Techniques of Right Extended Pneumonectomy

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Tracheal sleeve pneumonectomy is considered the operation of choice for tumors involving the right tracheobronchial angle, even though the procedure is burdened by a high rate of perioperative morbidity and mortality. In this report, we present our experience with two different techniques to avoid sleeve pneumonectomy: the tangential tracheal suture and the tracheoplasty.

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Results
From December 2009 to December 2012, 12 patients with non-small cell lung cancer (9 men and 3 women, median age 65 years) underwent right pneumonectomy by use of these techniques (six tangential tracheal sutures and six tracheoplasties).

In two cases, associated superior vena cava resection and reconstruction with heterologous pericardial patch were performed. One patient underwent a chest wall resection including the first four ribs.

Buttressing of the tracheal suture was performed in every case, using a flap of pericardium in 8 patients (in 1
patient in addition to an intercostal muscle), and a pericardial fat pad and a pleural flap in 2 patients, respectively.

Eight patients had induction therapy (6 chemotherapy and 2 chemoradiotherapy), and 1 patient underwent operation for an anastomotic recurrence 9 months after a right upper sleeve lobectomy.

No intraoperative or postoperative complications related to the procedure were observed.

All tracheoplasties were checked in the perioperative period with fiberoptic bronchoscope on the seventh and 30th postoperative days, resulting in normal suture healing in every case.

Pathologic examination revealed 10 squamous cell carcinomas and two adenocarcinomas: 11 cases of direct tracheal involvement (T4) by the tumor and one tracheal involvement by N2 disease. Positive tracheal margins were observed in two cases despite negative results of frozen section examination.

The pathologic stages were as follows: eight stage IIIA, two stage IIIB, and two pTxNxMx for complete response after induction treatment.

Comment

Tracheal sleeve pneumonectomy represents the standard of treatment for tumors involving the proximal part of the right main bronchus, the tracheobronchial angle, or the carina. This operation achieves satisfactory results in a few experienced centers [1–4], but it may be associated with several dangerous complications, such as adult respiratory distress syndrome, empyema, and anastomotic leaks [6]. Technical errors during airway resection and reconstruction are the basis of impaired anastomotic healing; excessive dissection with blood supply impairment, significant anastomotic tension resulting from an excessive length of airway resected, or ineffective use of release maneuvers are the most recognized causes. The reported rate of bronchopleural fistulae after TSP is between 5% and 10%, higher than after conventional pneumonectomy (between 1% and 4%) [5].

Mansour and colleagues [7] have recently described a technique of partial right sleeve pneumonectomy with carinal flap closure in cases of limited tumor invasion of the tracheobronchial angle. The advantage of this procedure is the reduction of tissue dissection and maintenance at the same time of a good blood supply on the stump; the well-vascularized membranous portion of the right main bronchus is used to close the tracheal defect. On the other hand, this operation may be applied only for tumors invading the cartilaginous wall of the main bronchus with no involvement of the membranous part and with limited involvement of the tracheobronchial angle. Our techniques are applicable also for tracheobronchial invasion extended to the membranous wall and carina. As with TSP, in our techniques it is of paramount importance to preserve the blood supply and avoid any tension on the suture line.

One of the main advantages for both techniques is the reduced devascularization caused by the limited tracheobronchial dissection. In our opinion, the risk of significant stenosis after tangential suture procedure is negligible because of the relevant caliber of the trachea. Concerning tracheoplasty, the key point to avoid anastomotic tension is to perform a generous wedge resection of the tracheobronchial angles and a blunt dissection of the left main bronchus. In this manner also the risk of kinking is reduced, given that acute rotation caused by mediastinal shift is unlikely.

In conclusion, the tangential tracheal suture and the tracheoplasty techniques are effective alternatives to TSP in cases of limited neoplastic involvement of the right tracheobronchial angle or the origin of the right main bronchus.

References