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Robotic-assisted thoracoscopic resection of a mature anterior mediastinal teratoma in an adult

***Corresponding Author:** Huzaifa A Shakir*

Tel: 972-972-3555 & 973-972-3510; Email: shakirhu@njms.rutgers.edu

Abstract

Germ cell tumors rarely present in the anterior mediastinum. We report a case of 43-year-old female who presented to the hospital with cough and chest pain. Computed tomography imaging showed a 7.8 cm right anterior mediastinal mass with extension to the right upper lung. A tissue biopsy was performed showing organizing fibrosis and granulomatous inflammation, scattered foreign body type multinucleated giant cells, and rare non-necrotizing epithelioid granuloma. The patient underwent complete mass resection with the da Vinci Xi® robotic surgical system (Intuitive Surgical, Inc., Sunnyvale, CA, USA). Surgical histopathology of the mass revealed benign mediastinal mature teratoma.

Keywords: Mediastinal teratoma; Mediastinal mass; Mature teratoma; Teratoma resection; Robotic resection; Teratoma; Mediastinal neoplasm.

Tiffany Hsiung[1]; Hima Bindu Thota[2]; Justin T Sambol[1]; James V Guarrera[2]; Huzaifa A Shakir[1]*

[1]Division of Cardiothoracic Surgery, Rutgers New Jersey Medical School, Newark, NJ, USA.

[2]Division of Transplant and Hepatobiliary Surgery, Rutgers New Jersey Medical School, Newark, NJ, USA.

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Introduction

In adults, teratomas are rarely found extra-gonadally. Benign mediastinal teratomas are ever rarer, with only 108 reported cases from January 1992 to January 2018 [1]. Of all germ cell tumors, mediastinal tumors only represent around 1-3% of germ cell neoplasms [2]. Teratomas are histologically defined as containing tissue from all three germ cell layers including the endoderm, mesoderm, and ectoderm. Mature teratomas generally present with well-differentiated germinal derivatives in comparison to immature teratomas where differentiation of germinal derivatives is less clear [3]. Herein, we report a case of successful robotic surgical management of an anterior mediastinal mature teratoma in an adult.

Case presentation

A 43-year-old female presented to the emergency department with a productive (non-bloody) cough and non-radiating substernal right-sided chest pain for the prior six days. An initial radiograph showed a 4.4 cm right midlung opacity (Figure 1). An initial computerized tomography scan showed a 7.8 cm invasive right upper lobe mass that invaded the mediastinum. Histopathology of a subsequent computerized tomography-guided right lung biopsy showed organizing fibrosis and granulomatous inflammation and scattered foreign body type multinucleated giant cells and rare non-necrotizing epithelioid granuloma, but was inconclusive for a diagnosis of a specific entity. Positron emission tomography scan showed a 3.7 cm x 6.5 cm x 3.4 cm hypermetabolic (standardized uptake value max = 6.0) heterogenous right upper lobe mass extending into the right anterior mediastinum. Her past medical history was significant for migraines. Physical exam was notable for bilateral lower leg edema. After presentation at our multidisciplinary conference, the decision was made to proceed with robotic surgical resection.

Intra-operatively, the right upper lobe was found to have adhesions to the mediastinum. These adhesions were taken down with bipolar cautery. The mediastinal mass was then shelled out and a cavity was noted in the lung. The cavity was partially excised with Bovie, sharp dissection, and blunt squeezing of the cavity's granulomas. Intraoperative frozen biopsy showed skin and adnexal tissue compatible with teratoma. The cavity

of the right upper lobe was then wedged out using a green load ECHELON™ 3000 Stapler (ETHICON, Inc., Raritan, NJ). The lungs were re-inflated under direct vision and two chest tubes were inserted. After ensuring successful lung re-inflation and hemostasis, all incisions were closed, and the patient was extubated and transferred to recovery without incident. The chest tubes were taken out on post-operative day two. The rest of the post-operative course was uneventful, and the patient was discharged home on post-operative day four.

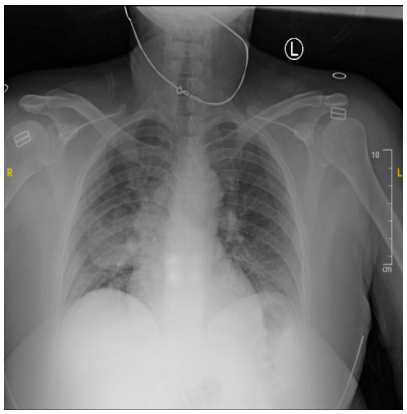

Figure 1: Pre-operative chest radiograph showing a right midlung opacity.

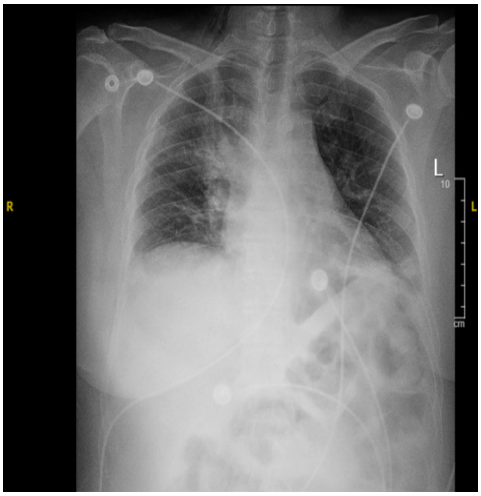

Figure 2: Post-operative day two chest radiograph showing decreased right perihilar opacity.

