

## Numb chin syndrome : A subtle clinical condition with varied etiology

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### SUMMARY

One of the rare neurologic symptoms characterized by hypoesthesia or paresthesia of the chin and the lower lip, limited to the region served by the mental nerve is known as Numb chin syndrome. Vast etiologic factors have been implicated in the genesis of numb chin syndrome. Dental, systemic and malignant etiologies have been well documented. We present a case of a 59 year old female patient who reported with all the classical features of numb chin syndrome. On magnetic resonance imaging, the vascular compression of the trigeminal nerve root was evident which has been infrequently documented to be associated with the condition. We have also briefly reviewed the etiology and pathogenesis of numb chin syndrome and also stressed on the importance of magnetic resonance imaging as an investigative modality in diagnosing the condition.

**Key Words:** Numb Chin Syndrome, Mental nerve neuropathy, trigeminal nerve root, mental nerve.

### Introduction

Numb Chin Syndrome (NCS) is a sensory neuropathy characterized by altered sensation and numbness in the distribution of the mental nerve, a terminal branch of the mandibular division of trigeminal nerve. Any dysfunction along the course of trigeminal nerve and its branches, intracranially and extracranially either by direct injury or compression of the nerve can predispose to NCS.<sup>1</sup> Various etiologic factors have been considered of which dental procedures and dental pathologies are the most common benign causes. However on exclusion of a dental cause it should be considered as a "red flag" symptom as it is largely associated with malignancies or metastatic conditions affecting the mandible. Intracranial causes such as metastasis, local tumor or multiple sclerosis have been implicated.<sup>2,3</sup>

Here we present a case of numb chin syndrome related to vascular compression of the trigeminal root with spontaneous regression of the condition.

### Case report

A 59 year old medically fit female patient reported to our dental hospital with the chief complaint of numbness and tingling sensation of the right side involving the gums, lower lip and chin region since a duration of 1 month which was sudden in onset, continuous in nature with no history of trauma, episodes of pain, tooth extractions or surgical procedures on the right side [Figure 1 & 2]. She had visited a neurologist 2 weeks back who prescribed her Oxycarbazepine and Carbamazepine for 10 days. But the symptoms had not regressed.

On extraoral examination numbness to light touch sensation, hypoesthesia and tingling sensation was present unilaterally along the right side of the lower lip and chin region and intraorally along the gingiva in relation to 41, 42, 43 and 44 involving the alveolar and labial mucosa correspondingly. All the motor functions of lips and tongue appeared normal. No alteration in taste sensation was reported. Electrical pulp testing revealed all teeth were vital. Generalized attrition of teeth was present.

Haematological investigations revealed all parameters under normal values. Radiographic investigations of intraoral periapical radiograph in relation to 41, 42, 43, 44 [Figure 3] and panoramic radiograph [Figure 4] revealed no periapical or bony abnormalities. The inferior alveolar canal was patent. Magnetic resonance imaging [Figure 5] of the brain with gadolinium contrast medium revealed the right superior cerebellar artery was indenting on the cranial aspect of the trigeminal nerve at the pre pontine cistern.

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Thus based on the clinical and radiographic findings a final diagnosis of Numb Chin Syndrome due to right superior cerebellar artery indenting on the cranial aspect of trigeminal nerve at pre pontine cistern was considered. Patient was referred back to the neurologist who advised her to undergo trigeminal ganglion intervention. However the patient did not follow up for the surgery. The patient was regularly reviewed for the symptoms. 3 months following the initial episode there was regression of the symptoms and 18 months later patient continues to be asymptomatic.



