

Physiotherapy Management of Peripheral Unilateral Isolated Hypoglossal Nerve Palsy in a 53 Year Old Woman: A Case Report

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Abstract

Hypoglossal nerve palsy is not common in literature, especially its physiotherapy assessment and management. We described a case of a 53 year old woman who presented clinically with right sided atrophy of the tongue, ipsilateral deviation and fasciculation, a speech defect, inability to swallow solids, and difficulty in swallowing fluid as a result of one year history of hypoglossal nerve palsy after a traditional uvulectomy. She was fully assessed and received physiotherapy management in the form of electrical stimulation and a home programme in combination with spiritual therapy. After 11 weeks of treatment there was improvement in terms of her initial clinical presentation.

Keywords: Hypoglossal nerve palsy; Traditional uvulectomy; Physiotherapy management; Spiritual therapy

Introduction

Hypoglossal nerve, the 12th cranial nerve, arises from the hypoglossal nucleus, and runs to the medulla oblongata in the preolivary sulcus which separates the olive and the pyramid. The nerve then transverses the hypoglossal canal to the base of the skull. The hypoglossal nerve supplies motor fibres to all muscles of the tongue, except the palatoglossus muscle, innervated by the pharyngeal branch of vagus nerve, the 10th cranial nerve [1]. Hypoglossal nerve palsy refers to paralysis of the tongue. A nuclear or infranuclear lesion produces paralysis, atrophy, and fasciculation of the ipsilateral half of the tongue. On protrusion, the tongue usually deviates toward the side of the lesion [2]. A central lesion most often produces bilateral paralysis with the tongue becoming smaller and firm and protrusion is lost. A unilateral supranuclear lesion may also occur, producing mild to moderate contralateral weakness. In this case, the tongue deviates to the opposite side. Atrophy and fasciculation are absent [2]. Metastatic disease at the base of skull, autoimmune disease (e.g. rheumatoid arthritis), surgical procedure near neck, infection, diabetes mellitus, multiple sclerosis, stroke, head and neck trauma, fracture through the occipital condyle, periostitis of hypoglossal canal, and orotracheal intubation have been implicated as the causes of hypoglossal nerve injury [3].

The tongue (Latin. *lingua*; Greek. *glossa*) is a highly mobile muscular organ that varies greatly in shape and size. Its main functions include mastication, taste, deglutition (swallowing), articulation (speech), and oral cleansing. The tongue is divided into two halves; each half has four extrinsic and four intrinsic muscles. The extrinsic muscles comprise the genioglossus, hyoglossus, styloglossus and palatoglossus. The superior and inferior longitudinal, transverse and

vertical musculatures are the intrinsic muscles of the tongue [2]. Motor innervations of the tongue are as documented above [1]. Sensory innervations depend on the part of the tongue, and can be either general sensory or special sensory or both. The general sensory innervations of the anterior two-third of the tongue is by the lingual nerve, a branch of the 5th cranial nerve, i.e. the trigeminal nerve, while the special sensory innervations come from the chorda tympani nerve, a branch of the facial nerve (7th cranial nerve). For the posterior one-third of the tongue, the glossopharyngeal nerve, the 9th cranial nerve, is responsible for both the general and special innervations [2].

The hypoglossal nerve palsy unlike the facial nerve palsy is seldom reported in literature. Most available studies focus mainly on aetiology, diagnosis, medical and surgical management, and prognosis and most are primarily case reports. To our knowledge, no study has been published reporting on the physiotherapy management of this condition, probably due to its rare occurrence. The purpose of this case report was therefore, to illustrate the outcome of physiotherapy management of hypoglossal nerve palsy as presented in a 53 year old woman who underwent a traditional uvulectomy two weeks prior to the clinical presentation. Our client indicated her consent for this publication by signing a written informed consent.

Case Report

History

We report a case of 53 year old woman who presented with one year history of heaviness of the tongue, speech defect (mainly articulation), inability to sing or swallow solids, and difficulty in swallowing fluid as a result of a uvulectomy performed by a traditional surgeon two weeks prior to clinical manifestations. She was apparently healthy, with no history of trauma or fever, prior to the incidence.

She was a known hypertensive, diagnosed in 2006, and claimed to take antihypertensive drugs as prescribed by a physician, but had no history of diabetes or rheumatoid arthritis. A full time house wife in a monogamous home with six children, she did not smoke cigarettes or drink any alcoholic beverages. She was a choir leader at her church. She has no formal education.

She was referred by the ENT Surgery department with right hypoglossal nerve palsy on the 5th June 2012 for physiotherapy at the University of Maiduguri Teaching Hospital, Maiduguri, Nigeria.

