International Journal of
Physical Medicine & Rehabilitation
ISSN: 2329-9096

Qureshi, Int J Phys Med Rehabil 2013, 1:2
DOI: 10.4172/2329-9096.1000112

Commentary Open Access

Tracheostomy Decannulation; A Catch-22 for Patients with Spinal Cord Injuries

Ahmad Zaheer Qureshi*

Department of Physical Medicine and Rehabilitation, King Fahad Medical City, Saudi Arabia

Although tracheostomy is considered to be the most common surgical procedure performed on critically ill patients, there is no general consensus as to when a tracheostomy tube (TT) can be safely removed [1]. Bach and Saporito defined successful decannulation as extubation or decannulation and site closure with no consequent respiratory symptoms or blood gas deterioration for at least 2 weeks [2]. Removing a tracheostomy is of fundamental importance in rehabilitating a patient recovering from critical illness [3].

Challenges of TT decannulation in patients with spinal cord injuries (SCI) are of particular importance. Respiratory complications are common in acute SCI patients and tracheostomy is regularly required, particularly in patients with tetraplegia [4]. The frequencies of tracheostomy in patients with tetraplegia are reportedly ranging from 16% to 30% with a median of 31 days from the time of tracheostomy to decannulation [5]. In comparison to this, forty years ago, Bellamy reported that 77% of SCI patients with complete and 33% with incomplete tetraplegia underwent tracheostomy, out of which, 40% of the complete and 21 % of incomplete died in the first year [6]. SCI patients are a unique group of population that may not satisfy the routine criteria for decannulation. One of the major reasons is that they may be aspirating their secretions. Aspiration is defined as "passage of material below the vocal folds into the trachea" [7]. This reflects the inability to protect the airway and is usually considered to be a contraindication for TT removal [8]. Several mechanisms of aspiration are narrated in the literature relevant to SCI patients. Acute cervical trauma may cause edema of paravertebral tissue compressing the pharyngeal space and leading to mechanical dysphagia. This affects upper esophageal sphincter and causes pooling of secretions in pharynx leading to aspiration [9,10]. In rare cases, high cervical lesions may involve lower cranial nerves leading to neurological dysphagia and subsequent aspiration [11]. Cervical spine surgeries, especially via anterior approach involves manipulation of neck structures. This may lead to subsequent iatrogenic injuries, commonly occurring on the side of the surgical approach and leading to potentially threatening complications [10,12,13]. Since lung volumes may be reduced up to 30 % in SCI patients, it may affect the time and strength of expiratory flow required for airway clearance of pooled pharyngeal secretions [14]. Rates of aspiration are increased due to presence of nasogastric tube and endotracheal intubation. It can be up to 56% in intubated patients [8]. Post extubation, dysphagia may persist transiently [15]. TT itself can lead to dysphagia due to mechanical and physiological causes and results in aspiration [16]. Consequently, inability to protect airway renders the TT in situ and it becomes challenging to break this vicious cycle. Other barriers for TT decannulation in SCI patients include poor or ineffective cough and chest infections [8]. SCI patients may be required to wear neck collars or braces for immobilizing the neck in slight hyperextension or they may be positioned in supine during cervical traction. This posture may cause dysphagia as well [17].

Patients with SCI often undergo tracheostomy if it is anticipated that they are going to require ventilatory support for more than 3 weeks [18]. It is reported that approximately 10% of mechanically ventilated critically ill patients need tracheostomy for prolonged airway and ventilatory support [19]. Prolonged tracheostomy tube placement may lead to increased risk of late complications, including tracheal stenoses, bleeding, fistulas, infections, accidental dislodgement, mechanical problems with cuff, aspiration and pulmonary complications [19,20]. The amount of care required can be significantly improved in SCI patients after decannulation [8]. It enables them to communicate verbally and resume oral feeding. They are able to protect their airways and have reduced secretions, oxygen requirement, airway irritability and need for chest physiotherapy. Moreover, timely removal of TT can decrease length of hospital stay and preserve hospital resources [8]. Patients report better sleep and level of comfort in addition to cosmetic satisfaction [2]. All these factors have a considerable positive impact on quality of life in SCI patients. In general, majority of patients with tracheostomy who are discharged from Intensive care units (ICU) can be successively decannulated. A international survey showed that most of the clinicians would consider re insertion of artificial airway within 48-96 hours after tracheostomy to constitute a decannulation failure. They considered a 2% to 5% of decannulation failure rate to be acceptable [19,21]. Ceriana and colleagues defined decannulation failure as the 'need to reopen the tracheotomy because of an acute episode or progressive worsening of arterial blood gases not corrected by the application of noninvasive mechanical ventilation' [4].

