

A Case Report of Traumatic Neuroma in the Buccal Mucosa: Role of Histopathology in Unravelling Clinical and Diagnostic Hurdle

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ABSTRACT

Traumatic neuroma, also known as amputation neuroma, is a benign, non-neoplastic proliferation of nerve tissue that occurs in response to long-standing nerve injury or trauma. While this condition is mostly associated with peripheral nerves, it can also manifest in the oral cavity, particularly following surgical procedures, accidental injury, or chronic irritation. Although traumatic neuromas are relatively rare in the paediatric population, their occurrence in the oral cavity warrants attention due to potential diagnostic challenges and the impact on the patient's quality of life. Traumatic neuromas can be easily overlooked or misdiagnosed, as there is no consensus on their clinical presentation due to their rarity. This article presents a case report of a 14-year-old female patient complaining of excruciating pain in the left side of her face. The case highlights the unusual and obscure clinical presentation of traumatic neuroma, posing a diagnostic dilemma and the importance of histopathology for definitive diagnosis and proper treatment and management.

CASE REPORT

A 14-year-old female patient came to the outpatient department with a chief complaint of pain in the left side of her face for the last two years. She gave a history of trauma from a bamboo stick on the left side of her face four years back. She first noticed a small depression extra-orally on the left side of her face. The pain was excruciating and occurred spontaneously, without any provocation at any time of the day. On probing the patient further regarding the presence of any trigger zones, nothing positive could be elicited, though the patient accepted that the pain was continuous, gnawing and radiating in nature, lasting for hours, which hampered her daily activities and affected her quality of life.

The patient initially consulted a local dentist, who prescribed her analgesics for pain management and referred her to our institute for further evaluation and treatment. No relevant medical history was reported.

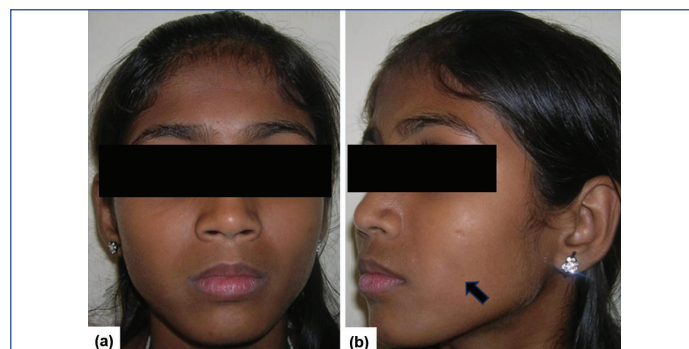
On extraoral inspection, a small depression with brownish discolouration was noted on the left side of the cheek [Table/Fig-1a,b]. Both coarse and fine sensation was found to be normal bilaterally. On intraoral examination, the overlying buccal mucosa on the left side appeared normal, without any signs of erythema or discolouration [Table/Fig-2]. On palpation, a small sub-mucosal nodule could be felt, which was firm in consistency, non-fluctuant, non-mobile, non-pulsatile, non-compressible and tender. The regional cervical lymph nodes were not palpable. The patient's overall oral hygiene was satisfactory, with no significant dental problems.

Based on the above clinical findings, signs and symptoms, a provisional diagnosis of benign soft-tissue neoplasm was made. Neuralgic pain (trigeminal neuralgia), lipoma, fibroma, neuroma, pleomorphic adenoma or epidermoid cyst was considered in the differential diagnosis.

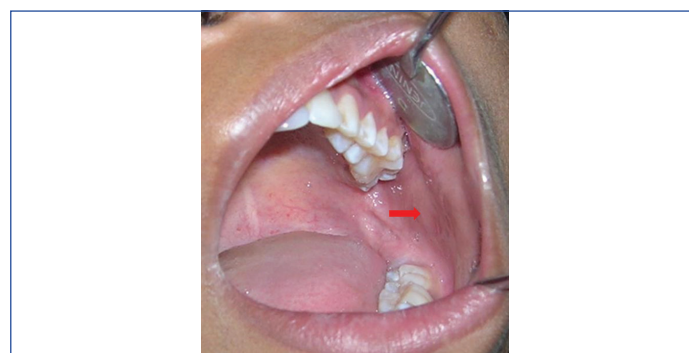
A routine haemogram was advised. Since all the parameters were found to be within normal limits, after written informed consent from the patient, an excisional biopsy was performed under local anaesthesia to determine the histopathological nature of the lesion.

