

Tongue swelling and necrosis after brain tumor surgery

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ABSTRACT

We present a case of tongue necrosis due to intraoperative pressure injury. A laryngeal mask airway with adhesive electrodes was inserted into the oropharynx, over an endotracheal tube, to facilitate glossopharyngeal nerve monitoring during craniotomy for a cerebellopontine angle tumor. The case, mechanisms of injury, and modifications to our current practice are discussed.

Key words: Anesthesia complication, cerebellopontine angle tumor, craniotomy, laryngeal-mask airway, neuromonitoring, tongue necrosis

Introduction

Injury to the oropharynx may occur in the intubated patient, particularly during neurosurgery with transcranial stimulation of the motor cortex. Mechanisms include mechanical injury to the oropharynx due to repetitive stimulation of the jaw and bite injury from the teeth or venous congestion from positioning of hardware (endotracheal tube, bite blocks and neurophysiological electrodes and cables) occluding outflow. Prevention requires careful positioning of equipment in relation to soft-tissues and when possible, careful observation.

We present a case of a patient who underwent general endotracheal intubation, and cranial nerve monitoring for removal of a left cerebellopontine angle meningioma. As we have previously reported^[1], cranial nerve 9 monitoring was facilitated by surface electrodes attached to a laryngeal mask airway that was positioned behind an endotracheal tube and abutting the posterior pharyngeal wall. Post-operatively, there was a severe lingual edema that resulted in the patient having difficulty with swallowing and speaking. As her airway remained patent, it was initially managed conservatively. However, the patient experienced increased pain and

continued dysarthria and developed midline tongue necrosis, necessitating surgical debridement and reconstruction, in order to optimize her recovery.

This is an unusual case of tongue necrosis as a result of oropharyngeal hardware for neuro-monitoring purposes that underwent surgical treatment. This case report highlights the potential complications that can occur with the use of a laryngeal mask airway with cranial nerve monitoring in patients undergoing brain tumor resections (as we have previously described). While patients who have post-anesthetic tongue injuries such as this can initially be managed conservatively; failure to improve in the setting of tissue necrosis warrants surgical evaluation.

Case Report

A 34-year-old female presented for neurosurgical evaluation with complaints of decreased left hearing and left facial numbness for the past year and a half. For the past several weeks, she noticed new difficulty with her balance.

She underwent audiometric testing, which revealed complete sensorineural hearing loss on the left. In addition to her left hearing loss, she had left face numbness within V1 and V2 sensory distribution. The rest of her exam was normal.

Magnetic resonance imaging revealed a large extra-axial mass of the left cerebellopontine angle that extended to the cavernous sinus and a second lesion in the left frontal convexity. Given that the cerebellopontine mass was causing her constellation of symptoms, she was taken to the operating room for a retrosigmoid craniotomy for tumor resection.

General anesthesia was induced and her trachea was intubated uneventfully. As we have previously described, a laryngeal

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surface electrode (Neurovision Medical) was adhered to the endotracheal tube and placed in juxtaposition to the vocal cords to monitor evoked electromyography (EMG) in response to stimulation of cranial nerve 10. Furthermore, as previously described, a laryngeal mask airway with surface electrodes applied to its cuff^[1] was positioned behind the endotracheal tube so that the cuff and electrodes were abutting the posterior pharyngeal wall to record EMG in response to glossopharyngeal nerve stimulation. The mouth was then packed with gauze to ensure that neither the laryngeal mask airway (LMA), nor the electrodes shifted during the procedure and a gauze bite block was placed between the incisors and molar teeth on the left side of the mouth. Other electrodes were placed by the electrophysiological monitoring team to monitor cranial nerves 7 and 8 as well as sensory evoked potentials (SEP's) and motor evoked potentials (MEP's) and correct positioning confirmed. The patient was placed in left lateral decubitus position, park bench with right-side-up, and the head was turned to the left to facilitate retrosigmoid craniotomy. A lumbar drain was placed for brain relaxation. Brain tumor resection was performed with no apparent complications. Histopathology revealed meningioma with atypia.

