

AB003. Pancoast tumors

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Abstract: Pancoast or superior sulcus tumors are rare tumors although some series claim they account for up to 5% of lung cancers. They are located in the apex of the lung and may invade adjacent structures such as the first and second ribs, the lower nerve roots of the brachial plexus, the subclavian vessels, the sympathetic chain and the vertebral column. Pancoast tumors give rise to a variety of symptoms that depends on the area of invasion within the thoracic inlet, which is divided into 3 compartments separated by the insertion of the anterior and middle scalene muscles on the first rib. When the tumor invades the brachial plexus patients develop severe pain that typically begins in the shoulder or scapular region and spreads to the upper extremity. The ulnar nerve arises from the lower part of the brachial plexus and may eventually cause atrophy of the forearm and hand muscles. Obstruction of the subclavian vein leads in edema of the upper extremity and invasion of the sympathetic chain and stellate ganglion may occur which causes Horner's syndrome. Because shoulder pain is often the initial symptom and pulmonary symptoms are frequently rare initially, there is often a delay in diagnosis for most patients while they are investigated by other specialties including physiotherapist, rheumatologists and orthopedic surgeons. The diagnosis will be made by the combination of the characteristic clinical symptoms with the radiographic findings of a mass in the apex of the lung which is confirmed by CT scan. Diagnosis, staging and treatment follow the same principles as other lung cancers. Tissue diagnosis of the tumor by way of CT-guided fine needle aspiration should always be performed before any treatment because there are important although rare differential diagnoses from other pathology in in the apex of the lung that may produce similar clinical and radiologic findings. These include inflammatory and infectious lung diseases such as TB, aspergillus, echinococcus, actinomyces or common lung abscesses. Primary chest wall tumors and mesothelioma should also be ruled out, and if a CT-guided biopsy is not possible VATS may be a useful. Magnetic resonance imaging is superior to CT investigations of tumor invasion of the structures in the thoracic inlet before any surgery is considered. Pancoast tumors are classified

according to the TNM-system and are by definition T3 or T4 tumors when they invade the chest wall only (T3) or if they extend the brachial plexus, vascular structures or vertebral column (T4). The only difference relates to N-stage where ipsilateral supraclavicular nodes sometimes considered regional lymph nodes in contrast with other lung neoplasms where they are always staged as N3 disease and consequently contraindicate surgery. For decades treatment of Pancoast tumors was non-surgical with palliation radiotherapy. From the 1950s, surgery became an option following neoadjuvant radiotherapy, and since then prospective trials have demonstrated that neoadjuvant chemo-radiotherapy is superior to radiation alone and is now considered standard of care although surgery upfront has been advocated by few. Contraindications for surgical resection are presence of distant metastases, involvement of mediastinal (N2) or contralateral supraclavicular lymph nodes (N3), involvement of the brachial plexus above the T1 nerve root and invasion of more than 50% of a vertebral body. Surgical resection can be made from variations of an anterior or posterior approach. The choice depends on the location of the tumor in the thoracic inlet which is most often in the posterior compartment as well as the extent of invasion. It has been suggested that if there is any tumor invading the endothoracic fascia at the upper thoracic aperture one should always use the anterior approach. Definite resectability of a Pancoast tumor can only be assessed during surgery and the goal of surgery is always a R0-resection. Invasion into adjacent structures may require rather extensive resections and subsequent need for reconstruction, which includes stabilization of the vertebral column and reconstruction of the subclavian artery. The subclavian vein may be reconstructed or ligated without reconstruction and the T1 nerve root may be sacrificed with minimal morbidity whereas the C8 nerve root should always be spared because it would otherwise result in permanent paralysis of the upper extremity. Resection of invaded structures should be made en bloc with the pulmonary resection, which is preferably an upper lobectomy. Very few surgeons have extensive experience in these resections and it is of benefit to involve other surgical specialties such as spine surgeons in the procedure. The classic posterior approach was introduced in the 1960s by Shaw and Paulson. The more popular anterior trans-clavicular approach was developed by Darteville where the patient lies supine and an L-shaped skin incision is made along the anterior border of the sternocleidomastoid muscle extending to the manubrium where it turns laterally just below the

clavicle whose medial part is divided and retracted which gives an ideal exposure of the subclavian vessels and the brachial plexus. However, a lobectomy is not possible through this approach and requires an additional thoracic incision. Both approaches have been modified by several others and VATS has been introduced as an adjunct for the parenchymal resection whereby a subsequent thoracotomy can be avoided which is believed to minimize the surgical trauma. The main factors which affect prognosis in patient with Pancoast tumors who undergo treatment with curative intent (trimodality treatment) are the T-status, which is lower for T4 tumors and particularly when there is invasion of the spine. Response to induction treatment is also important with better results for better responders. Pathological N-status is just as important as for other lung cancers and naturally the completeness of resection

plays a major role for survival. The reported survival varies tremendously depending on these factors but is typically 40–50% in general but may reach 90% in highly selected subgroups of patients. In conclusion, Pancoast tumors are rare but may be treated surgically in selected patients with fine results. Surgery is demanding, and few surgeons have extensive experience with these advanced cancers. Resection should always be part of multimodality management in collaboration with medical and radiation oncologists.

Keywords: Pancoast tumors; superior sulcus tumors; lung cancer

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