International Journal of Otorhinolaryngology and Head and Neck Surgery
Kajai S et al. Int J Otorhinolaryngol Head Neck Surg. 2022 Nov;8(11):918-924
http://www.ijorl.com
pISSN 2454-5929 | eISSN 2454-5937

DOI: https://dx.doi.org/10.18203/issn.2454-5929.ijohns20222682

Case Report

Aspiration of a fractured tracheostomy tube, a rare complication of tracheotomy: the factors involved in this incident and literature review

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Received: 23 July 2022
Revised: 05 September 2022
Accepted: 10 October 2022

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ABSTRACT

Tracheostomy is executed routinely for several indications. It is a safe and life-saving procedure. In some cases, the tracheostomy tube has to be maintained for a long duration. We report a rare case of aspiration of a fractured tracheostomy tube. In the light of the literature, we reported the various factors leading to complications of tracheotomy. A 5-year-old boy, presenting to the emergency department for aspiration of a fractured tracheostomy tube accidentally during a cleaning process by his mother. On clinical examination, the patient was slightly symptomatic. A flexible bronchoscopy was made which objectified the presence of the cannula in the trachea, an additional chest X-ray was taken, which revealed the aspirated tracheostomy tube in the trachea and right main bronchus. Extraction was done by rigid bronchoscopy under general anesthesia. The postoperative course of the patient remain uneventful. In order to reduce the potentially fatal complications of the tracheotomy, it is necessary to insist on a regular medical follow-up.

Keywords: Inhalation, Tracheostomy tube inhalation, Complication of tracheostomy, Foreign body

INTRODUCTION

Tracheostomy is executed routinely for several indications. It is a safe and life-saving procedure.

Because of the primary disease, in some cases decannulation cannot be performed and the tracheostomy tube has to be maintained for a long duration.

In case of it maintained for an extended period of time, it requires a regular follow-up to prevent late complications

We report a rare case of aspiration of a fractured tracheostomy tube, which can be potentially life threatening. And in the light of the literature of the last decade, we will analyze the demographic data related to the patients, types of tracheostomy cannulas and the different modalities of care which require a personalized approach.

CASE REPORT

A 5-year-old boy, presenting to the emergency department for aspiration of a fractured outer cuff of the metal tracheostomy tube accidentally during a cleaning process by his mother. The patient tracheostomized four and a half years ago following subglottic stenosis, developed secondary to prolonged intubation for his Guillain barrere disease. He was advised regular follow-up. But the patient failed to follow-up for the last 2 years and was self-cleaning the tube by his mother as instructed by the ENT physician.

On clinical examination, the patient was slightly symptomatic; tachypneic, a little restless with a mild productive cough. A flexible bronchoscopy was made which objectified the presence of the cannula in the trachea, an additional antero-posterior (AP) chest X-ray

was taken, which revealed the aspirated tracheostomy tube in the trachea and right main bronchus (Figure 1**)**.

The extraction procedure was as follows- (a) under general anesthesia, the patient was laid supine with the placement of a block under his shoulders and a sterile field was created around the tracheal stoma; (b) the tracheal lumen was accessed through the stoma; (c) introduction of a rigid bronchoscope through his tracheostoma allowed visualization of the foreign body (Figure 2); (d) halstead mosquito curved was introduced into the tracheal lumen to sound for the distal end of the fractured tube; and (e) the halstead was then moved in a cephalad direction.

The postoperative course of the patient remain uneventful.

Figure 1: X-ray chest and neck postero-anterior view showing broken metallic tube in trachea and right main bronchus.

Figure 2: Bronchoscopic view of the fractured tube in the trachea.

DISCUSSION

Demographics data

The displacement of tracheostomy tube is considered to be rare, with an incidence of <1/1000 tracheostomy tube, the first case was reported in 1960 by Bassoe et al then the majority of the cases are reported occasionally.[1,2]

The analysis of the last cases reported in the literature during this last decade. Table 1 shows: a sex ratio of males to females: 1:7 and ages commonly affected: pediatric population 53.57%. The common underlying pathology: neurological and laryngeal pathology with the same frequency 35.71%.

The clinical presentation

Aspiration of a fractured tracheostomy tube can be potentially life threatening. The classical triad of foreign body aspiration (coughing/choking, wheezing and reduced breath sounds) was present in 75% patients.[19]

The analysis of these last reviews of the literature objective the presentation of 75% of cases in a state of respiratory distress hence the interest in preventing this potentially fatal accident.[3,5,8-11,13-15,17,20,21]

However, the discovery may sometimes be fortuitous, or the patient is almost asymptomatic after inhalation for the other remaining cases.[6] Standard radiology retains all its indications, given the importance of differential diagnoses of dyspnea and atypical presentation especially in the elderly, this additional examination remains accessible in emergency with a major diagnostic value.