Literature shows a considerable diversity in criteria for decannulation [2,4,8,19,21]. It is a multi factorial process and the protocols may vary from one setting to another. A systematic review about multidisciplinary care for tracheostomy patients showed that all appraised studies presented different descriptions of multidisciplinary care. Therefore it makes it difficult to conclude that which combination of disciplines would make up the most appropriate multidisciplinary care team for tracheostomy patients [22]. Mostly, TT decannulation takes place after a transfer to non-ICU setting and intensivists often do not follow long term outside the ICU. The bed-side health care providers may lack the expertise to manage compromised airways. A failure of decannulation may reflect failure or unavailability of expertise. A commonly used approach is capping and downsizing the TT prior to decannulation. This approach was analyzed in a comparative study, which reports that the procedure of cuff deflation proved to be equally successful in predicting safe TT removal and decreased the cannulation time by 5 to 6 days on average [8]. Respiratory therapists and physicians are the two group of clinicians most directly involved in decannulation process. Considerable differences in their decannulation practices were observed by Stelfox and colleagues in their survey, which necessitates the need for the development of evidence based tracheostomy guidelines

***Corresponding author:** Ahmad Zaheer Qureshi, Department of Physical Medicine and Rehabilitation, King Fahad Medical City, Saudi Arabia, Tel: 966-1-2889999; E-mail: qureshipmr@gmail.com

Received February 03, 2013; **Accepted** March 15, 2013; **Published** March 17, 2013

Citation: Qureshi AZ (2013) Tracheostomy Decannulation; A Catch-22 for Patients with Spinal Cord Injuries. Int J Phys Med Rehabil 1: 112. doi:10.4172/2329-9096.1000112

[21]. They also identified determinants of tracheostomy decannulation, which included one clinician factor i. e. principle work facility and five patient factors which were oxygenation, level of consciousness, ability to tolerate tracheostomy tube capping, effectiveness of cough and secretions. They proposed to consider these simple bedside factors in the decision to decannulate TT. Few specific considerations in SCI are respiratory muscle weakness, completeness of injury, neurological level of injury, vital capacity and peak cough flow [2,4,18]. Ross and colleagues claim that it is possible to decannulate aspirating spinal cord injured patients in some instances, using a risk management approach [8]. However, clinicians need to be aware that, while monitoring SCI patients during decannulation, significant changes in heart rate or blood pressure may not be seen due to loss of sympathetic tone. Similarly, during assessment for vital capacity in SCI patients, it is recommended to assess for abdominal movement indicating diaphragmatic function. Accessory muscles can generate a vital capacity if there is good thoracic compliance. A strong cough may be difficult to achieve due to varying degree of abdominal muscle strength in SCI patients. A technique called "assisted coughing" is used by applying a firm upward thrust below the diaphragm which is timed with coughing. This helps to clear the secretions in patients with abdominal weakness due to neurological injury. Bach et al. [2] included SCI patients with ventilatory impairments in their study and concluded that the ability to generate a peak cough flow of at least 160 L/min is necessary for the successful TT decannulation irrespective of the ability to breathe. Romero et al. [23] reported that early tracheostomy performed within a week of intubation is associated with shorter length of stay in ICU and shorter duration of mechanical ventilation. A cohort study included 34 SCI patients who were analyzed in Tracheostomy Review and Management Service (TRAMS) introduced as a consultative team of respiratory and ICU doctors, clinical nurse consultants, physiotherapists and speech pathologists. This intervention was compared with pre-TRAMS care and showed statistically significant reduction in acute length of stay and duration of cannulation [22]. Bach has proposed in his various studies that noninvasive methods are superior and highly desirable for ventilator-dependant SCI patients, but literature supporting the idea is still deficient [2,18,20,24-26]. Ventilator dependant patients can be considered a good candidate for noninvasive ventilation because of their young age, intact mental status, intact bulbar musculature and absence of lung disease [18]. Patients who have used both types of ventilations invariably preferred non-invasive ventilation. It eliminates the need for skilled tracheostomy care, permits to master the glossopharyngeal breathing, avoid complications related to TT and suctioning equipment, eliminate the discomfort of TT changes, facilitate assisted coughing, have less pulmonary morbidity and is less costly [24,25]. This can be achieved by application of noninvasive inspiratory and expiratory muscle aids used in physical medicine to assist or substitute for weak or paralyzed ventilatory muscles [18]. Bach recently reports that lack of ventilator-free breathing ability in high level spinal cord injury does not mandate tracheostomy or diaphragm pacing [26].

Ensuring appropriate care for SCI patients with tracheostomies is an important issue. Benefits of early TT decannulation are advocated in the literature but there are no standard guidelines so far. Tracheostomy decannulation can be a challenging task due to aspiration as a major risk factor in SCI patients. There are special considerations for this unique group of population and requires evidence based guidelines to facilitate safe and effective tracheostomy care and decannulation protocols. Multidisciplinary tracheostomy care is considered to be the most appropriate model care for tracheostomy patients. Non-invasive ventilation for ventilator dependant patients is touted as effective method of care in patients with SCI but there is insufficient evidence in the literature to support this. As long as tracheostomy is preceded by a tracheostomy and followed by one, it remains a catch-22 for patients with SCI.

