Section A-Research paper

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DYSPHAGIA IN TRAUMATIC CERVICAL SPINAL CORD INJURY

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ABSTRACT

This study aimed to identify swallowing difficulties in cervical spinal cord Injury patients due to trauma. A total of 6 patients with traumatic cervical spinal cord injury admitted to the tertiary care hospital and referred to speech language pathology (SLP) service were enrolled in the study. The selected study subjects were in the age range of 25-45 years. Patients referred were initially assessed for bedside swallow assessment to decide the patient's eligibility for cuff deflation trials and if successful then for speaking valve trials in graded pattern and duration taken to decannulate. These patients were analyzed on time duration taken for start of cuff deflation trials, start of speaking valve trial, duration of speaking valve trial. All 6 subjects underwent bedside swallow assessment (BSE) and Videofluoroscopic evaluation of swallowing (VFSS) to confirm safety of swallowing as well as to rule out aspiration risk. The results showed that the tracheostomy rehabilitation starts 5-7 days post admission/surgical correction of cervical fractures with a referral from the physician. Following referral in 3-4 days cuff deflation trials are attempted with repeated swallowing training for management of own oropharyngeal secretions which facilitates better tolerance of cuff deflation trials. Once patient is tolerating cuff deflation trials graded speaking valve trial is done along with RT. As patient is able to exhibit volitional swallow and bedside swallow assessment is done and if patients fail consecutively the SLP decides for instrumental swallow assessment. This decides the candidacy of oral feeding with modified diet/regular diet. Once patient tolerates full time speaking valve capping trials are initiated either by SLP/RT to decide candidacy of decannulation. In conclusion, the functional swallow safety should be assessed as a routine in patients with cervical spinal cord injury to rule out silent aspiration risk and to minimize secondary health complications. Tracheostomy rehabilitation is a great challenge for speech language pathology to facilitate speech breathing and functional swallow status, which requires specialized skills and competencies for a speech language pathologist

Keywords: Dysphagia, Traumatic Cervical spinal cord injury, Swallowing, speech language pathology, Tracheostomy.

1. INTRODUCTION

Swallowing difficulties in patients with cervical spinal cord injury due to trauma is a recent developing research domain. In patients with cervical spinal cord injury there can be loss of muscle function or sensational aspects or autonomic function in the body parts controlled by the spinal cord below the level of the injury are frequently seen. Muscle wasting, respiratory difficulties, and associated pneumonia mostly due to aspiration are seen in 67% of patients with cervical spinal cord

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injury. In many patients, dysphagia problem is transient and tends to recover naturally throughout the rehabilitation process [1,2]. However, the fact that aspiration risk is a major risk factor of hospital-acquired pneumonia [3], and that in spinal cord injury patients' respiratory problems, especially pneumonia, is the most common cause of death [4], makes precise evaluation of swallowing function in cervical spinal cord injury patients invaluable.

Safety of swallowing can be assessed during bedside swallow assessment or by using instrumental tools like video fluoroscopic study for swallowing and fibreoptic endoscopic swallow evaluation examination. Bedside swallowing evaluation has the advantage of simple implementation, but bears the disadvantage of low sensitivity and specificity in detecting dysphagia [5] in patients with tracheostomy post cervical spinal cord injury.

Kirshblum et al reported that in their study that 42 out of 187 traumatic cervical spinal cord injury patients who showed positive results on bedside swallow evaluation were further tested with VFSS [7]. Of these patients 74% had dysphagia confirmed using instrumental swallow study. With increasing age as well as requirement of tracheostomy and mechanical ventilation patients have more severe dysphagia with traumatic spinal cord injury. Patients with traumatic cervical spinal who had undergone anterior approach for cervical spine surgery has more severe dysphagia comparatively.

Wolf et al reported that 51 cervical spinal cord injury patients who were admitted to the intensive care unit due to respiratory difficulties [2]. Among these patients 21 patients had severe dysphagia in FEES as well as 87% of patients had good prognosis of dysphagia with rehabilitation by SLP. Abel et al. reported that 73 patients with cervical spinal cord injury underwent bedside swallow evaluation and 32 patients who were suspected to have dysphagia were further tested with VFSS [8].

