Re-do robot-assisted salvage lobectomy after esophagectomy with gastric pull-up reconstruction: a case report

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CASE REPORT

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Re-do robot-assisted salvage lobectomy after esophagectomy with gastric pull-up reconstruction: a case report

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Abstract

Background Robot-assisted Thoracic Surgery (RATS) is well-established for complex minimally invasive thoracic surgery. Despite the available literature, robotics for complex advanced NSCLC for re-do surgery remains underexplored.

Case presentation We present a 55-year-old female who underwent esophagectomy with gastric pull-up reconstruction for squamous cell carcinoma (SCC) of the esophagus (cT3N2M0, stage IIIB) after neo-adjuvant concurrent chemoradiation therapy (ypT2N1 stage IIB disease). Six years later, computed tomography (CT) scan showed stage IA Thyroid Transcription Factor-1 (TTF-1) positive adenocarcinoma in the left upper lobe treated by stereotactic radiotherapy. Two years later, a SCC of the right upper lobe (RUL) was found (Fig. 1). Although locoregional therapy was preferred Pembrolizumab® was initiated with curative intent as the tumor demonstrated a high Programmed Death-Ligand 1 (PD-L1) expression. Follow-up CT-scan showed no biological response. Salvage lobectomy was proposed, and patient consent obtained. As demonstrated in the video, RATS provided great exposure to the adhesions, vascularization of the neo-oesophagus and maximal dexterity in difficult spaces.

Conclusions This case demonstrates the value of RATS in complex re-do thoracic surgery after immunotherapy and previous thoracotomy.

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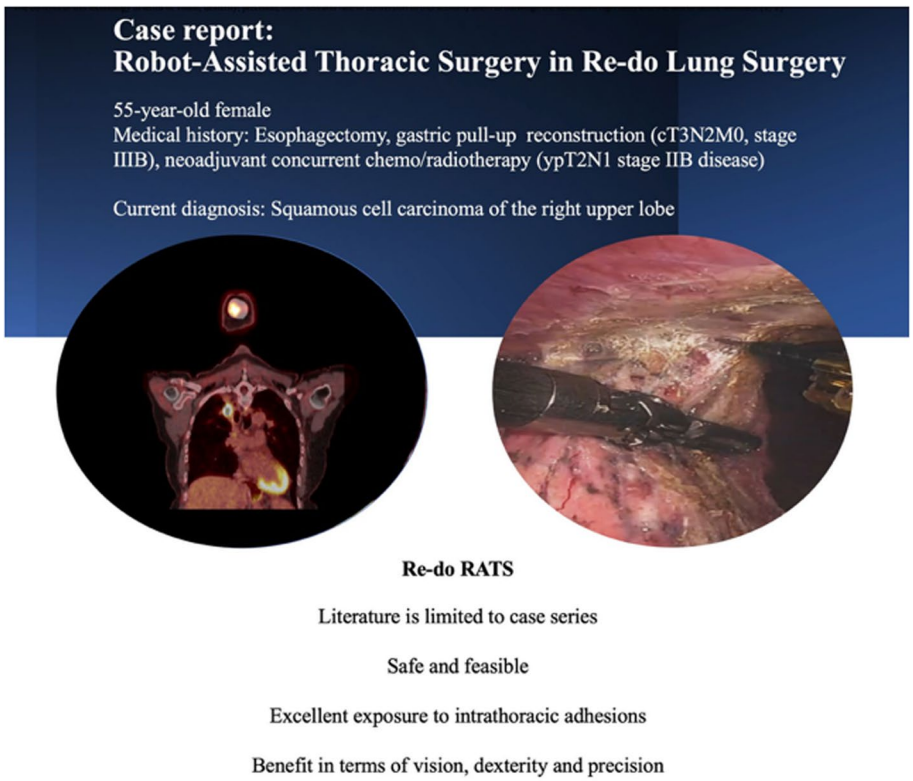
Graphical Abstract

Robot-Assisted Thoracic Surgery in Re-do Lung Surgery



Background

Robot-assisted Thoracic Surgery (RATS) is well-established for minimally invasive thoracic surgery. It has demonstrated technical and clinical benefits in the treatment of early-stage non-small cell lung cancer (NSCLC) [1, 2]. These advantages are being explored in advanced stages NSCLC, also following neoadjuvant therapies [2–5].

