THERAPEUTIC USE OF BOTULINUM TOXIN IN TRACHEO-ESOPHAGEAL SPEECH FAILURE – A CASE REPORT

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ABSTRACT

The present study focuses on the therapeutic use of Botulinum Toxin in the Tracheo-Esophageal speech failure in a single subject who exhibited hypertonic PE segment following laryngectomy, as Botulinum Toxin is used to relax the spasmodic pharyngo esophageal segment. A 49 year male with the history of total laryngectomy and left sided pharyngeal plexus resection and primary TEP, with the complaint of unable to produce TEP speech due to hypertonic PE segment served as participant. The subject received Botox injection of 25 units after verifying/confirming the usefulness of injection by receiving local anesthesia - 1% xylocaine to relieve the hypertonic PE segment. Perceptual analysis of speech and voice made subsequent to Botox injection. Subject developed excellent TEP speech secondary to Botulinum injection. Thus, Botox injection preferred in failed TEP speaker.

Keywords: Tracheo-Esophageal speech (TE speech), Botulinum Toxin (Botox), Pharyngoesophageal segment (PE segment)

1. INTRODUCTION

Tracheo-esophageal prosthetic speech after total laryngectomy requires optimal vibratory activity of the pharyngoesophageal (PE) segment as exhaled pulmonary air is diverted through the tracheo esophageal prosthesis in posterior upper tracheal wall. Persistent malignancy, post radiation fibrosis and post-surgical scarring and stenosis are recognized causes of TEP speech failure following total laryngectomy. Apart from this, a disturbance in the relaxation and coordination of the reconstituted upper esophageal sphincter and pharyngeal constrictor muscles following laryngectomy has also been implicated as an important cause of TEP speech failure (Duranceau, A; Jamieson, Hurwitz, Jones, postlethwait, 1976). There is still controversy existing regarding the role that pharyngoesophageal spasm may play in causing TEP speech failure (Schneider, Thumfart, Potoschnig, Eckel, 1994). Abnormal tone and dysmotility of the PE segment are difficult to document due to inherent problems in performing and interpreting pharyngeal manometry findings. There is considerable divergence of opinion regarding the anatomy and physiology of the motor nerve supply of the pharyngeal constrictors; exact contribution to the pharyngeal plexus from gloss pharyngeal nerve, cervical sympathetic ganglion, the recurrent laryngeal nerve and their role remains to be elucidated. Study by Henley J, Soulriere C, Jr. (1986) has documented by intraoperative EMG that in humans the recurrent laryngeal functionally contributes to the motor innervations of the cricopharyngeus part of the inferior constrictor muscle. Surprisingly, the pharyngeal plexus does not always functionally contribute to the motor innervation of the cricopharyngeus portion of the inferior constrictor muscle. This might be one of the reasons for non-functioning of pharyngeal neurectomy in TEP speech failure. Singer,
Blom, in 1981 have reported a 12% incidence of TEP speech failure due to PE spasm in their evaluation of 129 patients. The methods, which have been tried with variable success to overcome this problem, are pharyngeal plexus neurectomy, cricopharyngeal myotomy and mechanical hypopharyngeal dilation. Both pharyngeal neurectomy and cricopharyngeal myotomy are supplementary surgical procedures requiring general anesthesia adding risk cost and inconvenience to the subject when performed as a secondary surgical procedure. Mechanical hypopharyngeal dilation would not be expected to improve TEP speech production in the absence on PE segment narrowing due to scarring. So a new approach to denervate the PE segment was introduced by Hoffman, Fisher, et al (1997) that offer distinct advantages over previously described treatments for selected patients with TEP speech failure. Hoffman, Fisher, et al (1997) have used Botulinum toxin to relax the spasmodic pharyngo esophageal (PE) segment.

Botulinum toxin type A, a neurotoxin synthesized by bacillus Clostridium botulinum, has been found to be a therapeutic value in the treatment of a variety of ophthalmologic and neurologic disorder. In the head and neck region, this neurotoxin has been proved to be effective in the treatment of disorder such as hemifacial spasm, laryngeal dystonia, oromandibular dystonia, blepharospasm and spasmodic torticollis. Botulinum toxin type A (Botox®) acts by binding at the presynaptic cholinergic nerve terminals to impair the release of acetylcholine at the neuromuscular junction. This results in chemical denervation, which is temporary lasting from ten weeks to nine months (Blitzer, Brin, Fahn, Lovelace, 1988, Frue, Felt, Wojno, Mush, 1984, Janovic, Orman, 1987).

1.1. Need of the study:

Literature review indicated that though there are studies available on acquisition of TEP speech in total laryngectomees. Studies on failure to TEP speech and rectification of the same by Botox injection are limited. The present study was taken up keeping in mind the same.

