Bilateral Lingual Nerve Injury Following Endotracheal Intubation: Risk Factors and Diagnostic Considerations

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Patient: Female, 52-year-old
Final Diagnosis: Bilateral lingual nerve palsy • cranial nerve injury
Symptoms: Loss of taste • loss of tongue sensation • voice hoarseness
Medication: —
Clinical Procedure: Endotracheal Intubation
Specialty: Anesthesiology • Neurology

Objective: Rare disease

Background: Endotracheal intubation is an essential procedure to protect the airway. However, immediate complications like voice hoarseness, cervical spine injury, and tooth trauma are common. One of the rarest complications is lingual nerve palsy. Risk factors include small airway instruments, non-supine position, nitrous oxide use, and difficult intubation. Only 15 cases of lingual nerve injury were identified worldwide, and only 2 of them were bilateral. This case report describes the third case of bilateral lingual nerve palsy after intubation.

Case Report: We present a 52-year-old woman admitted for a total abdominal hysterectomy. Postoperatively, the patient noted voice hoarseness, left tongue numbness, and loss of taste on both sides of the tongue. MRI brain revealed no new masses or lesions, and a diagnosis of bilateral lingual nerve palsy was made. She was treated conservatively with symptom observation for 14 weeks. On follow-up, she remained with only a patch of numbness and dryness, and loss of taste on the top middle area of the tongue.

Conclusions: Lingual nerve palsy is a very rare but devastating adverse effect of airway manipulation. Symptoms can include dryness, loss of sensation, and loss of taste of the anterior two-thirds of the tongue on the ipsilateral side. Salivary function assessment is important to determine the location of peripheral nerve injury. All possible causes like stroke, hemorrhage, and nerve impingement should be evaluated. MRI is advised to exclude central etiologies. Steroids may be used to decrease tissue edema and inflammation.

Keywords: Cranial Nerve Injuries • Intubation • Lingual Nerve Injuries • Taste

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Background

Endotracheal intubation is one of the most common procedures done in the medical field. It can be associated with various complications, some of which are common and can be avoided, such as dental injury, soft tissue lacerations, and arytenoid dislocation. However, others are rare and hard to avoid, such as cranial nerve injury. In this report, we describe a very rare case of bilateral lingual nerve palsy after intubation. We are aiming to understand the mechanism of injury, identify the risk factors, and help clinicians practice safe intubation maneuvers.

Case Report

We evaluated a 52-year-old woman with a remote history of left frontal oligodendroglioma treated with resection and chemotherapy, and seizure disorder controlled with lamotrigine. She was admitted to our hospital for a total abdominal hysterectomy due to excessive uterine bleeding and fibroids. On the first postoperative day, she noted voice hoarseness, left tongue numbness, and loss of taste on both sides of the tongue. She denied facial numbness/weakness, trouble swallowing, diplopia, vision changes, numbness or weakness of extremities, difficulty coordinating movements, imbalance, or any other neurological symptoms. She also denied swelling or pain of the jaw or cheeks, trauma to the face or head, or difficulty speaking. Her husband confirmed that her speech was normal.

Pre-operative assessment showed that her Mallampati score was 2, which carries an average risk for difficult intubation. Her weight was 70 Kg and height was 161 cm, with BMI of 27.

The patient was given 2 mg of midazolam i.v. and 50 mg of fentanyl i.v., followed by 150 mg of propofol i.v. She was adequately sedated, so succinylcholine 100 mg was given and intubation started. Sevoflurane was used as the anesthetic gas during the procedure. The endotracheal tube was successfully inserted on the first attempt, with Macintosh blade size 3. However, it was difficult to visualize the glottis, which led to a prolonged duration of the procedure.

The initial postoperative exam showed swelling and erythema of the tip of the tongue, decreased soft touch and temperature sensation of the left anterior two-thirds of the tongue, decreased taste of the whole anterior two-thirds of the tongue, and a small laceration on the pharyngeal mucosa posterior to the tongue on the left side. MRI brain revealed normal old post operative changes and no new masses or lesions.

As salivation was unaffected, a diagnosis of bilateral lingual nerve injury distal to the submandibular ganglion was made, and the prominent left-sided symptoms were attributed to the laceration. She was treated conservatively with the observation of symptoms, and no steroids were given. She was discharged home 2 days later to follow up in the outpatient clinic.

Five weeks later in the neurology clinic, she reported that some numbness persisted on the tongue tip, and the taste had not returned. Fourteen weeks after discharge, she still had a patch of numbness and dryness described to be the size of a quarter on the top middle area of the tongue and she admitted that she could taste well on the sides. However, she could not taste much anteriorly near the tip of the tongue.