Neoadjuvant therapy renders lung parenchyma, lymph nodes and blood vessels fragile, and may cause dense adhesions. As the indications for neoadjuvant therapy expand, the complexity of subsequent lung resection increases. The Da Vinci Xi robot (Intuitive Surgical Inc., Sunnyvale, CA, USA) provides a high-definition 3-dimensional view, and instrumentation that increases precision and dexterity. Despite the available literature, robotics for complex advanced NSCLC for re-do surgery remains underexplored [1–3].

Case presentation

The Science Committee of the Leiden University Medical Center waived the need for approval. Patient's informed consent for publication was obtained.

This is a video-supported report of a 55-year-old female who underwent esophagectomy with gastric pull-up reconstruction for squamous cell carcinoma (SCC) of the esophagus (cT3N2M0, stage IIIB) after neo-adjuvant concurrent chemoradiation therapy (ypT2N1 stage IIB disease). A total of 50 Gray of radiation was applied in a period of 6 weeks and Carboplatin and Paclitaxel treatment for 6 weeks. Six years later, computed tomography (CT) scan showed stage IA Thyroid Transcription Factor-1 (TTF-1) positive adenocarcinoma in the left upper lobe treated by stereotactic radiotherapy. Two years later, a SCC of the right upper lobe (RUL) was found (Fig. 1). Although locoregional therapy was preferred Pembrolizumab® was initiated with curative intent as the tumor demonstrated a high Programmed Death-Ligand 1 (PD-L1) expression. Follow-up CT-scan showed no biological response and a tumor diameter of 54 mm. Tumor growth and the dimensions of the tumor urged to perform a

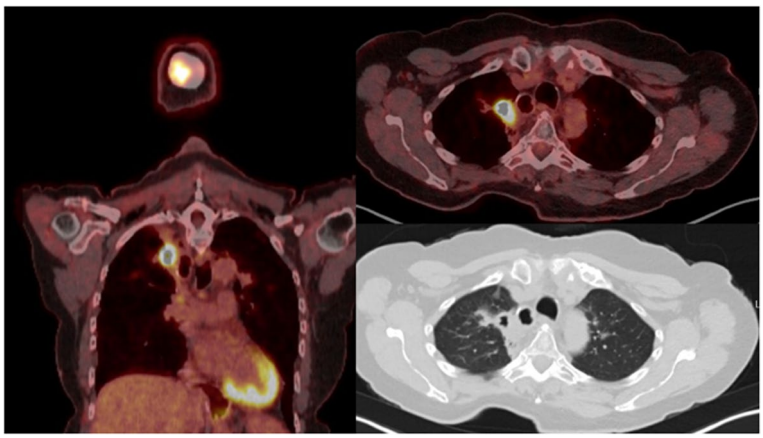


Fig. 1 Pre-operative positron emission tomography CT scan demonstrating the exact localization of the tumor in the right upper lobe

salvage lobectomy including complete mediastinal lymph node dissection. Patient consent was obtained.

Standard anesthesia monitoring and single lung ventilation were installed. The patient was positioned in left lateral decubitus position.

A handheld 30-degrees video-endoscope revealed adhesions in closure-line of the previous thoracotomy and thus RATS was deemed feasible. After standard port placement (Fig. 2A). docking and instrument placement (Tip-up fenestrated grasper™, Cadière forceps™, Maryland bipolar dissector™ and the Monopolar spatula™) adhesiolysis between the lung and the chest wall and taking down dense adhesions between the lung and the intrathoracic gastric pull-up the nasogastric tube was exposed (Fig. 2B). The nasogastric tube was placed in the gastric pull-up as a safety measure. Meticulous dissection of its vascularization enabled subsequent standard lobectomy of the RUL with complete lymph node dissection (R4, 7, 10 and 11). After removal of the specimen and chest tube placement, a Ropivacaine® intercostal nerve block levels T4 to T9 was installed. Total operative time was 3 h 44 min with 50 ml blood loss.

