CASE REPORT

Hy-zy Hitch-zygomatico-hyoid Suspension for the Management of Post-surgical Dysphagia

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ABSTRACT

Dysphagia is not only a main symptom of the head and neck cancer, but also the dangerous complication of the various surgical and other treatment modalities for the same. Though various studies have been done to diagnose this condition but very little is done towards the surgical management of this life threatening condition. Through this article the new surgical technique of managing esophageal dysphagia by hyoid suspension. Our technique zygomatico-hyoid suspension is simple and logically effective way of managing dysphagia secondary to the surgical resection of the lesion in the patient with head and neck cancer. Though this technique is not tried in large number of patients hence the long-term benefits and overall improvement in patient’s quality of life is yet to be ascertained, but still it can be a new direction in the surgical management of dysphagia.

Key Words: Dysphagia, hy-fy hitch, hyoid suspension.

Introduction

Dysphagia is a term derived from the Greek words dys (difficulty) and phagein (to eat).1 It is a manifestation that expresses a disorder in the transport of food and saliva through the upper part of the alimentary tract. Oro-pharyngeal dysphagia (OD) is a more anatomically restricted term referred to changes in the mobilization of the bolus from the oral cavity to the esophagus (that means, in bolus propelling from the oral cavity to the pharynx, in the pharyngeal reconfiguration during the swallow, or in the opening of the upper esophageal sphincter).2 OD is an unavoidable concern in the management of patients with oral malignancies. Being a symptom at presentation, as an adverse effect during whatever the treatment, or as sequelae compromising the quality of life of the patients, swallowing disorders have to be promptly anticipated and efficiently dealt with. For an outcome to be considered functional, the patient has to be able to swallow in an effective and safe manner. Actually, preserving a functional deglutition is usually the most important goal of the different function-preserving surgical techniques in head and neck cancer surgery.

Normal oro-pharyngeal swallowing

Swallowing is mainly divided into three phases: (1) Preparatory oral phase, (2) oral phase and the last (3) pharyngeal and esophageal phase. Mechanically, several closely coordinated actions are involved: (1) Elevation and retraction of the soft palate with closure of oropharynx, (2) UES opening, (3) laryngeal closure at the level of the laryngeal vestibule, (4) tongue loading (ramping), (5) tongue pulsion, and (6) pharyngeal clearance. A fundamental aspect of deglutitive pharyngeal reconfiguration is in transforming the oropharynx from a respiratory to a swallowing pathway by opening the inlet to the esophagus and sealing the inlet to the larynx. Laryngeal vestibule closure and hence airway protection during swallowing is achieved by laryngeal elevation and anterior tilting of the arytenoid cartilages against the base of the epiglottis. UES opening results from anterior traction caused by contraction of the suprahyoid and infrahyoid musculature evident fluoroscopically by anterior hyoid movement.

Patho-physiology of dysphagia

Can be divided into two categories:

- Directly due to the resection of the tissues involved in the swallowing i.e. tongue.
- Due to the damage caused by the radiation therapy by following ways:
  a. Decreased pharyngeal peristalsis.
b. Decreased or defective posterior inversion of the base of the tongue towards the posterior pharyngeal wall.

c. Decreased elevation of hyoid bone and larynx and decreased inversion of epiglottis. The use of laryngeal suspension as a technique to improve function following surgical resection of the anterior floor of the mouth was first described by Edgerton and McKee and DesPrez and Kiehn. Later Jabaley and Hoopes simplified the concept of laryngeal suspension after partial or complete resection of hyomandibular complex by means of a heavy chromic catgut suture between the thyroid cartilage and mandibular symphysis on the premise that the main vector of force required to support the larynx is anterior and superior in the midline. Goode also described the similar technique of laryngeal suspension after total laryngectomy by thyroid mandibular suspension, and he found that swallowing function was improved significantly with his method of laryngeal suspension. Hillel and Goode gave lateral laryngeal suspension technique in which the thyroid cartilage was suspended to the condyle of resected mandible a modification of Goode original technique, the advantage of this technique is it causes superior as well as lateral movement of larynx which widens the opening of opposite hypopharynx. These techniques have proven that the hyoid suspension does improve swallowing function to some extent, but all these techniques are hyomandibular suspension and our techniques is the only technique in which we have used zygomatic bone a support bone through which hyoid is suspended and in our view this technique provides the most stable and most effective way of displacing hyoid antero-superiorly resulting in the better swallowing control. In this article, we describe our method of hyoid-zygomatic suspension.

Materials and Methods

We performed zygomatico-hyoid suspension in 24 patients undergoing subtotal or total glossectomy with or without a mandible resection even cases where genial region resections are being performed and there would be loss of attachments of the tongue and which would lead to tongue fall back also for any gross suprahyoid resections which would lead to loss of hyoid bone axis in relation to the skull base. The procedure was performed at the Mahatma Gandhi Cancer Institute, Miraj.

