



## Near Carinal Tracheal Resection

Narendran Balasubbiah<sup>1\*</sup>, Narasimman Sathiamurthy<sup>1</sup>, Benedict Dharmaraj<sup>1</sup>  
and Diong Nguk Chai<sup>1</sup>

<sup>1</sup>Thoracic Unit, Hospital Kuala Lumpur, 50586 Wilayah Persekutuan, Kuala Lumpur, Malaysia.

### Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

### Article Information

#### Editor(s):

(1) Ashish Anand, GV Montgomery Veteran Affairs Medical Center, USA.

#### Reviewers:

(1) Bouzid Chafik, Benyoucef Benkhedda Algiers university, Algeria.

(2) Giulio Luca Rosboch, University of Turin, Italy.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/74835>

### Case Report

Received 28 July 2021  
Accepted 04 October 2021  
Published 07 October 2021

## ABSTRACT

**Aims:** Feasibility of surgery with non tension end to end anastomosis for near carinal tracheal resection and reconstruction with preoperative planning and surgical approach strategy.

**Presentation of the Case:** 55 year old male presented with central airway obstruction and haemoptysis requiring intubation. CT scan revealed a mass at the lower trachea and bronchoscopy revealed a mass which was 3 rings above the carina for which debulking was done. Tumour histopathology reported adenoid cystic carcinoma. A right posterolateral thoracotomy, near carinal tracheal resection and reconstruction, with wedge resection of the lower lobe lung lesion was done to clear the extra trachea along with the right lung lesion. Intrathoracic tracheal release manoeuvres was employed to obtain a non-tension end to end anastomosis. Patient was extubated post operatively and follow up bronchoscopy and CT scan surveillance showed no evidence of recurrence.

**Discussion:** Management principle of tracheal adenoid cystic carcinoma is surgery with a clear resection margin. Preoperative planning with CT scan imaging and bronchoscopy is important to determine the location, extent and invasion of the tumour both longitudinally and transversely. The feasibility of resection and extend of resection details will allow the necessary release manoeuvre and surgical approach needed before embarking on surgery. Cases which complete resection is not achievable, radiotherapy option is available; with chemotherapy for advanced palliative cases.

\*Corresponding author: E-mail: narendran.sangeta@gmail.com;

**Conclusion:** Successful near carinal tracheal resection and reconstruction requires careful preoperative planning with imaging modalities and bronchoscopy. Multidisciplinary team approach gives the best outcome managing such cases.

**Keywords:** Tracheal adenoid cystic carcinoma; near carinal resection; posterolateral thoracotomy.

## ABBREVIATIONS

CT-scan : Computer tomography scan;  
TACC : Tracheal adenoid cystic carcinoma;  
ACC : Adenoid cystic carcinoma.

## 1. INTRODUCTION

Tracheal adenoid cystic carcinoma (TACC) is the second most common histology subtype of primary tracheal tumours after squamous cell carcinoma. The annual incidence of tracheal tumours is 0.142 per 100000 population out of which slightly more than half were squamous cell and only 7.1% was ACC [1]. ACC is a subset of non-small cell carcinoma but differs in many aspects whereby they grow within submucosa of tracheal lumen and rarely metastasize. It has an overall survival of 95% for 5 years and 81% for 10 years [2]. Radiotherapy is an option for unresectable tumours or not fit to undergo surgery [3].

## 2. PRESENTATION OF CASE

55 year old man who has been a smoker, 35 pack years and newly diagnosed bronchial asthma, presented with symptoms of central airway obstruction and haemoptysis requiring intubation. Computed tomography (CT) of neck and thorax revealed an ill-defined intramural lesion from posterior wall of trachea projecting into tracheal lumen at the level of T4 vertebra measuring 2.7 x 2.4 x 3.5 cm (anteroposterior x width x cranio-caudal). Another suspicious right lung lower lobe focal cystic lesion at the postero-basal segment was seen measuring 3.9cm. Bronchoscopy was performed and the tumour was 3 rings above the carina and 3.5cm in length. The tumour was endoscopically debulked and airway patency achieved. Histopathology of the tumour reported adenoid cystic carcinoma. Following a multidisciplinary meeting with oncologist, pulmonologist and anaesthetist, decision was made to resect the remnant extratracheal lesion. The length of trachea to be resected was determined by bronchoscopy and CT scan.

