

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/mjafi

Case Report

Track your trach: Removal of a fractured tracheostomy tube using a flexible fiberoptic bronchoscope in a patient with severe head injury



Avishek Chakma ^{a,*}, Obaid Ahmed Siddiqui ^b, Shahna Ali ^c, Abu Nadeem ^d

^a Resident, Jawaharlal Nehru Medical College, Aligarh, India

^b Associate Professor, Jawaharlal Nehru Medical College, Aligarh, India

^c Assistant Professor, Jawaharlal Nehru Medical College, Aligarh, India

^d Associate Professor, Jawaharlal Nehru Medical College, Aligarh, India

ARTICLE INFO

Article history:

Received 8 April 2021

Accepted 20 August 2021

Available online 7 October 2021

Keywords:

Fractured tracheostomy tube

Fiberoptic bronchoscopy

Head injury

ABSTRACT

Tracheostomy is a common airway procedure for life support in critically ill patients with head injuries. This procedure is safe but also associated with early and late complications. Tube fracture and dislodgement into the tracheobronchial tree leading to airway obstruction is a rare but life-threatening complication after prolonged tracheostomy tube placement. There are very few published reports of tracheostomy tube fracture and dislodgement into tracheobronchial tree in a neurologically injured patient. We report a case of a fractured tracheostomy tube which got impacted in the left main bronchus, in a 41-year-old male patient who had been on prolonged tracheostomy tube after craniotomy and evacuation of subdural hematoma. The distal part of the tracheostomy tube fractured and impacted in the left main bronchus. Fiberoptic bronchoscopy was performed through the oral cavity to extract it, and the anaesthetic management during the period is discussed.

© 2021 Director General, Armed Forces Medical Services. Published by Elsevier, a division of RELX India Pvt. Ltd. All rights reserved.

Introduction

Mechanical ventilatory support with prolonged intubation is required in patients with head injuries because of their inability to protect the airway, persistence of excessive secretions and inadequacy of spontaneous ventilation. Prolonged endotracheal intubation, however, is associated with trauma to the larynx and trachea and patient discomfort in

addition to increased requirement of sedatives. Tracheostomy has been found to play an integral role in the airway management of such patients in intensive care units. In some cases, because of persistence of the primary disease, decannulation cannot be performed, and the tracheostomy tube has to be maintained for a long time. Its late complications are tracheal stenosis, tracheostomy tube fracture, tracheo-oesophageal fistula and so on.¹ It is important that the patient

* Corresponding author.

E-mail address: chakmaavi@gmail.com (A. Chakma).

<https://doi.org/10.1016/j.mjafi.2021.08.014>

0377-1237/© 2021 Director General, Armed Forces Medical Services. Published by Elsevier, a division of RELX India Pvt. Ltd. All rights reserved.

must undergo careful follow-up at regular intervals to avoid late complications such as fracture and dislodgement of the tube into the bronchus.²

Fracture of a tracheostomy tube and its dislodgement into the bronchus of a postoperative neurosurgical patient is not commonly reported. The fact that most of these patients present in acute respiratory distress makes the management more difficult. Although rigid bronchoscopy is the mainstay of treatment for removal of a foreign body from airway and requires general anaesthesia, the use of a flexible fibreoptic bronchoscope (FOB) under monitored anaesthesia care with the patient breathing spontaneously has been infrequently reported for removal of a foreign body from airway.³

Anaesthetic management during extraction of the dislodged tracheostomy tube is challenging and technically different from regular procedures.

There are various ways of providing oxygen insufflation during bronchoscopy. High-flow nasal cannula (HFNC) provides low to moderate levels of positive end-expiratory pressure, improves functional residual capacity, increases patient comfort and can be used as a reliable source of providing supplemental oxygen during various interventions.⁴

We present a case report where retrieval of a fractured tracheostomy tube was performed using an FOB under spontaneous respiration and HFNC.