The patient was extubated in the operating theater and discharged on postoperative day 6.

Pathology revealed complete resection of yT2aN0M0 SCC, with major pathological response, and a second unexpected pT1aN0M0 adenocarcinoma. There were no metastasis in the mediastinal lymph nodes. There was no indication for adjuvant therapy.

Discussion & conclusions

RATS is gaining popularity for thoracic surgery. Its benefits in terms of vision, dexterity, precision, low blood loss and low conversion rate seem to outweigh the associated high costs and lack of tactile feedback [1, 2]. Most studies on RATS concern lung resection for early-stage NSCLC, or locally advanced stages with metastatic lymph node involvement. There is increasing evidence showing feasibility and clinical benefit in complex cases, such as extended resections, surgery after neoadjuvant

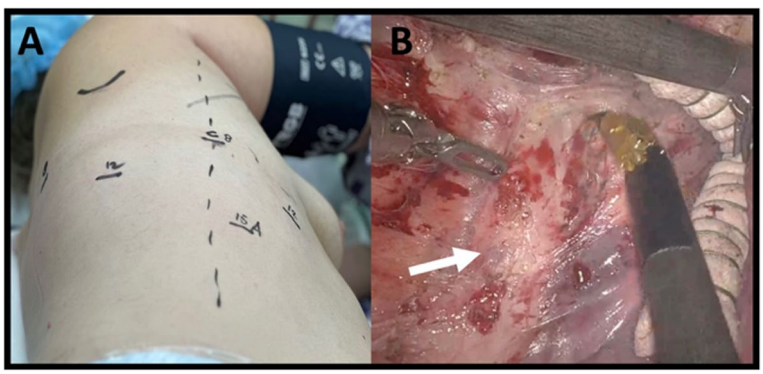


Fig. 2 **A** Standard port design for robot-assisted RUL lobectomy. **B** Intrathoracic view of adhesions between gastric pull-up and the lung. White arrow indicates the gastric pull-up

chemoradiation and immunotherapy, salvage surgery for in-field recurrence [4] and re-do thoracic surgery [5].

In this case complicating factors are adhesions from previous ipsilateral thoracotomy, risk of damage to vasculature of the gastric pull-up and the effects of immunotherapy. RATS was considered the optimal approach, because of advantages of superior vision, camera stability, long instruments with Endowrist™ technology, allowing maximal dexterity in spaces with difficult accessibility and a third instrument allowing optimal tissue retraction for exposure (Central picture). The magnification of the robotic endoscope provides excellent view on adhesions near vital structures, such as the esophagus and its vascularization. Including a gastrointestinal surgeon to the team is valuable to identify gastric pull-up vascularization. From cost management point of view the extent of adhesions and feasibility of RATS can be assessed by a conventional video-endoscope.

This case demonstrates the value of RATS in complex re-do thoracic surgery after immunotherapy. This technique offers a minimally invasive approach to these patients and highlights the evolving role of robotics in thoracic surgery.

Abbreviations

CT	Computed Tomography
NSCLC	Non-Small Cell Lung Cancer
PD-L1	Programmed Death-Ligand 1
RATS	Robot Assisted Thoracic Surgery
RUL	Right Upper Lobe
SCC	Squamous Cell Carcinoma
TTF-1	Thyroid Transcription Factor 1

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12957-025-03661-0.

Supplementary Material 1. RATS RUL Lobectomy after Esophagectomy.

Authors' contributions

G.S. and R.K. initiated this project and wrote the manuscript. Q.T. was the assisting surgeon from the department of GI and reviewed the manuscript. J.B. Supervised the project and reviewed the manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

The research reported in this case report adheres to the relevant ethical guidelines.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report.

Competing interests

The authors declare no competing interests.

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