



Case Report

Cardiopulmonary bypass for resection of pancoast tumor with mediastinal extension and involvement of right bronchial branch: A case report

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ARTICLE INFO

Keywords:

Cardiopulmonary
Surgery
Pancoast tumor
Pneumonectomy
Mediastinal

ABSTRACT

Introduction: and importance: Pneumonectomy is commonly associated with cardiopulmonary complications. Pneumonectomy in Pancoast tumor with mediastinal extension and no metastasis could be successful and efficient.

Case presentation: Herein, we report a successful pneumonectomy of a 54-year-old man with pancoast tumor along with the involvement of mediastinal space including right hilum of the lung, right bronchial, inferior vena cava vein and pericardium.

Clinical discussion: Based on the bronchoscopy and biopsy, the complete involvement of right bronchial tree was reported and non-small cell carcinoma was diagnosed in pathology.

Conclusion: To reduce the complications of the surgery, the cardiopulmonary pump machine was used during the operation.

1. Introduction

Surgery for Pancoast tumors (non-small cell carcinoma) [1], if the tumor is not metastatic but extended to the adjacent vital elements, such as pericardium and main vessels of mediastinal space [2], is very likely to result in cardiopulmonary complications and hemorrhage [3]. In such cases, the cardiopulmonary pump machine is recommended to be used, so that the pneumonectomy surgery with the simultaneous resection of Pancoast tumor, mediastinal lymph nodes, hilum of the lung and sub carina can be successfully conducted [4]. In large lung tumors which are benign, due to vast extension and involvement of vital organs, cardiopulmonary shift and the collapse of the involved lung during the surgery is highly possible and can be life threatening [5].

2. Case presentation

A 54-year-old man who was a farmer and non-smoker, was referred to our clinic with two-month coughing and chest pain, on July 3, 2018. Following the necessary diagnostic measures, he was diagnosed with the tumor of right apex with the involvement of right bronchial and mediastinal extension (Table 1).

Based on the bronchoscopy and biopsy, the complete involvement of right bronchial tree was reported and non-small cell carcinoma was diagnosed in pathology.

Based on spirometry test, pulmonary consultation, FVC: 82.8% and FEV1: 84.1% and cardiology consultation, the possibility of conducting the surgery was safe. Brain MRI was normal, and metastasis in brain was not seen. In addition, the sonography of different organs and chest CT scan were all normal, so the patient was candidate for surgery (Fig. 1).

Patient underwent complete median sternotomy for left lung, under general anesthesia in supine position and elevation of shoulders (Fig. 2). After opening of pericardium by putting catheter in ascending aorta and right atrium, it was connected to cardiopulmonary pump. Following this, with the right-anterior lateral thoracotomy in the form of trap door in the fourth intercostal space with ligation of the right-internal mammillary artery, the exploration of right thorax was done. By placing the catheter between the left sternum and chest wall in the upper edge of thorax, mediastinal space and right thorax was seen. The superior and inferior pulmonary vein was ligated and disconnected. The stump of the bronchial of lower and upper lobe was cancerous. First, the right pulmonary artery was ligated and cut off, followed by the resection of the right bronchi and the resection of left lung. In the next

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<https://doi.org/10.1016/j.amsu.2021.102910>

Received 14 September 2021; Received in revised form 30 September 2021; Accepted 3 October 2021

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Table 1
Vital signs in times of referring to clinic.

Blood Pressure	Pulse Rate	Respiratory Rate	Temperature	Blood sugar
120/80 mmHg	70 beats/min	16 beats/min	37 C°	118 mg/dl

exploration, the Pancoast tumor was detached from azygos vein and superior vena cava. The tumor adhesion to innominate vein was detached and the Pancoast tumor was pulled out. After this, the mediastinal and sub carina adenopathies were removed and then the reconnection of the right bronchi in carina was performed. In the next step, the stump of the bronchi was separately repaired in several bites by using number-zero vicryl. After the pericardial repair, by putting two 32 chest tubes in the anterior mediastinal space and right chest and placing catheter in the internal space of right pleura for 24-h wash-up after the operation, the chest wall, thorax wall and sternum were closed (Fig. 3).

Postoperative follow-up was performed by two medical interns and trained nurse, where no major complications were reported. He was discharged after a week and was follow up was scheduled after 15 days

at our outpatient clinic. No major complaints were reported during the follow up.

