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Case report

New hybrid method for trachea dilatation with rigid and flexible tools

Konstantinos Sapalidis[a], Stella Laskou[a], Aikaterini Amaniti[a], Charilaos Koulouris[a], Dimitrios Giannakidis[a], Stylianos Mantalovas[a], Ilias Karapantzos[b], Chrysa Karapantzou[b], Paul Zarogoulidis[c,*], Iakovos Arapakis[b], Haidong Huang[d], Chong Bai[d], Ioanna Kougioumtzi[e], Nikolaos Katsikogiannis[e], Eirini Sarika[e], Fotis Konstantinou[f], Wolfgang Hohenforst-Schmidt[g,h,i,j], Isaak Kesisoglou[a]

[a] 3rd Department of Surgery, ``AHEPA`` University Hospital, Aristotle University of Thessaloniki, Medical School, Thessaloniki, Greece
[b] Ear, Nose and Throat Department, ``Saint Luke`` Private Hospital, Thessaloniki, Panorama, Greece
[c] Pulmonary Department-Oncology Unit, ``Theageneio`` Cancer Hospital, Thessaloniki, Greece
[d] Department of Respiratory and Critical Care Medicine, Changhai Hospital, Second Military Medical University, Shanghai, China
[e] Surgery Department (NHS), University General Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Greece
[f] Thoracic Surgery Department, University General Hospital of Alexandroupolis, Democritus University of Thrace, Alexandroupolis, Greece
[g] Sana Clinic Group Franken, Department of Cardiology, "Hof" Clinics, University of Erlangen, Hof, Germany
[h] Sana Clinic Group Franken, Department of Pulmonology, "Hof" Clinics, University of Erlangen, Hof, Germany
[i] Sana Clinic Group Franken, Department of Intensive Care, "Hof" Clinics, University of Erlangen, Hof, Germany
[j] Sana Clinic Group Franken, Department of Nephrology, "Hof" Clinics, University of Erlangen, Hof, Germany

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ABSTRACT

Trachea stenosis is observed either in benign or malignant situations. In cancer malignancy a tumor might obstruct the central airway in three different ways. Again granuloma tissue is usually observed after intubation or stent placement in order to manage a benign malformation of the trachea. In any case there are several tools and techniques that can be used either with surgery or endoscopically to manage such situation. We will focus on a hybrid technique in order to ventilate the patient while performing endoscopic management of granuloma tissue.

1. Introduction

It has been observed in lung cancer or other cancer malignancies that cancer tissue might be presented in the trachea or central airways [1,2]. There are three different forms of obstruction; a) inside the airway, b) outside pressure and c) mixed [3]. Based on the findings the treating physician will choose the best approach either first by performing debulking and then placing a stent or immediately place a stent. The type of stents that we can use are both silicon and metallic (covered or not) auto expandable or polyurethane stents. If debulking is necessary then argon plasma coagulation, YAG laser or cryo probe can be used as rigid probes or flexible probes based on the method that we will use intubation with rigid bronchoscope and rigid probes or rigid bronchoscope and flexible probes through the working channel of a flexible bronchoscope. In cancer obstruction we usually use metallic covered stents, however; the choice of the stent remains for the treating physician. In the case where we have a benign situation such as; tracheomalacia then silicon stent is preferred. In order to place a silicon stent we need to use a rigid bronchoscope with all the necessary stent deployment equipment, currently we mostly use DUMON and DYNAMIC (Freitag) stents [3]. Unfortunately stents have an adverse effect of producing granuloma tissue at the two end parts of the stent in both metallic and silicon. This tissue is mainly formed due to the local stress which inhibits a cascade of local angiogenesis proteins [4]. In the situation where granuloma tissue is observed then we have to remove it. We can use several methods which have been previously described [3]. In the case where we have granuloma tissue formation due to intubation of a patient or tracheal stenosis then we have to choose based on the length the

* Corresponding author.
E-mail address: pzarog@hotmail.com (P. Zarogoulidis).

