

Case Report

Tracheal Stenosis Distal to Tracheostomy Tube

Omar Farooq Butt*

Department of Otolaryngology, HMG Al Qassim Hospital Buraydah, Saudi Arabia

*Corresponding author

Omar Farooq Butt, Department of Otolaryngology, Al Qassim Hospital, King Abdulaziz Road, PO Box 1313, Buraydah 51431, Qassim, Saudi Arabia, Tel: +966 559748076; Fax: +966-16-3166667; Email: omarbtt22@gmail.com

Submitted: 08 July 2020

Accepted: 21 July 2020

Published: 23 July 2020

ISSN: 2379-948X

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Abstract

Tracheal stenosis is a challenging problem and is a known complication of prolonged intubation or tracheostomy. The management can involve a multidisciplinary approach with multiple complex procedures.

This is a case of an unusual site of complication as it is distal to the end of the tracheostomy tube. It is considered to be associated with repeated suction related trauma to the trachea. This is a quadriplegic patient with motor neuron disease who is ventilator dependent and wanted repeated suction done as he felt better with it. This case and its management are of interest due to the associated comorbidities and the ways we modified our equipment and technique to deal with the problems faced. Surgery in this region is particularly demanding as the airway is shared with the anaesthetist and access available is limited. In this patient it was made more difficult because of the site of stenosis and the non-availability of the direct laryngoscopy or tracheoscopy from the oral route due to trismus and neck rigidity. The method used was novel and was selected and modified due to the fact that the patient was on low molecular weight heparin and aspirin. We did not want bleeding in the airway and coblation was our method of choice as this method gives us a speedy and bloodless procedure with very little, if any, charring and thus quicker healing. The available equipment ie Evac-70® wand, which we use for tonsillectomy, was modified so it could be used in the trachea under endoscopic view via the stoma. The wand provided suction, saline and a cutting plasma field, all in one instrument.

Keywords

- Tracheostomy complications
- Tracheal stenosis
- Coblation
- Post tracheostomy
- Post intubation

ABBREVIATIONS

ALS: Amyotrophic Lateral Sclerosis; DVT: Deep Vein Thrombosis; ENT: Ear Nose and Throat; SaO₂: Saturation of Oxygen

INTRODUCTION

I would like to present this interesting case of a patient who is suffering with Amyotrophic Lateral Sclerosis [1]. He has a long term tracheostomy and is on ventilator support due to his neuromuscular weakness. He presented with increasing shortness of breath and noisy breathing. A flexible endoscope was passed into the airway via the tracheostomy tube and we found tracheal stenosis beyond the distal end of the tracheostomy tube.

This case was unusual as the stenosis was beyond the distal end of the tracheostomy tube. The reason for this, what we could conclude, was repeated suction related trauma as this patient wanted to have the suction frequently. He felt he could breathe better after having suction.

He had very limited opening of the mouth due to trismus and fixed temporomandibular joint. He also has cervical spine problems leading to very limited neck mobility. He was also

on anticoagulants and low dose aspirin to prevent DVT, being quadriplegic and long term bed ridden.

In this case we discuss the challenging management of the stenotic web beyond the distal end of the tracheostomy tube and the surgical approach to this difficult airway. The stenosis was safely removed using a modified coblation technique via the widened stoma, after stomaplasty, under endoscopic view. This difficult airway required a coordinated effort from both the ENT and anaesthetic departments.

CASE PRESENTATION

This 58 years old male with ALS is quadriplegic and has had a long term tracheostomy as he was ventilator assisted for breathing. He was admitted under the care of the neurologist and the internal medicine department. He was getting regular tracheostomy care from the respiratory care practitioner and his family [2-6]. He wanted frequent suction of the tracheal secretions as that made him feel better and the family / regular carers were doing it for him.

I was called to see this patient as he felt difficulty in breathing and it was not easy to pass the suction catheter into the airway. We suspected decannulation or partial dislodgement of the

tracheostomy tube, which can potentially be life threatening [7]. We found a Size 6 Cuffed fenestrated Shiley tracheostomy tube in situ which was snugly fitting the stoma. He had noisy breathing which was requiring a high ventilator pressure to maintain his SaO₂ at 96% on air. The inner tube was changed but with no improvement. On flexible endoscopy we found the tube was in the trachea but the lumen of the trachea was narrowed beyond the distal end of the tracheostomy tube. The tracheal stenosis was Myer's and Cotton grade 2 [6]. It was decided to take the patient to the operating room and excise the stenotic web under a general anaesthetic. At the same time a stomaplasty was planned to replace the existing size 6 cuffed tubes with a larger tracheostomy tube (Figure 1,2).

The surgical plan was to intubate orally or nasally once the patient was put to sleep via the existing tracheostomy. We planned to then remove the tracheostomy tube and clear the stenosis in the distal segment with Cold steel [8] or Coblation [9] under direct view using an Operating Laryngoscope and assistance with Hopkins Telescope [10] or an operating microscope as LASER was not available at our centre.



