

Management of Bronchopleural Fistula Complicated by Skin Wound Necrosis after Thoracomyoplasty

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Summary: Skin necrosis is a rare complication after thoracomyoplasty and usually needs conservative treatment. We described positive findings with surgical approach. A 54-year-old man showed bronchopleural fistula after undergoing right pneumonectomy for lung cancer, treated with thoracomyoplasty. On the 20th postoperative day, a skin wound lesion was noted, whose deterioration required a skin flap transposition. Patient was discharged from hospital on the 7th postoperative day and did not show relapse at the 7th year follow-up. Surgery can be the most viable alternative to medical treatments in the management of a chest wall cutaneous complication even in high-risk patients. (*Plast Reconstr Surg Glob Open* 2017;5:e1193; doi: 10.1097/GOX.0000000000001193; Published online 25 January 2017.)

Major pulmonary resections can be threatened by postoperative development of insidious septic complications. Pleural empyema is most common, and in about half the cases, it is associated with the presence of a bronchopleural fistula, which requires prompt pleural drainage.¹ In case conservative management is not sufficient, the overlap infection calls for aggressive strategies such as the Eloesser's open window thoracostomy, allowing both a local control of inflammation and a complete cleansing by intrapleural instillations of antibiotics. Chest wall reconstruction needs thoracomyoplasty followed by layered suturing of subcutaneous and cutaneous tissues. We reported a case of skin necrosis surgically treated, discussing indications and methods to treat bronchial dehiscence and cutaneous complication.

CASE REPORT

A 54-year-old man was referred to our department for management of a solitary pulmonary nodule (12 mm) on the apical segment of the right lower lobe. He had a history of tobacco smoking (2 packs per day), diabetes, and widespread microangiopathy. A right lower pulmonary lobectomy was performed, and histological examination allowed diagnosis of adenocarcinoma

(pT1aN0M0, stage IA); the patient was discharged on the fourth day after intervention. Seven months after the surgery, a relapse on the ipsilateral lung was diagnosed (pT3N0M0, stage IIB) and a right completion pneumonectomy was performed. At the ninth postoperative day, bronchoscopy revealed regular outcomes on the right main bronchus suture and so the patient left the hospital. Fifty-five days after the surgery, following the appearance of slight dyspnea, the patient underwent fiberoptic bronchoscopy revealing the presence of a 2-mm small dehiscence on the suture of the right main bronchial stump. Fistula was associated with leukocytosis (leukocytes $15.4 \times 10^3/\mu\text{L}$; neutrophils 9.37%), without inflammatory markers (erythrocyte sedimentation rate and C-reactive protein $11 < 0.5$). Conservative management with repeated endoscopic instillation of silver nitrate and human fibrin glue was started. However, this strategy was unsuccessful. The fistula's size rapidly doubled (5 mm) and a pleural empyema in the pneumonectomy space due to multiresistant drug aerobic Gram-negative bacterium (*Stenotrophomonas maltophilia*) appeared. The rapid deterioration of the patient's clinical conditions, sepsis, and the extent of the bronchopleural fistula indicated an Eloesser open window thoracostomy by means of resection of 3 rib segments. Once the septic status was resolved, a thoracomyoplasty with a double muscle flap transposition (latissimus dorsi and pectoralis major muscles) was performed (Fig. 1). On the twentieth postoperative day, a skin wound dehiscence associated with an infection supported by *Staphylococcus epidermidis* and *Candida albicans* was noted, whereas fiberoptic bronchoscopy revealed gradual improvement

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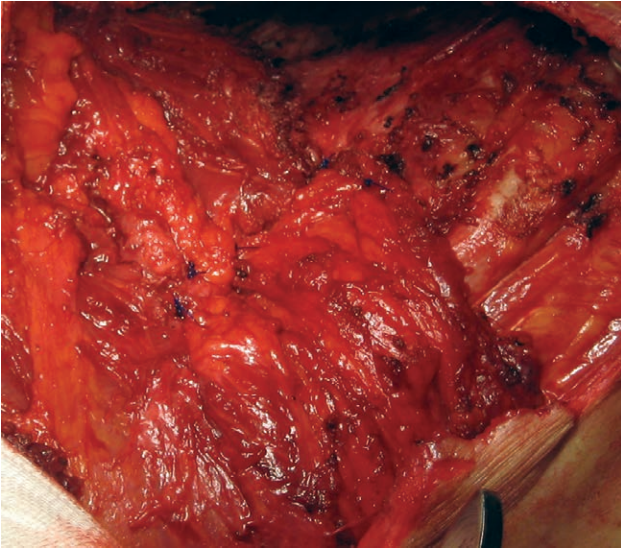


Fig. 1. Latissimus dorsi muscle flap during thoracomyoplasty.

until the closing of the previous fistula. This latter septic complication was treated with oral systemic antibiotics (sulfamethoxazole + trimethoprim) associated with teicoplanin topical treatment. However, despite a targeted antibiotic therapy, the wound dehiscence led to the development of a muscle-cutaneous fistula with skin necrosis likely of vascular origin (Fig. 2). Therefore, after an extensive surgical debridement and the excision of the fistula (Fig. 3), surgical reconstruction was performed by covering the loss of substance with a skin axillary rotation flap (Fig. 4). The postoperative course was uneventful and the patient was discharged on the seventh day. During follow-up, no other local graft complications or relapse of disease was noticed. The patient is alive and in good health after 7 years.