References

1. Apezteguia C, Rios F, Pezzola D (2004) Tracheostomy in patients with respiratory failure receiving mechanical ventilation: how, when, and for whom? Evidence-Based Management of Patients with Respiratory Failure. Springer, Berlin.
2. Bach JR, Saporito LR (1996) Criteria for extubation and tracheostomy tube removal for patients with ventilatory failure. A different approach to weaning. Chest 110: 1566-1571.
3. Christopher KL (2005) Tracheostomy decannulation. Respir Care 50: 538-541.
4. Biering-Sørensen M, Biering-Sørensen F (1992) Tracheostomy in spinal cord injured: frequency and follow up. Paraplegia 30: 656-660.
5. Cheshire DJ (1964) Respiratory Management in Acute Traumatic Aetraplegia. Paraplegia 1: 252-261.
6. Bellamy R, Pitts FW, Stauffer ES (1973) Respiratory complications in traumatic quadriplegia. Analysis of 20 years' experience. J Neurosurg 39: 596-600.
7. Higgins DM, Maclean JC (1997) Dysphagia in the patient with a tracheostomy: six cases of inappropriate cuff deflation or removal. Heart Lung 26: 215-220.
8. Ross J, White M (2003) Removal of the tracheostomy tube in the aspirating spinal cord-injured patient. Spinal Cord 41: 636-642.
9. Braakman R, Penning L (1971) Injuries of the cervical spine. Excerpta Medica Foundation, Amsterdam.
10. Welsh LW, Welsh JJ, Chinnici JC (1987) Dysphagia due to cervical spine surgery. Ann Otol Rhinol Laryngol 96: 112-115.
11. Zedjlik CP (1992) Management of Spinal Cord Injury, 2nd edn. Jones & Bartlett Publishers: Boston, USA.
12. Hardy R (1991) Complications of Anterior Cervical Surgery. Complications of Spinal Surgery, Chapter 8. American Association of Neurological Surgeons, Park Ridge, IL.
13. Goldsmith T (2000) Evaluation and treatment of swallowing disorders following endotracheal intubation and tracheostomy. Int Anesthesiol Clin 38: 219-242.
14. Dikeman KJ, Kazandjian MS (1996) Communication and Swallowing Management of Tracheostomized and Ventilator-Dependent Adults. Singular Publishing Group, Inc. San Diego, CA.
15. Leder SB, Cohn SM, Moller BA (1998) Fiberoptic endoscopic documentation of the high incidence of aspiration following extubation in critically ill trauma patients. Dysphagia 13: 208-212.
16. Elpern EH, Scott MG, Petro L, Ries MH (1994) Pulmonary aspiration in mechanically ventilated patients with tracheostomies. Chest 105: 563-566.
17. Kirshblum S, Johnston MV, Brown J, O'Connor KC, Jarosz P (1999) Predictors of dysphagia after spinal cord injury. Arch Phys Med Rehabil 80: 1101-1105.
18. Bach JR (2006) Prevention of respiratory complications of spinal cord injury: a challenge to "model" spinal cord injury units. J Spinal Cord Med 29: 3-4.
19. Stelfox HT, Crimi C, Berra L, Noto A, Schmidt U, et al. (2008) Determinants of tracheostomy decannulation: an international survey. Crit Care 12: R26.
20. Bach JR, Alba AS (1990) Noninvasive options for ventilatory support of the traumatic high level quadriplegic patient. Chest 98: 613-619.
21. Stelfox HT, Hess DR, Schmidt UH (2009) A North American survey of respiratory therapist and physician tracheostomy decannulation practices. Respir Care 54: 1658-1664.
22. Garrubba M, Turner T, Grieveson C (2009) Multidisciplinary care for tracheostomy patients: a systematic review. Crit Care 13: R177.
23. Romero J, Vari A, Gambarrutta C, Oliviero A (2009) Tracheostomy timing in traumatic spinal cord injury. Eur Spine J 18: 1452-1457.
24. Bach JR (1993) A comparison of long-term ventilatory support alternatives from the perspective of the patient and care giver. Chest 104: 1702-1706.

25. Bach JR, Rajaraman R, Ballanger F, Tzeng AC, Ishikawa Y, et al. (1998) Neuromuscular ventilatory insufficiency: effect of home mechanical ventilator use v oxygen therapy on pneumonia and hospitalization rates. Am J Phys Med Rehabil 77: 8-19.

26. Bolikal P, Bach JR, Goncalves M (2012) Electrophrenic pacing and decannulation for high-level spinal cord injury: a case series. J Spinal Cord Med 35: 170-174.

Citation: Qureshi AZ (2013) Tracheostomy Decannulation; A Catch-22 for Patients with Spinal Cord Injuries. Int J Phys Med Rehabil 1: 112. doi:10.4172/2329-9096.1000112