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The reliability of lung function tests in a quadriplegic patient

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There are few quadriplegic patients who require thoracic surgery.¹ A weak capability to cough may lead to retention of pulmonary secretions and consequently life-threatening infectious complications,² particularly during the postoperative course. Surgery remains the only radical treatment of endangering conditions, such as lung aspergilloma complicated by hemoptysis.³ Lung resection usually requires a predicted postoperative forced expiratory volume in 1 second (FEV₁) exceeding 30%; otherwise, resection may be associated with a high postoperative mortality.

CLINICAL SUMMARY

A 35-year-old man was involved in a motor accident (12 years previously) causing T8 paraplegia complicated by phlebitis and pulmonary embolism. He underwent T3-L3 arthrodesis 7 years later to correct post-traumatic kyphoscoliosis that was complicated by C6 quadriplegia (with partial left arm mobility) and several bacterial pneumonias resulting in destruction of the right upper lobe, followed by aspergilloma formation and mild hemoptysis occurring several times per day. Treatment with an oral

antifungal drug was stopped because of liver complication (cytolysis). Itraconazole proved to be ineffective. Aspergillous serology remained positive, and hemoptysis continued. Lobectomy was declined by 2 thoracic surgery centers because of the patient's low FEV₁: 570 mL (13% of the predicted value).

The patient was referred to the Georges Pompidou European Hospital. He had no dyspnea, and room air saturation was 99% at rest. He was able to move himself using a wheelchair, but he had swallowing problems and an inability to cough. No abdominal muscle activity or accessory respiratory muscle contraction was observed. After 2 weeks in a pulmonary prehabilitation program, spirometry did not improve. FEV₁ was still 13%, vital capacity was 25% (1350 mL), and diffusing capacity of the lung for carbon monoxide was 37%. Arterial oxygen tension was 100 mm Hg, and arterial carbon dioxide tension was 45 mm Hg. However, except for an aspergilloma, the lung parenchyma was disease-free on the computed tomography scan, and lung perfusion was uniformly homogeneous in both lungs on ventilation-perfusion scan. We suspected that the real respiratory function was underestimated by spirometry and not interpretable in this patient. C6 quadriplegia explained the respiratory weakness with an FEV₁ less than 20% of predicted. A right upper lobectomy was performed by video-assisted thoracoscopic surgery. A temporary prophylactic tracheostomy was performed to manage postoperative expectorating incapability problems and swallowing difficulties. The postoperative course was uneventful. The patient was weaned from mechanical ventilation within 24 hours, and the tracheostomy tube was removed on postoperative day 9. Intense chest physiotherapy continued

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postoperatively. The patient was symptom-free at the 5-year follow-up with unchanged FEV₁.

DISCUSSION

This case illustrates that the interpretation of respiratory functional evaluation must not be considered independently of the patient context. At first, surgery was declined by overlooking the role of a neurologic deficit as the cause of the inability to perform expiratory maneuvers. We could not find other examples of lobectomy performed in quadriplegic patients with such a low preoperative FEV₁. No functional data were available in the 3 lobectomies (performed by standard thoracotomy) reported by Rocco and colleagues,¹ but the authors reported that preoperative evaluation may be limited, and the major emphasis must be on clinical expertise and arterial blood gas analysis to approximately determine the surgical risk. In the absence of diffuse pulmonary disease that explains major respiratory insufficiency, low preoperative FEV₁ may not necessarily constitute a contraindication to surgery. In addition, vital capacity, which has been proposed as a single global measure of overall ventilatory function status in these cases,⁴ was not helpful. To avoid postoperative pulmonary infectious complications related to low expiratory flow rates and incapacity to expectorate, temporary tracheostomy might be a good adjunct to the surgical treatment. In a randomized controlled trial⁵ including 102 high-risk patients undergoing lung resection,

a significantly lower rate of sputum retention was observed in the group with prophylactic tracheostomy compared with the control group, without early mortality linked to infectious lung complication.

CONCLUSIONS

The validity of pulmonary function tests in severe neurologic impairment should be considered with caution. These test results must not singly influence the decision-making for the anticipated operation when other criteria seem normal (rest of parenchyma, oxygen saturation). Prevention of complementary procedures, such as tracheostomy, might help to obtain better postoperative results.

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Four-flap compound repair of thoracic hernia after sternum osteomyelitis and omentum flap

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Sternal wound infections represent potentially life-threatening complications in patients undergoing cardiovascular surgery. Although the incidence ranges from only 0.3% to 5%, the condition is associated with

significant mortality of 14% to 47% in the published data.¹

Different approaches have been tried to manage post-sternotomy osteomyelitis, including surgical revision followed by open dressings or closed irrigation and reconstruction with vascularized soft tissue flaps. The omentum flap represents an alternative technique that was primarily used in the past.² Its use was hampered by the additional surgical trauma, turning a “1-cavity” into a “2-cavity” surgery, with a much wider range of possible complications, such as pain, reduced thoracic compliance, and a significant risk of hiatal and midline hernia formation.¹

The standard techniques of sternal wound coverage such as the pectoralis major flap have limited applicability in defects in the lower third of the sternum, and a cranially

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