Masters of Cardiothoracic Surgery

Bilateral uniportal robotic-assisted thoracic surgery sleeve lobectomy for a bilateral endobronchial lung cancer

Diego Gonzalez-Rivas[1,2], Ricardo Fernandez Prado[1], Alejandro Garcia-Perez[3], Mugurel Liviu Bosinceanu[2], Natalia Motas[2,4,5], Veronica Manolache[2,4]

[1]Department of Thoracic Surgery and Minimally Invasive Thoracic Surgery Unit (UCTMI), Coruña University Hospital, Coruña, Spain; [2]Department of Thoracic Surgery, Policlinico di Monza, Oncology Hospital Monza, Șoseaua Gheorghe Ionescu Sisești 8a, Bucharest, Romania; [3]Department of Thoracic Surgery, Coruña University Hospital, Coruña, Spain; [4]University of Medicine and Pharmacy "Carol Davila", Bulevardul Eroii Sanitari 8, Bucharest, Romania; [5]Department of Thoracic Surgery, Institute of Oncology "Prof. Dr. Al. Trestioreanu", Bucharest, Romania

Correspondence to: Natalia Motas. Department of Thoracic Surgery, Institute of Oncology "Prof. Dr. Al. Trestioreanu", Bucharest 022328, Romania. Email: natalia.motas@gmail.com; Diego Gonzalez-Rivas. Department of Thoracic Surgery and Minimally Invasive Thoracic Surgery Unit (UCTMI), Coruña University Hospital, Coruña 15008, Spain. Email: Diego.Gonzalez.Rivas@sergas.es.

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Clinical vignette

A 74-year-old male patient, ex-smoker, with chronic obstructive pulmonary disease (COPD) treated with inhaled steroids, presented with fever, dyspnea, and asthenia, lung hyperinflation on chest X-ray, normal blood tests, forced expiratory volume in 1 second (FEV_1)/forced vital capacity (FVC) of 57.5%, FVC of 2.9l (80%), FEV_1 of 1.67l (60%) and diffusing lung capacity for carbon monoxide (DLCO) of 62%. Computed tomography (CT), positron emission tomography-CT (PET-CT), and flexible bronchoscopy with biopsies diagnosed bilateral synchronous endobronchial squamous cell carcinoma (SqCC) of the bronchus intermedius [tumor =3.1 cm, standardized uptake value (SUV) =9.2] and left lower bronchus (tumor =2.5 cm, SUV =9.8). Invasive mediastinal staging was not considered. The patient was evaluated in another center, where they proposed a right middle and lower bilobectomy and radiotherapy of the left lung carcinoma; he requested a second opinion at our hospital. Considering our surgical experience, the patient's characteristics, and the imperious need for a radical, but lung-sparing, operation, after multidisciplinary discussion the patient was offered a bilateral sequential sleeve lobectomy using the newest robotic technique, uniportal robotic-assisted thoracic surgery (U-RATS).

Surgical technique

Preparation

The key to the planned management was the ability of the team to successfully limit the resection on the right side to a lower lobectomy, closely related to the invasion of the right carcinoma. The patient was intubated into the left lung, then placed in lateral decubitus on the left side, as in any intercostal uniportal access into the thorax. As per standard robotic thoracic surgery, the instruments for video-assisted thoracoscopic surgery (VATS) and open thoracic surgery were prepared in the operating room. The robot was docked on the posterior side of the patient, with active arms 2, 3, and 4 and arm No. 1 canceled.

Exposition

A 4-cm intercostal incision was placed on the right 7th intercostal space, between anterior and middle axillary lines. A complete intrathoracic inspection was undertaken.

Operation

U-RATS right lower sleeve lobectomy was performed; the middle lobe was preserved by anastomosing the middle lobe

bronchus to the bronchus intermedius using a continuous barbed suture. Systematic nodal dissection was mandatory, and was performed in stations 12i = peribronchial, lower lobe, 12m = middle lobe, 11i = inferior interlobar, 10 = hilar, 7 = subcarinal, 8+9: paraesophageal and pulmonary ligament, 4R+2R = inferior and superior paratracheal.