Notes on hyoid-zygomatic suspension technique

The hyoid suspension in which 24-gauge stainless steel wire was pre-stretched and using an awl 26 cm in length a circumzygomatic to the hyoid bone suspension was carried out by the Key steps were the following. The procedure was performed under general anesthesia while doing primary resection of the tumor. Patient was placed in anti-Trendelenburg position with neck hyperextension. Incision was given in natural skin crease between the hyoid inferior body and the thyroid notch as shown in the schematic figure (Figures 1 and 2). Median strap muscle dissection between two imaginary parasagittal planes crossing the lesser cornu of the hyoid bone was carried out (Figure 3). Hyoid bone mobilizing test in antero-superior direction carried out permanent hyoid fixation after having tested the correct position of the thyroid cartilage below the hyoid bone, following fixed steps which are as follows: The zygomatic arch is palpated and puncture wound is performed at the origin of the temporal

Figure 1: Schematic diagramme showing the direction and placement of zygomatico-hyoid suspension wire.

Figure 2: Incision for the resection and neck dissection as part of surgical treatment of head and neck carcinoma.
process of the zygomatic bone. Two pre-stretched 24-gauge wires are passed circumferentially around the hyoid bone in the region where the insertion of the fibrous loop for the intermediate diagastric tendon is present. Later, awl is inserted from the arch puncture wound and passed anterior to the masseteric muscle and brought to the hyoid bone body region where the already wire loops are present (Figure 4). The wire is fed into the eye of the awl and later pulled out. This wire is removed from the awl’s eye and stabilized. The awl now is reinserted superficial to the arch brought out from the previous anterior massetric site to the hyoid bone, the other end of wire is fed in the eye and the wire along with the awl is brought out (Figure 5). Traction is given bilaterally, and the mobility of the hyoid along with its infrahyoid component is examined. Mandibular movements have to be checked before the wires are twisted and stabilized. Untoward traction is to be avoided in order to avoid hyoid bone fractures. Incision lines are closed in layers. Post-operative position of the wire was checked using radiographs (Figure 6).

**Post-operative follow-up**

Postoperatively all patients tolerated the procedure well, with no intra or post-operative complications. All patients were kept on naso-gatric tube feeding for minimum 2-3 weeks post-operative period during which they were trained to start pureed fluids.

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**Figure 3:** Raising of skin-platysmal flap.

**Figure 4:** Insertion and placement of bone awl from the zygomatic arch downwards and forwards up to the hyoid bone.

**Figure 5:** Tying the 24-gauze stainless steel wire to the awl and passing it around the zygomatic arch.

**Figure 6:** Post-operative radiograph showing the final placement and position of wire for the zygomatico-hyoid suspension and also barium swallow test revealing that the fluid is not entering the larynx. Same patient who has undergone surgery in the above pictures i.e. bilateral neck dissection and anterior mandibular segmental resection and reconstruction. Patient if of ryles tube total rehabilitation achieved.
followed by juices and later clear fluid, once the patient tolerates water that’s an indication that patients have achieved their normal swallowing function. Post op function are also evaluated by doing video-fluoroscopy, barium swallow test, routine chest x-ray to rule out any s/o silent aspiration.

**Discussion**

The hyoid is a u-shaped bone placed in the anterior neck midline, at the center of three force vectors directed, respectively, at the mandible, sternum, and mastoid process. It gives insertion to the middle constrictor musculature, which form the lateral wall of the hypo pharynx. The suspension of this bone to the zygomatic bone restores the inferior collapse of the reconstructed floor and lateral mandibular region and improves the tone of the middle constrictor muscles. This technique unlike all the previous techniques does not take support of the mandible at all, hence in cases where in mandible resection is performed along with the tongue or the larynx this technique is probably the only option available to the surgeon to suspend the hyoid bone. Without re-suspension, it is speculated that resection of sub mental lateral mandibular region may lead to inferior and posterior displacement of the hyoid bone. A posterior displacement of the hyoid bone may be implicated in the obstruction of the pharyngeal airway, which in turn may lead to dysphagia, or swallowing impairment. The post-surgical alteration in size and position of the hard and soft tissues surrounding the pharyngeal space is also responsible for the airway obstruction.

**Conclusion**

Circumzygomatic hyoid suspension technique is an innovative technique and it is the only technique of hyoid suspension in which instead of mandible the support is taken from zygomatic bone. As in this technique, the vector is in the same direction, but its supporting bone absolutely immobilized, thereby giving greater elevation and stable anterior displacement in comparison to the other techniques of hyoid suspension. We found that swallowing and infra hyoid functions improved in our patient thereby quality of life improved. This hyoid suspension technique is effective when short-term results are considered. The need of a more effective anatomic-based diagnostic approach is crucial to guide the patient selection. Extended follow-ups and randomized prospective trials with case-control series are needed to more critically evaluate the efficiency of this surgery.

**References**