Proposal for bail-out procedures - Thoracic oncologic
Negative pressure dressing for radiation-associated wound dehiscence after posterolateral thoracotomy

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Abstract

Wound complications following surgical resection in patients treated with neoadjuvant chemoradiation therapy are common and can be a difficult problem to manage. Negative pressure dressing technology appears to be safe and effective in the treatment of radiation-associated wound complications and can be used in the outpatients clinic setting. The presented case demonstrates that negative pressure dressing also manages the hydropneumothorax as a result of the dehiscence of the thoracic wall.

Keywords: Lung cancer; Radiation-associated wound dehiscence; Vacuum-assisted wound closure

1. Purpose

Wound complications following surgical resection in patients treated with neoadjuvant chemoradiation therapy are common and can be a difficult problem to manage. Vacuum-assisted closure (VAC) technology has proven to be effective in the management of wound complications postoperative [1].

2. Description

A 54-year-old man was presented to our department with a Pancoast tumor at the right side, T4N0M0. Six weeks after concurrent radiochemotherapy (cisplatin/etoposide combined with 23×2 Gy radiotherapy) we performed an extended posterolateral thoracotomy followed by an en bloc resection of the upper right lobe with dorsolateral costa 1–4 and the nerve root Th1. On the 7th postoperative day, the patient was discharged without any complication. On the 27th postoperative day, we admitted the patient in our hospital with a partial dehiscence of the posterolateral thoracotomy wound (Fig. 1a) after a movement of extreme frontal bending followed by acute dyspnea as result of a pneumothorax. A bronchoscopy was performed which did not show any evidence of a bronchopleural fistula. A plain thoracic X-ray showed a hydropneumothorax (Fig. 1b). A chest tube was inserted and the wound was covered with an occlusive dressing. On the 29th postoperative day, a vacuum-assisted closure device was applied (Fig. 2a) and the chest tube was removed. A chest X-ray showed resolution of the pneumothorax and the pleural effusion (Fig. 2b).

The foam was cut to fit the dehiscent wound, with care taken to place the sponge in the deepest portion of the wound in the thoracic cavity. Suction was applied at 50 mmHg. With the portable negative pressure dressing system the patient was ambulant and discharged. The negative pressure dressing was changed every 72 h by a home-based care nurse. While changing the negative pressure dressing no recurrence of the pneumothorax had occurred. After eight weeks, the wound was completely closed.

3. Evaluation

The treatment of patients with cancer has advanced into a complex, multimodal approach incorporating surgery, radiation, and chemotherapy. Managing wounds in this population is complicated by tumor biology, the patient’s disease state, and additional comorbidities, some of which may be iatrogenic. Radiation therapy, whether used in the neoadjuvant or adjuvant setting, has quantifiable negative healing effects due to local tissue fibrosis and vascular effects. Chemotherapeutic agents, either administered alone or as combination therapy with surgery and radiation, may have detrimental effects on the rapidly dividing tissues of healing wounds. Also a poor nutritional status, as is often seen in patients with cancer, has a negative impact on wound healing [2].

Negative pressure dressing has been increasingly used to facilitate wound healing by secondary intention. Negative pressure dressing should be considered an effective adjunct to conventional treatment modalities for the treatment of wound dehiscence of the thoracic wall.

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Vacuum-assisted wound closure is a wound management technique that exposes the wound bed to negative pressure by way of a closed system. Edema fluid is removed from the extravascular space, thus eliminating an extrinsic cause of microcirculatory embarrassment and improving blood supply during this phase of inflammation. In addition, the mechanical tension from the vacuum may directly stimulate cellular proliferation of reparative granulation tissue [3].

Animal studies have demonstrated that this technique optimizes blood flow, decreases local tissue edema, and removes excessive fluid from the wound bed. These physiologic changes facilitate the removal of bacteria from the wound. Additionally, the cyclical application of sub-atmospheric pressure alters the cytoskeleton of the cells in the wound bed, triggering a cascade of intracellular signals that increases the rate of cell division and subsequent formation of granulation tissue. The combination of these mechanisms makes the negative pressure dressing device an extremely versatile tool in the armamentarium of wound healing.

Negative pressure dressing is generally well tolerated and, with few contraindications or complications, is fast becoming a mainstay of current wound care [4].

4. Conclusion

Wound complications following surgical resection in patients treated with neoadjuvant chemoradiation are common and can be a difficult problem to manage. Negative pressure dressing technology appears to be safe and effective in the treatment of radiation-associated wound complications and can be used in the outpatients clinic setting. The presented case demonstrates that negative pressure dressing also manages the hydropneumothorax as a result of the dehiscence of the thoracic wall.

References

eComment: Vacuum-assisted closure in thoracic surgery – an alternative to pedicled latissimus dorsi flap?

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I read with great interest the recent report from Dr. Welvaart et al. [1] regarding the use of the vacuum-assisted closure (VAC) system for wound healing by secondary intention. We agree with the authors that the use of negative pressure dressings is a valuable option in a given patient. As demonstrated vacuum-assisted closure is an option following mediastinitis with aortic arch replacement [2]. VAC is sought to prevent contamination of the wound without negative impact on cardiac hemodynamics in open chest and delayed sternal closure [3].

However, we would like to consider that this approach with eight weeks of VAC system with dressing changes by a home-based care nurse is not European-wide accessible. As far as Germany is concerned, the outpatient treatment with negative pressure dressing is rather hard to achieve as far as reimbursement with the health insurance is concerned. Given the illustration of the patient, a pedicled latissimus muscle flap [4] with or without a split-thickness skin graft might have been considered for defect closure in the radiated patient, too most probably without the long-lasting sequelae of eight weeks of VAC therapy.

References