

CASE REPORT

Robotic-Assisted Right Upper Lobe Pulmonary Metastasectomy in a Patient with Rectal Adenocarcinoma: a Case Report

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ABSTRACT

Background: Pulmonary metastases from colorectal cancer (CRC) present a complex therapeutic challenge. Robotic-assisted thoracic surgery (RATS) is increasingly utilized for its precision and minimally invasive advantages.

Case presentation: We report the case of a 55-year-old male diagnosed with T1N0M0 rectal adenocarcinoma, who underwent abdominoperineal resection without adjuvant chemotherapy. Fourteen months later, positron emission tomography-computed tomography (PET-CT) identified bilateral pulmonary metastases. A robotic-assisted wedge resection of the right upper lobe nodule was performed at the Thoracic Surgery Department of GHRMSA "Emile Muller", Mulhouse, France. Lymphadenectomy was not conducted, which was consistent with current evidence suggesting limited benefit in CRC metastases. The patient's overall survival was 18 months from the initial diagnosis to the first metastasectomy.

Conclusions: Robotic-assisted metastasectomy offers a safe, precise and efficient option for managing pulmonary metastases from CRC. This case highlights the role of molecular profiling in prognostication and the evolving surgical approaches in metastatic CRC.

Keywords: colorectal cancer, pulmonary metastases, robotic-assisted thoracic surgery, wedge resection, metastasectomy.

INTRODUCTION

Colorectal cancer (CRC) is the third most common cancer globally and remains a leading cause of cancer-related mortality (1). Approximately 10-15% of CRC patients develop pulmonary metastases, often necessitating surgi-

cal intervention for potential curative intent (2). While conventional thoracic surgery has been the standard, recent advancements in minimally invasive techniques, particularly robotic-assisted thoracic surgery (RATS), have demonstrated improved precision, reduced perioperative morbidity and faster recovery times compared to traditional methods (3).

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The decision-making process in managing pulmonary metastases is influenced by several factors, including the molecular characteristics of the primary tumor. Mutational analysis, specifically for RAS and BRAF, along with microsatellite instability (MSI) status, plays a pivotal role in predicting prognosis and guiding treatment (4). We present a case of robotic-assisted right upper lobe metastasectomy in a patient with rectal adenocarcinoma and discuss the prognostic implications of molecular characteristics and surgical strategies. ■

CASE PRESENTATION

A 55-year-old male was diagnosed with rectal adenocarcinoma (T1N0M0) for which an abdominoperineal resection was performed. Histopathological evaluation revealed no lymph node involvement (0/15). Molecular profiling indicated microsatellite stability (MSS) and absence of RAS and BRAF mutations. These findings are typically associated with a favorable prognosis, as supported by large-scale studies on molecular markers in CRC (5).

Given the early-stage tumor and lack of high-risk features, adjuvant chemotherapy was not administered, in alignment with current NCCN guidelines for stage I rectal cancer (6). The patient remained disease-free for 14 months until routine follow-up imaging revealed two PET-positive pulmonary nodules: one in the right upper lobe and another in the left upper lobe.

The patient underwent robotic-assisted wedge resection of the right upper lobe metastasis at the Thoracic Surgery Department of GHRMSA, Mulhouse, France. Intraoperative visualization revealed the pulmonary nodule with associated pleural retraction (Figure 1).

The nodule was resected using sequential stapling, as shown in Figures 2 and 3. No lymphadenectomy was performed, as recent evidence suggests no survival benefit from systematic lymph node dissection in pulmonary metastases from CRC (7).

The resected specimen was retrieved using an endobag, as illustrated in Figure 4. Histopathological analysis confirmed metastatic adenocarcinoma consistent with the primary rectal tumor. Postoperative recovery was uneventful, and the patient was scheduled for contralateral metastasectomy approximately four weeks later,

as recommended by current literature for bilateral pulmonary metastases (8). ■

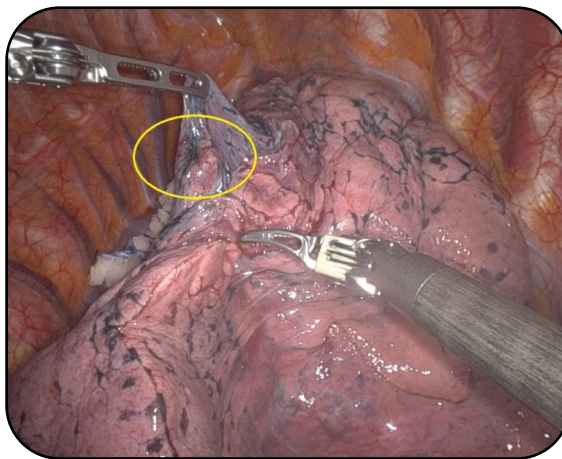


FIGURE 1. Intraoperative view of the right upper lobe pulmonary nodule with pleural retraction