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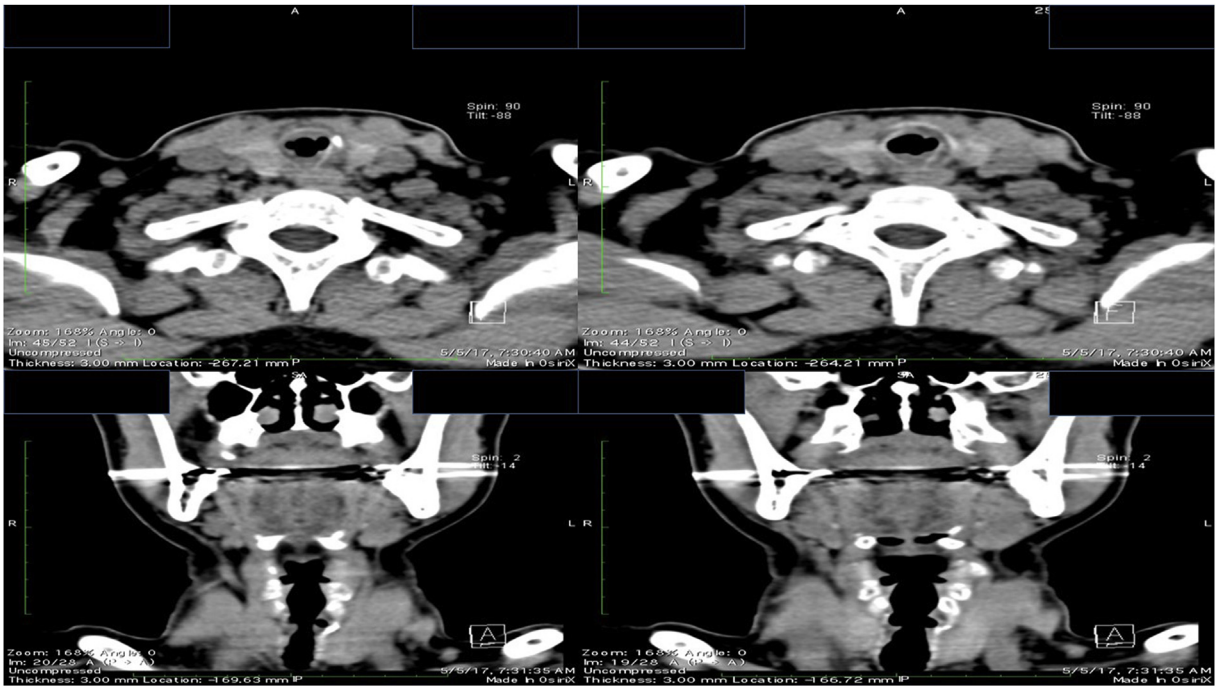

Fig. 1. Initial endoscopic figure before balloon dilation.

Fig. 2. Set up of the procedure (red arrow indicates the light source of the rigid ENT scope).

appropriate treatment approach either with surgery or endoscopic. We will currently present a hybrid method of ventilation during a trachea dilation with balloon.

2. Case presentation

A 60 year old lady was diagnosed with trachea stenosis after intubation for 15 days after a car accident (Fig. 1.). Due to the very small length of the granuloma tissue $\leq$3mm and 3 $\approx$ mm from the trachea wall inside the centrum of the airway it was decided to use a balloon dilation initially and observation every 2 months initially. The position of the stenosis and tissue formation did not allow intubation with rigid bronchoscope or endotracheal tube and therefore for airway safety and equipment application (balloon visibility) it was decided to use a hybrid method that is used from the ear, nose and throat department (ENT) (Figs. 2–6.). Direct observation of the vocal cords was able with the

Fig. 3. Set up of the procedure.

Fig. 4. Patient intubated with a No 6. Tracheal tube (set up of the procedure).

rigid scope 12cm length and a balloon dilation system was used (Fig. 7.). We preoxygenated the patient by intubating her with an endotracheal tube of No.6 and after taking out the endotracheal tube we inserted the balloon dilator. We used psi of 10 bars for one minute and then we intubated the patient again. We performed this method three times until we had accomplished an acceptable result(Figs. 8–10.). At the end of the procedure we used swab impregnated in mitomycin C in a round shape (Figs. 11–14.). We evaluated again the patient after two months and we did not perform again the procedure since the findings where the same(Fig. 15.). The patient will remain under observation with both CT-scan of the trachea and endoscopic procedures when necessary. It has to be mentioned that the patient before referring to our center had a session of electrocautery in another hospital several months before.

