



## Role of palatal exercises in patient with post diphtheric palatal palsy: A case record

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### Abstract

Diphtheria is a vaccine-preventable illness caused by exotoxin-producing strains of *Corynebacterium diphtheria*. Diphtheria is clinically considered to be a biphasic illness with initial symptoms of low-grade fever, sore throat, neck swelling, nasal twang, and usually ipsilateral palatal paralysis followed by diphtheric polyneuropathy. A 11-year girl presented with nasal twang followed by postdiphtheric palatal palsy was treated with palatal exercise for improving nasal twang and noticeable change was found in quality of phonation by treatment with palatal exercise.

**Keywords:** post diphtheric palatal palsy, palatal exercise and nasal twang

### Introduction

Diphtheria is a vaccine-preventable illness caused by exotoxin-producing strains of *Corynebacterium diphtheria*. Diphtheria is clinically considered to be a biphasic illness with initial symptoms of low-grade fever, sore throat, neck swelling, nasal twang, and usually ipsilateral palatal paralysis, followed by diphtheric polyneuropathy in about ~20% cases. The classic features of diphtheritic polyneuropathy include sensory and motor signs and symptoms, most notably acute flaccid paralysis (AFP) with reduced or absent deep tendon reflexes with onset and resolution 35–140 days after the onset of bulbar signs and symptoms.<sup>1</sup>In present study we demonstrate role of palatal exercise in post diphtheric palatal palsy to improve quality of phonation.

### Case Record

A 11-year-old female child presented to GG hospital Jamnagar with history of sore throat, regurgitation of liquid and nasal twang before 1 week, there was no limb muscle weakness, sensory involvement, or respiratory distress present. She was admitted in hospital for 4 days, CT-scan and other investigations were done and she was diagnosed with suspected case of post diphtheric palatal palsy. Probable danger signs were explained and DTP vaccination was given to her and siblings.

Nasal regurgitation was reduced but nasal twang was there and she was referred to physiotherapy department for it. Patient was assessed by qualified physiotherapist no involvement of other cranial nerves, sensory or motor involvement of limb and respiratory involvement was found. She was assessed for palatal, pharyngeal and laryngeal muscle weakness<sup>[2]</sup>.

Palatal muscles were examined by following method- Patient produces a high-pitched "Ah-h-h". To see the palate and fauces adequately, the examiner may need to place a tongue blade lightly on the tongue and use a flashlight to illuminate the interior of the mouth Instructions to Patient: "Use a high-

pitched tone to say 'Ah-a-a-a'." Criteria for Grading based on Observation of Uvular and Arch Motion. Our patient was having WF grade in it i.e. Slight deviation of uvula to uninvolved side and sluggish soft palate movement as shown in figure A.

### Elevation of the larynx in swallowing

The examiner lightly grasps the larynx with the thumb and index finger on the anterior throat to determine the presence of elevation and its extent. Instructions to Patient: "Swallow."

### Vocal cord abduction and adduction

In this test the examiner is looking for hoarseness, pitch and tone range, breathlessness, breathiness, nasal quality speech, dysarthria, and articulation or phonation disturbances. The patient is asked to respond to four different commands to determine the nature of airflow control during respiration, vocalization, and coughing.

1. "State your name." Patient should be able to say his or her name completely without running out of breath.
2. "Sing several notes in the musical scale," (do, re, mi, etc.) "first at a low pitch and then at a higher pitch." Patient should be able to sustain a tone (even if he or she "can't carry a tune") and vary the pitch.
3. "Repeat five times a hard staccato, interrupted sound: 'Akh, Akh, Akh'." Examiner must demonstrate this sound to the patient. Patient should make and break sounds crisply with a definite halt between each sound in the series.
4. "Cough". She had nasal quality speech and difficulty in singing with different pitch and also in AKH word recitation test.

### Occlusion of the Nasopharynx (Palatopharyngeus) Test

Aiming at the examiner's finger, the patient blows through the mouth with pursed lips to occlude the nasopharynx via the palatopharyngeus. Place a slim mirror above the upper lip to check for air escape from the nostrils (the mirror clouds).

Alternatively, place a small feather fixed to a small plastic platform right under the nose; the motion of the feather is used to detect air leakage. Nasal speech is a sign of inability to close off the nasopharynx. Resistance: None. Instructions to Patient: "Blow on my finger." WF for palatopharyngeus i.e. minimal leakage of air, slight mirror clouding or father ruffling. As shown in figure 1.