**Figure 1:** Extraoral view – Hypoesthesia and tingling sensation on right lower lip



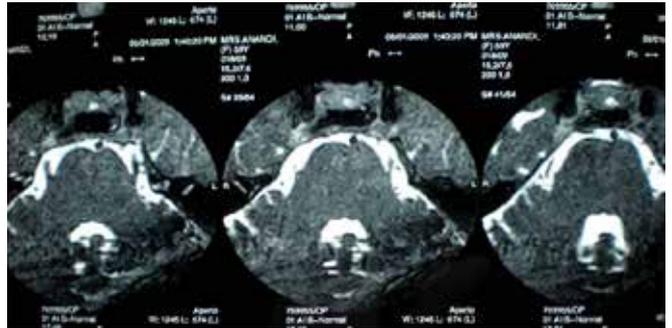
**Figure 2:** Intraoral view– Hypoesthesia and tingling sensation on alveolar and marginal mucosa of 41, 42, 43, 44.



**Figure 3:** - Intraoral periapical radiograph – no periapical pathology.



**Figure 4:** Panoramic radiograph - No bony abnormality.



**Figure 5:** Magnetic Resonance Imaging - Right superior cerebellar artery indenting on the cranial aspect of trigeminal nerve at pre pontine cistern.

## Discussion

Charles Bell in 1830 was the first to describe the presentation of numb chin syndrome.<sup>4</sup> However it was Calverley et al in 1963 who phrased the term 'syndrome of the numb chin'.<sup>5</sup> 'Numb chin syndrome' (mental nerve neuropathy' or 'numb lip syndrome'), is a sensory neuropathy characterized by numbness, paresthesia, and very rarely pain in distribution of the mental nerve or inferior alveolar nerve.<sup>3,6</sup> Symptoms typically include unilateral numbness of the skin of the chin, the lower lip, mucous membrane inside the lip and occasionally, the gingiva without any motor or taste disturbance. Pain, swelling, percussion-induced pain or loosening of the mandibular teeth may be present when the primary pathology is locally destructive. If malignancy or systemic condition is suspected, patients may have symptoms such as weight loss, fever, fatigue and pain in addition to signs and symptoms related to the primary tumor.<sup>2,7</sup> In the reported case, patient presented with all the characteristic signs and symptoms of unilateral numbness of the skin of the chin and lower lip, labial and gingival mucosa on the right side without any motor or taste disturbance.

The trigeminal nerve has three branches; designated V1, V2, and V3, which provide sensory and motor innervation to the face. The posterior sensory division of mandibular branch of the trigeminal nerve (V3) courses through the mandible as the inferior alveolar nerve which exits the mental foramen as the mental nerve. This provides sensory innervation to the skin of the chin, mucous membrane of the lower lip, and the mandibular gingiva around the incisors.<sup>2,8</sup> Any dysfunction to the terminal sensory branch of the mandibular division of the trigeminal nerve can cause mental neuropathy.<sup>6</sup>

**Two major processes that can affect the sensory nerves include:**

- I. Direct nerve injury causes inflammation and interruption in the nerve continuity. Nerve damage affects all nerve fibers

i.e. large myelinated A beta fibers, thin myelinated A delta fibers and unmyelinated C fibers causing hyposensitivity or elevation in detection threshold.<sup>3</sup>

II. Inflammatory milieu that accompanies trauma or infections encroaches the adjacent neural tissue producing perineural inflammation & neuritis. Inflammatory process with minimal nerve damage primarily affects the large myelinated A beta fibers causing reduction in detection threshold. Malignancies cause neuropathy due to inflammatory process, nerve compression or a combination of both.<sup>3</sup>

Various etiological factors causing numb chin syndrome have been proposed in literature [Table 1] 1,2,9,10.

Various theories have been postulated regarding the pathophysiology of NCS:

- Compression of the mandibular nerve through the infratemporal fossa and skull base or compression of the nerve root through its intracranial course by direct cause (local tumor) or indirectly through a rise in intracranial pressure.<sup>9</sup>

- Malignant cell infiltration of the inferior alveolar nerve sheath or direct compression of local tumor mass involving the plexiform course of the nerve in the mandible. Metastatic deposits and perineural or neural invasion of the mandible or base of the skull lesions, leptomeningeal seeding, or paraneoplastic syndrome.<sup>1,2,10</sup>
- Selective demyelination of the nerve in multiple sclerosis can cause NCS. It may be the first and sole presenting sign of multiple sclerosis and temporal arteritis.<sup>9,10</sup>
- Radiotherapy to the mandible can cause direct damage to the nerve or by ischemia.<sup>9</sup>
- AIDS patients may develop NCS because of the presence of a high grade lymphoma involving the central nervous system or mandible.<sup>2</sup>
- Use of metronidazole has also been associated with neuropathy; possible hypothesis being metronidazole binding to ribonucleic acid and inhibiting protein synthesis.<sup>11</sup>