Airway was secured by single lumen orotracheal tube and exchanged to intermittent cross field

ventilation using flexometallic tube into the distal trachea during anastomosis. Right posterolateral thoracotomy was performed with lower lobe nodule wedge resection sending for frozen section; reported non-malignant. This was followed by near carinal tracheal resection and reconstruction. Trachea resected was 4 cm in length and 1 cm from the carina; margins were sent for frozen section. End to end anastomosis was performed after confirming clear margin with maxon 3/0 suture in interrupted manner. To achieve adequate length of remnant trachea for tension free anastomosis, inferior pulmonary ligament, right hilar and carina was mobilised. Grillo's chin-chest stitch was performed to prevent neck extension and tension on the anastomosis. Patient was extubated post-surgery. Flexible bronchoscopy was performed on fifth day of surgery for assessment and Grillo's stitch was removed. Soft neck collar was applied for the next six weeks. He was discharged well at day nine of surgery.

Histopathological examination revealed a lobulated tracheal mass within the tracheal wall measuring four cm (cranio caudal), two cm (transverse) and one cm (depth) with clear margins. The lung tissue wedge biopsy showed acellular necrotic material with no evidence of malignancy. Follow up bronchoscopy at first, third, ninth and fifteenth months showed well healed anastomosis with normal airway calibre. Follow up CT-scan showed no extra tracheal recurrence either. He was not subjected for any adjuvant treatment.

## 3. DISCUSSION

### 3.1 Surgical Intervention Versus Bronchoscopic Debulking in Near Carinal Tumour

There is no established staging system by American Joint Committee for cancer guidelines for tracheal tumours, except Bhattacharyya staging system which has validated results [4,5]. This patient had stage 3 tracheal tumour and bronchoscopic debulking only achieved luminal clearance leaving the extratracheal primary tumour behind. Hence failure of local disease

control will render high chances of disease progression. R0 surgical resection can lead to prolong disease free survival as well as avert repeated bronchoscopy debulking, anaesthetic risk, radiotherapy treatment and cost.

