Prevention of middle lobe torsion or bronchial plication using anti-adhesive membrane: a simple, safe and uncomplicated technique!

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Abstract

Middle lobe torsion after right upper lobectomy is a rare but serious complication. Simple lobar shift may also lead to a bronchial plication, causing iterative pneumopathies. The preventive fixation of middle lobe to lower lobe is indicated to avoid these complications in case of complete major fissure. We performed this fixation, by using a resorbable anti-adhesive membrane, usually indicated in preventing postoperative pleural adhesion. This procedure is simple, effective, quick, and easy to perform without any risk of air leaks.

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1. Introduction

Complications occurring at the level of the middle lobe after upper lobectomy are rare but potentially dangerous. They may be favored by a large complete fissure (Fig. 1A), pedicle skeletonisation during hilar lymph node removal, and postoperative persistent pneumothorax. It may include a simple shift of the middle lobe leading to bronchial plication (partial obstruction), a main cause of recurrent pneumopathies, or complete lobar torsion [1]. These may have severe consequences and sometimes may require reintervention for middle lobe repositioning or lobectomy in the case of irreversible infarctus [2]. To prevent such complications, several techniques are recommended: good positioning of the middle lobe before thoracic closure and fixation of lobes together when complete fissure is present. Usually, this fixation is performed by some stitches or staple suture (Wong) but may result in air leakage. When using Sepra-Film (Genzyme Biosurgery, Framingham, USA), an anti-adhesive membrane to prevent adhesion at the level of thoracotomy in patients likely to be reoperated (e.g., surgery for metastasis), we observed a joining of lobes in place. Thus, we continued carrying out this preventive fixation of middle lobe using anti-adhesive membrane, which is innovative in this indication.

2. Technique

After right upper lobectomy, when all essential maneuvers are done, including testing of the bronchial stump, control of air leaks, verification of hemostasis, and lavage of the pleural cavity, chest tubes are inserted into the pleural cavity as usual. Pericostal sutures for closure of thoracotomy are placed unknotted and the Finochietto retractor is repositioned in place to facilitate the application process. The anesthetist is asked to inflate the lungs. The middle lobe is maintained in anatomical position, as before lung resection, and any potential torsion is checked. Once joined, the lower and middle lobes are pushed toward the upper part of the pleural cavity to facilitate apical re-expansion. The lung ventilation is slightly decreased to obtain incomplete inflated lobes. The Sepra-film membrane is cut to obtain a narrow 5-cm-wide strip, making the intra pleural application easier. The membrane is applied onto the surface of middle and lower lobes maintained together (Fig. 1B). A swab moistened with physiological serum holds the membrane on the surface of the two lobes for 30 s. The lung is completely inflated (Fig. 1C) and the thoracotomy is closed. We have used this technique to fix mobile middle lobe to lower lobe in 10 patients during right upper lobectomy for tumor without any complications. The application of the device is easy, quick, non-aggressive, and without risk of air leakage, especially in emphysematous lungs.

3. Discussion

Right upper lobectomy leads to important anatomical changes for middle lobe inside the pleural cavity when
complete fissure is present. There is a real risk of bad positioning of middle lobe when the lobes are reinflated (Fig. 1A). Closed observation is essential to find out a lobar torsion and correct it immediately in order to avoid major complications such as lobar necrosis. Its malpositioning can lead to simple bronchial plication with potentially severe consequences, mainly in the form of recurrent pneumothoraxies. Manual repositioning of middle lobe at the end of operation and interfixation of the two remaining lobes using stapler or some stitches applied on lung is recommended [1].

The drawback of these sutures is that they may cause air leakage. Other possibilities were described using pleural flap [3] but it may lead to restricting lung expansion or putting a thin layer of glue, bioglu [4], Tachocomb [5], which are resorbable biological materials but their tissue adhesion may be poor on damp tissue. Usually used to reduce postoperative adhesions, Sepra-Film is interesting in this nonspecific indication, as it immediately and permanently sticks on the lung surface, and it does not lead to restriction or air leakage. When membrane is applied on parenchyma, it will take the shape of an expanded lung. The transformation of hydrofilm membrane to hydrogel, when it is in contact with wet tissue, allows this expansion. It is composed of two chemically modified anionic polysaccharides (sodium hyaluronate and carboxymethylcellulose) completely resorbable in 7 days. The membrane content ensures a perfect link between the two lobes. The non-specific use of the adhesion barrier to prevent lobar torsion is an innovative strategy. Our experience shows that it is a simple procedure using a resorbable product that can be recommended for interlobar fixation when a natural shift of middle lobe is noticed during reventilation.

References