**Table 1.** Etiological factors for numb chin syndrome

Dental cause	Malignant causes	Systemic causes	Others
Odontogenic causes	• Breast cancer	• Amyloidosis	• Drugs- Metronidazole
△Dental abscess	• Haematological malignancies like lymphomas and leukemias	• Sickle cell anemia	• Age related mandibular atrophy
△Osteomyelitis	• Lung cancer	• Syphilis	• Benign sensory trigeminal neuropathy
△Cysts and tumors of dental origin.	• Renal cell carcinoma	• Diabetes mellitus	• Radiotherapy to the mandible
Iatrogenic causes	• Melanoma	• Post-vaccination or connective tissue vasculitis	• Chemical exposure
△Dental trauma	• Prostate cancer	• Sarcoidosis	• Vertebrobasilar insufficiency.
• Wisdom tooth extraction	• Thyroid cancer	• Aneurysms	• Temporal arteritis
• Orthognathic surgery of the mandible	• Sarcomas	• HIV	
• Implants	• Gastrointestinal cancers	• Demyelinating disorders – multiple sclerosis	
• Mandibular surgeries	• Multiple myeloma	• Viral infection – Bell's Palsy	
• Orthodontic treatment (due to excess pressure)	• Head and neck cancers	• Lyme disease	
• Faulty dentures (compressing mental foramen during mastication)			
• Endodontic treatment (mechanical or chemical injury to inferior alveolar nerve by root filling material protruding beyond apex)			
△Dental anesthesia			
△Facial trauma			
△Haematoma			

In the present case, radiographic examinations were taken to localize any pathology in the mandible. Excluding the dental cause, magnetic resonance imaging was done to evaluate any intracranial pathology. There was vascular compression of trigeminal root which could have caused direct nerve injury. However the pathogenesis of this causing NCS is not clearly understood and reported. Further there was regression of the condition suggesting there could have been a partial or transient nerve injury causing the neuropathy. Very few cases have been reported with spontaneous remission of the symptoms. Such a favorable outcome suggests the cause could be of vascular origin, although a viral etiology, as in Bell's palsy, is also possible.<sup>10</sup>

The diagnosis of NCS is largely clinical. Neurosensory evaluation can be done by electrical or heat detection thresholds.<sup>3</sup> Patients presenting with symptoms of numb chin syndrome should be thoroughly investigated to accurately identify the etiology. Haematologic investigations include complete blood tests and cerebrospinal fluid analysis. Conventional radiographs like intraoral periapical radiograph and panoramic radiograph can be taken to evaluate any dental pathologies or as a screening radiograph. Further computed tomography can accurately evaluate the bony pathologies and malignancies.<sup>2</sup> MRI may be indicated to delineate any intracranial cause or multiple sclerosis. PET scan or PET/CT scans are useful in metastatic tumors to accurately localize the abnormal cells.<sup>9</sup>

Treatment of this condition is largely the accurate diagnosis and management of underlying pathology. The prognosis in malignant conditions with metastasis is poor with average survival after NCS is diagnosed is approximately 5 months if caused by mandibular metastases and 12 months if leptomenigeal metastases is present.<sup>12</sup>

### Conclusion

The most important step in the diagnosis of NCS is recognizing the potential clinical significance of unilateral chin or lip numbness. Thus it is necessary that patients reporting with no obvious pathology should be thoroughly evaluated. In the present case the etiologic factor has been the vascular compression at the level of trigeminal nerve root which was diagnosed by magnetic resonance imaging. This cause has not been routinely implicated in NCS. Thus advanced imaging modalities have a large role to play in the present scenario.

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