Case report

A 41-year-old male patient, with weight 80 kg, height 1.69 m, and body mass index 28, presented to the emergency department with complaints of breathing difficulty and stridor since 3 h approximately before admission.

On examination at presentation, the patient was restless, Glasgow Coma Scale (GCS) was E4VtM3, oxygen saturation 92% on room air, which increased to 96% upon connecting to Hudson oxygen mask at a rate of 5 L/min, pulse rate was 120/min, blood pressure 144/96 mmHg and respiratory rate 28/min. Local examination of the anterior neck revealed only the neck portion of the tracheostomy tube with tracheal ties, and there was pus oozing at the site of tracheostomy tube. On auscultation, there was decreased air entry into the left side with rhonchi. Chest radiograph revealed a dislodged portion of the tracheostomy tube partly in the trachea and partly in the left main bronchus (Fig. 1).

He was a follow-up case of right frontotemporal osteoplastic craniotomy and evacuation of subdural hematoma two years back. In view of prolonged intubation and mechanical ventilatory support, tracheostomy was performed with single-lumen, cuffed, polyvinyl chloride (PVC) 7.5-mm tube. On improvement of his GCS and general condition, he was discharged with tracheostomy tube in place. During his regular follow-up in neurosurgery clinics, the size of the tube was gradually reduced over a period of two years.

A decision of removing the tracheostomy tube with an FOB under monitored anaesthesia care was taken, and the technique opted was a combination of topical airway anaesthesia along with intravenous sedation and preservation of spontaneous respiration. An informed written consent was obtained from his spouse. The patient was shifted to a bronchoscopy

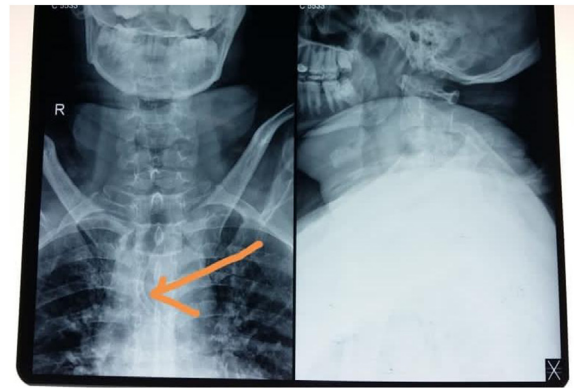


Fig. 1 – Chest radiograph showing a fractured tracheostomy tube (arrow) in the left main bronchus.

suite with all the preparations to manage a difficult airway situation. A rigid bronchoscope was kept as a backup device. Monitors such as pulse oximeter, noninvasive blood pressure cuff, electrocardiogram and temperature probe were attached. An HFNC by Airvo™ at a rate of 60 L/min with 100% fractional concentration of oxygen (fio₂) was attached to the patient's nostrils to provide supplementary oxygen. An intravenous line with 20-gauge cannula was secured in the right upper limb. Premedication was performed intravenously with injection of glycopyrrolate 0.2 mg, fentanyl at a dose of 2 mcg/kg and dexamethasone at a dose of 0.15 mg/kg. Dexmedetomidine injection at a dose of 1 mcg/kg over 10 min was given through the intravenous route as bolus, and maintenance was performed with dexmedetomidine infusion at a dose of 0.4 mcg/kg/h. Five puffs of 10% lidocaine were sprayed in the oral cavity to anaesthetize mucous membranes of mouth and tongue. Then an FOB was introduced through oral cavity via an Ovassapian mouth gag, and spray-as-you-go (SAYGO) technique was used, through a 20-gauge epidural catheter. One millilitre of 4% lidocaine was instilled each at epiglottis, vocal cords, subglottic part, and the left main bronchus to blunt cough reflex. The total amount of administered lidocaine was 210 mg (maximum dose 5 mg/kg).

