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HOW TO DO IT

Our tips for bronchoplasty using suture holder and tourniquet

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Abstract
Bronchial anastomosis is an important part of successful bronchoplasty, but it takes time to achieve stable results because of few opportunities to do it. To ensure a stable outcome, we have applied some tips for bronchial anastomosis. One of the tips is the use of a suture holder to obtain appropriate suture pitches, adjusting the discrepancy of the bronchial diameter, and another one is the use of a tourniquet to obtain an adequate tension upon tying the knots, ensuring good operative view.

Keywords Bronchoplasty · Bronchial anastomosis · Suture holder · Tourniquet

Introduction

Bronchoplasty is a well-known technique, which is sometimes performed in patients with compromised lung function to preserve functional lung parenchyma [1]. However, the frequency with which the procedure is required is very low. According to the annual report of the Japanese Association for Thoracic Surgery, only 546 cases (1.4%) were accompanied with bronchoplasty among 38,444 procedures for primary lung cancer [2]. The frequency of bronchoplasty is only 1–2 cases per year even in an institution with 100 lung cancer cases annually. It is insufficient to master bronchoplasty as a routine procedure. In fact, hospital mortality of lung resection with bronchoplasty is relatively higher than that without bronchoplasty coupled with the complexity of the tumor lesion itself.

Although several tips are suggested for the bronchoplasty procedure, success in bronchoplasty mainly depends on bronchial anastomosis. The point of bronchial anastomosis is considered to obtain appropriate suture pitches, adjusting the discrepancy of the bronchial diameter, and tension upon tying the knots, ensuring good operative view. Continuous suture accompanied with parachute technique in bronchial anastomosis has been proposed in previous papers to obtain a good operative view [3, 4]. But it is difficult to standardize the continuous suture technique while adjusting the discrepancy of the bronchial diameter at institutions with low frequency of bronchoplasty. So, we present here our tips using suture holder and tourniquet in bronchial anastomosis.

Technique

The procedure was performed in standard fashion including bronchial resection in open surgery. Systematic hilar and mediastinal lymph node was also dissected before bronchial anastomosis began. Bronchial anastomosis using interrupted sutures with the 4 – 0 PDS was performed as follows: after confirming that the membrane–cartilage junction faced correctly, the initial stitch was placed in the deepest aspect of the bronchial cartilage (6 o'clock) in an in–out and out–in fashion and the threads were set on the 6 o'clock position of the circular suture holder (TMP suture-ring, Tokai Medical Products, Inc., Kasugai, Japan). The second stitch was placed on both sides of the first stitch and the threads were set on the corresponding slits of the suture holder (5 and 7 o'clock). Two more stitches were placed on the lateral to the each second stitch and the threads tightened using tourniquets [4 mm (outer-diameter), 120 mm (length), SILASCON, Kaneka Medix Corp., Osaka, Japan], confirming that each bronchial stump was attached properly. Then, the first three threads were tied down making knots inside the bronchial cavity. After releasing the tourniquets and placing the next stitches laterally in an out–in and in–out fashion, previous threads were tied down. After placing residual stitches

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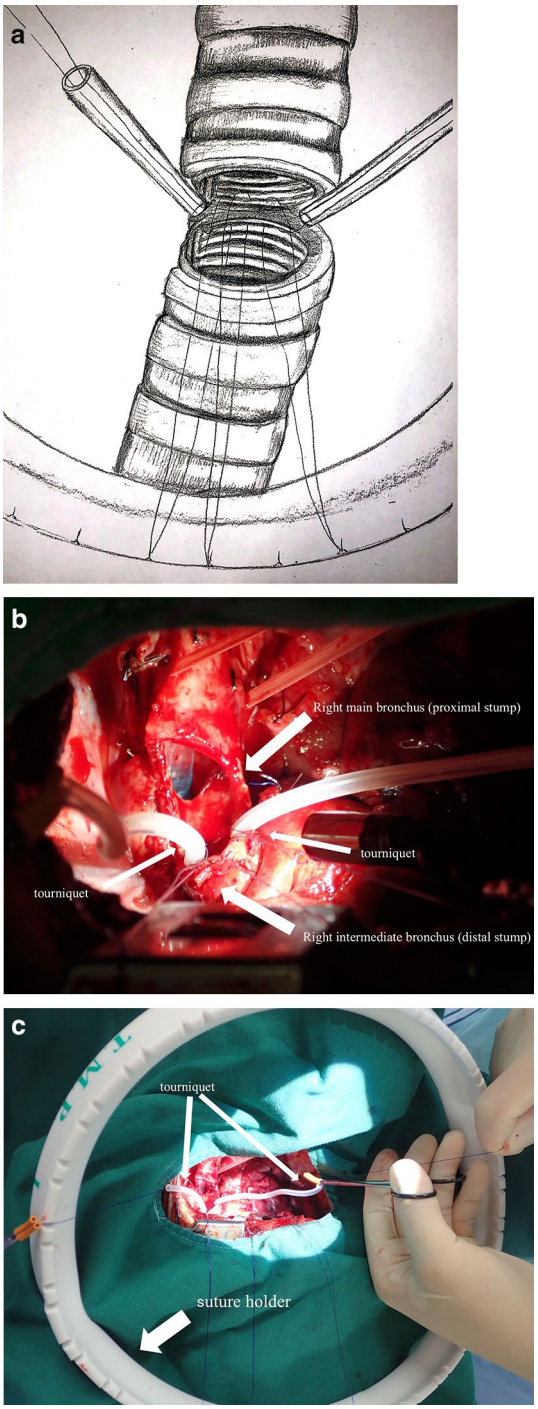

Fig. 1 **a** Schematic bronchial anastomosis using a suture holder and tourniquet. **b** Bronchial anastomosis using tourniquet in right sleeve upper lobectomy. **c** External view of our procedure in right sleeve upper lobectomy

setting on the corresponding slits of the suture holder, the thread on the top (12 o'clock) was tightened using the tourniquet. After checking the final integrity of the bronchial anastomosis, the remaining threads were tied down making knots outside the bronchial cavity. Finally, the thread on the top was tied after releasing the tourniquet (Fig. 1).

Discussion

In bronchial anastomosis, too loose or too tight ligation will result in immediate air leakage requiring additional stitch or anastomosis site ischemia inducing bronchial fistula, respectively. We simplified the bronchial anastomosis using the suture holder and the tourniquet. Suture holder, which is often used in heart valve replacement, contributed to making it easy to confirm the pitch of the sutures. Tightening the threads using tourniquets contributed to keeping proper wall tension while tying the knot under a good operative view. We applied this technique for 5 patients who were all bronchoplasty cases in the last 4 years. We have not experienced the problem of bronchial anastomosis site since the introduction of this technique.

Conclusion

Bronchoplasty with our bronchial anastomosis technique using a suture holder and tourniquets is promising.

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Compliance with ethical standards

Conflict of interest All authors have no conflict of interest.

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