Completion

The patient was discharged on the fourth postoperative day after an uneventful course. The pathological result showed a 3-cm polypoid SqCC, poorly differentiated, with an implantation base of 2 cm, presenting bronchial wall infiltration into the muscular layer and peribronchial connective tissue, but respecting the subjacent lung parenchyma, with lymphatic and vascular invasion (L1, V1). All lymph nodes were negative for malignancy (0/41). The pathological stage was pT1cN0M0 L1 V1 R0—stage pIA3. After two weeks, FEV_1 was 2.03l (64%), the clinical status was improved, and the CT of the chest showed fully re-expanded right and middle lobes. After re-evaluation at three weeks, the patient underwent U-RATS left lower sleeve lobectomy with systematic nodal dissection (stations 12s = lobar superior, 12i = lobar inferior, 10 = hilar, 8+9 = paraesophageal + pulmonary ligament, 5 = subaortic). The left upper bronchus was anastomosed to the left main bronchus. To protect the recent bronchial anastomosis, the right lung was low-pressure ventilated through a double-lumen tube. The patient was discharged on the third postoperative day uneventfully.

The pathology report for the left side was 2.5-cm polypoid SqCC, poorly differentiated, with bronchial wall infiltration; extensive perineural infiltration (Pn1), lymphatic (L1) and vascular (V1) invasion of the adjacent lung. One peribronchial lymph node was positive (1/9). The pathological stage was pT1cN1M0 Pn1 L1 V1 R0—stage pIIB.

Comments

Clinical results

Thirty- and 60-day follow-up showed improved respiratory function (FEV_1 of 2.09l, 75%), a normal postoperative chest X-ray, and excellent quality of family and social life. Tumor-board recommended adjuvant systemic therapy, which the patient refused.

Advantages

Bilateral synchronous primary lung cancers are uncommon and pose diagnostic, staging, and therapeutic difficulties, especially when lung function is poor, as with this patient. The optimal personalized management of our patient raised a number of issues. Firstly, the diagnosis was easily obtained by bronchoscopic biopsies because both cancers presented with endobronchial components. The fact that both originated in the bronchial mucosa favored the diagnosis of two primary SqCC, and they were classified as such. Secondly, once metastatic disease was ruled out, the best local treatment had to be decided, especially considering the prior therapeutic plan offered at another hospital. Bilateral sequential (not simultaneous because of limited respiratory reserve) operations were proposed for radical resection of both malignancies and reduction of hyperinflated lungs. Bilateral sleeve lung resections are rare, with only a few cases having been performed (1-3) with at least one side by thoracotomy. In the reported case, the newest, most modern, and most precise minimally invasive surgical technique was used: U-RATS (4,5). To our knowledge, this is the first case ever reported of bilateral sleeve lobectomies for simultaneous lung cancers performed by minimally invasive surgery. Thirdly, the best sequence of the operations had to be determined. Priority was given to the right-sided tumor because it caused sputum retention and risk of infection, and to avoid compromise of the left lung. And fourthly, alternative treatments were discussed in the multidisciplinary team meeting, like endobronchial resection of one or both tumors, brachytherapy, external radiotherapy, and their combination, but a meticulous assessment of the CT indicated that both lesions could be completely resected by lung-sparing operations, and bilateral sleeve lobectomy was considered the best option for this patient. These operations achieved complete resection of both cancers, provided the most accurate staging, and were followed by a fast recovery, and the possibility for early start of systemic therapy in a patient who had gained lung function after two lobectomies.

Caveats

Bilateral sequential uniportal robotic-assisted lower sleeve lobectomies for synchronous endobronchial polypoid SqCCs were the less invasive and the most technically advanced curative option for an elderly patient with

impaired lung function. Therefore, bilateral U-RATS sleeve lobectomy should be considered a therapeutic option for those patients. For U-RATS, previous experience with both the uniportal approach and the robotic technology is mandatory to assure patient safety.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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