonsillar abscesses or dental-odontogenic infection. Delay in the treatment of a severe infection that starts in the pharynx leads to the spread of the suppurative infection through the deep and superficial cervical fascial spaces to the mediastinum. In most cases a mixed infection from aerobic and anaerobic species. The disease is classified into two types as focal and diffuse type.

Mediastinitis can be managed by antibiotic therapy, wound incision and drainage, debridement, rewiring, closed irrigation, delayed closure and omental or myocutaneous flap reconstruction. Of considerable importance is the use of negative pressure to enhance wound granulation and closure as initially described by Davydov in early 1990. The technique known as vacuum-assisted closure (VAC) was later successfully adapted for surgical wound management. VAC is an alternative wound healing strategy in mediastinitis, and recent studies have reported promising results although studies comparing VAC with open packing are scarce.

**Keywords:** vacuum assisted closure, head and neck, mediastinitis.

Lemierre's syndrome is a life-threatening, but a rare complication of an oropharyngeal infection. It can be associated with embolic events (25%) and endocarditis in (12.5%) of the patients <sup>(1)</sup>. It still is a life-threatening disease with a reported mortality up to 17%. The suggested diagnostic criteria are history of recent oropharyngeal infection, clinical or imaging evidence of thrombophlebitis of the internal jugular vein, and isolation of an anaerobic pathogen. Pharyngitis is the entry source for more than 85% of cases of Lemierre's syndrome, otitis media or dental infections accounts for less than 2% <sup>(2)</sup>. Lemierre's syndrome is usually caused by the Gram-negative anaerobic bacillus *Fusobacterium necrophorum*, other ethiological agents like *Peptostreptococcus*, Group B and C *Streptococcus*, *Staphylococcus*, *Enterococcus* species and *Proteus* have also been isolated <sup>(3)</sup>.

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from aerobic and anaerobic species. The disease is classified into two types as focal and diffuse type.

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### Case report

A 43-year-old male patient with a significant history of type 2 diabetes mellitus of long duration, allergy to sulfa drugs an surgical history of tonsillectomy.

His condition began on November 3rd after extraction of the lower left third molar with prophylactic antibiotic management with gentamicin. The next day he presented pain and volume increase in the left mandibular region, and reported he went to a different dentist who continued with the same



**Figure 1.** Neck drainage from deep cervical spaces and oral cavity.

antibiotic management.

On November 9, he went to emergency room. He continued with pain, swelling, added odynophagia, increased pain in the left side of the face, significant edema in the temporal region, with crepitus that goes to the masseteric region accompanied by induration and erythema, in the oral mucosa We found an extraordinary limitation at mouth opening, turgor of the left buccal mucosa, swollen lips and abundant sialorrhea.

He was admitted to hospital where a chest and neck X-ray revealed a deviation of the airway to the right and was accompanied by dyspnea. Thrombosis of the internal jugular vein was reported in head and neck tomography accompanied by anterior mediastinal air dissection. The following clinical analyzes were collected: leukocytes 25,000, neutrophils 23,000, hemoglobin 14.8, platelets 234,000, antibiotic impregnation with ceftazidime 2 grams every 24 hours, clindamycin 600 mg every 6 hours and amikacin 500 mg every 12 hours. We decided that surgical management was required, so evaluations and surgical time were requested.

## Discussion

This catastrophic and mostly polymicrobial bacterial infection is characterized by a rapid and destructive spread within the subcutaneous tissue and along the superficial fascial planes. It is reported that necrosis of soft tissues can progress as fast as 1 inch

an hour. After the invasion and blockage of blood vessels by pathogens, vasoconstriction and thrombosis occurred, which cause skin necrosis as well as diminished delivery of antibiotics and systemic treatments to affected area. Debridements are followed by broad spectrum systemic antibiotic therapy. Recent cases reports have pointed out the positive effect of VAC, which facilitates wound healing and stimulates the formation of new well-vascularized granulation tissue. This patient was approached by a multidisciplinary team which included maxillofacial surgery, thorax surgery, otorhinolaryngology, infectiology and the intensive care unit.

The first management step was ensuring the airway through a tracheostomy since at the time of the approach he had difficulty breathing and deviation of the airway. After initial reanimation the second step was led to drainage of the oral and cervical abscess, as well as placement of the VAC system accompanied at the same surgical time of the drainage of the descending mediastinal abscess with median sternotomy, devitalized fatty and mediastinal connective tissue was debrided with an approximate bleeding of 900 milliliters and a duration of 3 hours. Culture of the secretion was taken. At the end of the surgical approach 3 endopleural posterosuperior right, left, and retrosternal and 1 anterior mediastinal tube were placed with a continuous infusion of one gram of vancomycin every 24 hours.

After a 9 hours surgery the patient was discharged with low doses of norepinephrine and mechanical ventilation, to intensive care unit where was managed with intravenous piperacillin/tazobactam 4.0/0.5 grams every 6 hours and vancomycin 1 gram every 12 hours. Mechanical ventilation and norepinephrine were suspended after the first day in intensive care unit.

On the third day after the first surgery a new surgical cleaning whit debridement was performed as well as placement of VAC system. *Escherichia coli* beta-lactamase extended spectrum (BLEE) grew in the culture taken at the first surgical approach, therefore



**Figure 2.** Vacuum assisted closure system placement.



**Figure 3.** Clean and well vascularized tissue after VAC system removal.

the antibiotic therapy was then led to Meropenem 1g every 8 hours and linezolid 300 mg every 12 hours, the patients also developed acute kidney injury classified like acute kidney injury network 2 (AKIN 2) during his stay in intensive care unit.

Oral intake was initiated 12 hours after second surgery with clear liquids, with no complications.

A third and a fourth surgical cleaning were performed with no complications. Three days after the fourth surgery the patient was discharged to general floor after 16 days in intensive care unit, With normal oral intake and no signs of systemic inflammation.

Finally, the patient was discharged with follow-up in the outpatient clinic after 29 days with excellent aesthetic and functional results.

## Conclusion

Prompt diagnosis and surgical debridements are crucial for the management of descending necrotizing mediastinitis. Recurrent debridement is often necessary to clean necrotic tissues and secretions. It also helps to evaluate the clinical course of the wound and the infection. VAC therapy combines benefits of both closed and open wound treatment, protects the wound against contamination and provides an optimal physiologic environment for tissue repair. VAC therapy also stimulates growth tissue and plays a major role in cleaning accumulated secretions from the wound.

Another benefit of VAC treatment is the amount of excised skin. All necrotic skin and soft tissues should be removed. In contrast to aggressive surgical debridement, less invasive debridement procedures such as incision drainage can be performed with VAC treatment <sup>(7)(8)</sup>.

Studies from a single medical care center have reported shorter length of stay in intensive care, lower mortality, in the group with VAC therapy. No benefits in hospitalization days were shown <sup>(9)(10)</sup>.

## Conflicts of interests

The authors declare no conflict of interests.



**Figure 4.** Aesthetic and functional results after 1 and 3 months.

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