Keywords: Face, Nerve injury, Pain, Submucosal-nodule, Trauma

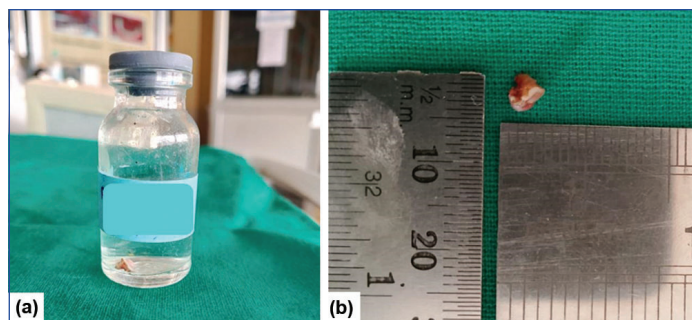
The gross specimen was well circumscribed, nodular and firm, measuring 0.5×0.5×0.5 mm [Table/Fig-3a,b]. Under low (10x) and high power (40x) magnification, the haematoxylin and eosin-stained sections showed haphazard proliferation of myelinated and unmyelinated nerve bundles surrounded by the densely collagenous and fibroblastic stroma and pronounced chronic inflammatory cell infiltrate [Table/Fig-4a,b,5a,b]. The overall clinical and histopathological features were consistent with benign neuroma and suggestive of "Traumatic Neuroma."



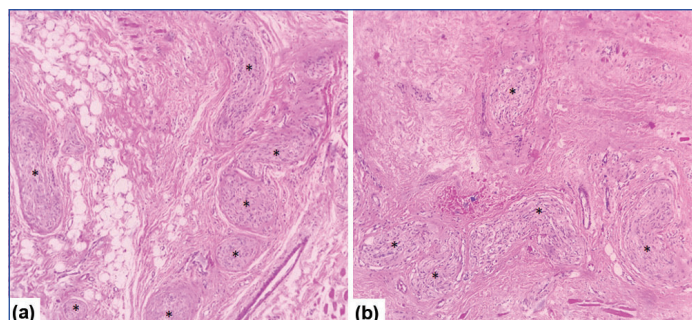
[Table/Fig-1]: a) Front profile of the patient; (b): Showing the depression on the left side of the face.



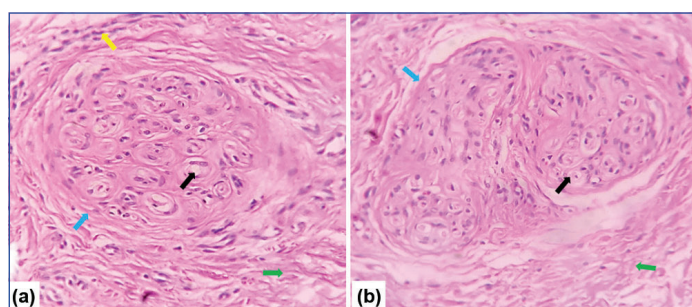
[Table/Fig-2]: Normal appearance of the left buccal mucosa with no visible lesion noted intra-orally except for a palpable nodule (Red arrow).



[Table/Fig-3]: a) The nodule was removed and placed in 10% Neutral-Buffered Formalin (NBF); b) Gross specimen measuring 0.5x0.5x0.5 mm.



[Table/Fig-4]: a,b) H&E-stained section shows the haphazard arrangement of nerve bundles (black asterisk) within the background of dense fibrous connective tissue (10x magnification).



[Table/Fig-5]: a,b) H&E-stained section shows cross-sectioned nerve bundle (perineurium in blue arrow, endoneurium in black arrow) within dense fibrous connective tissue (green arrow) along with chronic inflammatory cell infiltrate (yellow arrow) (40x magnification).

No recurrence was observed on post-surgical follow-up after 12 months.

DISCUSSION

Neuromas represent a varied collection of tumours originating from peripheral nerve sheaths, which may be reactive or hyperplastic. This group encompasses traumatic neuroma, solitary circumscribed/encapsulated neuroma, mucosal neuroma, oral pseudoperineuroma, and neuromas associated with the Phosphatidylinositol-4,5-bisphosphate 3-kinase catalytic subunit alpha (PIK3CA)-related overgrowth spectrum [1].

This case report details a unique presentation of a female 14-year-old patient with a traumatic neuroma on the left buccal mucosa and emphasises the importance of histopathological evaluation corroborative to clinicopathological presentation.

Traumatic neuroma is not a true neoplasm but a reactive proliferation of neural tissue that generally occurs following surgical procedures, accidental injury, or chronic irritation [2,3]. It is rather hyperplasia of nerve fibres and their supporting tissues [2].

