



## Tracheal fistula repair with stent placement after failure of reconstruction with muscle tissue. A lung cancer surgery complication

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### ABSTRACT

A report a case of a 63 year old male diagnosed with lung cancer adenocarcinoma. The patient had a right paratracheal mass diagnosed with EBUS-TBNA 22G. The patient had surgery, however 7 days after the billau catheter was removed pneumothorax was diagnosed which did not resolved. Bronchoscopy reveled two minor fistulas in the interior wall of the trachea. An additional surgery was performed in order to add muscle patches on the exterior part of the trachea. Unfortunately additional stent placement was placed after a silicon stent since the muscle patches failed. We chose a metallic auto expandable stent since after three months of follow up a small metastatic lesion was observed in the liver. Stent placement is an option for these patients and the right stent has to be placed for each case.

### 1. Introduction

Surgery is the best option for early stage lung cancer patients [1]. Therefore screening is essential for high risk patients [2]. Video assisted surgery (VATS) is commonly used in most tertiary hospitals [3]. Another method is the use of robotic assistance, however; the cost is much higher than VATS [3]. Lung cancer staging is performed with positron emission tomography (PET-CT) and endobronchial ultrasound-convex probe (EBUS-TBNA) [4]. Currently with VATS complications are limited, however; there are cases where local interventions are necessary to resolve the problem. Lately endobronchial valves have been used to resolve air-leaks from small fistulas [5]. Thoracic surgeons have been using extrathoracic pedicled muscle flaps in order to cover non-malignant tracheal or bronchial fistulas for several years [6].

Tracheal stents can be used to block air-leaks, small or large. The issue is usually to choose the right material, silicon or metallic (covered) [7–9]. We have also stents that are covered with drug eluting agents in order to induce locally cancer apoptosis or block fibrin tissue formation [10–12]. The procedure of stent placement is easy and currently companies and experts in the field are focusing in 3D customized stents [13].

### 2. Case presentation

We report the case of a 63 year old male diagnosed with lung cancer adenocarcinoma with EBUS-TBNA 22G needle. The patient had a right paratracheal mass diagnosed with EBUS-TBNA 22G (Figs. 1 and 2.). The patient had surgery a right pneumonectomy, however after 7 days when the billau catheter was removed pneumothorax was diagnosed

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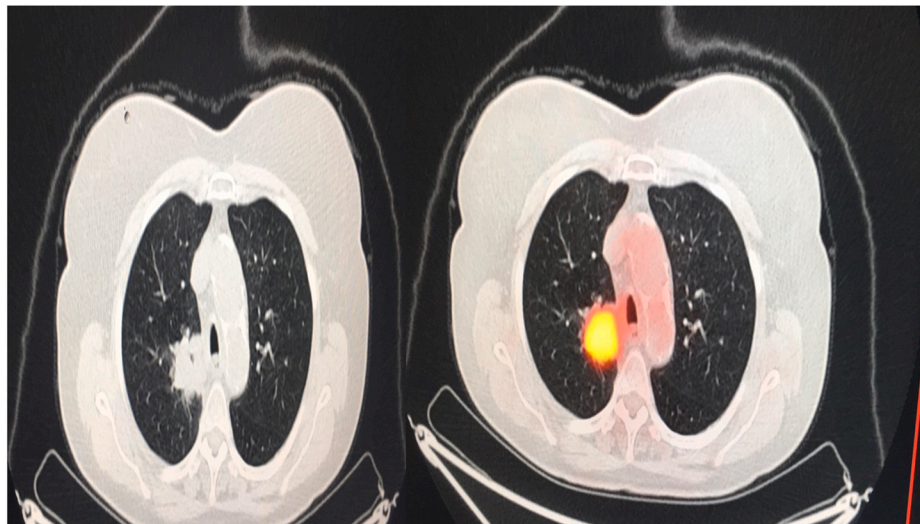


Fig. 1. Lung mass right upper lobe with PET-CT.

