Minimally invasive VATS left upper lobe apical trisegmentectomy

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Clinical vignette

The patient is a 75-year-old female with a 40-pack-year smoking history. Low dose lung screening computed tomography (CT) scan found a 1-cm left upper lobe (LUL) mass. The patient denies any hemoptysis, weight loss, bone pain or neuro status changes. Her pulmonary function tests are not normal. Her pulmonary function tests demonstrated that the forced expiratory volume (FEV_1) was 58% of predicted FEV_1 and 80% of predicted diffusion lung capacity (DLCO). A lingular sparing LUL apical trisegmentectomy was thus planned.

Surgical techniques

Preparation

The patient is intubated with a dual lumen endotracheal tube. The left lung is then isolated. The patient is positioned on a beanbag in the right lateral decubitus position, with the left side up. The break in the table is between the level of the nipples and the iliac crest.

Exposition

Four incisions are made.

1st incision (2 cm): inferiorly and medial, one space below mammary crease, generally in the 6th intercostal space and tunneled posteriorly. A finger is placed into the thoracic cavity and the costophrenic angle palpated.

2nd incision: mid axillary line, between 8th or 9th intercostal space. A 5-mm trocar is placed through the space to accommodate the 5-mm, 30-degree thoracoscope.

3rd incision (4-5 cm): utility incision is made in the intercostal space directly over the level of the superior pulmonary vein. This incision is 4 cm and is started on the anterior border of the latissimus muscle and extended anteriorly. A wound retractor is placed in this incision to keep the tissues from co-apting and causing a vacuum during the use of the suction device.

4th incision: four fingers below tip of the scapula, halfway to spine in the auscultatory triangle.

Operation

The thoracoscope is inserted and the hilum is exposed. The level 5 & 6 lymph nodes are dissected free. The lung is retracted laterally and posteriorly through the posterior and the anterior incisions. The Vagus and recurrent laryngeal nerve are identified and preserved. Dissection is carried out along the superior border of the superior pulmonary vein as far up onto the hilum as possible, generally until the descending aorta is visualized. This will help in freeing the superior aspect of the anterior trunk of the pulmonary artery. The superior pulmonary vein is inspected and care is taken to ensure that a common trunk is not present. The lingular vein is identified and preserved. The veins draining the superior segment are isolated. A stapler is passed from the 4th incision below the scapula and the veins transected.

The lung is now pulled inferiorly to help expose the anterior trunk of the pulmonary artery. Lymph nodes present on the LUL bronchus must be dissected free. This node dissection will in turn aid visualization of the anterior trunk and allow for safer dissection of the plane between the bronchus and the anterior trunk. The plane between the bronchus and the anterior trunk is established. A stapler is passed from the 4th incision below the scapula and the anterior trunk is transected. The second branch is often visible from this exposure and may be taken at the same time as the anterior trunk.

Through the posterior incision, the lung is now positioned superiorly and slightly anteriorly. There will

often be a slight notch in the periphery that can aid in identifying where the fissure should be, between the apical trisegment and the lingula. The pulmonary artery is identified in the hilum/fissure. A stapler passed through incision 1 separates the lingula from the apical trisegment to the level of the hilum. Blunt dissection is used to create a tunnel between the artery and the rest of the fissure. The lung parenchyma is lifted away from the artery, exposing the tunnel created on top of the artery. A stapler is passed through incision 1 and the fissure is transected. This is repeated until the fissure is completely transected. The lingual and the posterior segment are rolled forward onto the stapler anvil which is held in place and not advanced. The lingular artery is identified and preserved. This in essence duplicates a division of the fissure between the lingual and the upper division from posterior to anterior.

The lung is then returned to its anatomic position and the lingula is retracted superiorly and anteriorly via the posterior port. The pulmonary artery is again identified and now dissected in the fissure to expose the upper lobe arterial branches. Then the lingular artery is identified and kept safe. The stapler is passed from incision 1 and the artery to the posterior segment is divided, taking care not to injure the lingular artery. Careful inspection is carried out to ensure all arterial branches to the apical trisegment have been transected. If any remain they may be transected either from incision 1 or 4, depending on which incision allows for the safest angle of approach.

The lung is now retracted anteriorly to help expose the bronchus. The bronchus is dissected towards the lung parenchyma until the carina between the upper division and the lingula is identified. A stapler passed from incision 1 is used to transect the upper division bronchus, while taking care to preserve the lingular bronchus.

Completion

Upon division of the segment, it will be placed in a large Cook brand lap sack and removed via the utility incision (#3 incision). Local anesthetic is used to accomplish intercostal nerve blocks from T2-T8. Chest tubes are placed. The incisions are then closed in three layers.

Comments

Clinical results

We evaluated the results of our institutional outcomes for VATS trisegmentectomy (1). A total of 73 VATS trisegmentectomies were performed between 1998 and 2010. The average age was 72 years old; 49 female, 24 male. Diagnoses for the trisegmentectomies included: primary lung cancer 91% (66/73), benign disease 4% (3/73) and metastatic disease 5% (4/73). Of the patients undergoing VATS trisegmentectomy for primary lung cancers, 68% (45/66) were for stage IA, 17% (11/66) were for stage IB, 15% (10/66) were for stage 2 and above. A total of 73 LUL trisegmentectomies were performed. The mean hospital stay for patients undergoing VATS trisegmentectomy was 3.8 days (SD =3.3) *vs.* 5.5 days (SD =7.9) for VATS LUL lobectomy P=0.0736 (P>0.05). There was no statistical difference in overall complication rates between the two groups. There was also no difference in survival between patients undergoing VATS trisegmentectomy and those undergoing LUL lobectomy for either stage IA lung cancer or stage IB lung cancer.

Advantages

We believe that segmentectomy can be performed by VATS with no more morbidity or mortality than that for VATS lobectomy (1,2). Additionally, LUL trisegmentectomy provides the same chance of survival as lobectomy for stage IA and IB tumors (1,3). Transecting parenchyma for the segmentectomy does not translate into a longer stay than post lobectomy (1,4). The lingula does not need to be resected for small apical lung cancers, as LUL trisegmentectomy provides the same survival as lobectomy for stage IA and IB tumors (1-5). Our experience supports the use of lingula-sparing trisegmentectomy in the treatment of IA and IB lung cancer.

Caveats

The biggest concern for a cancer operation is survival rates. In our series, the overall survival was the same for the segmentectomies and the lobectomies. That rate however, can be affected by many factors, including staging and comorbidities. Some studies have shown better survival with lobectomy, however the debate continues in regards to optimal approaches.

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References

1. Soukiasian HJ, Hong E, McKenna RJ Jr. Video-assisted thoracoscopic trisegmentectomy and left upper lobectomy provide equivalent survivals for stage IA and IB lung cancer. J Thorac Cardiovasc Surg 2012;144:S23-6.
2. Schuchert MJ, Pettiford BL, Keeley S, et al. Anatomic segmentectomy in the treatment of stage I non-small cell lung cancer. Ann Thorac Surg 2007;84:926-32; discussion 932-3.
3. Okada M, Koike T, Higashiyama M, et al. Radical sublobar resection for small-sized non-small cell lung cancer: a multicenter study. J Thorac Cardiovasc Surg 2006;132:769-75.
4. Harada H, Okada M, Sakamoto T, et al. Functional advantage after radical segmentectomy versus lobectomy for lung cancer. Ann Thorac Surg 2005;80:2041-5.
5. Watanabe A, Koyanagi T, Ohsawa H, et al. Systematic node dissection by VATS is not inferior to through an open thoracotomy: a comparative clinicopathologic retrospective study. Surgery 2005;138:510-7.

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