Once a nerve is injured or cut, the section closest to the body (proximal) tries to recover and reconnect to the farthest section (distal) by the elongation of nerve fibres through the multiplication of Schwann cells [2]. Degeneration of the distal segment of the nerve following the severance of nerve fibres commences with swelling, fragmentation, and disintegration of the axonal cylinders and myelin sheaths. The nerve does not entirely vanish. Repair of a damaged

nerve begins with proliferation of the axon cylinders, the cells of the neurilemmal sheaths and the endoneurium. Reinnervation usually occurs; unless the proliferating proximal end meets some obstruction, such as scar tissue or a mal-aligned bone, in which case the nerve continues to proliferate into an unorganised bulbous or nodular mass of nerve fibres and Schwann cells in varying proportions. This constitutes a traumatic neuroma [4].

Traumatic neuromas may develop at any age; however, they are most frequently identified in middle-aged adults. They appear to be slightly more common in women [3,5]. The present case involved a 14-year-old female child, which is in accordance with the literature reporting the rarity of the lesion at a young age. Although traumatic neuroma can occur in any part of the body, most commonly in the gallbladder and thigh [4], it is a relatively rare lesion in the oral cavity, with a frequency of 0.34% [6]. The case under discussion involved the left buccal mucosa, which is an uncommon site for the occurrence of traumatic neuroma; the commonly reported sites for its occurrence in the head and neck region being mental foramen, lower lip, tongue and intraosseous areas [7-9]. Typically, traumatic neuromas present as small, firm, smooth-surfaced, non-ulcerated, sub-mucosal nodules, associated with altered nerve sensations that can range from anaesthesia to dysesthesia to overt pain [2]. The most common clinical symptom is pain, which can be intermittent or constant and may range from mild tenderness or burning sensation to severe radiating or gnawing pain [2,10].

This patient presented with a painful nodule at the injury site and experienced excruciating pain consistent with the clinical features reported in the literature. Since no trigger zone could be identified, and the pain arose spontaneously at any time of the day, trigeminal neuralgia was ruled out and it was more suggestive of traumatic neuroma.

In traumatic neuroma, the nature of pain has been reported to vary from patient to patient.

Microscopically, traumatic neuromas usually appear as unencapsulated growths that feature numerous nerve fascicles arranged in a disorganised manner, which includes axons, Schwann cells, and fibroblasts set within a dense collagenous background, and associated with chronic inflammation [11] as was seen in our case. The histologic differential diagnosis for oral traumatic neuromas includes neurovascular hamartomas, neurofibromas, mucosal neuromas, and palisaded encapsulated neuroma [5]. Neurovascular hamartomas are seldom reported in the oral cavity. The histopathological characteristics of neurovascular hamartomas consist of ill-defined masses of densely clustered nerve bundles and blood vessels embedded in a loose matrix, with little or no inflammation. In a neurovascular hamartoma, vascular proliferation is closely associated with the neural proliferation, while in a neuroma, the two components are distinct, with the neural proliferation being more prominent. Furthermore, the presence of fibrotic and inflammatory reactions is more indicative of a traumatic neuroma [12]. Both neurofibromas and traumatic neuromas are lesions that lack encapsulation and consist of fibrous connective tissue; however, neurofibromas contain mast cells and elongated fibroblasts characterised by bent, wavy, and serpentine nuclei interspersed with abundant fine collagen, while traumatic neuromas feature chaotically arranged axons that distinguish them from neurofibromas [13]. On histological examination, mucosal neuromas appear similar to traumatic neuromas due to the abundance of nerve bundles. Nevertheless, they lack inflammatory cells within a loosely arranged fibrous connective tissue environment [8,14]. Palisading neuromas and traumatic neuromas create nerve bundles. The presence of spindle cells arranged in a palisading pattern, along with a typically well-defined margin and the lack of inflammatory cells and fibrous connective tissue, is more characteristic of Palisaded neuromas [5,15,16]. Given the limited data, to the best of our knowledge, this case is rare, being the only reported case of traumatic neuroma in the buccal mucosa [Table/Fig-6] [3,5,17-20].

Author	Age	Sex	Site	Clinical features
Ananthaneni A et al., [17]	50 years	Female	Upper lip	Painless, oval-shaped, smooth swelling measuring 1 cm × 0.5 cm approximately, with normal overlying mucosa
Eguchi T et al., [5]	30 years	Male	Hard palate	Painful diffuse swelling with normal overlying mucosa
Dimitrios A et al., [3]	9 years	Female	Lower lip	Painless, small, nodular swelling in the lower lip, measuring 0.7 x 0.6 x 0.3 cm with whitish overlying mucosa
Alzoman H et al., [18]	46 years	Male	Gingiva	Painful swelling measuring 12 mm × 5 mm, firm and smooth in consistency, covered by normal mucosa
Tarallo G et al., [19]	36 years	Female	Hard palate	Mildly painful, well-defined neoformation with smooth surface, measuring about 1 cm in diameter, firm in consistency, covered by healthy mucosa
Nelke K et al., [20]	42 years	Male	Hard palate	Painless, well-circumscribed, firm and non-mobile nodule approximately 10 mm in diameter
Present case (2025)	14 years	Female	Buccal mucosa	Painful, submucosal nodule with normal appearing surface mucosa

[Table/Fig-6]: Traumatic neuromas of the oral cavity reported in the last 10 years [3,5,17-20].

The histological differences of traumatic neuroma from other neurogenic tumours have been listed in the [Table/Fig-7] [2,5,8,12-16].

Tumours	Most common site of involvement	Clinical features	Histopathological features
1. Traumatic neuroma [2]	Mental foramen, tongue, and lower lip	Painful, firm, small nodule	Unencapsulated growth with numerous nerve fascicles arranged in a disorganised manner, including axons, Schwann cells, and fibroblasts set within a dense collagenous background, and associated with chronic inflammation
2. Neurovascular hamartoma [12,16]	Dorsal surface of the tongue	Painless, solitary or multiple, nodular, firm lesion	Ill-defined masses of densely clustered nerve bundles and blood vessels embedded in a loose matrix, with little or no inflammation
3. Neurofibroma [13]	Tongue	Painless, slow-growing, soft, sessile lesion that can range in size from a small nodule to a large mass.	Unencapsulated and consists of interlacing bundles of spindle-shaped cells with wavy nuclei in fibrous or myxomatous stroma and contains mast cells
4. Mucosal neuroma [2,8,14]	Lips, tongue, and buccal mucosa	Painless, soft papules or nodules and associated with multiple endocrine neoplasia type 2b	Unencapsulated, irregular tortuous bundles of nerve cells with prominent perineurium scattered throughout the submucosa. They lack inflammatory cells within a loosely arranged fibrous connective tissue
5. Palisaded Encapsulated Neuroma [5,15]	Hard palate, gingiva, and labial mucosa	Asymptomatic, solitary dome-shaped, firm nodule	Capsulated mass consists of spindle cells organised in a palisading pattern. Absence of chronic inflammatory cells in the connective tissue

[Table/Fig-7]: Comparative differentiation of traumatic neuroma from other similar neurogenic/spindle cell tumours based on clinical and histological features [2,5,8,12-16].

The diagnosis of traumatic neuroma is established primarily based on clinical history, and clinical and histopathological features.

Immunohistochemistry (IHC) has no definite role in the diagnosis of tumours of neural origin and it only acts as an adjunct, as almost all neural tumours are S-100 positive.

Nerve-sparing surgical excision is the treatment of choice as this technique causes minimal manipulation and severance of nerve fibres [10], which was done in our case. Recurrence is not frequently reported. The patient is under regular follow-up and no recurrence or pain has been noted over a period of 12 months. The patient reported satisfactory healing and alleviation of pain on her first follow-up appointment.

CONCLUSION(S)

Clinically, subepithelial lesions on the buccal mucosa are challenging to diagnose because they may masquerade as a variety of neoplasms. Moreover, the insidious nature and the anatomic location of the buccal mucosa are not consistent with the usual presentation of a traumatic neuroma. It is important to recognise this condition early to avoid misdiagnosis with other benign lesions or neural tumours and provide appropriate management to prevent prolonged discomfort and potential functional limitations. This case highlights the rarity of traumatic neuroma in the buccal mucosa and also emphasises the importance of histopathological interpretation to diagnose the tumour.

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PLAGIARISM CHECKING METHODS: [\[Jain H et al.\]](#)

- Plagiarism X-checker: Feb 19, 2025
- Manual Googling: Aug 19, 2025
- iThenticate Software: Aug 21, 2025 (10%)

ETYMOLOGY: Author Origin**EMENDATIONS:** 6**AUTHOR DECLARATION:**

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Feb 17, 2025**Date of Peer Review: **May 09, 2025**Date of Acceptance: **Aug 23, 2025**Date of Publishing: **Dec 01, 2025**