Pulmonary middle lobe fixation using TachoComb in patients undergoing right upper lobectomy with complete oblique fissure

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Abstract

Postoperative lobar torsion is a life-threatening complication of pulmonary resection. To prevent this complication, pulmonary lobe fixation has been proposed. We present here a new technique of middle lobe fixation after right upper lobectomy, using TachoComb, a collagen fleece coated with fibrin glue. This technique may facilitate tight fixation of the middle lobe to the lower lobe of the right lung in patients undergoing right upper lobectomy with complete oblique fissure.

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1. Introduction

Pulmonary lobar torsion is a rare, but serious complication after thoracotomy [1–6]. In particular, middle lobe torsion after right upper lobe sections is the most common event, and its cause is considered intraoperative and postoperative dislocation of the middle lobe with complete oblique fissure [1–6]. To prevent this complication, it is reasonable to fix the middle lobe to the lower lobe if the oblique fissure is complete [1–6].

However, the practical technique of stapling or suturing the two lobes has not been sufficiently discussed: There is a possibility of postoperative air leakage, hemorrhage and torsion because of the detachment of both the lobes due to laceration of pulmonary parenchyma. Therefore, we introduced a new technique of the lobar fixation using collagen fleece coated with fibrin glue, TachoComb (Product manager: Nycomed Pharmaceutical Co., Ltd., Denmark, Sales department: Torii Pharmaceutical Co., Ltd., Japan). This technique may facilitate tight fixation of middle lobe to lower lobe of the right lung in patients undergoing right upper lobectomy with complete oblique fissure.

2. Technique

Fixation of the middle lobe to lower lobe of the right lung after upper lobectomy is performed under the following conditions: because of complete or dissected free oblique fissure, the middle lobe is mobile enough to twist on a narrow pedicle. In practice, when the middle lobe relocates into a markedly twisted position, or possibly into a torsion position under intraoperative inflated respiratory condition after upper lobectomy, this technique is indicated.

Before fixation, TachoComb (Product manager: Nycomed Pharmaceutical Co., Ltd., Denmark, Sales department: Torii Pharmaceutical Co., Ltd., Japan), commercially available as a collagen fleece coated with fibrin glue, is prepared. This fleece is trimmed into two to three rectangular pieces measuring 4.8 cm × 1.5 cm. Then, each piece is fixed to the half-inflated middle and lower lobes in a bridging manner, while the middle portion, about 1.5 cm in size, is not stuck to the pulmonary lobe surface. Next, 3-0 atraumatic polypropylene sutures are passed through the TachoComb-seated surface of the both lobes, principally by way of the middle contact-free portion of TachoComb (Fig. 1A,B), or directly without passing through the TachoComb, if otherwise impossible (Fig. 1A,C). These sutures are carefully and gently performed, and each ligature is tightly made in two folds of the middle contact-free...
portion of TachoComb. This fixation is performed in two or three locations between the middle and lower lobes.

3. Results

Between April 2001 and January 2003, right upper lobectomy (including combined resection with wedge resection of the middle or lower lobe) was done in 69 patients. Through this period, the present technique was applied in three patients. It was used in one patient for the repair of the middle lobe torsion after right upper lobectomy (case 1). This patient had shown abnormal shadow on plain X-ray examination 3 days after right upper lobectomy for lung cancer, and according to computed tomography, middle lobe torsion was diagnosed. Therefore, 4 days after the initial surgery, lobar fixation was performed because of the reversible function of the middle lobe. This fixation technique was used in the remaining two patients undergoing combined upper lobectomy and middle lobe wedge resection (case 2) or upper lobectomy (case 3), because the middle lobe was markedly mobile due to complete oblique fissure.

There were two interlobar fixations in each of two patients (cases 1 and 3) and three in one patient (case 2). There was no air leakage or pulmonary injury related to each fixation detected intraoperatively, especially in spite of pulmonary complication of emphysema in case 3. There was no postoperative complication observed in this series.

4. Comment

In order to prevent postoperative pulmonary torsion, especially middle lobe torsion after right upper lobectomy, middle lobe fixation to the lower lobe is widely recommended, if the oblique fissure is well developed [1–6]. In fact, this surgical process was routinely performed by some surgeons [1,2,4,6]. However, fixation technique has not been described practically. Herein, we present a new technique of lobar fixation using TachoComb.

TachoComb, consisting of equine collagen in a sponge-like form coated on one side with human fibrinogen and bovine thrombin, is commonly used to effectively control diffuse parenchymatous bleeding and major air leaks from the lung [7,8]. However, to our knowledge, application of this fleece in interlobar fixation of the lung has not been previously reported.

Representative techniques of lobar fixation were previously described [1,2,4,6]: interlobar suturing, and adhesion using fibrin glue on the interlobar surface. However, in the former technique, postoperative air leakage due to laceration of pulmonary parenchyma at the suture point may be a complication, especially in patients with emphysematous lung disease, and the power of interlobar adhesion may not be sufficient in the latter. In addition, complete interlobar adhesion between the corresponding lobes by the conventional methods may cause some technical difficulty in re-thoracotomy. To overcome these weak points, the present technique using TachoComb was developed. Initially, an attempt to achieve interlobar bridging using this fleece alone had been made, but to hold these corresponding lobes more tightly without air leakage, sutures were additionally performed through the fleece adhering to the pleura. As a result, the middle lobe could be partially but tightly fixed to the lower lobe without unfavorable dislocation or torsion. Thus, the present technique was satisfactorily effective without any postoperative complications, although this technique was slightly expensive [7,8]. Of course, in order to demonstrate its usefulness more clearly, comparison between this technique and others is needed.

In our institute, lobar fixation was not performed before April 2001, and we experienced two cases (1.3%) of middle lobe torsion among 152 right upper lobectomies between January 1996 and April 2001. There was no other type of lobar torsion than these two cases: therefore, the incidence was 0.24% among a total of 842 pulmonary resections throughout those periods, indicating that our incidence rate was similar to that described in other reports [1,3,4–6]. One of these cases is presented in this report (case 1). Thereafter, we performed prophylactic fixation of the middle lobe using this novel technique, when the middle lobe was very mobile due to complete oblique fissure (cases 2 and 3), and no such postoperative torsion has occurred since then.

In conclusion, we introduced a novel method of interlobar fixation of the lung, limiting the middle lobe...
fixation to the lower lobe in patients undergoing right upper lobectomy. Importantly, this technique may be useful in the following two conditions: fixation of the middle lobe repairing postoperative torsion and prophylactic fixation in patients with emphysematous lung disease. Moreover, this technique may be widely applied to achieve remaining lobar fixation, for example, middle lobe fixation to the upper lobe after lower lobectomy, and lingular segment fixation to left lower lobe after apical tri-segmentectomy.

References


