



Lower lobe S⁷⁺⁸ video-assisted thoracoscopic surgery segmentectomy

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Abstract: The aim of surgical resection of pulmonary metastases is to prolong or cure patients without inducing morbidity and with preservation of as much lung tissue as possible to ensure a sufficient resection margin. Video-assisted thoracoscopic surgery (VATS) segmentectomy is an option for centrally placed metastasis that are not accessible for a wedge resection. A case of a 65-year-old male with two nodules central in the right lower lobe suspicious for metastasis is presented. VATS Segmentectomy of segment 7 and 8 on the right side was performed by a standardized anterior three port approach, demonstrated on video. Technical details are discussed. The postoperative course of the patient was uneventful.

Keywords: Video-assisted thoracoscopic surgery (VATS); segmentectomy; pulmonary metastases

Received: 23 July 2018; Accepted: 07 August 2018; Published: 07 September 2018.

doi: 10.21037/jovs.2018.08.06

View this article at: <http://dx.doi.org/10.21037/jovs.2018.08.06>

Introduction

More and more patients are referred for resection of metastasis. The evidence for the efficacy of metastasectomy is sparse (1). The aim of surgical resection is to prolong or cure patients with inducing minimal morbidity and preservation of as much lung tissue as possible ensuring a sufficient resection margin. Video-assisted thoracoscopic surgery (VATS) segmentectomy is an option for centrally placed metastasis that are not accessible for a wedge resection.

Case presentation

The patient was a 65-year-old male who underwent a right-sided nephrectomy 3 months previously due to a renal cell carcinoma. Follow-up CT showed two nodules in the right lower lobe suspicious for metastasis. The performance status was good with a previous percutaneous coronary intervention (PCI) 3 years ago as the only co-morbidity. He was a non-smoker with a FEV1 of 2.82 (86%) and a DLCO



Figure 1 Video of a VATS segmentectomy 7,8 right for central metastases (2). VATS, video-assisted thoracoscopic surgery. Available online: <http://www.asvide.com/article/view/26955>

60%. A PET-CT revealed two PET positive nodules in segment 8 on the right side. One 5 mm tumour was superficial on the pleural surface and one 7-mm tumour was central in the segment not accessible for a wedge resection (*Figure 1*).

Pre-operative preparation

For preparing of segmentectomies and identifying central nodules a 3D CT reconstruction may be very helpful. Details of vessels and bronchi can aid in the procedural planning and intraoperative surprises minimized. For this patient only a PET-CT was available.

Equipment preference card

The set up is similar to what we use for performing VATS lobectomies: A 30-degree, 10-mm HD thoracoscope (Endoeye, Olympus), a wound protector (SurgiSleeve, Medtronic) applied in the utility incision, for division of vessel and bronchus an endoscopic-tristapling device (Medtronic), for double lumen intubation a camera tube (Ambus), peanuts, a silicone chest tube CH 24 and a set of dedicated VATS instruments (Duffner and Scanlan).

Procedure

An anterior approach with two ports and a 4-cm utility incision similar to previously described in detail for VATS lobectomy (3-5). The patient is positioned in the lateral decubitus and the table is bend at the level of the xiphoid to make the intercostal spaces wider. A double-lumen camera tube is used for selective lung isolation. The 4-cm utility incision is anterior to the latissimus dorsi muscle in the 4th intercostal space. The serratus anterior muscle is split in direction of its muscle fibers and the intercostal muscle is cut at the upper edge of the 5th rib. A wound protector is inserted. A 30-degree, 10-mm HD thoracoscope is introduced and the thoracic cavity can be examined for unexpected pathology, adhesions and the level of the diaphragm. Then, an additional 10-mm camera port is placed anterior at the level of the diaphragm and in line with the anterior part of the utility incision. An additional 15-mm port is placed posterior at the level of the diaphragm and approximately 10 cm below the angle of scapula. A rib retractor is not used at all and anatomical dissection of the hilum and individual division of the vessels and bronchus.

Role of team members

The thoracic surgeon and the assistant surgeon are standing on the same side of the patient sharing a monitor. This facilitates learning the VATS technique and makes it possible to supervise the training surgeons doing selected

parts of the procedure (6). The scrub nurse is positioned on the opposite site of the patient with a separate screen in front of her. This ensures good ergonomic conditions for the staff. In VATS procedures in general and in segmentectomies in particular, it is important to interact with the anesthesiologist. Surgery is depended on sufficient lung collapse and relaxation of the diaphragm to acquire sufficient space. A double lumen tube is preferred to a bronchial blocker, due to the importance of ventilating the lung after compression of the segmental bronchus and visualizing the intersegmental planes. A camera tube ensures fast and easy correction of tube position in case of displacement (7).

Post-operative management

The patient is extubated immediately at the end of the procedure and is transferred to a recovery room and monitored until next morning. For pain control a multimodal analgesic regimen is applied using paracetamol 1 g times 4 per day, ibuprofen retard 800 mg times 2, gabapentin 300 mg times 3 and a paravertebral block with marcain 0.5% and an intercostal catheter blocking the chest drain site with continuous marcain 0.25%, 6 mL/hour as previously described (8). The philosophy of enhanced recovery is applied and patients are mobilized on the day of surgery (9). Routinely only one chest drain, CH 24 is used in the lower anterior port and connected to a digital monitor (Topaz, Medela). The chest drain is removed in the airflow is less than 20 mL/min in more than 12 hours and the fluid per day is less than 500 mL (10) and then a chest X-ray is performed before discharge. For routine patients this is the only chest X-ray applied in the postoperative management (11). The patients come to the outpatient clinic approximately 2 weeks after surgery for chest X-ray and final histology.

Tips, tricks and pitfalls

When performing a segmentectomy it is important to study the CT scan carefully in cooperation with a skilled radiologist to achieve as much information about the anatomy and tumour position as possible. It is advisable to dissect all the hilar structures before division to avoid mistakes (12). Application of a Babcock on the bronchial stump may help the hilar dissection and make it easier to orientate the lung while performing division of intersegmental fissures.

Conclusions

The postoperative course was uneventful. The chest drain was removed the morning after surgery and the chest X-ray showed a fully expanded lung. The patient was discharged on the first postoperative day and at the visit in the outpatient clinic, he told us that he was walking his dog later that same afternoon. Final histology showed two renal cell metastases. The resection margin of the central metastasis was 10 mm.

VATS segmentectomy is a minimal invasive option for central metastasis with a limited morbidity and mortality risk offering the possibility for ensuring sufficient resection margins and sparing lung parenchyma.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the Guest Editor (Alessandro Brunelli) for the series “Uncommon Segmentectomies” published in *Journal of Visualized Surgery*. The article has undergone external peer review.

Conflicts of Interest: The author has completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/jovs.2018.08.06>). The series “Uncommon Segmentectomies” was commissioned by the editorial office without any funding or sponsorship. The author reports personal fees (speaker fee) from Medtronic, outside the submitted work. The author has no other conflicts of interest to declare.

Ethical Statement: The author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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doi: 10.21037/jovs.2018.08.06

Cite this article as: Petersen RH. Lower lobe S⁷⁺⁸ video-assisted thoroscopic surgery segmentectomy. *J Vis Surg* 2018;4:185.