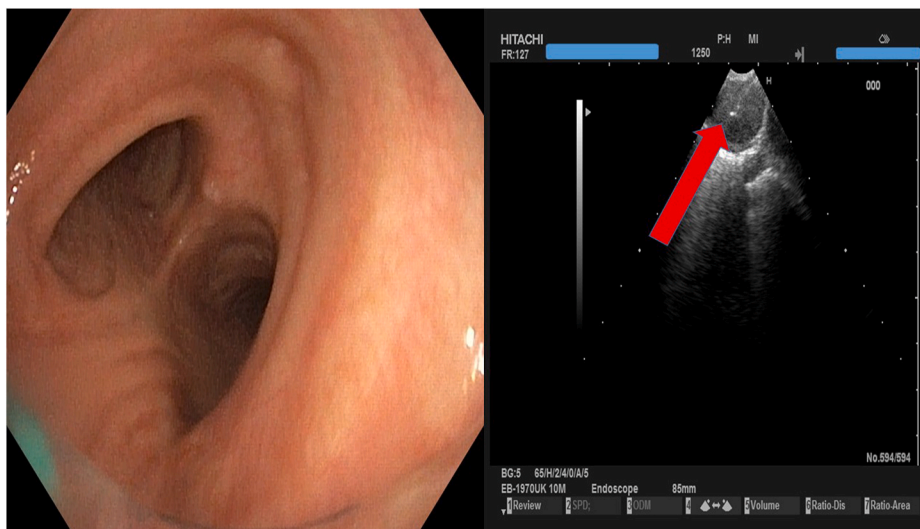


Fig. 2. Left; Endoscopic figure, no lesion endobronchially, Right; lesion with the red arrow indicating the tip of the needle 22G. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

which did not resolved. Bronchoscopy revealed two minor fistulas in the interior wall of the trachea (Fig. 3.). An additional surgery was performed in order to add a muscle flap patch on the exterior part of the trachea (Fig. 4.). Unfortunately additional stent placement was placed after a silicon stent since the muscle patches failed (Fig. 5.). We chose finally a metallic auto expandable stent since after three months of follow up a small metastatic lesion was observed in the liver (Figs. 6 and 7.). Stent placement is an option for these patients and the right stent has to be placed for each case. After one year of follow up small granulomas have been observed in parts of the stents, however without local cancer

recurrence. The patient had a biopsy of the initial metastatic liver lesion and with PD-L1 expression 90% is under immunotherapy with pembrolisumab for 9 months with complete disease control (see Fig. 8).

### 3. Discussion

Lung cancer screening is were nowadays focus for patients with smoking habit,  $\geq 50$  years of age and chronic obstructive pulmonary disease (COPD) [2]. We have novel diagnostic tools such the Radial Endobronchial ultrasound, endobronchial ultrasound-convex probe,