The location of the tracheotomy tube has no elective seat (right main bronchus in half of the cases), linked apparently to the curved shape of the foreign body.

Duration of tracheostomy

The average duration of wearing the tracheostomy tube is 67 months "Five years and half". These explain that prolonged wearing of the tracheostomy tube is the major cause of poor compliance and loss of sight of patients.

Nature of tracheostomy tube and fractured zone

Stagnation of alkaline bronchial secretion, defective manufacturer, recurrence of the process of withdrawal, boiling of the tube, and cleaning can cause mechanical stress and degradation of the passive film of the tubes. Educating the patient about maintenance and regular checking can possibly prevent this complication.[23]

Currently, there is a common use of metallic tracheostomy tubes for extended tracheostomy, and these relate to ease of use and cleaning, they are formed by the following different metallic products: silver, zinc, nickel, copper, and, stainless steel.[24,25] It is recommended to place only pure silver tubes in patients requiring a long-term tracheotomy, because the silver tracheostomy tube appeared free of corrosion on electron microscopic examination Nevertheless the literature suggests that on prolonged use, silver tubes might fracture in comparison

to those made by stainless steel.[17,19,23,25,26] The analysis of the literature in the Table 1 found that 34.48% of patients were carriers of a plastic tracheostomy tube (Romson polyvinyl chloride) and the rest of 65.52% were carriers of a metallic tube. The common fractured zone was the junction between the neck plate and the tube, in more than 86% of patients. And this fractured zone, has no relationship to the nature of the tracheostomy tube.

Table 1: Age distribution.

Age (years)	≥50	50≤ and ≥29	≤15
Percentage (%)	21.42	25	53.57

Table 2: Summary of the demographic, clinical and management data of patients who have undergone accidental inhalation of the tracheostomy tube during the last decade.

Study	Age (years)	Sex	Patient disease	Duration of tracheostomy	Nature of tracheostomy tube	Respiratory distress	Seat of foreign body	Fractured zone	Method of extraction
Singhal et al[3]	7	-	Neurodegenerative disorder	10 months	Non-metallic	Mild respiratory distress	Left main bronchus	Junction between the neck plate and the tube	Rigid bronchoscopy
Chakma et al[4]	41	Man	Neurological disease	Prolonged	Plastic	-	Left main bronchus	The distal part	Fibre optic broncho scope
Amini et al[5]	34	Man	Amyotrophic lateral sclerosis and quadriplegia	7 years	Metallic tracheostomy tube	Significant respiratory distress	Left bronchus	Junction of the tube to the outer edges	Rigid bronchoscopy
Chehbouni et al[6]	70	Man	Dementia syndrome	3 years	Metallic tracheostomy tube	Asymptomatic	Trachea	The distal part of the tube	Rigid bronchoscopy
Mulkalwar et al[7]	53	Man	Glottis carcinoma	-	Polyvinyl chloride (portex) tracheostomy tube	Asymptomatic	Trachea and right main bronchus	The junction of shaft and neck plate	Via the tracheostomy stoma
Waindeskar et al[8]	35	Man	Bilateral cord palsy and subglottic stenosis	9 years	Non-metallic	Breathing difficulty	Right main bronchus	Junction between the neck plate and the tube	Tracheostomy site
Kashoob et al[9]	29	Man	Leukodystrophy	18 years	Metallic tracheostomy tube	Respiratory distress	Right main bronchus	The junction of shaft and neck plate	Rigid bronchoscopy
Hosur et al[10]	35	Man	Subglottic stenosis	10 years	Metallic tracheostomy tube	Dyspnea: yes	Trachea and left bronchus	The junction of shaft and neck plate	Bronchoscopy

Continued.