DISCUSSION

Bronchopleural fistula occurs in 4–20% of major pulmonary resections, with mortality rates between 18% and 67%; it commonly derives from constitutional factors (diabetes mellitus, vascular disease, hypoalbuminemia, cirrhosis, and corticosteroid therapy), pathological factors (tumor relapse, previous adjuvant therapies), and technical factors (right pneumonectomy, mediastinal lymphadenectomy).² The management of bronchopleural fistula depends on both the time of onset and the underlying cause. A small dehiscence in an asymptomatic patient can be conservatively treated (clinical observation, antibiotics, endoscopic procedures), whereas a greater or early fistula (up to 7 days after surgery) requires emergency surgery. In our experience, surgical intervention was dictated by 2 main factors: (a) a progressive increase in diameter of the leak; and (b) the relative ineffectiveness of conservative treatments (biological glue such as Tissucol and silver nitrate instillations). Moreover, in view of infectious complications, open window thoracostomy was necessary as a surgical repair of the fistula would have failed in the



Fig. 2. Skin necrosis after surgical debridement.

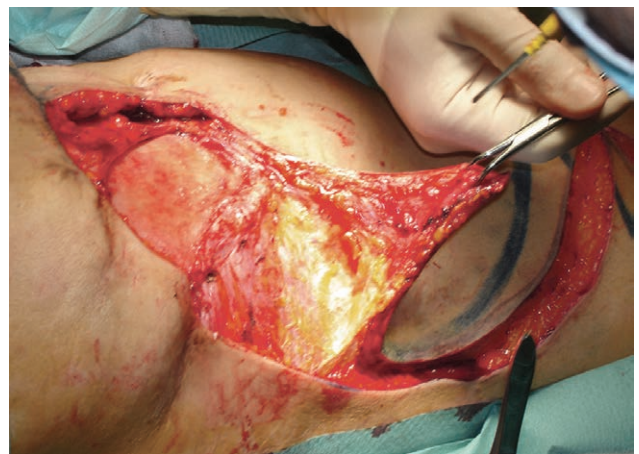


Fig. 3. Cutaneous axillary flap harvesting.

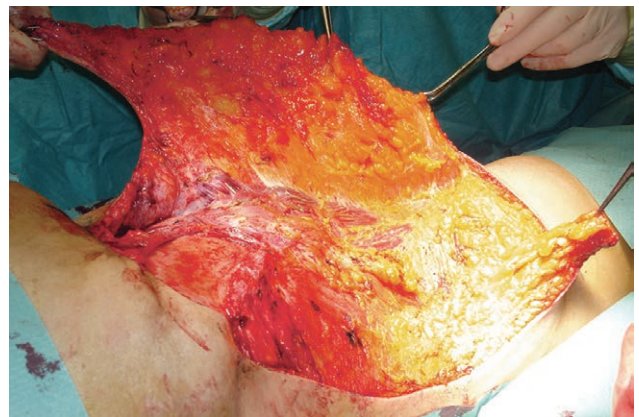


Fig. 4. Reconstructive plastic procedure with axillary flap coverage of the loss of substance area.

presence of infection. At the resolution of the septic state, a direct thoracomyoplasty was indicated for the synthesis of the chest wall defect as leading to lower morbidity and mortality rates.³ The choice of latissimus dorsi and pectoralis major muscle transposition flaps lies both in the preservation of a common vascular pedicle (thoracodorsal

vessels) and in the extent of the flaps themselves, enabling a complete obliteration of the residual space. The development of a muscle-cutaneous fistula associated with skin wound necrosis is a rare complication due to predisposing factors such as vascular diseases, diabetes, chronic obstructive pulmonary disease, infections, and surgical maneuvers (improper isolation or transposition of vascular pedicle). The use of vacuum-assisted therapy has already been described,⁴ but it does not have extended indications. In our experience, surgical management was due to the width of necrotic area and the coexistence of poor prognostic factors (diabetes mellitus and microangiopathy), exposing the patient to difficult wound healing and regeneration processes and to a higher risk of infection. Literature data confirm this attitude,⁵ especially when conservative treatment is ineffective. In conclusion, surgical correction using skin flap rotation represents a safe, effective, and convenient choice. This approach ensures excellent results in the short term through the inhibition of septic state, reduction in healing time, and minimization of patient discomfort.

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REFERENCES

1. Ng CS, Wan S, Lee TW, et al. Post-pneumonectomy empyema: current management strategies. *ANZ J Surg.* 2005;75:597–602.
2. Sarkar P, Chandak T, Shah R, et al. Diagnosis and management bronchopleural fistula. *Indian J Chest Dis Allied Sci.* 2010;52:97–104.
3. Reyes KG, Mason DP, Murthy SC, et al. Open window thoracotomy: modern update of an ancient operation. *Thorac Cardiovasc Surg.* 2010;58:220–224.
4. O’Connor J, Kells A, Henry S, et al. Vacuum-assisted closure for the treatment of complex chest wounds. *Ann Thorac Surg.* 2005;79:1196–1200.
5. Franco D, Tavares Filho JM, Cardoso P, et al. Plastic surgery in chest wall reconstruction: relevant aspects – case series. *Rev Col Bras Cir.* 2015;42:366–370.