1.1.1. Aim of the study:

The study aimed to describe cases of TE failure due to hypertonic PE segment and improved performance through injection with Botox

2. MATERIALS AND METHODS

2.1. Subject

The study is a retrospective one which carried out in the Department of Head and Neck Surgical Oncology of Kidwai Memorial Institute of Oncology, Bangalore.

A 49 year old, farmer presented to the department with symptoms of hoarseness, dysphagia, and ear pain and was progressive in nature for three months. On direct laryngoscopy, subject had ulceroproliferative transglottic growth with fixed left vocal cord. Following direct laryngoscopy and biopsy under general anesthesia, histopathological examination revealed a squamous cell carcinoma, which was staged as T3N0M0. Standard wild field laryngectomy with left sided pharyngeal plexus neurectomy (identify 4-6 branches) and three-layered T-shaped pharyngeal closure was done. Subject also underwent primary tracheo-esophageal puncture and a Foley's catheter of 18mm was introduced as a stent through the puncture to maintain the fistula. Post-operative convalescence and wound healing was uneventful. Oral feeding was started on 10th post-operative day. Provox-2 voice prosthesis was introduced on 13th POD after ensuring that subject had satisfactory fistula speech. Following day, it was noticed that subject was unable to produce TEP speech. To rule out hypertonic PE segment, Para pharyngeal region was injected in 1% xylocaine, 0.5ml infiltration at 3 points along prevertebral fascia overlying C3-C6. Following this infiltration, the aphonic subject was able to communicate using TE voice prosthesis for a period until the effect of local anesthesia lasted. This confirmed that hypertonic PE segment was the cause of TE speech failure (Singer, Blom, 1984). Subject was explained and counseled about the alternative option of Botox injection, its temporary nature and cost of treatment. Subject agreed for Botulinum toxin injection completing 60 Gy of adjuvant radiotherapy.
2.1.1. Injection technique

The procedure was performed by a Neurophysician of National Institute of Mental Health and Neuroscience Bangalore, using Botox injection therapy under EMG monitoring. Subject was made to lie in the supine position and PE segment was defined by marking three surface points bilaterally. Botox was injected unilaterally, on the side of thyroid lobectomy located first between middle constrictor and base of tongue, second in lower PE segment adjacent to tracheostome and the last point in the mid-portion of the PE segment midway between the above two sites. The injection was injected using 27 gauges Teflon coated EMG needles after identifying sharp motor potential indicating hypertonic muscle segment. Total dose of Botox used was 25 units. Hoffman, Fisher, et al (1997) had used local anesthetic before injecting Botox injection to reconfirm the spasmodic PE segment, but we have not used any local anesthetic as the injection is well tolerated and the swelling caused by the anesthetic may alter the anatomical landmarks.

3. RESULTS AND DISCUSSION

Twenty-four hours following injection subject developed TE speech. Clinical course of the subject is depicted in the Fig 1. Tracheoesophageal voice prosthetic speech was rated as excellent. Development of speech secondary to "Chemodeneration" effect of Botulinum toxin becomes evident at the end of 24 hours. Speech was defined as excellent as subject had the ability to produce 25 - 35 syllables per air intake (breath), counting numbers up to 30 per breath and able to phonate (MPD) for fifteen seconds. Speech was highly intelligible for both family members and friends with excellent social acceptability, satisfactory intensity and quality of voice. Temporal characteristics of speech indicated that subject could communicate with effortless ease.

The pharyngeal closure technique using constrictor muscle of augment the pharyngeal mucosal closure may also result in impeding a laryngeal speech acquisition by forming a constrictor ring. Hence today more attention is paid to close pharynx using 4/0 vicryl utilizing continuous sub mucosal suture with magnifying loupe. Constrictor muscle, as a second layer is reconstructed in a loose manner.

Botulinum toxin injection is technically simpler and does not require general anesthesia and could be effective alternative to the patients who simply do not want other operation. Under EMG monitoring it could be administered with fair accuracy. There are no absolute contraindication to injection of Botulinum toxin except a history of hypersensitivity to the toxin (none yet reported) and injection at the sight of injection. The only disadvantage is that it is presumed to have a temporary effect, which can last from 5 months to 37 months (Lewis, Julie, Bishop-Leon, Arthur, Forman, Eduardo, M.diaz, 2001). This variation in its effect might be related to the degree of tissue damage after surgical excision and/or radiation treatment that impair the ability of the neuro-muscular junction to regenerate. In an over cases the chemical denervation has been complete, and the resultant satisfactory speech production has been long lasting. None of the cases showed a tendency to watch reoccurrences of spasm. The safety, ease of administration and no associated complication out ways the cost factor with respect to other surgical options with attendant complications. We believe that the price paid is much less than the reward of ability to communicate with follows beings.

4. REFERENCES:


Flowchart 1: depicts the clinical course of subject after failure to achieve TEP speech and restored speech with Botox injection