Study	Age (years)	Sex	Patient disease	Duration of tracheostomy	Nature of tracheostomy tube	Respiratory distress	Seat of foreign body	Fractured zone	Method of extraction
Akhter et al[11]	3	Woman	Post-operative of heart surgery	-	Romson's polyvinyl chloride plastic tube	Respiratory distress	Trachea	The junction between tube and neck plate	Rigid bronchoscope
Wilson et al[12]	30	Woman	-	2 years	Metallic tracheostomy tube	Asymptomatic	The right main bronchus	The junction between tube and neck plate	Via the tracheostomy stoma
Nemati et al	58	Man	-	-	Metallic tracheostomy tube	Symptomatic	right main bronchus	the junction between tube and neck plate	Rigid bronchoscopy
Moideen et al[13]	42	Man	Bilateral abductor palsy	3 years	Metallic tracheostomy tube	Mild respiratory distress	Left main bronchus	The junction between tube and neck plate	Gently dislodgeed with bronchoscope forceps
Gupta et al[14]	6	Male	TB of the spine with paraspinal abscess + subglottic stenosis	5 years and half	Portex tracheostomy tube : plastic	Yes : stridor	Trachea and right bronchus	The junction between tube and neck plate	Broncoscopy
Sathe et al[15]	Case 1:14; Case 2:55	Women	1 – Parkinson's disease and quadriplegia 2- tracheostomy following head injury	1- Foor years 2- Two years	Metallic tracheostomy tube	Yes	Right main bronchus	1- The junction between tube and neck plate 2- Below the neck plate	Rigid bronchoscopy through the tracheastoma
Rana et al[16]	67	Man	Total laryngectomy	Four years	Metallic tracheostomy tube	Asymptomatic	Right main bronchus	The junction between tube and neck plate	Desjardin's forceps through the stoma

Continued.

Study	Age (years)	Sex	Patient disease	Duration of tracheostomy	Nature of tracheostomy tube	Respiratory distress	Seat of foreign body	Fractured zone	Method of extraction
									oftracheostomy
Songern et al[17]	65	Man	Hemorrhagic stroke + tracheostomy for managing secretion	18 months	Metallic tracheostomy tube-stainless steel	Yes	Left main bronchus	The neck of the outer cannula tube	Rigid bronchoscopy through the tracheastoma
Loh et al[18]	7	Woman	Cord vocal palsy + hemiparesis	12 years	Polyvinyl chloride tracheostomy tube	Asymptomatic	Right main bronchus	The junction between tube and neck plate	Flexible bronchoscope through the tracheastomy stoma
Parida et al[19]	Range: 1-15	Men: 3 women: 5	-bilateral abductor palsy, -subglottic stenosis -congenital subglottic hemangioma	Mean age: 2 years	4 cases: Jackson's metallic inner tube. 3 cases: Romson's polyvinyl chloride plastic tube	8 cases: respiratory distress	5 cases: right bronchus 2 cases : trachea 1 case : trachea and left bronchus	Seven cases: the junction between tube and neck plate	7 cases: rigid bronchoscopy 1 case: exploreng the tracheastomal wound
Poduval et al[20]	5	-----	Subglottic stenosis and bilateral cord palsy	4 years and 11 months	Metallic tracheostomy tube	Difficulty in breathing	Trahea	Junction between the neck plate and the tube	Rigid bronchoscopy
Antwi-Kusi et al[21]	3	Woman	Post-traumatic brain injury	10 days after tracheostomy	Metallic tracheostomy tube	Yes	Left tracheabronchial	The junction between tube and neck plate	Through the tracheal stoma
Krishnaurthy et al[22]	60	Man	Laryngectomy for larynx carcinoma	6 years	Metallic tracheostomy tube (stainless steel)	Asymptomatic	Trachea and the left main bronchus	The distal part of the tube	Rigid bronchoscopic

The management

Rigid bronchoscopy is the preferred procedure for removal of large foreign bodies in approximately 75%.[3,5,6,9-11,13-15,17,19,20,22] A rigid bronchoscope tube has a large bore which provides adequate ventilation and allows insertion of various types of instruments for operating.

Rigid bronchoscopy was used for removal of fractured metallic tracheostomy tube in most previously reported

cases. Insertion through the tracheostomy stoma is the preferred route in order to prevent mechanical injury by the fractured tube to the vocal cords and oral cavity during removal.

In general, rigid grasping forceps is used for removal; however, in our case the proximal end of the tube was severely corroded, and might be broken during grasping.

Thoracotomy or bronchotomy was not required.