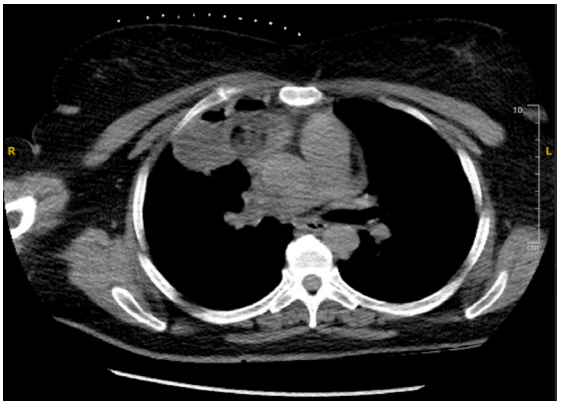

Figure 3: Computed tomography chest abdomen window demonstrating 7.8 cm anterior mediastinal mass.

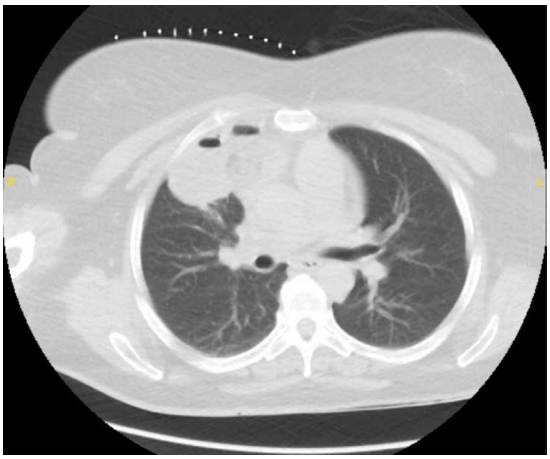

Figure 4: Computed tomography chest window demonstrating 7.8 cm right anterior mediastinal mass.

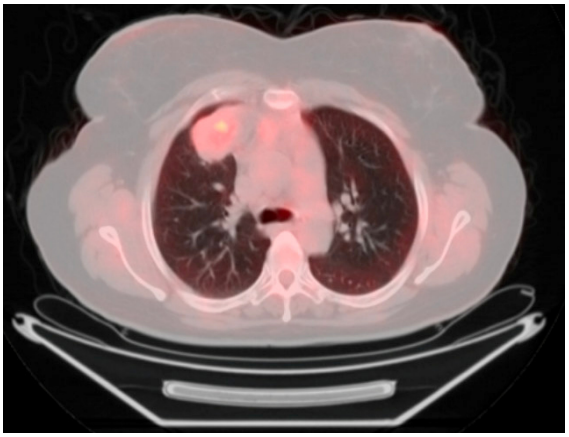

Figure 5: PET computed tomography chest demonstrating a 6.5 cm hypermetabolic, heterogenous mass in the right upper lobe extending into the right anterior mediastinum.

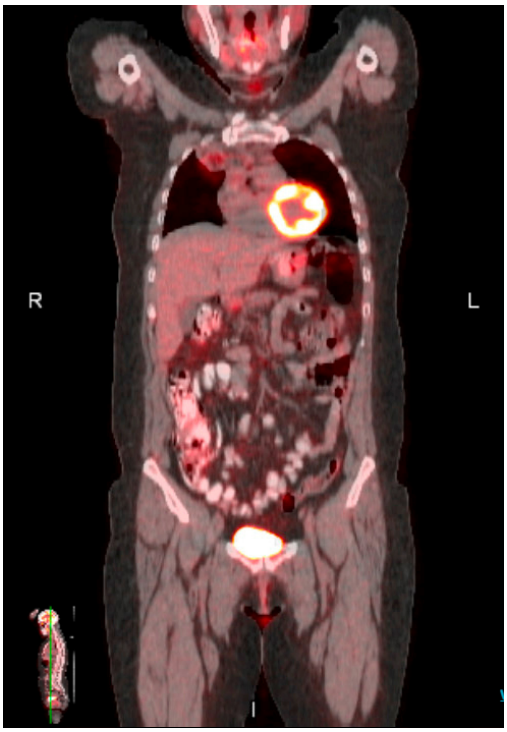

Figure 6: PET computed tomography chest coronal view demonstrating a 6.5 cm hypermetabolic, heterogenous mass in the right upper lobe extending into the right anterior mediastinum.

Discussion

Most benign mediastinal teratomas are discovered due to symptoms such as chest pain, cough, and breathlessness, although some can be asymptomatic and are incidental findings on chest radiography. Patients with mediastinal germ cell tumors also rarely have abnormal physical findings. In some cases, especially when the neoplasm is malignant, there may be significant levels of human chorionic gonadotropin or alpha-fetoprotein [4]. When a symptomatic mediastinal teratoma is suspected, the only curative and mainstay of treatment is surgical resection, which usually results in the complete resolution of symptoms without the need for chemotherapy or radiation. It is important to excise mediastinal neoplasms to prevent potential invasion into the superior vena cava, development of pleural effusions, or rupture into the pericardial cavity with the potential to cause cardiac tamponade [5]. After excision, benign mediastinal teratomas rarely reoccur [1]. Although historically mediastinal teratoma resection has been performed open (for larger and more invasive tumors) it has been shown that minimally invasive approaches with video-assisted thoracoscopic surgery have comparable outcomes but with decreased morbidity and hospital length of stay when compared with median sternotomy [6,7]. Our case has shown that robotic-assisted thoracoscopic resection is a feasible method for resection of mediastinal teratomas, even with invasion of the neoplasm into the lung.

Conclusion

While there is no established consensus on the approach to resection of mediastinal teratomas, there are not many cases of robotic-assisted thoracoscopic resection published in the literature, and our case has shown that robotic-assisted thoracoscopic resection is a feasible method to resection of mediastinal teratomas, even with invasion into the lung [8-10].

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