3. Discussion

Preserving the airways is not only essential in order to keep the oxygenation in proper levels, but also by doing this we preserve the QoL of the patient [1]. The methods of debulking with YAG laser, cryo therapy and argon plasma therapy have been described in previous publications their prons and cons [5,6]. On of the most

Fig. 5. Rigid scopes and forceps.

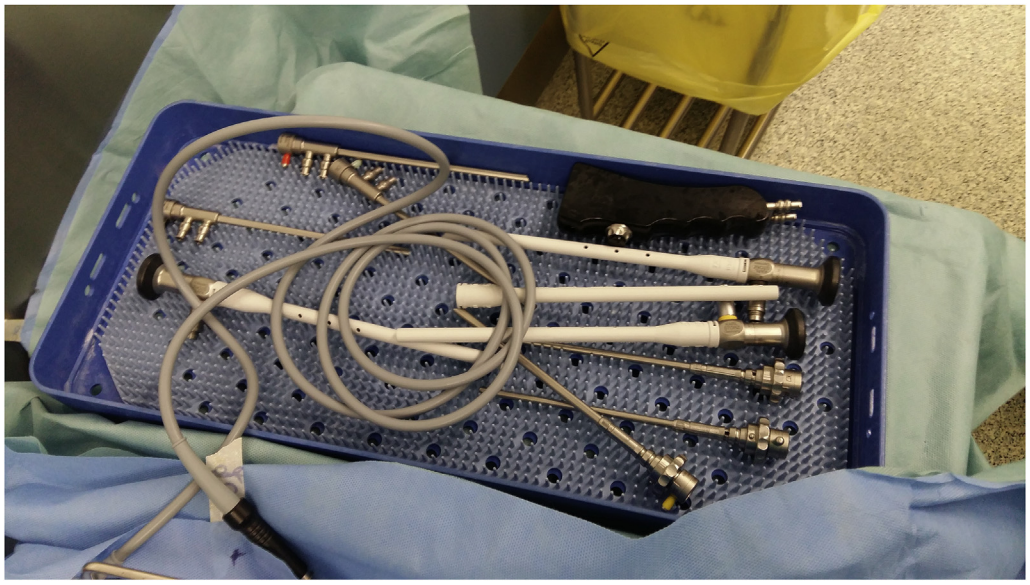

Fig. 6. Rigid cameras.

important issues during stent placement in preserving proper ventilation throughout the procedure. Jet-ventilation is considered the best mode of ventilation in order to keep low levels PCO_2 and prevent blood acidosis (high tidal volume and high frequency of respiratory rate) [7]. During silicon stent placement and while using a rigid scope or rigid bronchoscope the inlet where the instruments are inserted is a reason why the patient has oxygene escape and the PCO_2 levels become elevated. Again the time for the PCO_2 to elevate are depended also from the underlying lung disease. Our patient had dyspnea symptoms from the trachea stenosis in her everyday life and when the dilation was performed she was immediately relieved. We present this simple alternative method of ventilation where pulmonary physicians can collaborate with the ENTs and semi rigid and flexible techniques can be combined.

Fig. 7. Balloon dilator system.