Patients with cervical spinal cord injury due to traumatic reasons develop aspiration pneumonia mostly. There have been very limited studies available where time duration for achieving different stages of in swallowing rehabilitation is discussed in patients with traumatic cervical spinal cord injury. Thereby the current study was designed with this purpose of study.

2. METHODOLOGY

The subjects of the study included 6 patients with traumatic cervical spinal cord injury admitted to the tertiary care hospital as well as consulted to speech language pathology (SLP) as inpatient were enrolled in to the study. The selected study subjects were in the age range of 25-45 years. Patients referred were initially assessed for bedside swallow assessment to decide the patients' eligibility for cuff deflation trials and if successful then for speaking valve trials in graded pattern. These patients were analyzed on time durations of start of cuff deflation trials, start of speaking valve trial, duration for start of capping tolerance and time taken for decannulation.

3. RESULTS

Table 1: Management of dysphagia among patients

Section Details	subject 1	subject 2	subject 3	Subject 4	Subject 5	Subject 6	Average days of trachea rehabilitation
Date of referral	Admission 2 weeks ago	Admission 2 weeks ago	Admission 3 weeks ago	Admission 3 weeks ago	Admission 2 weeks ago	Admission 12 days ago	Referral after 12.5 days of admission
Start of cuff deflation trials	4 days	3 days	3 days	6 days	2 days	5 days	3.8 days after referral

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Start of Speaking valve trial	2 days	27.3.19 (1 day)	24.3.19 (6 days)	24.3.19 (10 days)	8.4.19 (4 days)	25.1.19 (7 days)	5 days after referral
Full time SV tolerance	19.3.19 (8 days)	29.3.19 (3 days)	7.4.19 (19 days)	1.4.19 (17 days)	11.4.19 (7 days)	28.1.19 (9 days)	10 days after referral
Bedside swallow evaluation	25.3.19 (14 days)	2.4.19 (6 days)	8.4.19 (20 days)	3.4.19 (19 days)	11.4.19 (7 days)	29.1.19 (10 days)	12.6 days after referral
Instrumental swallow assessment	28.3.19 (17 days)	4.4.19 (8 days)	10.4.19 (22 days)	4.4.19 (20 days)	16.4.19 (13 days)	31.1.19 (12 days)	15.3 days after referral
Start of oral feeding	29.3.19 (18 days)	5.4.19 (9 days)	11.4.19 (23 days)	5.4.19 (21 days)	17.4.19 (14 days)	31.1.19 (12 days)	16.1 days after referral
Removal of enteral feed	3.4.19 (23 days)	8.4.19 (12 days)	15.4.19 (27 days)	10.4.19 (26 days)	25.4.19 (22 days)	4.2.19 (16 days)	21 days after referral
Capping trials	3.4.19 (23 days)	8.4.19 (12 days)	16.4.19 (28 days)	10.4.19 (26 days)	26.4.19 (23 days)	3.2.19 (15 days)	21.16 days after referral
Decannulation	5.4.19 (25 days)	10.4.19(14 days)	20.4.19(32 days)	14.4.19 (30 days)	30.4.19 (27 days)	6.2.19 (18 days)	24.3 Days after referral

All 6 subjects underwent bedside swallow assessment (BSE) and following to it Videofluoroscopic evaluation of swallowing (VFSS) was done to confirm presence or absence of aspiration. The average number of days for tracheostomy rehabilitation was 12.60 days. The tracheostomy rehabilitation starts 5-7 days post admission/surgical correction of cervical fractures with a referral from the physician. Following referral in 3-4 days cuff deflation trials are attempted with repeated swallowing training for management of own oropharyngeal secretions which facilitates better tolerance of cuff deflation trials. However, candidacy of cuff deflation trials can be prolonged in duration post referral depending on patient's cognitive status and ability to manage secretions. Once patient tolerates cuff deflation, graded speaking valve trial is done along with RT/nurse. As patient is able to exhibit volitional swallow and cough reflex strengthens with minimal trach/oral suctioning requirement bedside swallow assessment is done and if patients passes/fails consecutively the SLP decides for instrumental swallow assessment which can be either Video fluoroscopic evaluation of swallowing or Flexible Endoscopic evaluation of Swallowing. This decides the candidacy of oral feeding and patient is started on modified diet/regular diet as per functional swallow status. Once patient tolerates full time speaking valve, capping trials are initiated either by SLP/RT to decide candidacy of decannulation. In brief, the trach rehabilitation starts as early as 2 days post op and can extend until 1-2 months depending upon cognitive deficits and swallow safety status of a patient.