Laboratory and radiological investigations before her referral as documented in her case note were as follows: Complete blood cell count, erythrocyte sedimentation rate (ESR), urinalysis and other biochemical findings (e.g. fasting blood glucose, electrolyte, urea and creatinine) and thyroid function test were normal. Herpes simplex virus, retroviral screening and auto-antibodies tests were negative. Chest X-ray, computed tomography scanning and Magnetic Resonance Imaging (MRI) were unremarkable. Cranial and cervical MRI did not show any brain tumor or ischaemic lesion. On the MRI, other cranial nerves were normal.

Physiotherapy Management

An initial physiotherapy assessment showed her resting blood pressure, pulse and respiratory rates to be 130/90 mmHg, 73 bpm, and 14 cpm respectively. She was not in any breathing distress or pain, and had no facial asymmetry, skin rashes, or discolouration. She looked worried, anxious, and frightened.

Physical Examination of the Tongue

Protrusion of the tongue revealed right sided atrophy and fasciculation with ipsilateral deviation, and the tongue was white coated (Figure 1). Pushing the opposite cheek out with the tongue was difficult. Tactile tongue sensation was tested by a sterilized piece of cotton wool held with a prong and touched to the tip of the tongue. Some grains of sugar in a sterilized and clean wooden spatula were scooped and dropped at the tip of the protruded tongue to test for the integrity of the taste buds. Both sensations were intact. The first test was used to determine the integrity of the general sensory innervations of the tongue. The second test was for special sensory innervations. A sterilized inelastic tape ruler was used to measure the distances between the tip of the protruded tongue and tragus of each ear. The measurement taken from the tip of the tongue to the tragus of left ear was 14.8 cm and that of right was 14.0 cm. For hygienic purpose, the authors wore surgical gloves during all the maneuvers outlined. Although MRI revealed that other cranial nerves were normal, the authors conducted a quick assessment of the functions of other cranial nerves as documented by Arnheim and Prentice [4] to isolate hypoglossal nerve injury. Our findings indicated peripheral unilateral isolated hypoglossal nerve palsy.



Figure 1: At presentation; note the deviation of the tongue to the right and ipsilateral atrophy.

Plan of Treatment

The short term goals of the treatment were set as: (1) The difference in distance between the measurement taken from the tip of the tongue to the tragus of left ear and that taken from the same reference point to the right ear would be reduced. (2) The bulk of the right side of the tongue would increase appreciably. (3) Our client would be able to push out the left cheek, swallow both fluids and solids, articulate speech and sing without much difficulty. The time specified to achieve each goal was 12 weeks. For long term goal, we proposed that the functional ability of our client's tongue would be restored to normal or near normal of its pre-morbid condition, as self-reported by the client.

We planned the following treatment: (1) spiritual therapy, (2) electrical stimulation, and (3) a home programme. The essence of spiritual therapy was to enable the client to cope with the psychological aspect of her condition. She was quite depressed and anxious. As a result, we instructed her to be prayerful and have faith in God. Evidence has suggested that certain spiritual beliefs and the practice of prayer are associated with improved coping and better health outcomes [5-7].

To commence electrical stimulation, the client laid comfortably on a couch. The right cheek and the ipsilateral lower jaw were thoroughly cleaned with sterilized water. Two pieces of lint cloths were soaked in saline water and gently squeezed to get rid of excess water. Passive and active electrodes were inserted inside each of the lint and placed at the cervical and right buccinator regions respectively. The salty water was to increase the conductivity of the electrodes. The parameters for the electrical stimulation were mono-rectangular waveform with 280 ms phase duration and 1.5 ms phase interval. The frequency, intensity, and duration of treatment were 0.80 Hz, 20 mA, and 10 minutes respectively. After this phase, the active electrode was transferred to the right lower plathysma region. The same parameters were repeated and frequency of treatment was 3 times per week. We used Sonoplus 992, 2600 AV Delft, Netherland, for the electrical stimulation. She was instructed to move the tongue as far as she could and as frequently as possible as her home programme.

Result

After 11 weeks of management, the ipsilateral deviation, right sided atrophy and fasciculation were no longer obvious (Figure 2). She could push her opposite cheek out with her tongue, even against some resistance. The distances from the tip of protruded tongue to the tragus of each ear were as follows: left: 15.3 cm; right: 15.1 cm. The improvements in distances pre - post treatment were 0.8 cm and 0.2

cm respectively. The speech has remarkably improved; she could now sing and swallow solids and fluids easily. Although she still complained of a feeling of slight heaviness of the tongue.