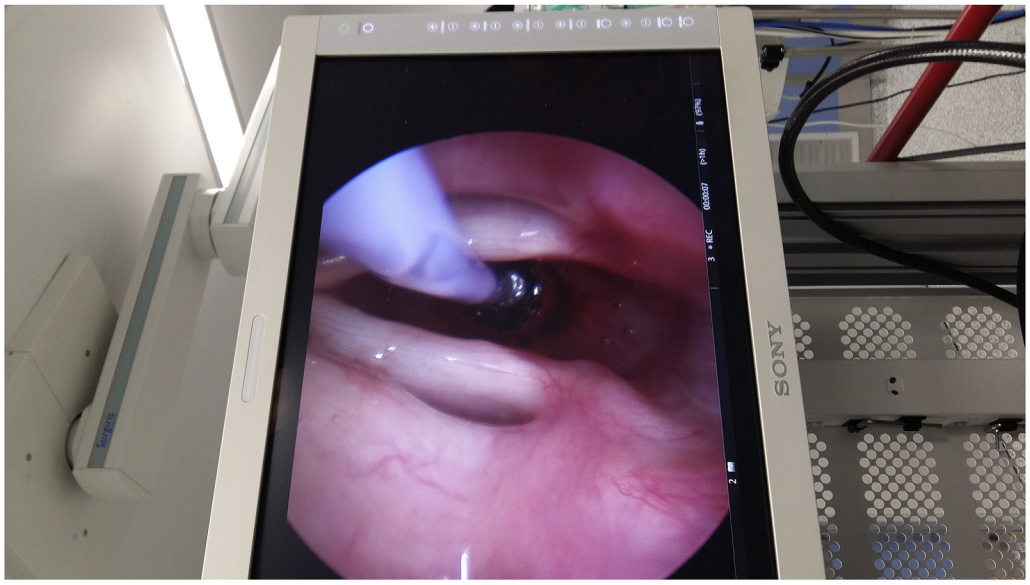

Fig. 8. Vocal cords and balloon dilator.

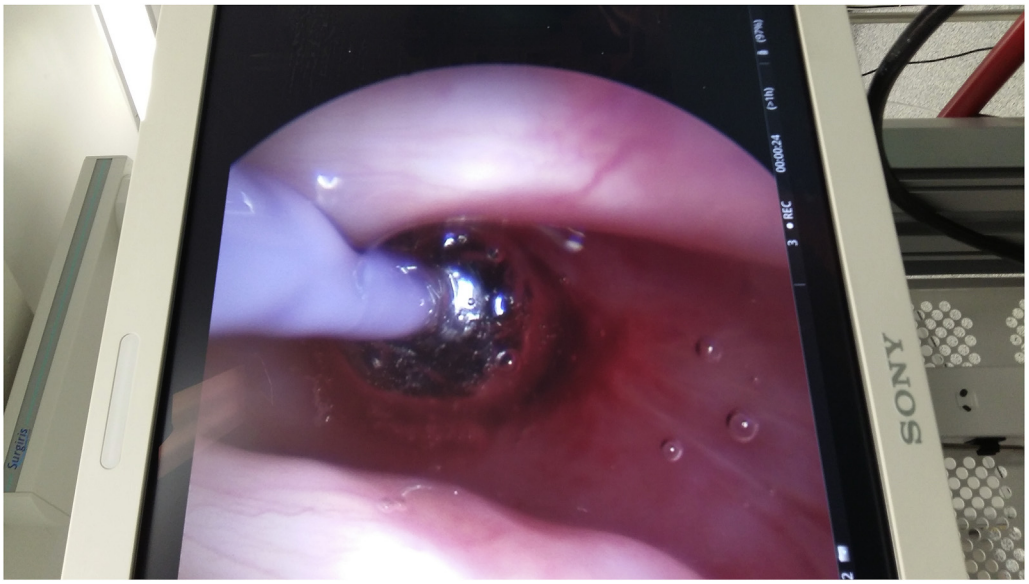

Fig. 9. Vocal cords and balloon dilator (we use Fig. 8 and 9 in order to show the position of the stenosis and balloon application).

Fig. 10. Trachea after balloon dilation.

Fig. 11. Mitomycin C.