Discussion

The lingual nerve contains fibers for innervation of tactile and temperature sensation on the ipsilateral aspect of the anterior two-thirds of the tongue. It also contains fibers for innervation of taste sensation in the same area via the ipsilateral chorda tympani nerve (a branch of the facial nerve), as explained in Figure 1. Proximally, the nerve also carries fibers for parasympathetic innervation of the submandibular sublingual glands. Lingual nerve injury is a devastating incident associated more often with laryngeal mask airway use than with endotracheal intubation [1]. Also, the right side is more commonly injured than the left due to more frequent use of the laryngoscope on the right side [2].

The incidence rate of lingual nerve injury is 0.066% in patients receiving general anesthesia and airway instrument usage in one study [3]. The first case of cranial nerve injury following intubation was reported in 1970 [2,4] and the first case of isolated lingual nerve injury following intubation was reported in 1971 [5]. Eleven and 4 cases of lingual nerve injury during general anesthesia were reported in the period from 1970 to 2001 and from 2001 to 2013, respectively [2,6]. Only 2 of them were bilateral, with complete recovery in one of those cases. To the best of our knowledge, this case is the 16th case of lingual nerve palsy after intubation worldwide, the third case of bilateral affection of the lingual nerve, and the second without complete resolution [2]. Recovery is expected in most cases during the first month after diagnosis [7].

Risk factors for cranial nerves injury during intubation include small airway instruments (endotracheal tube or laryngeal mask airway) which may require the anesthesiologist to excessively inflate the cuff to avoid a leak, non-supine position during the procedure, neck and shoulder surgeries, nitrous oxide use, difficult intubation, jaw thrust maneuver, and large tongue, which can lead to severe tongue compression [2,8]. Nitrous oxide is thought to diffuse into the air-filled cuff of the endotracheal tube, which may increase the amount of compression over the nerves [6].

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Our patient experienced a loss of both somatic sensation and taste, which indicates injury to both the lingual nerve and the accompanied chorda tympani branch of the facial nerve. Unilaterality of somatic sensation deficit indicates that the left side was more severely affected. The mechanism of injury in our patient was most likely due to the direct mechanical trauma evidenced by the laceration seen on the posterior wall and left side of the tongue. Our patient had only 2 risk factors for cranial nerve injury post-intubation – difficult intubation and prolonged procedure duration. Other risk factors such as multiple intubation attempts, large tongue, jaw thrust maneuver, non-supine position, or use of nitric oxide did not exist.

Once cranial nerve injury is suspected, MRI of the brain should be done to exclude central etiologies, and detailed history and physical exam should be performed to evaluate at which level the nerve is injured. If the salivary function is preserved, the injury would be more distal and beyond the submandibular ganglion as the nerve passes anteriorly and from lateral to medial side under the submandibular duct. The nerve then enters the lateral margin of the mid-tongue to supply sensation to the anterior two-thirds of the tongue. Early recognition is important to exclude other causes of new cranial nerve lesions such as brainstem stroke, hemorrhage, or mass effect compressing the nerve.

There are currently no clear guidelines regarding the treatment of cranial nerve injuries following intubation either with steroids or other anti-inflammatory drugs. However, treatment with these agents has been reported in many papers [1,2,9].

The theoretical benefit of steroid use is to decrease tissue inflammation and edema, which would further decrease nerve compression. Cranial nerve injuries associated with intubation are very rare and hard to avoid even after minimizing the risk factors. Our recommendations for the anesthesiologists to avoid such complications are to be aware that lingual nerve palsy could occur due to the above-mentioned risk factors. Anesthesiologists should choose the appropriate tube size, and avoid nitrous oxide use and jaw thrust maneuver if possible. In future studies, there is a need to investigate other possible risk factors like the patient’s age, use of paralytic agents, or type of sedative given during the anesthesia induction.

Conclusions

Airway management is a critical issue for patient safety and survival. Risk factors associated with cranial nerve injuries after intubation are small airway instruments, hyperinflation of the LMA cuff, non-supine position during the procedure, neck and shoulder surgeries, nitrous oxide use, difficult intubation, jaw thrust maneuver, and large tongue. Detailed history and physical exam should be performed to explore other causes of cranial nerves injury. MRI is a useful tool to exclude brainstem stroke, hemorrhage, or mass compressing the nerves. Steroids can be used, especially during the first few days after symptoms onset and may help decrease the edema and swelling, which would help with the neuropraxia.
References:


