

## How I Do It

# Vacuum-Assisted Closure for Managing Neck Abscesses Involving the Mediastinum

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A 57-year-old immunocompetent male patient with a deep neck abscess involving the mediastinum was referred to us following unsuccessful treatment at his local hospital with medical therapy and ultrasound-guided aspiration. After initial evaluation and resuscitation, a contrast-enhanced computed tomography (CT) scan was performed, and the patient was transferred for surgical drainage. A vacuum-assisted closure (VAC) device was used as a surgical drain to help prevent reaccumulation of the purulent collections. A repeat CT scan on day 3 confirmed the absence of residual pus in the mediastinum and in the neck spaces, and the VAC device was removed. Perfect healing of the deep tissues with successful mediastinal toilette was observed. The patient resumed oral meals on postoperative day 10, and 2 days later he was discharged. A 1-month follow-up CT again demonstrated the complete healing and absence of the neck abscess. This case illustrates the possibility of avoiding more extensive and life-threatening procedures, such as open thoracotomy, in the treatment of neck abscesses extending into the mediastinum, and highlights the utility of VAC in the management of deep neck abscesses.

**Key Words:** Neck abscess, mediastinitis, vacuum-assisted closure, infection.

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## INTRODUCTION

Deep neck infection is a serious and potentially life-threatening clinical condition. The main complications include: respiratory obstruction, mediastinitis, pleural empyema, pericarditis, major venous thrombosis (Lemierre syndrome),<sup>1</sup> and septic shock. The mortality of such conditions is very high, reaching 40% to 50%.<sup>2,3</sup> Infection spreading toward the mediastinum occurs along the deep cervical fascia and is facilitated by gravity and negative intrathoracic pressure during respiration.<sup>4</sup>

Surgical drainage of purulent material, with debridement of necrotic tissue together with systemic antibiotic administration is recommended. Nevertheless, especially in complicated cases, several revisions of the surgical field are required and even recommended by some authors.<sup>2,3,5</sup> To the best of our knowledge, no use

of a vacuum-assisted closure (VAC) device has been previously described in the postoperative management of neck abscess with mediastinal involvement.

We report our experience with one patient presenting an extended deep neck abscess involving the superior mediastinum, in which the application of a vacuum-assisted closure device (V.A.C. Via Therapy System; Kinetic Concepts Inc., San Antonio, TX) was successfully used instead of common drainage tubes after surgical evacuation. A VAC device promotes wound healing by delivering negative pressure (a vacuum) at the wound site through a patented dressing, which helps draw wound edges together, remove infectious materials, and actively promote granulation at the cellular level.

## CASE REPORT

A 57-year-old immunocompetent male patient was referred to our institution with a deep neck abscess involving the upper part of the mediastinum. This patient was referred from a peripheral hospital where he had been admitted 10 days earlier with a peritonsillar and neck abscess on the right side. He underwent unsuccessful attempts to drain the neck abscess by ultrasound-guided aspiration, and during the last of these procedures he developed acute hemorrhaging with sudden-onset upper airway obstruction. He was quickly intubated and referred to our tertiary care center, which

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Fig. 1. Computed tomography scan demonstrates extensive pharyngeal and neck tissue edema with a large, complex, right-sided abscess involving the superior mediastinum.

is the regional referral center for extracorporeal membrane oxygenation (ECMO). A contrast-enhanced computed tomography (CT) scan of the neck and thorax showed an extensive abscess of the parapharyngeal and neck space on the right side, with displacement of the larynx and trachea and involvement of the superior mediastinum (Fig. 1).

After initial evaluation and management of the septic shock by the anesthesiologists in the intensive care unit (ICU) ECMO referral center, the patient was transferred to the operating room for surgical drainage. Through a bimaxillary apron cervical incision, a large volume of purulent secretions was drained from all of the neck levels bilaterally, from the right parapharyngeal

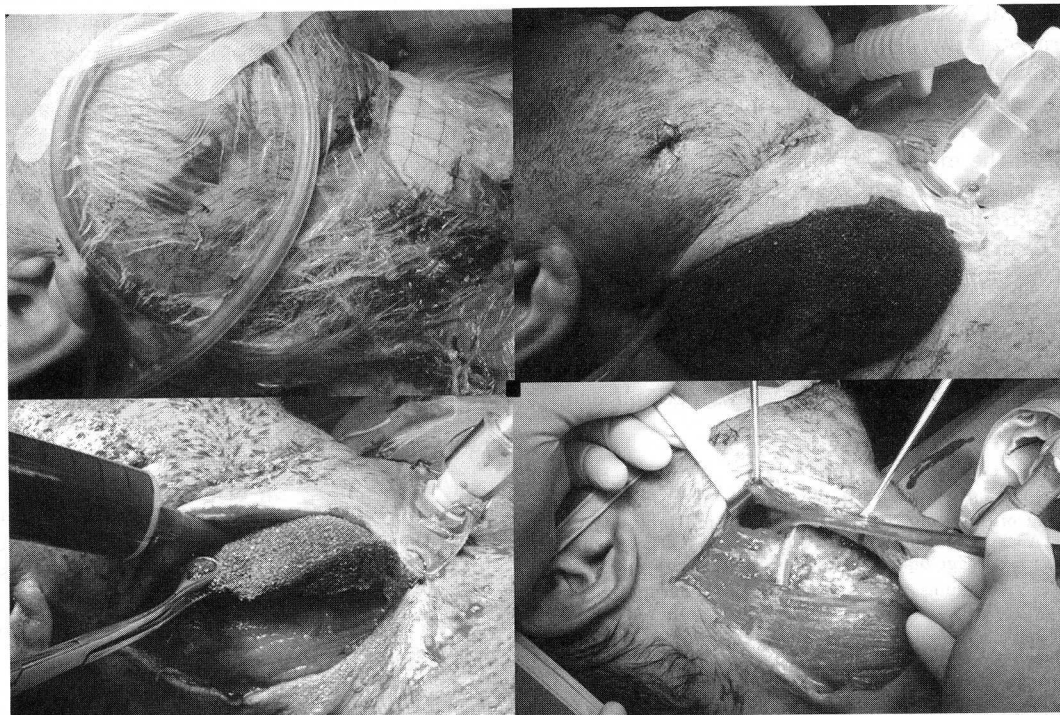


Fig. 2. Surgical removal of the vacuum-assisted closure dressing. No purulent secretions were found during the field revision, and the tissue appears vital and clean. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]



space, and from the thoracic inlet, and samples were sent for microbiological analysis. A tracheostomy was performed and care was taken to avoid communication of the tracheostomy with the neck spaces. After abundant antibiotic and saline irrigation, VAC foams were carefully placed to fill the superior mediastinum cavity and deep to the right sternocleidomastoid muscle. The skin incision was closed on the left side and was left open over the VAC foam to allow suction. The neck was tightly draped with transparent film to avoid air leakage. The VAC device was set to provide a continuous pressure of  $-175$  mm Hg over the foam.

At the end of the surgical procedure, the patient was admitted to the ICU, where full treatment of septic shock continued until the resolution of hemodynamic instability.<sup>6</sup> Weaning from pressure support ventilation began during the first day, with rapid recovery of spontaneous ventilation parameters. The patient was discharged from the ICU to the high dependency unit after 2 days. Microbiological cultures were positive for a methicillin-resistant *Staphylococcus aureus*, and antibiotic treatment was modified accordingly.

After 3 days, the VAC drained approximately 300 mL of serohematic fluids, and the CT scan confirmed the absence of residual pus in the mediastinum and neck spaces. We then removed the VAC foams in the operating room and closed the neck incision. During this procedure, we observed perfect healing of the deep tissues underlying the VAC foam with successful mediastinal toilette (Fig. 2). The patient resumed oral meals on the 10th postoperative day, and 2 days later he was discharged. After 1 month, the patient underwent a follow-up neck and thorax CT scan, which demonstrated complete healing and absence of the neck abscess.

## DISCUSSION

Surgical intervention remains the mainstay of treatment for complicated or severe cases of deep neck infections. Indications for surgery include airway impairment, septicemia, descending infection, diabetes mellitus, or no clinical improvement within 48 hours from parenteral antibiotic administration.<sup>6</sup> In addition, abscesses  $>3$  cm in diameter that involve the prevertebral, anterior visceral, or carotid spaces, or that involve more than two spaces, should be surgically drained.<sup>7</sup> The transcervical approach is the most commonly used approach in treating deep neck abscesses involving the superior mediastinum. This access allows drainage of the secretions and facilitates removal of necrotic tissue in the neck, but it provides only limited access to the mediastinum, thus precluding complete surgical toilette in this area.<sup>7,8</sup> Conventionally, once surgical drainage has been completed, drainage tubes, usually in continuous aspiration, are placed in the surgical field to remove all secretions and to prevent a new collection of pus from forming in the postoperative course. The application of a VAC device requires a surgical second look to remove the foam, allowing direct visualization of the surgical field and of the effects produced by the device. A single surgical procedure can sometimes be successful.

However, some authors advocate serial surgical revisions of the field.<sup>2,3,5</sup>

The VAC device was previously described for the treatment of osteomyelitis and was originally applied to mediastinal infection by Durandy et al. as early as 1984.<sup>9</sup> VAC therapy has gained wide acceptance for the management of complex wound infections,<sup>10,11</sup> negative pressure wound therapy that promotes healing through the enhancement of granulation tissue formation, the removal of exudates, reduction of edema, increased tissue perfusion, and wound volume reduction.<sup>11</sup> The use of VAC therapy for the management of cervical and intrathoracic infections has not been widely studied thus far. VAC has been also tested in pharyngocutaneous fistulas after total laryngectomy and in head and neck wounds with promising results.<sup>12,13</sup>

The removal of exudates from the mediastinal cavity by VAC is well described in literature,<sup>14,15</sup> but to the best of our knowledge this technique has not been described in the management of deep neck infections. The negative pressure of VAC is higher when compared to a conventional drain tube. Furthermore, the surface area under negative pressure is larger. These characteristics make VAC more effective in eliminating the slime that protects bacteria from antibiotics, therefore reducing local infection.<sup>16</sup> Moreover, the tissue granulation promoted by VAC allows a better closure of the subcutaneous and cutaneous layers, rather than when using a conventional method.

## CONCLUSION

This case illustrates the possibility of avoiding more extensive and life-threatening procedures, such as open thoracotomy, in the treatment of neck abscess extending into the mediastinum and emphasizes the potential application of a VAC device in the management of deep neck abscess.

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