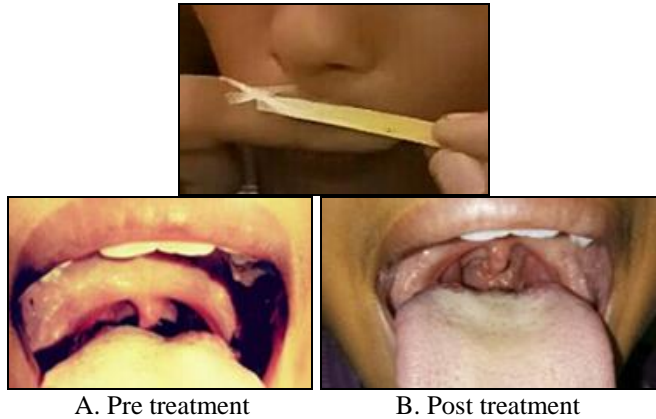


Fig 1

Nasal quality of speech can also be assessed by feeling vibration at nose in normal individual's vibration can be felt only during recitation of letters like M, N etc. i.e. ask patient to speak NG, MG, GG and feel nasal vibration in normally vibration is felt only during the M, N letters whereas no vibration in G, this can also be evaluated by using various words which includes letters like M N etc. In this patient it was continues which is suggestive of nasal air leak and improper closure by palatal muscle leading to Hyper nasal speech.

Based on assessment patient was suggestive of having nasal twang and palatal exercises were given to the patient which includes-

### 1. Make patient feel soft palate contraction

In front of mirror Patient produces a high-pitched "Ah-h-h" to cause the soft palate to elevate and adduct and with mirror biofeedback patient was made to feel contraction of soft palate. This was given as an exercise to hold soft palate elevation for 10 second and then relax.

### 2. A-YAWN AND Puff Exercise

- Puff out your cheeks with air; continue to breathe in and out of your nose.
- Try yourself, or get someone else, to press a finger against your inflated cheeks. Remember to keep your lips firmly together. Do not allow the air to escape through your mouth or nose. Hold for 10 seconds.

### B. Straw Exercises

- Blow out through a straw
- Blow out through a straw with your finger or someone else's, over the end. Keep the air in the straw for 5 to 10 second.
- Suck a small amount of liquid up through a straw and transfer it to another container, without losing any.

### 3. Nasal vibration and phonation exercise

- Ask the patient to speak various words which includes M and N letters like SONG, WRONG, etc. and feel vibrations at nose, now ask patient to elevate soft palate and feel reduced vibration at nose.
  - Ask patient to have conscious elevation of soft palate with speech and feeding.
4. With open mouth ask patient to breath in and out and feel escape of air from nose, now ask patient to elevate soft palate and feel the reduced escape of air from nose and ask patient to have conscious elevation of soft palate during breathing as an exercise.

The soft palate elevation, yawn and puff exercise, nasal vibration and phonation exercise, straw exercise and holding of soft palate elevation during mouth breathing were given 3 sets of 10 repetition with 5 to 10 second hold for 1 week period and patient was again assessed after 1 week the nasal twang was reduced and continues nasal vibrations were reduced.

### Discussion

Diphtheria has been eradicated in developed countries but yet due to either no vaccination or partial vaccination it has not been totally eradicated from developing countries like India, according to survey by WHO 3380 cases have been reported in 2017. As discussed in the introduction part it includes involvement of palatal muscle, pharyngeal and laryngeal muscle due to involvement of cranial nerve. The palatal muscle weakness gives rise to lowering of soft palate, with unilateral involvement deviation of uvula to one side, nasal twang and nasal regurgitation, escape of air from nose and chances of aspiration of content into lungs due to improper closure of nasal passage and this function is done by palatal muscle. The measures of management in such cases refer to either speech therapy or by medication and surgery. There is lack of research available in this field regarding importance of physiotherapy in palatal palsy patient.

As physiotherapy is drugless and noninvasive treatment method with exercise which have relatively minimal side effect. In one of the case study usefulness of palatal exercise and electrical stimulation on palatal palsy caused by lateral medullary syndrome leading to dysphagia it was found that physiotherapy is effective in improving strength of palatal muscle and decreasing patient symptoms of dysphagia. 4 In our study the effect of palatal exercise on nasal twang caused by post diphtheric palatal palsy was studied and it was found to be effective.

As with the increasing strength of palatal muscle the adequate closure of airway can be achieved during feeding, speaking etc. this reduces patient symptoms of nasal twang, and also this exercises are so simple that with one demonstration patient can also do it as home protocol and his quality of life can be improved.

### Conclusion

Thus our case study is suggesting that palatal exercises can be use full in patient with post diphtheria palatal palsy in reducing nasal twang. Further studies on use of palatal

exercise in large number of patient with postdiphtheric palatal palsy and in patient with palatal palsy due to different condition can be done and palatal exercise may be included in treatment of palatal palsy.

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