Post-operatively, she was neurologically stable and no injury to the tongue was noted on extubation. However several hours after extubation she developed significant swelling of her tongue. It had normal sensation and color but the degree of swelling prevented her from both speaking and eating. Because her airway was clear, no emergent interventions were performed. In order to help reduce her swelling and protect her airway, she was started on high-dose steroids, her head of the bed was kept up at 90° and her clinical exam was followed closely in the intensive care unit. The patient was discharged on a dysphagia diet. She was referred back to our hospital about one week later after she presented to an outside emergency room with worsening lingual pain and disfigurement of the tongue. Upon readmission, pressure necrosis was visible in the midline of the tongue presumed secondary to endotracheal tube compression due to the effect of the overlying LMA. Given the nature and extent of her injury, otolaryngology was consulted, and concern for a possible concomitant infection was raised. Frequent nystatin oral treatments, oral steroids, and clindamycin led to improvement in the lingual edema over the next several days. Her airway remained patent. She began tolerating a clear liquid diet, and then progressed to a soft mechanical diet. She was discharged from the hospital with outpatient speech therapy.

Approximately, 3 weeks after her initial injury, she presented to the neurosurgical clinic with a lingual pain and disfigurement. The tip of her grossly swollen tongue was bifid with a big necrotic groove extending posteriorly interfering with her speaking, eating and drinking. On exam, she had marked

lingual dysarthria and the tongue itself was bifid at the tip. There was a large mass of infarcted tissue on the inferior surface. Plastic surgery was consulted and recommended operative intervention to debride and re-approximate the tongue. She was taken to the operating room where the necrotic area of the tongue was debrided. Using a Versajet machine, the mucosalized granulation tissue was removed on each side of the bifid tongue that had been split. Adjacent areas of the mucosa with the mosaic tongue patterns were then re-approximated after debriding all edges. The wound was closed primarily. At the end of the procedure, the tongue looked geographically and anatomically correct.

Two-week post-operatively, the tongue wound was completely healed. There was still mild swelling of the distal tongue without evidence of infection. One month after tongue repair, her tongue had totally epithelialized and her swelling had resolved. Unfortunately, she did have a cosmetic deformity of her tongue and her speech was still dysarthric. Her exam and deficits were stable, one year after tongue repair.

Discussion

The purpose of this case report is to highlight that unusual and unexpected injuries to the tongue can occur secondary to neuromonitoring efforts. We report a particularly disabling injury that occurred using a technique that we have previously described in the literature.

In a case series of more than a thousand patients injuries to the tongue or lips occurred with a frequency of 0.5-1.0% in surgical cases when neuromonitoring was used.^[1] In about half of these cases some sort of surgical intervention was required (albeit often just suturing).

Ineffective, poorly positioned, or shifting bite blocks are most often to blame for injuries to the tongue in such cases. In this instance, whilst a carefully bite block was used, we believe the presence of both an endotracheal tube and laryngeal mask in the mouth, coupled with the necessary head flexion (for surgical exposure) and lengthy procedure (large tumor in the brainstem) caused the tongue under the endotracheal tube to suffer ischemic damage. As a result, we no longer use this technique.

Our current practice is to use needle electrodes for glossopharyngeal monitoring. Electrodes are bent into a J-shape with a needle driver and inserted into the soft palate (unilaterally or bilaterally as needed) using a direct laryngoscope for visualization. They are removed in similar fashion with a needle driver and laryngoscope at the end of the case. We have had no complications in over 20 cases to date. As expected neuroanatomically, the stylopharyngeus cannot be reliably isolated. In our experience, soft palatal EMG signals can be elicited either from glossopharyngeal nerve stimulation

alone, or from both vagal and glossopharyngeal nerve stimulation, depending on the oropharyngeal innervation of the individual patient.

In conclusion, we describe a severe tongue injury with lingual infarction due to pressure injury from a laryngeal mask airway placed over an endotracheal tube to facilitate cranial nerve IX monitoring. We currently advocate the use of needle electrodes, placed as described above in the soft-palate, when intraoperative monitoring of the glossopharyngeal nerve is needed.

Reference

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