



# Unilateral Hypoglossal Nerve Palsy After Septoplasty Under General Anaesthesia

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Hypoglossal nerve palsy (HNP) is a rare perioperative complication. Causes of this condition are mostly attributed to oropharyngeal manipulation during airway management, suggesting injuries involving the peripheral part of the nerve. Owing to the concomitant pathways of the nerves, the hypoglossal nerve might be injured together with the recurrent laryngeal (Tapiá's syndrome) or lingual nerves. The present report described a case of isolated HNP as a rare perioperative complication.

**Keywords:** Anaesthesia, complication, hypoglossal nerve

## Introduction

**H**ypoglossal nerve palsy (HNP) is a rare perioperative complication that has physical, social and psychological effects on affected patients. The hypoglossal nerve can be injured alone, or it can also be injured together with the lingual nerve or recurrent laryngeal nerve (Tapiá's syndrome). Early diagnosis of this complication is important because of the possible differential diagnosis, including ischaemic stroke, intracranial haematoma, carotid artery dissection, airway obstruction or airway trauma. We presented a case of HNP and discussed the possible mechanisms. A brief review is included.

## Case Presentation

A 32-year-old male patient was scheduled for septoplasty due to septum deviation. Preoperative physical examination and laboratory analyses were normal. There were no characteristic findings in his medical history (American Society of Anesthesiologists grade I). Thyromental distance and sternomental distance were normal; atlanto-occipital joint extension was adequate; soft palate and uvula were visualised with a 4 cm mouth opening and the Mallampati score was 1.

No premedication was applied before surgery. Following standard routine monitoring, general anaesthesia was induced using propofol 3 mg kg<sup>-1</sup> (200 µg), fentanyl 1 µg kg<sup>-1</sup> (75 µg) and rocuronium 0.7 mg kg<sup>-1</sup> (50 mg) intravenously. Anaesthesia was maintained with inhaled sevoflurane, oxygen and air mixture and infusion of remifentanyl 0.3 µg kg<sup>-1</sup> min<sup>-1</sup>. There were no problems with mask ventilation and no need for an airway. Laryngoscopy was performed by using a Macintosh blade (no. 3), the appearance of the epiglottis and vocal cords was perfect (Cormack-Lehane Grade 1) and there was no need for external manoeuvres for endotracheal intubation. An endotracheal tube (no. 8) was gently inserted into the trachea at the first attempt. The placement of the tube was confirmed, and the cuff was inflated with a cuff pressure <20 cm H<sub>2</sub>O. The tube was secured to the left side of the patient's mouth. During surgery, the patient was haemodynamically stable. The surgery was performed in the Fowler position and lasted for 25 min. No throat packs were inserted. When the surgery ended, the patient was extubated with no problems. After attaining a modified Aldrete score of 10 on his follow-up in post-anaesthesia care unit for approximately 1 h, he was transferred to the otorhinolaryngology ward.