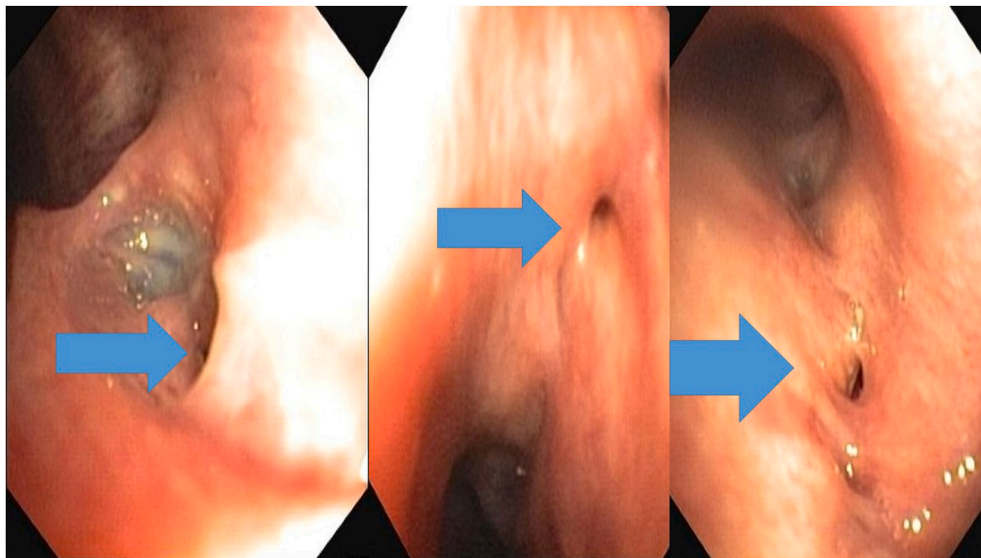


Fig. 3. Blue arrows indicate the fistulas. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

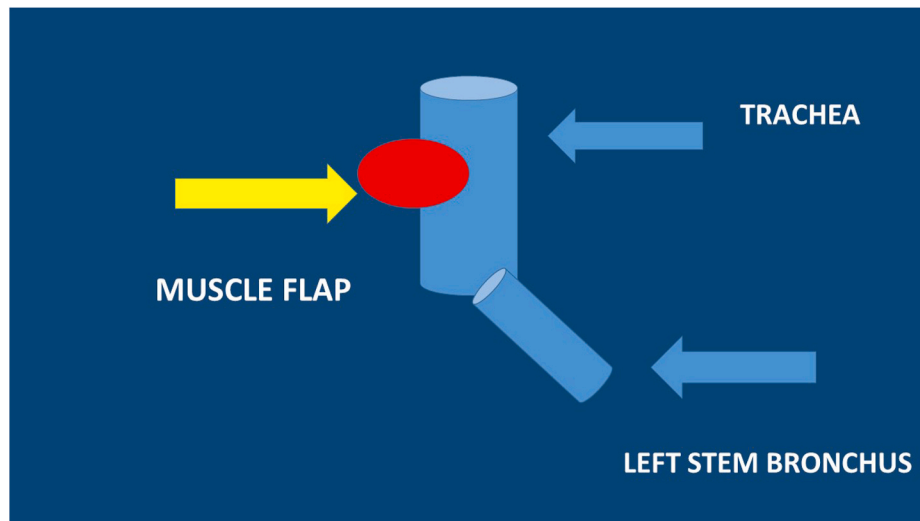


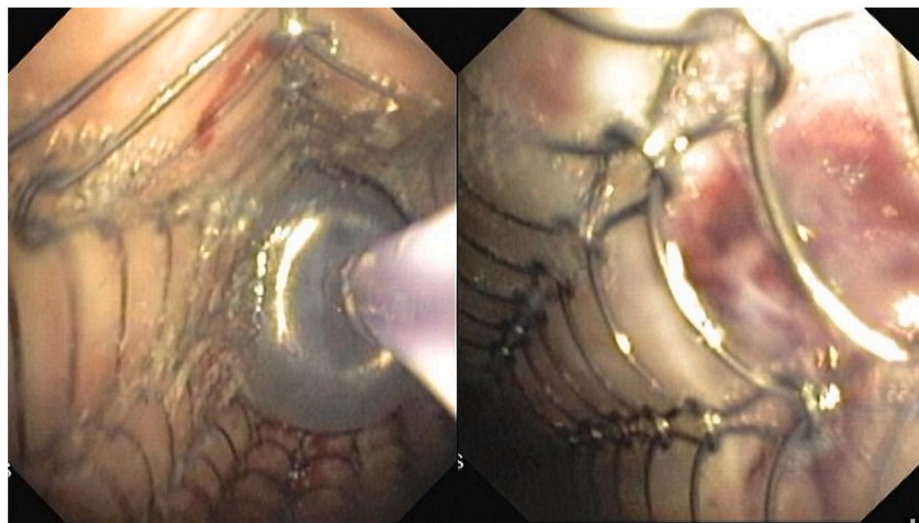
Fig. 4. Schematic demonstration for the muscle flap placement.