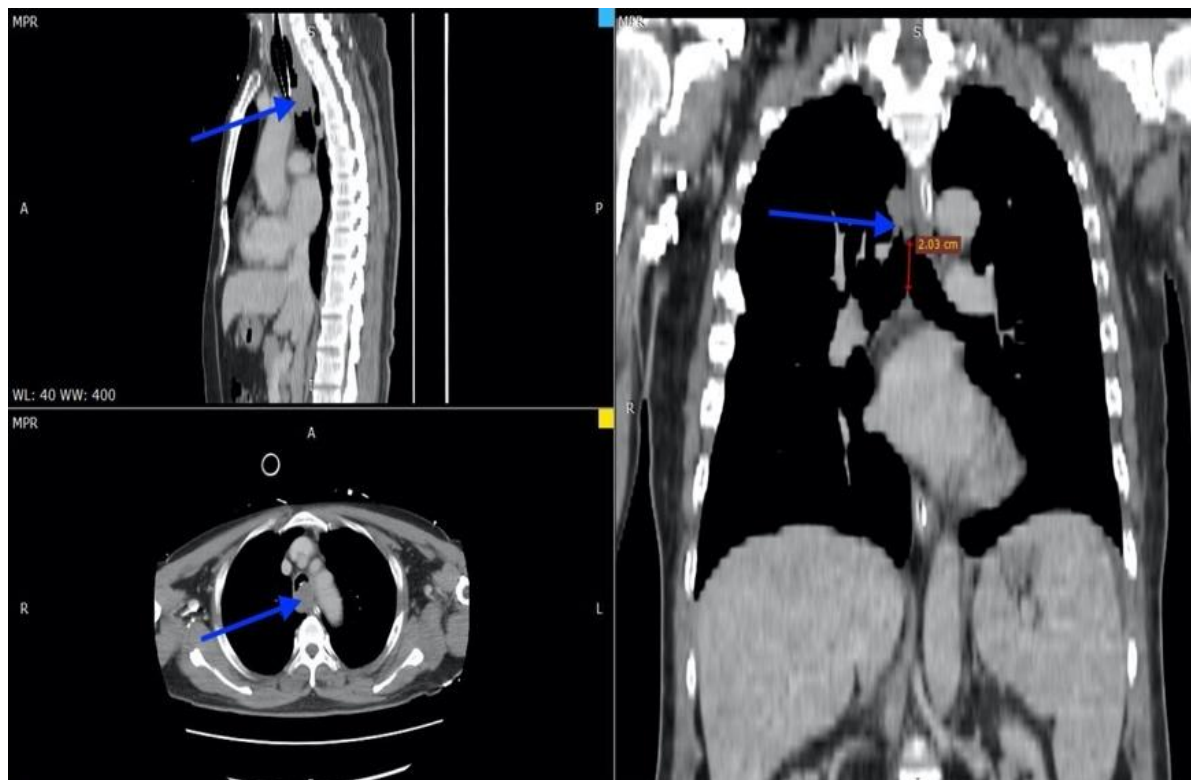
### 3.2 Imaging

CT scan helps assessing the tumour location and extent, both longitudinally and laterally. It also determines regional invasion to vessels or esophagus which is important for preoperative strategy. Extra tracheal lesions can be assessed along with nodal enlargements but the sensitivity and specificity is low. However fluorodeoxyglucose (FDG) positron emission tomography has sensitivity and specificity of 72% and 91% in mediastinal nodal staging, while 77% and 95% for all extrathoracic metastasis [6].

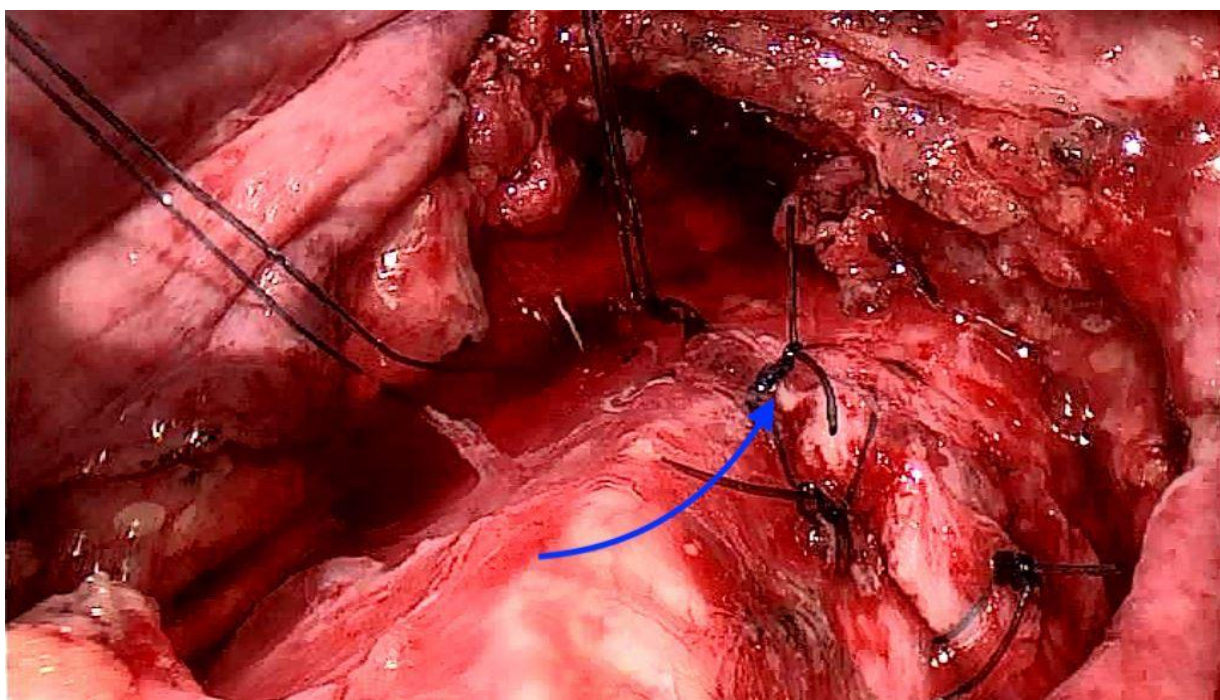
### 3.3 Surgical Approach and its Challenges

Grillo and Mathisen described the approaches based on the location of the tumour [7]. Upper tracheal tumours were exposed by cervical collar incision, mid-tracheal tumours by cervical collar incision extended to median sternotomy while low tracheal tumours by a right thoracotomy. CT

imaging study and bronchoscopy determines the two most important factors for tracheal tumour resection, which is location and extent both longitudinally and laterally. The length of trachea which needs to be resected with the remnant is another major determinant for the approach adopted. Besides, state of the glottis including the recurrent laryngeal nerve function, age, body built, previous treatment received such as radiation therapy also affect surgical decision. The regular consensus regarding the limits of tracheal resection is approximately half the length of trachea could be excised and reconstructed with primary anastomosis utilizing several release manoeuvres reducing tension on the anastomosis [8]. Simple neck flexion with pre-tracheal dissection could allow removal upto 4 cm length without further release manoeuvre [9]. Our patient had a right posterolateral thoracotomy in the fourth interspace which provides wide access to the lower two-thirds of the trachea, carina and right hilum. This approach was suitable for resection of the distal trachea and right lower lobe lesion besides intrathoracic release manoeuvres on the right side with hilar and inferior pulmonary ligament release.