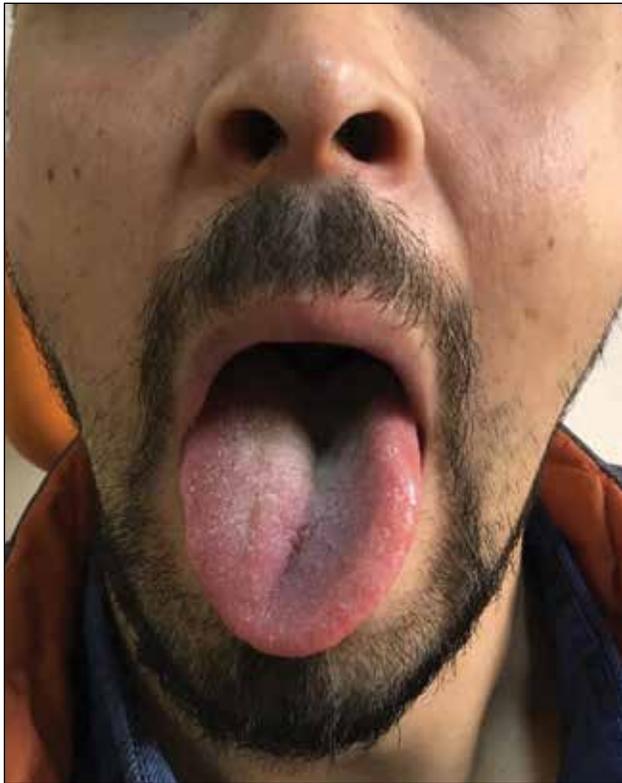


Figure 1. Deviation of the tongue to the right on protrusion



Figure 2. Deviation of the tongue to the left while inside of the mouth

**EMG**

**EMG Summary Table**

			Spontaneous					MUAP			Recruitment
Muscle	Nerve	Roots	IA	Fib	PSW	Fasc	H.F.	Amp	Dr.	PPP	Pattern
R. Tongue	Hypoglossal	Medulla-	N	3+	3+	None	None	N	Large	N	Reduced
L. Tongue	Hypoglossal	Medulla-	N	None	None	None	None	N	N	N	N

Figure 3. Needle electromyography of the tongue

On postoperative day 1, the patient complained of inability to use his tongue while chewing food, difficulty in swallowing and slurred speech. Physical examination showed deviation of the tongue to the right on protrusion (Figure 1) and to the left while inside of the mouth (Figure 2). This clinical finding demonstrated right HNP. Taste sensation, gag reflex and movements of the bilateral vocal cords were normal. Cranial magnetic resonance imaging (MRI) was performed, and neurologic pathologies were excluded by a neurology consultant. Neck arterial and venous Doppler ultrasonography was performed in order to exclude carotid artery dissection. Prednisolone 250 mg day<sup>-1</sup> intravenously was given for 3 days. On postoperative day 4, the patient was discharged from the hospital with conservative therapy (speech and swallowing therapy), and no other medications were given. On the first month of his follow-up, he was referred to a neurologist for needle electromyography of the tongue. The results showed

spontaneous denervation, neurogenic changes and reduction of motor unit potentials on the right half of the tongue. These findings were associated with partial axonal injury of the right hypoglossal nerve (Figure 3). Regular follow-ups were conducted every month for 1 year. The patient's slight slurred speech persisted, and swallowing problem was reduced although no recovery was obtained visually on his tongue.

**Discussion**

The hypoglossal nerve is the motor nerve of the tongue muscles. HNP is a rare but physically, socially and psychologically challenging postoperative complication for affected patients. Major aetiological factors include postoperative (29.3%), idiopathic (15.1%), primary neoplastic (14.2%), metastatic malignancy (13.0%), inflammatory (7.3%), radiation (6.1%) and traumatic (4.1%) injuries (1). Postoperative causes of this condition are mostly attributed to oropharyngeal manip-

ulation during airway management. The hypoglossal nerve might be injured together with the lingual or recurrent laryngeal (Tapia's syndrome) nerves because of the concomitant pathways of these nerves.

Airway management-related HNP suggests the involvement of the peripheral part of the nerve. Although the injuries are often in neuropraxic type, they may also be due to axonotmesis. Neuropraxic injuries are mild and may result from ischaemia or mechanical compression of the nerves and usually resolve within 3 months. Axonotmesis is the irreversible damage of the axon as a result of crush injuries or nerve stretch injuries, requiring a slower recovery (2). Shah et al. (3) compiled the proposed mechanisms of HNP (with or without lingual or recurrent laryngeal nerves) with regard to the location of the injury after airway management into four groups (3): (1) the nerve compression or impingement at the hyoid bone where the nerve is superficial in its course, (2) the nerve stretching at the lateral aspect of the transverse process of the first cervical vertebrae, (3) the shearing of the distal nerve fibres that supply motor input to the tongue with a laryngoscope blade and (4) a calcified stylohyoid ligament (4).