DISCUSSION

Dysphagia, being a risk factor of pneumonia, is a problem that requires close attention and immediate treatment and oropharyngeal dysphagia increases the risk of aspiration pneumonia, which is likely to add burden to existing respiratory dysfunction [10, 11]. Pollock et al reported four cases of unexpected pharyngeal damage post cervical trauma [12]; while Grundy et al highlighted the presence of bulbar palsy with acute respiratory distress and dysphagia in eight patients with cervical injuries [13]. In a larger review, Hsu et al identified in 47 cases of cervical spinal cord injury dysphagia, dysphonia and excessive secretions [14]. Swallowing function is closely coordinated with the breathing cycle and disruption leads to accidental inhalation and aspiration during the swallow, with lack of cough preventing airway clearance [15]. Respiratory interventions including tracheostomy insertion and

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supported ventilation are known to cause additional disruption to swallowing and are frequently cited as factors linked to dysphagia following cervical spinal cord injury (CSCI) [9, 16.].

Dysphagia and dysphonia are often the post-operative complications of cervical spinal cord injury. This is mostly with the oedema of the pharyngeal muscles as well as due to injury to the nerve supplying the pharyngeal and laryngeal muscle. Gastrointestinal problems following cervical spinal cord injury often results in disturbances in motility. Thereby these patients often need alternative mode of feeding. High malnutrition rates are also associated complications in patient with traumatic Cervical spinal cord injury. When patients with cervical spinal cord injury have respiratory, swallowing and gastro-intestinal disturbances they are more prone to aspiration risk due to oral feeding.

Age was found to be statistically related to dysphagia by Kirshblum et al as higher prevalence and severity of dysphagia is seen mostly in elderly groups with cervical spinal cord injury.

Gross et al also reported that the total lung capacity is reduced due to thoracic trauma which increases the risk of aspiration while oral feeding in patients with cervical spinal cord injury . Thus, we do agree with Abel et al that we should try more aggressively to close the tracheostomy earlier [8].

Assessment of laryngeal dysfunction facilitates the tracheostomy weaning process allowing opportunities for verbal communication. Currently there is little guidance to SLP on optimal management of tracheostomy or dysphagia following cervical spinal cord injury. This includes the use of thickened fluids for patients with cervical spinal cord injury having dysphagia as dysphagia specialist presume that increased viscosity of fluids slows transit of the fluid allowing more time for a delayed swallow initiation to capture the bolus thereby minimizing aspiration risk. In contrary for patients with cervical spinal cord injury rather than delayed pharyngeal swallowing, inefficient pharyngeal squeeze thereby patients are often unable to clear pharyngeal residue spontaneously even with multiple swallows thereby inducing secondary aspiration risk. Mostly patients with cervical spinal cord injury due to trauma have inflated tracheostomy cuffs thereby cough reflex is ineffective and exposing patients risk for silent aspiration thereby demanding need of instrumental swallow assessments.

Performing instrumental evaluation for swallowing safety routinely on all patients would be impossible due to financial and resource challenges, but physicians should consider referring these patient to Speech Language Pathologist for at least bedside swallow assessment to minimize aspiration pneumonia. However, for further research, a prospective longitudinal study would be ideal, to investigate the natural recovery of dysphagia in patients with cervical spinal cord injury. Two limitations, which we encountered in this study, were the lack of specific time frame, in which we conducted VFSS, and the lack of follow-up in 6 months post decannulation data to track occurrence of pneumonia.

CONCLUSION

The functional swallow safety should be assessed as a routine in patients with traumatic cervical spinal cord injury to rule out silent aspiration risk and to minimize secondary health complications. Tracheostomy rehabilitation is a great challenge for speech language pathology to facilitate speech breathing and functional swallow status, which requires specialized skills and competencies for a speech language pathologist.

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