特別講演II

Anterior Transcervical Thoracic Approach for Apical Lung Cancer

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The patient is placed in the supine position with the neck hyperextended and head turned away from the involved side. An L-shaped incision cervicotomy is made and includes a vertical pre sternocleidomastoid incision prolonged horizontally below the clavicle up to the delto-pectoral groove. The incision is then deepened with cautery. Division of the sternal attachment of the sternocleidomastoid muscle is made and the cleidomastoid muscle is scraped from the clavicle creating a myocutaneous flap which is folded back giving a full exposure of the neck and thoracic inlet and upper part of the anterolateral chest wall. Once the inferior belly of the omohyoid muscle is transected, the scalene fat pad is dissected and pathologically examined to exclude scalene lymph node micrometastasis. Inspection of the ipsilateral superior mediastinum is then made by operator's finger along the lateral aspect of the tracheoesophageal groove. Tumor's extension to the thoracic inlet is then carefully assessed. We recommend resection of the internal half of the clavicle only if the tumor is deemed resectable. Jugular veins are first dissected, so that branches to the subclavian vein can eventually be divided. On the left side, ligation of the thoracic duct is usually required. Division of the distal part of the internal, external and anterior jugular veins makes the visualization of the venous confluence at the origin of the innominate vein easier; do not hesitate to suture-ligate the internal jugular vein to increase the exposure to the subclavian vein. If the subclavian vein is involved, it can be easily resected after its proximal and distal control has been achieved.

Next, the scalenus anterior muscle is divided either on its insertion on the scalene tubercle on the first rib or in tumor free margins with cautery. If the tumor has invaded the upper part of this muscle, it needs to be divided at the insertion on the anterior tubercles of the transverse processes of C3 through C6. Before dealing with the anterior scalenus muscle, the status of the phrenic nerve is carefully assessed since its unnecessary division has a deleterious influence on the postoperative course. It should be preserved whenever possible. The subclavian artery is then dissected. To improve its mobilization, its branches are divided; the vertebral artery is resected only if invaded and provided that no significant extracranial occlusive disease was detected on preoperative doppler ultra-
sound. If the tumor rests against the wall of the subclavian artery, the artery can be freed following a subadventitial plane. If there is an invasion of the arterial wall, resection of the artery in order to obtain tumor-free margins is necessary. After its proximal and distal crossclampage, the artery is divided on either side. Revascularization is performed at the end of the procedure either with PTFE graft (φ6 or 8 mm) or, more frequently, with an end to end anastomosis. During these maneuvers, the pleural space might be opened by dividing the Sibson's fascia. The middle scalenus muscle is divided above its insertion on the first rib or higher as indicated by the extension of the tumor. It might require, especially for apical tumors invading the middle compartment of the thoracic inlet, division of its insertions on the posterior tubercles of the transverse processes of the second through seventh cervical vertebrae. The nerve roots of C8 and T1 are then easily identified and dissected in an out to inside fashion until they confluence to from the lower trunk of the brachial plexus. Thereafter, the prevertebral muscles are detached along with the dorsal sympathetic chain and satellite ganglion from the anterior surface of the vertebral bodies of C7 and T1. This permits visualization of the intervertebral foramina. The T1 nerve roots is usually divided beyond visible tumor, just lateral to the T1 intervertebral foramen. Although tumor's spread to the brachial plexus may be high, neurolysis is usually achieved without division of the nerve roots above T1. The nerve damages of the lateral and long thoracic nerves should be avoided since this may result in winged scapula. Before performing the pulmonary resection, the chest wall resection is completed. The anterolateral arch of the first rib is divided at the costochondral junction while the second rib is divided at the level of its middle arch and the third is scraped on the superior border toward the costovertebral angle. Then the specimen is progressively freed. The first ribs are then disarticulated from the transverse processes of the first two or three thoracic vertebrae. To facilitate this it is often useful to staple and divide the upper part of lobe below the tumor. It is through chest wall hole that one completes the operations by resecting en bloc the underlying lung parenchyma, possibly by an upper lobectomy rather than a wedge resection. Do not hesitate to turn the patient after closure of the anterior wound and complete the excision through the posterolateral thoracotomy.

Recently, we have developed a technique for resecting apical tumors extending into intervertebral foramen without intraspinal extension. The underlying principle is that a radical procedure can be performed by resecting the intervertebral foramen and dividing the nerve roots inside the spinal canal; this is made by a combined anterior transcervical and posterior midline approach. The first step of the operation includes the transcervical approach during which resectability is assessed and all tumor-bearing area is freed in tumor-free margins as described above. Upon completion, the patient is placed in a ventral position and a median vertical incision extending from the spinal processes from C7 to T4 is performed; after an unilateral laminectomy on three levels, the nerve roots are divided inside the spinal canal at the emergence of the external sheath covering the spinal cord. After cutting the vertebral bodies on the middle part, the specimen is resected en bloc with the lung, ribs and vessels through a posterior incision. On the side of the tumor the spinal fixation is made in the pedicle above and below the resection of hemivertebrae.
Contralaterally, a screw is placed in each pedicle.