CONCLUSION

In conclusion, we reported a rare complication of a metallic TT. Bronchoscopic removal of the fractured tube is feasible and causes less injury to the airway wall. Appropriate cleaning, routine careful examination, and scheduled replacement of the tracheostomy tube may help prevent this complication.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Rajendram R, Khan MF, Joseph A. Tracheostomy tube displacement: An update on emergency airway management. Indian J Respir Care 2017;6:800-6.
2. Bassoe HH, Boe J. Broken tracheotomy tube as a foreign body. Lancet. 1960;1(7132):1006-7.
3. Singhal G, Kumar P, Goel S, Pathak A. A case of migration of fractured tracheostomy tube- a case presentation. Egypt J Otolaryngol. 2022;38:34.
4. Chakma A, Siddiqui OA, Ali S, Nadeem A. Track your trach: Removal of a fractured tracheostomy tube using a flexible fibreoptic bronchoscope in a patient with severe head injury. Med J Armed Forces India. 2021.
5. Amini K, Ogharood V, Davari M. A Case of A Fractured Fragment of Tracheostomy Tube Entering the Left Bronchus: A Case Report. J Babol University Med Sci. 2021;23(1):393-7.
6. Chehbouni M, Benhoummad O. Acute Respiratory Distress Revealing an Unrecognized Tracheostomy Cannula at the Bronchial Level in the Pandemic COVID Era. European J Med Health Sci. 2021;3(3):72-4.
7. Mulkalwar A, Rege S. Aspiration of a Fractured Tracheostomy Tube Managed by a Rigid Bronchoscopy via Tracheostomy Stoma in a Patient with Existing Airway Compromise. J Clin Images. 2021;4(1):1082.
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. Kashoob M, Al Washahi M, Tandon R. Aspiration Pneumonia Due to Migration of Fracture Tracheostomy Tube after 14 Years of Use. Oman Med J. 2020;35(2):113.
10. Hosur B, Ahuja CK, Virk RS, Singh P. Unusually dislodged tracheostomy tube with intact airway. BMJ Case Rep. 2020;13(7):e237195.
11. Tahira A, Khan T, Soura, Genie F. Broken tracheostomy tube presenting as tracheobronchial foreign body: a rare case report. World J Pharm Res. 2018;8(2):1012-4.
12. Wilson W, Nagaraja DM, Murthy S. Fracture and aspiration of tracheostomy tube: A case report. Hong Kong J Emerg Med. 2018;25(6):371-3.
13. Moideen SP, Arun G, Mohan M, Afroze KH. Fractured Tracheostomy Tube - An Unusual Foreign Body in Tracheobronchial Tree. BJOHNS. 2017;25(2):107-10.
14. 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:bcr2015213963.
15. Sathe NU, Ratna P, Shelke S, Krishnan K. Broken metallic tracheostomy tube migrating into the tracheobronchial tree. Surgical Techniques Develop. 2016;6(1):6466.
16. Indrajit R, Chandragupta C, Kumar J. Retrieval of Fractured Metallic Tracheostomy Tube – An Innovative Approach. Annals Int Med Dental Res. 2016; 2:1-2.
17. Ngern A, Boonsarngsuk V. Fractured metallic tracheostomy tube: A rare complication of tracheostomy. Respir Med Case Rep. 2016;19:46-8.
18. Loh TL, Chin R, Flynn P, Jayachandra S. Fracture and aspiration of a tracheostomy tube. BMJ Case Rep. 2014;2014:bcr2013203232.
19. Parida PK, Kalaiarasi R, Gopalakrishnan S, Saxena SK. Fractured and migrated tracheostomy tube in the tracheobronchial tree. Int J Pediatr Otorhinolaryngol. 2014;78(9):1472-5.
20. Poduval J, Benazir F, Ninan P. Pneumopericardium - an unusual complication of broken tracheostomy tube presenting as foreign body trachea . J Laryngol Voice. 2014;4:32-5.
21. Kusi AA, Ampofo MO, Mohammed DI, Addison W. Fractured tracheostomy tube – A case report of a 3-year old Ghanaian child. African J Emergency Med. 2012;2(3):114-6.
22. Krishnamurthy A, Vijayalakshmi R. Broken tracheostomy tube: A fractured mandate. J Emerg Trauma Shock. 2012;5(1):97-9.
23. Mahattanasakul P, Kaewkongka T, Sriprasart T. Fracture Outer Metallic Tracheostomy Tube as an Airway Foreign Body. Indian J Otolaryngol Head Neck Surgery. 2019;1-5.
24. Kemper BI, Rosica N, Myers EN, Sparkman T. Inner migration of the inner cannula: an unusual foreign body. Eye Ear Nose Throat Mon. 1972;51(7):257-8.
25. Alvi A, Zahtz GD. Fracture of a synthetic fenestrated tracheostomy tube: case report and review of the literature. Am J Otolaryngol. 1994;15(1):63-7.

26. Brockhurst PJ, Feltoe CK. Corrosion and fracture of a silver tracheostomy tube. J Laryngol Otol. 1991;105(1):48-9.

Cite this article as: Kajai S, Oulghoul O, Rochdi Y, Raji A. Aspiration of a fractured tracheostomy tube, a rare complication of tracheotomy: the factors involved in this incident and literature review. Int J Otorhinolaryngol Head Neck Surg 2022;8:918-24.