Figure 1 Pre-operative endoscopic view through the distal end of the tracheostomy tube.

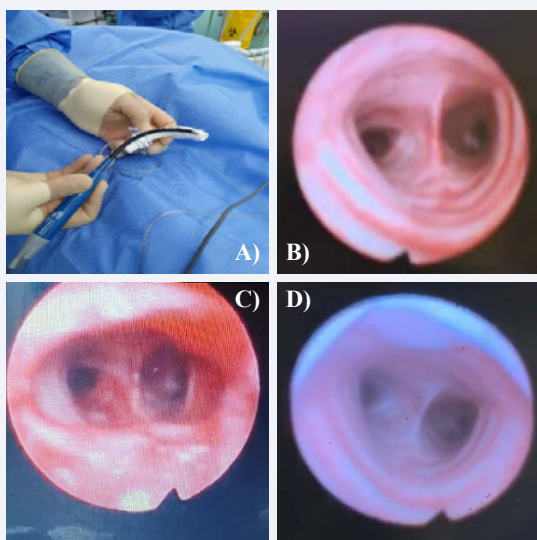


Figure 2 (A) – Reshaping the Evac-70@ wand preoperatively to conform to the curvature of the tracheostomy tube (B) –Immediate Post-Operative view (C) 10 days post post operative (D) 30 days post procedure.

The limitations in this case were the tight trismus and rigid neck which caused problems with intubation. Both the nasal or oral routes were attempted. Even with the use of a video laryngoscope and a nasoendoscope to guide the tube, we were unable to intubate. As the patient was being ventilated via the tracheostomy, a blind intubation was also attempted but failed and the tube was found to have entered the oesophagus a couple of times so further attempts at intubation were abandoned.

We had to share the narrow tracheostomy opening with the anaesthetist as it was the only way we could reach the stenotic segment. Equipment for subglottic jetting [11] was not available. It was decided to swap the tracheostomy tube with a smaller endotracheal tube to give us more room to operate via the existing stoma.

A Stomoplasty was done to widen the stoma and a size 5.5 tube placed, in the widened stoma, after removing the size 6 cuffed Trachoe® tracheostomy tube. An Evac-70® coblation wand was bent into a tracheostomy tube curve and passed into the tracheostoma under direct view using a flexible nasoendoscope with the help of a colleague. We were not getting a good view due to blood in the field, secondary to the intubation related trauma to the web. The flexible scope was swapped with a 0° rigid scope and the trachea was irrigated with 2ml of 1:10000 adrenaline [12,13]. This solution was left in situ for 1 min and then removed by suction. The endotracheal cuff was beyond the web so this irrigation was possible. The web in the trachea was successfully removed with coblation. The problems were all associated with the access to the stenotic segment and the limitation with the positioning of the patient. Once the area was visualized it was easily removed with the coblation setting at 7 and coagulation setting at 3. A size 9, cuffed Trachoe® tracheostomy tube was inserted and secured in place. The recovery was uneventful and other than slight ooze from the stomaplasty, no further problems were encountered. The patient was sent to ICU for one night where he remained comfortable and was transferred to his room the next day.

He stayed on the ventilator support for his condition and remained trouble free. He was checked with regular endoscopy and in 4 weeks the trachea totally cleared as shown in the photos of the trachea at 10 days and 4 weeks post op.

DISCUSSION

Amyotrophic lateral sclerosis (ALS) is a group of rare neurological diseases that mainly involve the nerve cells (neurons) responsible for controlling voluntary muscle movement.

The disease is progressive and currently, there is no cure for ALS and no effective treatment to halt, or reverse, the progression of the disease. ALS belongs to a wider group of disorders known as motor neuron diseases, which are caused by gradual deterioration (degeneration) and death of motor neurons [1]. This patient wanted repeated suction of the trachea (almost every 15 to 20min) as the family was caring for him 24/7 [14-16] the excessive suctioning resulted in repeated trauma to the segment beyond the distal end of the tracheostomy tube. Because of tracheal irritation and injury the patient experienced bloody or blood-tinged secretions [13] and over time this trauma led to the stenosis due to a thick band of tissue or a web. There

are very few studies discussing distal tracheal stenosis and one study covering the issue of deep vs shallow suction in intubated neonates associated with possible stenosis due to trauma [12].

Patients with tracheal stenosis would require intervention soon to improve the airway and different methods have been used and advantages and disadvantages have been documented and reported in literature [80]. The choice of method sometimes needs to be tailored depending on the cause, the situation, The extent of the stenosis and the severity of the symptoms [2].

ACKNOWLEDGEMENTS

Dr. Muath Alrawashdeh, Consultant Otolaryngologist, for his help in assisting with the management of this patient. Ms. Bushra Almathi - Translator, for helping in communicating with the patient and his family.

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Cite this article

Butt OF (2020) Tracheal Stenosis Distal to Tracheostomy Tube. *Ann Otolaryngol Rhinol* 7(3): 1241.