This case report has been reported in line with the SCARE 2020 criteria [6]. Written informed consent was obtained from the patient for publication of this case report and accompanying images.

3. Discussion

Pneumectomy is associated with low 5-year survival rate, especially in the case of extended excision [7]. This is the first time that the perioperative use of heart pump machine has been introduced for pneumectomy and extended excision [8]. No perioperative and major postoperative complications were reported in this case. Alternative to pneumonectomy have been suggested in a number of studies, however, postoperative complications and mortality still remains high [9]. Decision to treat so-called “difficult to cure” patients is strongly suggested to be made in a specialized joint consultation [10]. Doing psychiatrist counseling before and after the surgery plays an efficient role in improving clinical conditions and patient’s later cooperation [11].

Using a simple method, we managed a quite successful surgery and patient’s returned to health [12]. CT and MRI scan can be used evaluate

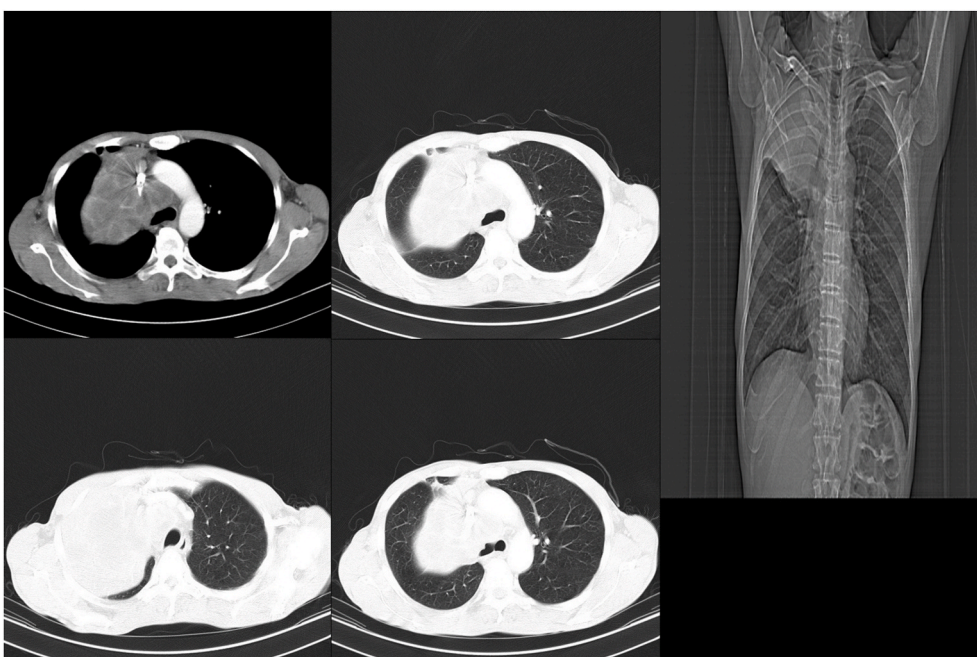


Fig. 1. Chest CT scan before bypass.

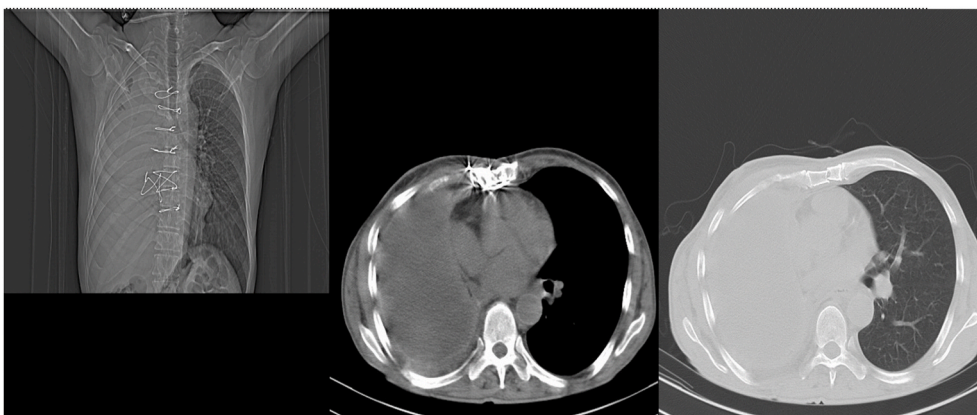


Fig. 2. Chest CT scan after bypass.