The tracheal stoma was sealed with a gauze dressing. A foreign body forceps meant for foreign body removal was inserted through the FOB (Fig. 2). Eventually, the dislodged part of the tracheostomy tube was taken out of the left main bronchus (Fig. 3). The procedure lasted for approximately 15 min without any episodes of desaturation. A 5.0-mm uncuffed PVC tracheostomy tube was placed through the tracheal stoma.

After the procedure, the patient had bilateral wheeze for which he was nebulised with salbutamol, and after adequate recovery, the patient was shifted to a high-dependency unit.

Discussion

Tracheostomy is a life-saving procedure undertaken for various indications including relieving airway obstruction, tracheobronchial toileting or to prevent aspiration of secretions. In some cases, as in this case, the tracheostomy tube had to be kept for a longer time because of the persistence of

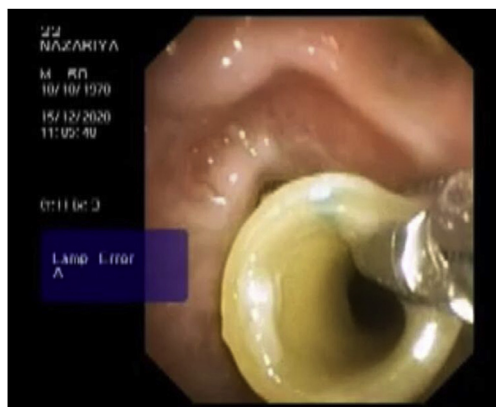


Fig. 2 – Bronchoscopic view of the fractured tracheostomy tube.

the primary disease. Various complications such as fracture and dislodgement of the tube have been reported because of prolonged cannulation. Fractured tracheostomy tube was first reported by Bassoe et al, in 1960 which was a silver nickel alloy tube.⁵ The incidence of dislodgement of tracheostomy tubes is less than 1:1000 tracheostomy tube days.⁶

Increased wear and tear and accumulation of alkaline tracheobronchial secretions due to prolonged use leading to softening and weakening of the tube have been advocated as some of the common causes of breakage of tracheostomy tubes.⁷ A PVC tracheostomy tube may stiffen and become rigid after a few months of regular use, and owing to development of rigidity, it may start to show some cracks, which encourage fracture.⁸ This could have been one of the reasons in our case as the patient was on prolonged tracheostomy tube. Air



Fig. 3 – Fractured tracheostomy tube after removal.

hunger and dyspnoea are the most common complaints in acute phase. Although right bronchus is the most common site of dislodgement,⁹ in our case, the tube was dislodged into the trachea and left main bronchus causing obstruction of airway; therefore, he presented with complaints of acute respiratory distress.

Anaesthetic management of a tracheobronchial foreign body (tracheostomy tube) is always a challenging situation, with the airway being shared by the surgeon and anaesthesiologist.² Although published literature is available on the use of an FOB in the removal of adult airway foreign bodies, there is relative scarcity of literature regarding the use of an FOB in removing a fractured tracheostomy tube in neurologically injured patients. In the aforementioned case, we faced additional challenges because the patient already had compromised airway anatomy. For the purpose of resuscitation of oxygenation, we introduced an HFNC by Airvo™ at the rate of 60 L/min with 100% oxygen. Bronchoscopic removal was performed by the chest physician inserting the FOB through the oral cavity, and oxygenation was maintained with HFNC.

Various anaesthetic techniques have been described for advanced diagnostic, interventional and therapeutic bronchoscopies.¹⁰ Although rigid bronchoscopy under general anaesthesia is the preferred technique of removal of a dislodged tracheostomy tube from the trachea or bronchus, the use of an FOB under monitored anaesthesia care in a neurologically injured patient is not commonly reported.³ Ng et al in 2002, described a case report of fractured tracheostomy tube removal in a 3-year-old child.¹¹ He was intubated transnasally with a 4.5-mm endotracheal tube, ventilation was maintained via the endotracheal tube and an FOB was used to retrieve the dislodged portion of tracheostomy tube with biopsy forceps.¹¹ Afzal et al. in 2013, described a case report of removal of a dislodged tracheostomy tube under conscious sedation with bag and mask ventilation and an FOB.³ Jayaraj et al. reported a case where they removed a tracheal foreign body in a one-year-old child using an FOB through laryngeal mask airway.¹²