**Fig. 1. Computer assisted tomography showing the tumour at the trachea close to the carina with extratracheal extension. The arrows points at the tumour**



**Fig. 2. Arrow showing tracheal anastomosis post resection**

### **3.4 Role of Surgery Versus Debulking and Chemoradiotherapy**

Multiple studies favoured surgical resection for TACC along with a combination radiotherapy for selected cohort of patients. In a systematic review of 1252 patients with TACC by Ran et al, resulted in 3 cohort of patients: surgery alone, surgery with adjuvant radiotherapy and radiotherapy alone at 40.8%, 36.4% and 19.2% respectively. 57% of those who underwent surgery achieved complete resection. The best survival outcome at 5 years and 10 years respectively was seen in the surgery group [10]. Hu et al study of 34 patients with TACC over a span of 22 years, showed better survival outcome in the surgically resected group, even when the resection margin was involved as compared to radiotherapy alone. Cases with a positive resection margin (R1 resection) were subjected to adjuvant radiotherapy. Chemotherapy in stage 4 disease is an option as seen in the Hu et al study, however there are no randomised trials to support its role [11].

### **4. CONCLUSION**

Successful near carinal tracheal resection and reconstruction requires careful preoperative planning with imaging modalities and bronchoscopy. Accurate measurement of the

tracheal lesion and the length of resection is paramount. This allows the surgeon to plan the operative approach as well as the release manoeuvres. The addition of hilar and pericardial release manoeuvres may allow 50% of tracheal length resected in keeping with principle of a well vascularized tension free anastomosis.

### **CONSENT**

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

### **ETHICAL APPROVAL**

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.



## REFERENCES

1. Honings J, van Dijck JAAM, Verhagen AFTM, van der Heijden HFM, Marres HAM. Incidence and Treatment of Tracheal Cancer: A Nationwide Study in The Netherlands. *Annals of Surgical Oncology*. 2007;14(2):968-76.
2. Högerle BA, Lasitschka F, Muley T, Bougatf N, Herfarth K, Adebeg S, et al. Primary adenoid cystic carcinoma of the trachea: clinical outcome of 38 patients after interdisciplinary treatment in a single institution. *Radiation Oncology*. 2019; 14(1):117.
3. Gaissert HA, Grillo HC, Shadmehr MB, et al. Long-term survival after resection of primary adenoid cystic and squamous cell carcinoma of the trachea and carina. *Ann Thorac Surg*. 2004;78:1889–96.
4. Bhattacharyya N. Contemporary Staging and Prognosis for Primary Tracheal Malignancies: A Population-Based Analysis. *Otolaryngology–Head and Neck Surgery*. 2004;131(5):639-42.
5. Zayed Y, Tariq MA, Chandran AV. Tracheal Cancer. [Updated 2021 May 25]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan- Available: <https://www.ncbi.nlm.nih.gov/books/NBK538437/>
6. Kubota K, Matsuno S, Morioka N, Adachi S, Koizumi M, Seto H, et al. Impact of FDG-PET findings on decisions regarding patient management strategies: a multicenter trial in patients with lung cancer and other types of cancer. *Ann Nucl Med*. 2015 Jun;29(5):431-41.
7. Grillo HC, Mathisen DJ. Primary tracheal tumors: treatment and results. *Ann Thorac Surg*. 1990 Jan;49(1):69-77.
8. Mulliken JB, Grillo HC. The limits of tracheal resection with primary anastomosis: further anatomical studies in man. *J Thorac Cardiovasc Surg*. 1968; 55(3):418-21.
9. Wright CD, Grillo HC, Wain JC, Wong DR, Donahue DM, Gaissert HA, et al. Anastomotic complications after tracheal resection: prognostic factors and management. *J Thorac Cardiovasc Surg*. 2004;128(5):731-9.
10. Juntao Ran, Guofeng Qu, Xiaohua Chen, Da Zhoa. Clinical features, treatment and outcomes in patients with tracheal adenoid cystic carcinoma: a systematic literature review. *Radiat Oncol* 2021;16. Article no 38,
11. Hu MM, Hu Y, He JB, Li BL. Primary adenoid cystic carcinoma of the lung: Clinicopathological features, treatment and results. *Oncol Lett*. 2015;9(3):1475-1481.

© 2021 Balasubbiah et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:*  
<https://www.sdiarticle4.com/review-history/74835>