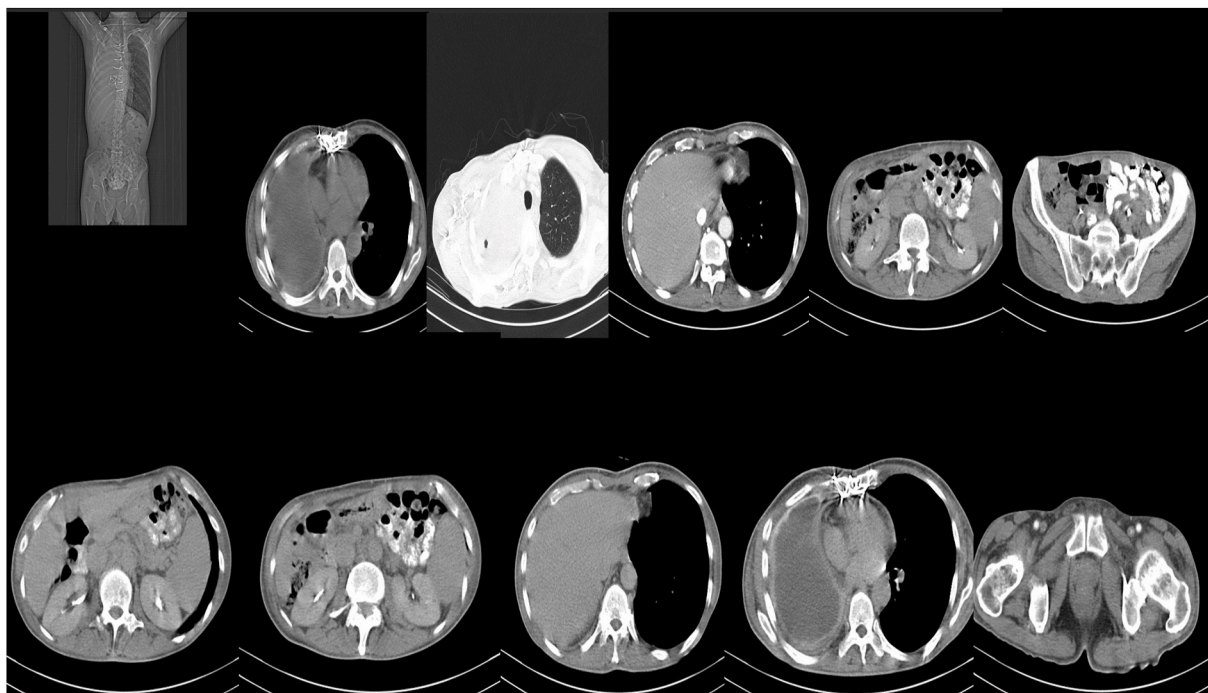


Fig. 3. Chest-abdomen CT scan after bypass.

lung parenchyma [13]. Owing to the complications of these surgeries [14], it is necessary to benefit from psychologists' counseling and support so as to reduce the initial stress and lift patient's spirit after the surgery [15].

4. Conclusion

Resection of Pancoast tumor in right apex with the involvement of lung can be operated using cardiopulmonary pump, in patients with the non-metastatic mediastinal and vessels of hilum pulmonic adenopathy. Further studies regarding this practice are important to obtain data regarding long term follow-up. Furthermore, patients with stage III and IV cancer, are likely to require chemotherapy and radiotherapy along with the surgery. Efficacy of this method in these patients also requires attention.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Ethical approval

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Sources of funding

No funding was secured for this study.

Author contribution

Dr. Saeid Marzban-Rad: conceptualized and designed the study, drafted the initial manuscript, and reviewed and revised the manuscript. Dr. Parastesh Sattari: and Maryam Marzban-Rad: Designed the data collection instruments, collected data, carried out the initial analyses, and reviewed and revised the manuscript. Dr. Ghasem Azimi:

Coordinated and supervised data collection, and critically reviewed the manuscript for important intellectual content.

Registration of research studies

Name of the registry: N/a

Unique Identifying number or registration ID: N/A

Hyperlink to the registration (must be publicly accessible): N/A

Consent

Informed consent was obtained from each participant.

Guarantor

Saeid Marzban-Rad.

Declaration of competing interest

The authors deny any conflict of interest in any terms or by any means during the study.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2021.102910>.

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