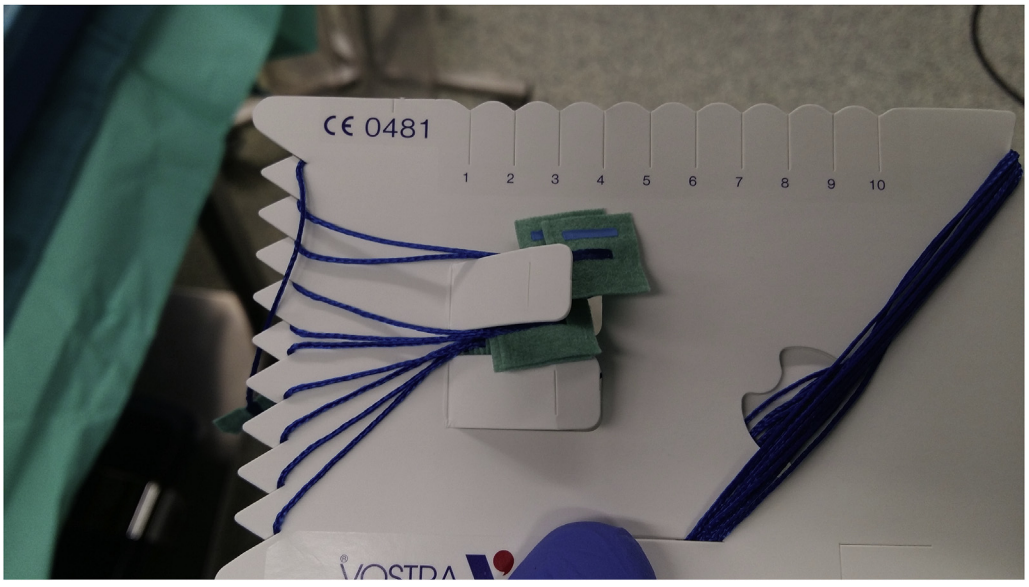

Fig. 12. Swabs.

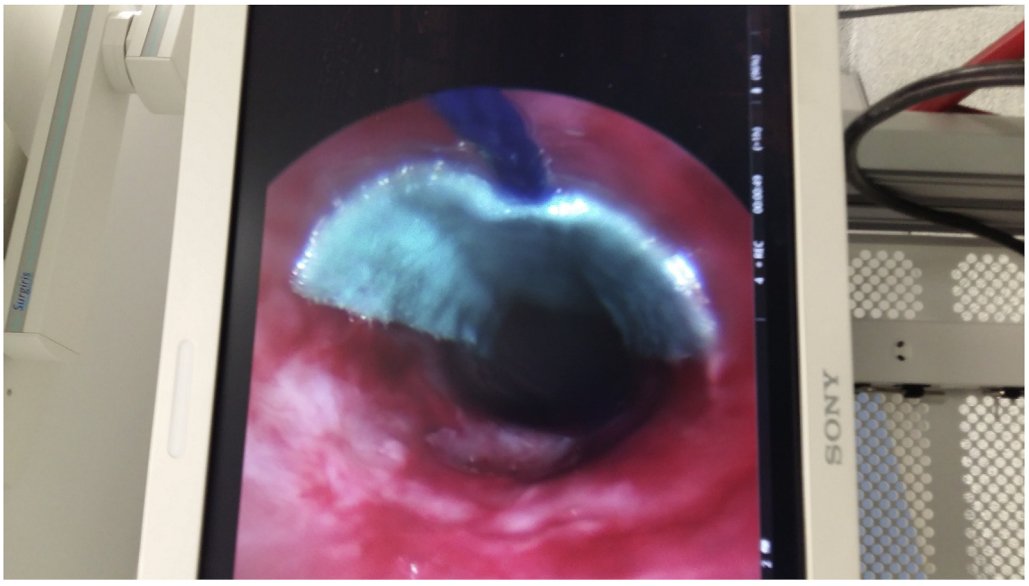

Fig. 13. Swab application on the right.

