



# Anterior approach to Pancoast tumors

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Pancoast tumors, or tumors of the superior sulcus, are rare non-small cell lung cancers arising from the apex of the lung and involving the structures of the apical chest at the level of the first rib or above (1). The involvement of the chest wall and the frequent infiltration of vital structures, such as the spine, the brachial plexus and the subclavian vessels, make surgical resection particularly challenging.

Because of this, for many years Pancoast tumors were deemed unresectable. Only in the 1950s, Shaw, with the introduction of a bimodality treatment based on induction radiotherapy followed by surgical resection through a postero-lateral approach, reached the first successes (2). Finally, in the 1990s a new trimodality approach was defined, based on a combination of induction chemo- and radiotherapy, followed by radical surgical resection, and different studies confirmed it as the modern standard treatment (3-12).

During this time lapse, there has been a concurrent evolution in the surgical techniques. The first surgical approach for the treatment of the Pancoast tumor was described by Shaw and Paulson and is known as high postero-lateral approach. It consists of a postero-lateral thoracotomy that extends upwards to the level of C7. This has been the standard approach for many years and it is still the standard technique in most centers, especially when the tumor involves the posterior compartment of the thoracic outlet (2). In the early 1990s, Darteville and colleagues described the anterior transcervical approach, subsequently refined by Grunenwald's transmanubrial L-shaped approach, which allows an excellent exposure of the entire thoracic inlet and in particular of the most anteriorly located structures, such as the subclavian vessels. Other approaches are the Masaoka's anterior transternal approach and the

hemiclamshell approach (13). The approach is generally chosen on the basis of the surgeons' preference and the location of the tumor, to ensure a complete resection.

In the recent issue of *Shanghai Chest*, Bobbio and colleagues provided a thorough description of the anterior approach technique through a transmanubrial L-shaped sternal division. This article, issued by renowned surgeons of the field, gives a step-by-step illustration of the surgical technique, accompanied by didactic colour plates and video clips, and by a complete argumentation of tricks and pitfalls. Thus, it constitutes a precious reference for all surgeons who want to deal with this challenging type of surgical procedure. Moreover, it gives the opportunity to focus on some particular issues of the treatment of Pancoast tumors (14).

First, an accurate knowledge of the anatomy of the first rib and, in general, of the thoracic outlet is of utmost importance in order to perform this operation. As stated before, the superior sulcus is a complex region and the frequent involvement of delicate vital structures makes the surgical approach technically demanding and a complete resection difficult to achieve. Thus, particular expertise is required to perform vascular and chest wall resections and reconstructions. Moreover, it frequently involves teamwork with other surgeons, as vascular surgeons or neurosurgeons. Therefore, this type of surgery should be performed only in high volume and specialized centers, where all these specialist surgeons co-exist, and where the patient is treated in a multidisciplinary setting.

The multidisciplinary approach is the second main point. In the history of Pancoast tumor, the most important improvements were determined by the association of radiotherapy and chemotherapy to surgery, thus giving

a chance of treatment to a tumor previously defined inoperable and incurable. Different studies confirmed that the combined approach is feasible and allows for a good rate of complete resection. Moreover, induction chemotherapy with platinum-based regimes generally is well tolerated without major toxicities and result in high resectability rate (15–62%) (3–12). Therefore, a standardized multidisciplinary approach with trimodality therapy should always be performed, to facilitate the surgical resection of the disease and to improve the oncological outcomes.

Last point to focus on regards the combined approaches. As stated by Bobbio and colleagues, it is frequently necessary, after completion of the surgical manoeuvres through the anterior approach, to turn the patient and perform a second incision to complete the lobectomy and the mediastinal lymph node dissection. This may be one of the most important limitations of this approach, adding a second incision in the same patient, with a consequent increase of post-operative pain-related complications. Recently, however, various authors have proposed a hybrid operative technique, which combines an open anterior approach (most frequently transmanubrial) with standard thoracoscopy. In these cases, dissection of the structures of the thoracic outlet is carried out via the transmanubrial approach, while dissection of the hilum to complete the lobectomy and mediastinal lymphadenectomy is performed through a standard VATS (15–19). There are some clear advantages through this approach, because lobectomy is conducted through well-known accesses, avoiding the uncommon transmanubrial access for lobar dissection and, supposedly, adding little morbidity to the procedure. With the evolution of the technical instruments and the increasing experience with thoracoscopic lobectomy, hybrid approaches could represent a new step forward in the surgical management of Pancoast tumors.

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