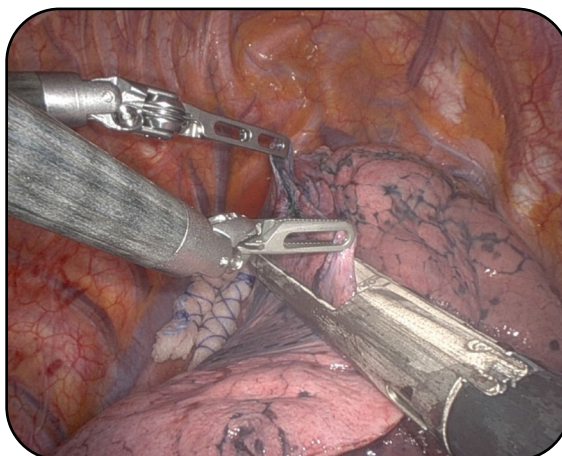


FIGURE 2. First stapling of the pulmonary tissue during wedge resection

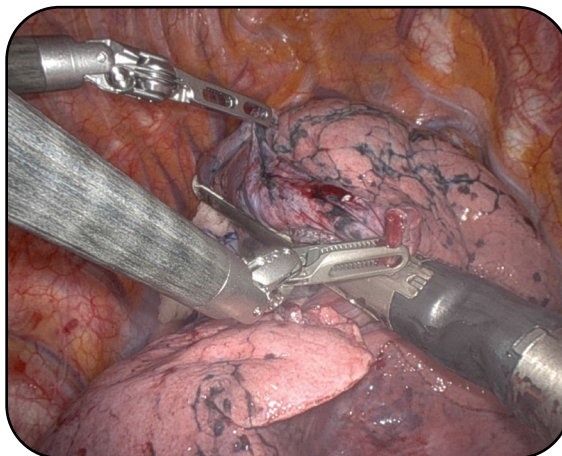


FIGURE 3. Second stapling phase to ensure adequate resection margins

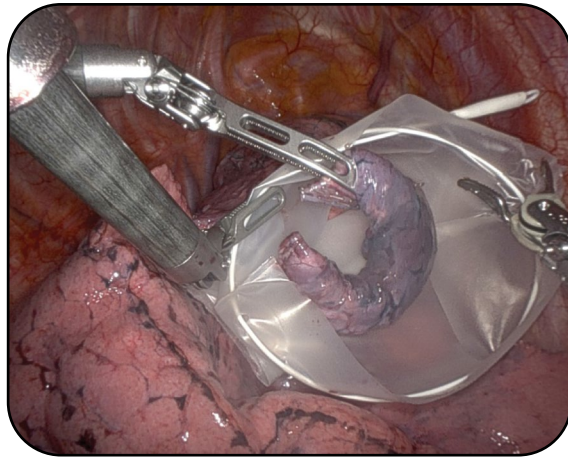


FIGURE 4. Resected specimen secured in the endobag for removal from the pleural cavity

DISCUSSION

Molecular characteristics significantly influence CRC prognosis. The absence of RAS and BRAF mutations, coupled with MSS, suggests a more indolent disease course (9). However, the emergence of pulmonary metastases highlights the unpredictable nature of metastatic CRC.

Robotic-assisted thoracic surgery has emerged as a preferred modality for pulmonary metastasectomy due to its enhanced dexterity and visualization, allowing for precise resection while minimizing trauma to healthy lung tissue (10). In our case, a wedge resection was chosen over anatomical resection, which was consistent with evidence supporting parenchyma-sparing approaches when margins are adequate (3).

The role of lymphadenectomy in pulmonary metastases from CRC remains controversial. Se-

veral studies have demonstrated no significant survival advantage with lymph node dissection in the absence of radiologically suspicious nodes (7). Our decision to omit lymphadenectomy aligns with this evidence, focusing on minimizing surgical morbidity without compromising oncologic outcomes.

Furthermore, the interval between metastasectomies is critical. The literature suggests a recovery period of four weeks between bilateral pulmonary resections to optimize lung function and reduce complications (8). This strategy was planned for our patient, although follow-up information post-second surgery is unavailable due to changes in the care team. □

CONCLUSIONS

This case underscores the importance of individualized treatment strategies in metastatic CRC, incorporating molecular profiling and minimally invasive surgical techniques. Robotic-assisted metastasectomy offers a safe and effective option for managing pulmonary metastases, with potential implications for improving patient outcomes. Further research is needed to refine surgical indications and integrate molecular markers into therapeutic decision-making. □

Conflicts of interest: none declared.

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Ethical statement: The present case was conducted in accordance with institutional ethical guidelines.

Informed patient consent: obtained for publication.

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