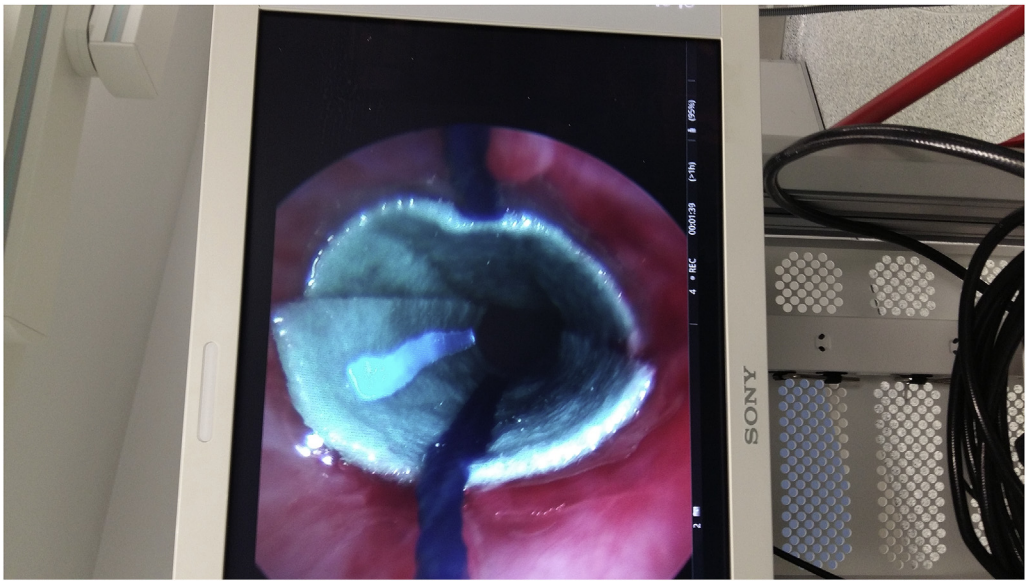

Fig. 14. Swab application in the trachea wall.

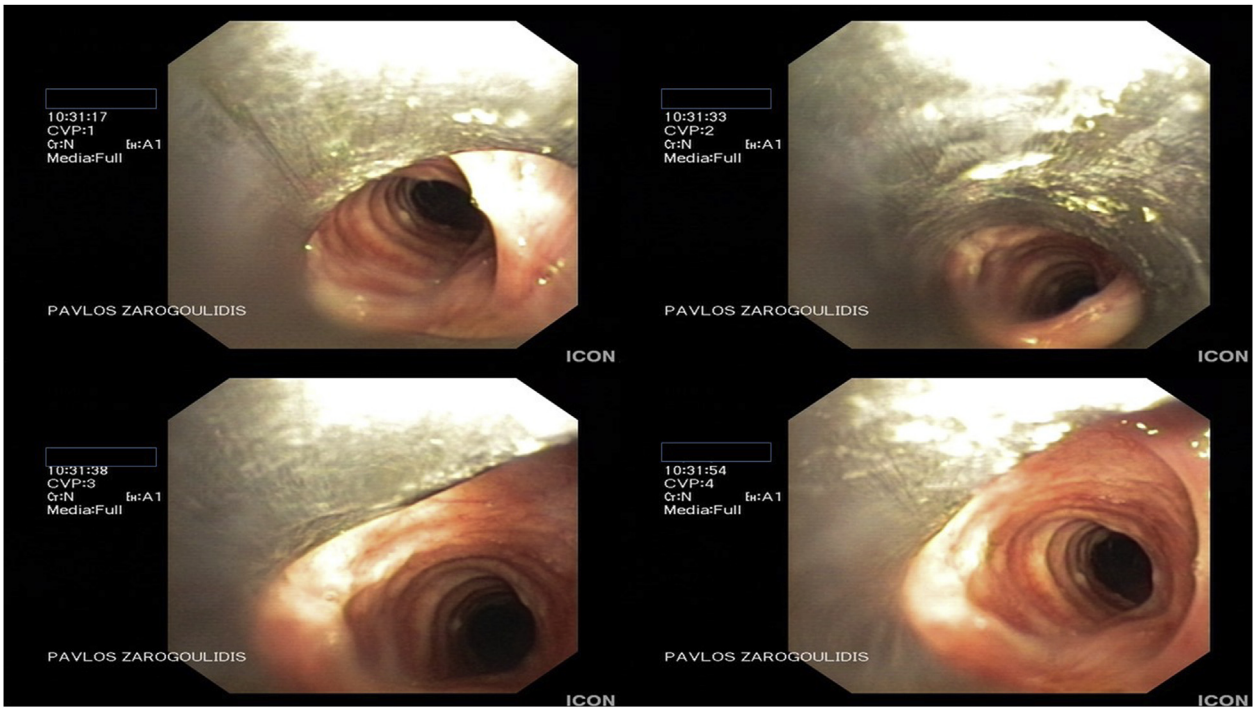

Fig. 15. Evaluation after 2 months.

Disclosure

The authors declare no conflict of interest.

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