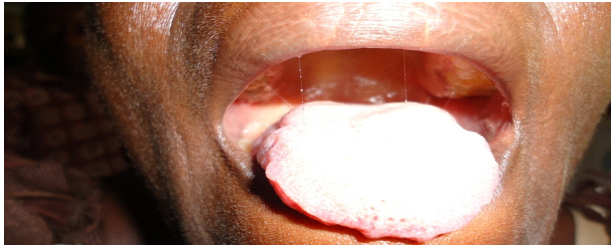


Figure 2: After 11 weeks intervention, note the remarkable difference in deviation and atrophy

Discussion

The hypoglossal nerve motor composition is highly complex and not fully understood [3]. As indicated earlier, a number of reasons have been implicated as the causes of hypoglossal nerve injury [3]. In our client, investigations (laboratory and radiological) showed no abnormal findings. Cranial nerve tests showed no abnormalities. Although, tumor has been incriminated as the major cause of hypoglossal nerve injury; trauma, local infection, and surgical procedures are also common causes (Marwah et al. [3] and our client's problem might have been as a result of one or two of these in combination, bearing in mind the traditional uvulectomy she underwent prior to presentation. We located our electrodes to stimulate the muscles innervated by the facial nerve. This decision was based on the anatomical relationship between hypoglossal nerve, facial nerve, and the other cervical nerves [1,8]. Anatomically, at the anterior end of the hypoglossal muscle, the hypoglossal nerve separates into its cervical branches which enter the muscles of the tongue. Some of the fibres of the hypoglossal nerve become part of the branches of the facial nerve running to the facial muscles [1]. The facial nerve, as the nerve of the second visceral arch innervates the muscles developing from it, namely, all the muscles of facial expression and part of the sublingual muscles [1]. The chorda tympani, a mixed nerve that emerges from facial nerve supplies sensation to the anterior two-thirds of the tongue [1].

Our patient may have resolved naturally with time; however unresolved cases of hypoglossal nerve palsy treated only with drugs have been previously reported [3,9,10]. Fernandes [9] presented a middle aged woman with a history of five months unresolved hypoglossal nerve palsy who was later considered for radiotherapy due to background metastatic disease. Loro and Owens [10] described a patient who was treated with drugs and followed up by a neurologist at 7 months post injury and the patient reported no real change or improvement from his 2-month post injury visit. Marwah et al. [3] reported a case of a patient with hypoglossal nerve palsy who was placed on drugs and examined periodically every other week, and showed no recovery at six months post lesion, although the authors asserted that the patient was more comfortable while speaking after receiving speech therapy. The spontaneous recovery following hypoglossal nerve palsy does not appear common.

Mathey et al. [11] posited that 12% of patients with carotid artery dissection present with hypoglossal nerve palsy and most dissections

heal spontaneously. The authors reported that the tongue movement of their patient returned to normal within a few weeks. This complete resolution, according to the authors was due to spontaneously healing of the carotid artery dissection which initially was a source of neurapraxia in the hypoglossal nerve. Unfortunately "a few weeks" was not defined by the authors. Cheong et al. [12] described a 32 year old man who presented with hypoglossal nerve palsy due to compression by a pulsating normal vertebral artery and underwent microvascular decompression. After 3-month post-surgery, the patient reported marked improvement of deviation of the tongue, but not total resolution.

When a nerve's function is impaired, the impulses it sends to the muscle it supplies is diminished or totally ceased depending on the type and severity of lesion that causes the impairment. This nerve lesion could be neurapraxia, axonotmesis or neurotmesis [13], and each result to temporary or permanent denervation of the muscle. Based on this knowledge, the parameters we chose were therefore specifically to stimulate the denervated tongue muscles. The highest possible intensity of the electrical stimulating machine that was utilized is 100 mA; we applied 20% (20 mA) of this intensity based on our patient's tolerance level. We would have adjusted the parameters to suit the patient in case of any discomfort. The authors believe that the method utilized in managing this patient was a novel idea, since there is dearth of literature on physiotherapy management of hypoglossal nerve palsy. Future scholars may improve on our adopted method as well as validate what we had done.

Limitations

Our case report was limited by the lack of a quantitative measure of muscle strength of the tongue and the inability to measure the circumference of the tongue. We circumvented this limitation by measuring the improvement in distance from the tip of protruded tongue to the tragus. Normative data of the distance the tongue can be protruded does not exist, so outcome was measured by the improvement in distance protruded. The sensitivity of the tongue can be measured with electromyography but this equipment is not available at our institution.

Conclusion

This paper reports on the physiotherapy management of a rare condition; that is hypoglossal nerve palsy. The use of electrical stimulation, spiritual therapy, and a home programme appeared to assist in increasing the movement of the tongue, and improving speech and swallowing.

Key Points

The hypoglossal nerve motor composition is highly complex and not fully understood. Hypoglossal nerve palsy is not as common as facial nerve palsy.

The rarity of this condition means that the development of guidelines for physiotherapy management need to be developed by meticulous and consistent reporting of cases.

Electrical stimulation may be one possible physiotherapy intervention with which to manage hypoglossal nerve palsy.

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