electromagnetic navigation and cone beam ct [14–21]. Pet-ct and endobronchial ultrasound convex probe is currently used for lung cancer staging [4,22]. Video assisted thoracic surgery is the most methodology for lung cancer practice. Regarding patients with disease relapse especially in non-small cell lung cancer adenocarcinoma -we have to acquire biopsy in order investigate epidermal growth factor receptor (EGFR), anaplastic lymphoma kinase (ALK), proto-oncogene B-Raf (BRAF), proto-oncogene-1 (ROS-1), RET proto-oncogene (RET) and programmed

death-ligand 1 (PD-L1) [23,24]. Our patient had only a liver lesion as disease relapse and he was only positive for PD-L1 90%, and therefore we initiated pembrolisumab 200mg every 20 days as treatment. We have performed again PET-CT evaluation for re-staging as we did initially and the lesion is not currently active, however; we will continue immunotherapy treatment and follow-up. Patients with this profile of complete disease response have been evaluated in clinical trials and they can receive immunotherapy for at least two years. Then it is up to the



**Fig. 5.** Left; silicon stent number 14-diameter- 6cm-length, Middle; images from the silicon stent placement, Right; Patient intubated with STORZ rigid bronchoscope number 14mm-(outer rim, 13mm inner working channel). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)



**Fig. 6.** Images from the mettalic stent placement procedure.

oncology council if the patient has still disease complete response to stop the treatment and be under close follow-up [25]. Regarding the proper stent, we chose a silicon stent as an initial material since we did not have a disease relapse, however; afterwards we inserted a metallic stent since this is the proper material when we have disease relapse and malignancy [26]. The metallic stent is more difficult to remove, as it has to be destroyed. Regarding this patient we could leave the silicon stent, since

we have complete disease control [27,28].

**Declaration of competing interest**

The authors declare no conflicts of interest.

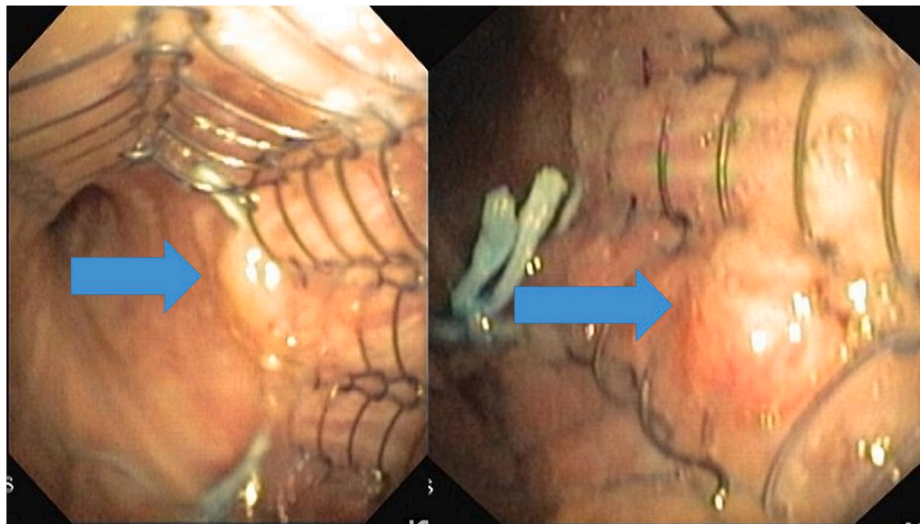


Fig. 7. Blue arrows indicate fibrinus granulomas verified with biopsy after 9 months of follow-up. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)



Fig. 8. Left: up and down image the Jet-Ventilator twin stream model that we used. Right: Up and down the rigid bronchoscope number 12mm with inner rim 11mm (working channel) with the necessary jet-ventilator connector and light. Moreover; a rigid electrocautery probe with suction capability.

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