Clinical symptoms of HNP are dysarthria, dysphagia and dyspnoea. Unilateral peripheral hypoglossal palsy represents deviation of the tongue ipsilateral to the injured side. If bilateral palsy is present, these patients will have total loss of tongue movement, and speaking and swallowing are extremely difficult. Once suspected, differential diagnosis of ischaemic stroke, intracranial haemorrhage, carotid artery dissection, airway obstruction or airway trauma must be kept in mind. Neurology and otorhinolaryngology consultations are needed for further assessment. In our case, carotid artery dissection and cerebrovascular pathologies were excluded in arterial and venous Doppler ultrasonography and cranial MRI. The oral cavity, uvula and movements of the vocal cords were normal. Neurologic assessment revealed no further cranial nerve deficits.

Most of the cases with HNP are reported following orotracheal intubation, laryngeal mask airway (LMA) placement, Combitube insertion (5) and bronchoscopy (6). The other aetiologies that are proposed to postoperative HNP are forceful laryngoscopy (7), hyperextension of the head, external cricoid pressure, short neck (8), oropharyngeal surgical packs (9), hyperinflated LMA or endotracheal tube (ETT) cuff (10) and diffusion of N<sub>2</sub>O into cuffs (11). Although airway management was not complicated in our case, it is possible that more force might have been placed on the tip of the blade during direct laryngoscopy with regard to Shah et al.'s third mechanism. ETT cuff-related HNP may be explained by anatomical variations. In our case, we maintained a cuff volume <20 cm H<sub>2</sub>O, and we did not use N<sub>2</sub>O. Some authors suggest the relationship between the side that ETT is taped and the side of the nerve injury (12), but we have experienced this complication on the opposite side of ETT that is taped. Inju-

ries of HNP are commonly observed on the right side, such as our case. This can be explained with sweeping the tongue with a laryngoscope blade from right to left.

In morphological studies, it has been shown with a three-dimensional computed tomography that the male gender has larger hyoid bone volume and longer length of greater cornu (13). Therefore, male patients are more likely to be affected by HNP due to nerve compression at the hyoid cornu level with regard to the first mechanism by Shah et al. (3) As our patient was male, this appears to be a possible mechanism for palsy.

Cases of HNP are mostly reported following otorhinolaryngologic (14) and shoulder surgeries (15). According to its incidence, cases with HNP have also been reported after cardiovascular, plastic, thoracic and neurosurgeries, respectively (3). The relationship between surgery types and HNP may be attributed to throat packs, haematoma, undetected neck rotation underneath surgical drapes or neck hyperextension and lateral flexion during surgery (especially cardiothoracic surgeries). Most of these surgery procedures require position changes after intubation (in which ETT can migrate) (16). As our patient underwent an otorhinolaryngologic surgery in a semi-sitting position, throat packs and position change after airway securement may have led to compression of the nerve.

The symptoms of HNP are usually onset on the day after surgery. In most of the reported cases, patients recover within 6 weeks to a 1-year period because the nerve injury is mostly in a neuropraxic type. Steroids may be used if airway oedema is suspected, but there is no report in the literature for the treatment of nerve palsy. If bilateral palsy is present, alternative feeding methods should be utilised. Patients might benefit from speech and swallowing therapy. Psychiatric therapy may be considered. In our case, the patient was given steroids for the first 3 days and was referred to speech and swallowing therapy. The needle electromyography of the tongue on the first postoperative month showed partial axonal injury. Although any visual recovery on the tongue was not observed on the first year of follow-up, the patient had real benefits from conservative therapy.

## Conclusion

Many proposed aetiologies of the iatrogenic HNP are preventable with careful attention. Although many complications are related to difficult airway management, we can encounter complications even in unexpected situations and uneventful airway management. HNP should be kept in mind as a rare perioperative complication.

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