HFNC is a new technique of providing oxygen in spontaneously breathing patients. We used HFNC for the advantages that it offers while using an FOB. It provides continuous oxygen flow and prevents desaturation, thereby allowing the bronchoscopist sufficient time to perform the procedure. In our patient, as we only sealed the stoma with a gauze piece, there might have been some loss of flow during HFNC, which again emphasizes that HFNC is a good choice for oxygen insufflation in such patients where we cannot afford leaks as compared to other methods of insufflation. This case demonstrates that in controlled clinical settings and with skilled personnel, the use of an FOB under monitored anaesthesia care and HFNC is a safe practical approach to remove a fractured tracheostomy tube from bronchus in a neurologically injured patient.

Disclosure of competing interest

The authors have none to declare.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.mjafi.2021.08.014>.

REFERENCES

1. Fernandez-Bussy Sebastian, Mahajan Bob, Folch Erik, Caviedes Ivan, Guerrero Jorge, Majid Adnan. Tracheostomy tube placement. *J Bronchol Interv Pulmonol*. October 2015;22(4):357–364.
2. Gupta SL, Swaminathan S, Ramya R, Parida S. Fractured tracheostomy tube presenting as a foreign body in a paediatric patient. *BMJ Case Rep*. 2016;2016. Published 2016 Mar 8. <https://doi.org/10.1136/bcr-2015-213963>.
3. Afzal M, Al Mutairi H, Chaudhary I. Fractured tracheostomy tube obturator: a rare cause of respiratory distress in a tracheostomized patient. *World J Anesthesiol*. 2013;2(3):30–32.
4. Luo JC, Lu MS, Zhao ZH, et al. Positive end-expiratory pressure effect of 3 high-flow nasal cannula devices. *Respir Care*. 2017 Jul;62(7):888–895.
5. Bassoe HH, Boe J. Broken tracheotomy tube as a foreign body. *Lancet*. 1960;1:1006–1007. [https://doi.org/10.1016/S0140-6736\(60\)90890-4](https://doi.org/10.1016/S0140-6736(60)90890-4).
6. Rajendram R, Khan MF, Joseph A. Tracheostomy tube displacement: an update on emergency airway management. *Indian J Respir Care*. 2017;6(2):800–806.
7. Gupta SC, Ahluwalia H. Fractured tracheostomy tube: an overlooked foreign body. *J Laryngol Otol*. 1996;110:1069–1071.
8. Waindeskar V, Kumar S, Agrawal D. Tracheostomy tube as foreign body in right main bronchus: a case report. *Indian J Otolaryngol Head Neck Surg*. 2020.
9. Parida PK, Kalaiarasi R, Gopalakrishnan S, Saxena SK. Fractured and migrated tracheostomy tube in the tracheobronchial tree. *Int J Pediatr Otorhinolaryngol*. 2014 Sep;78(9):1472–1475.
10. Galway U, Zura A, Khanna S, Wang M, Turan A, Ruetzler K. Anesthetic considerations for bronchoscopic procedures: a narrative review based on the Cleveland Clinic experience. *J Thorac Dis*. 2019;11(7):3156–3170.
11. Ng DK, Cherk SW, Law AK. Flexible fiberoptic bronchoscopic removal of a fractured synthetic tracheostomy tube in a 3-year-old child. *Pediatr Pulmonol*. 2002;34:141–143.
12. Jayaraj AK, Jayaraj PK, Muruges M, Aruchamy S, Yousefzadeh A, Siddiqui NT. Tracheal foreign body removal using flexible bronchoscope in a pediatric patient. A novel approach. *Am J Respir Crit Care Med*. 2017 Oct 15;196(8):1071–1072.