Fissureless technique might prevent the middle lobe impairment after right upper lobectomy

Running Head: fissureless right upper lobectomy

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The evolution of video-assisted thoracic surgery (VATS) has produced a series of technical changes such as the fissureless lobectomy, particularly fit for the right upper lobectomy (RUL) [1]. This technique has been so valued that is now routinely performed in our department, even in open surgery, when possible and believed appropriate for the oncological purposes. As a side remark, we had the sense that the middle lobe reaction could be aided in the postoperative course by stapling the fissure as the last step of the lobectomy.

The series of RULs (VATS and open) performed in 6 years' timespan was reviewed and divided in 2 groups, traditional (TG) vs fissureless (FG). We assessed in-hospital chest x-rays (postoperative day 3 to discharge), the 30-days one, number of fiberbronchoscopies, leucocyte counts and all the general clinical records. Data were compared to evaluate possible differences between the two techniques.

We found 162 cases of RUL: 96 (59.2%) TG and 66 (40.8%) FG. In the in-hospital chest x-rays, the radiologist disclosed normal findings of lung parenchyma in 86/96 TG

(89.5%) and 62/66 FG (93.9%) while middle lobe opacity was reported in 11 patients (8/96 and 3/66; 8.3% vs 4.5% respectively) (Fig 1 A, B, C, D). In the traditional RULs, middle lobe was solidarized to the lower by tangential mechanical stapling when surgeon revealed an excessive middle lobe mobilization; in the FG no patient required it. Permanent signs of middle lobe atelectasis were not reported at 30-day controls. In the TG the mean number of fiberbronchoscopies per patient was consistently higher (0.2 compared to 0.04 in the FG: p=0.005 Figure 1E). Leucocyte counts showed a slightly higher trend in the TG at third postoperative and discharge day (12.387 vs 10.852 p=0.08 and 10.492 vs 7.549 p=0.06). No redo-operation was required and postoperative right pneumonia was diagnosed in 4 TG patients and 2 FG patients (4.1% and 3% respectively).

Out of this analysis, fissureless RUL seems not inferior regarding outcome compared to traditional RUL. Perioperative Chest-X-Ray, general clinical data and leucocyte counts suggest that fissureless approach might show a less intense impact on the remaining lung. Specifically, the middle lobe reacts to fissureless RUL with fewer events of local atelectasis, vascular impairment and sputum retention compared to the traditional technique. The lower numbers of bronchoscopies in the FG, might be related to minor positional changes of the middle lobe that seems to have fewer free movements and tendency to stay in its native location, just coming higher. On the other hand, the necessity to prepare the interlobar-fissure vascular plane in the traditional group makes the middle lobe less stable especially when the fissure between middle and lower lobe is complete.

This preliminary retrospective collection of data attempted to assess the middle lobe changes after RUL using non-specific parameters. Moreover, the case-series encompasses RULs performed by VATS and open surgery and grouped according solely to fissure approach. In this regard, the number of bronchoscopies and the radiological revision showed several suggestive aspects for a smoother middle lobe adaptation but no

one is conclusive due to possible confounders (thoracotomy, pain, experience, VATS, et cetera).

In conclusion, fissureless RUL represents a feasible and alternative option to the traditional technique [2]. If oncologically sound, it is advisable in open surgery as well and might have a remarkable effect on the middle lobe. There is no possibility yet to disclose that this procedure is superior to the traditional one, that requires additional surgical steps, [3] due to the lack of knowledge but it seems a potential matter of interest for future research.

References

[1] Balsara KR, Balderson SS, D'Amico TA Surgical techniques to avoid parenchymal injury during lung resection (fissureless lobectomy). Thorac Surg Clin 2010; 20: 365-9.

[2] Refai M, Brunelli A, Salati M, et al. Efficacy of anterior fissureless technique for right upper lobectomies: a case-matched analysis. Eur J Cardiothorac Surg 2011; 39: 1043-6.

[3] Venuta F, Anile M, De Giacomo T, et al. Prevention of middle lobe torsion after right upper lobectomy with a polymeric sealant. J Thorac Cardiovasc Surg 2012; 143: 240-1.

Figures

Figure 1: Panel A: Third postoperative day chest x-ray of a TG RUL through thoracotomy showing middle lobe impairment (white arrow) requiring fiberbronchoscopy. Panel B: Discharge day chest x-ray of same patient showing persistent middle lobe impairment (white arrow). Panel C: Third postoperative day chest x-ray of a FG RUL in VATS showing middle lobe impairment (white arrow). Panel D: Discharge day chest x-ray of the same patient with resolution of middle lobe impairment (white arrow) without need of fiberbronchoscopy. Panel E: Graphic showing the rate of fiberbronchoscopies in the two groups.