

Review Article

Intraoral ancient schwannoma: A systematic review of the case reports

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ABSTRACT

Intraoral ancient schwannoma is a rare type of oral schwannoma, which is encapsulated and well demarcated from the surrounding tissues. Ancient schwannomas are associated with conventional features of neurilemmoma; however, they are distinguished from other types of schwannoma due to factors such as the long history, cellular architecture showing hypocellularity, and hyalinized matrices. This systematic review was performed through searching in databases such as PubMed and Google Scholar using related keywords (intraoral, oral, ancient, schwannoma, and neurilemmoma). Eventually, 26 case reports were systematically reviewed by the researchers. Required data were extracted by one researcher, and all the selected articles were reviewed in full text after screening. This systematic review aimed to determine the most significant influential factors in intraoral ancient schwannoma and evaluate the diagnostic and therapeutic methods in this regard.

Key Words: Neoplasm, neurilemmoma, schwannoma

Received: November 2015
Accepted: December 2016

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INTRODUCTION

Schwannomas, also known as neurilemmoma, neurinoma, or perineural fibroblastoma, are benign neoplasms that commonly appear in the soft tissues of head and neck (25%–45%).^[1] Oral schwannomas are rare, slow-growing tumors with unknown etiology, which apparently arise from neural sheath Schwann cells. These solitary lesions may occur at different ages (usually during the second and third decades of life), and the prevalence is not significantly different between men and women. Oral schwannomas are normally asymptomatic, while in some cases, they might be accompanied by pain and paresthesia if spotted in the intraosseous regions of the mandibles. In

such cases, these tumors may cause bone expansion, pain, and paresthesia.^[2] In general, schwannomas are solitary lesions; however, they are capable of multiplying when associated with neurofibromatosis. The most frequent sites of intraoral schwannomas are the tongue, palate, mouth floor, buccal mucosa, lips, and jaws.^[3]

Histologically, schwannoma is divided into five types of common, plexiform, cellular, epithelioid, and ancient schwannomas. Ancient schwannomas are frequently detected in the neck, while oral ancient schwannomas tend to appear on the floor of the oral cavity.^[4]

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How to cite this article: Salehinejad J, Sahebnaasagh Z, Saghafi S, Sahebnaasagh Z, Amiri N. Intraoral ancient schwannoma: A systematic review of the case reports. Dent Res J 2017;14:87-96.

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Intraoral ancient schwannoma is a rare type of oral schwannoma, which is encapsulated and well demarcated from the surrounding tissues. Degenerative changes including hyalinization, mucoid deposition, cyst formation, hemorrhage, calcification, and infiltration of siderophages and histiocytes can be seen in ancient schwannoma.^[5] Ancient schwannomas are associated with conventional features of neurilemmoma; however, they are distinguished from other types of schwannoma due to characteristics such as long history, cellular architecture, and hyalinized matrix.^[4]

Immunohistochemical and radiological examinations are usually performed to determine the extension of these tumors, and the immunohistochemical features of the tumors are evaluated to verify the neural differentiation of ancient schwannoma. Anti-S100 protein is the most important antibody identifying ancient schwannoma. These lesions have a good prognosis, and the first- treatment line involves surgical excision of the tumor. Complete removal of ancient schwannoma lowers the risk of recurrence.^[3] This systematic review aimed to address the following questions:

- What are the most influential factors in the occurrence of intraoral ancient schwannoma?
- What are the most common symptoms and complications associated with intraoral ancient schwannoma?
- What is the main difference between ancient schwannoma and conventional oral schwannoma and their differential diagnoses from other lesions?
- What are the most effective methods in diagnosing and treating intraoral ancient schwannoma?

MATERIALS AND METHODS

This systematic review aimed to investigate the published articles focusing on oral ancient schwannoma through searching in databases such as PubMed and Google Scholar. Initially, all the published articles during 1950–2016 with related abstracts were assessed by one researcher. Literature search was conducted using keywords such as intraoral, oral, ancient, schwannoma, and neurilemmoma. Selected articles were published in English and Persian, and duplicate reports were excluded from the study.

In this study, we only reviewed case reports of oral ancient schwannoma. Among other excluded studies were articles published in other language, previous

reviews, meta-analyses, expert opinions, consensus statements, original articles, editorials, letters, and qualitative studies. Furthermore, studies performed on other types of schwannoma were eliminated from this review.

Initially, 1400 articles were identified based on the title, 97 of which were selected after the close screening of the abstract. Afterward, studies on other types of schwannoma were excluded from the study ($n = 63$).

In total, 26 articles were selected out of 34 related studies, and other excluded articles were as follows: two reviews and narrative articles, one qualitative research, four studies with missing or unavailable data, and one republished article. Eventually, 26 case reports were systematically reviewed by the researchers.

Required data were extracted by one researcher, and all the selected articles were reviewed in full text after screening. Moreover, the results obtained by each case report were studied in detail and evaluated based on the objectives of this study. In the present review, we focused on different variables including age, gender, location, and size of ancient schwannoma, duration of disease, associated complications, and type of treatment and diagnosis. The screening process used for the identified articles is depicted in the PRISMA Flow Diagram.

RESULTS

In the present review, we assessed different variables [Table 1]. In total, 26 case reports were reviewed in this study. The majority of these studies focused on one reported case of oral ancient schwannoma, whereas one study evaluated two cases of ancient schwannoma. In almost all the reviewed cases, tumor resection was performed through surgical procedures.

Among the reviewed cases of oral ancient schwannoma, nine patients were males and 18 were females. In addition, the mean age of the patients with oral ancient schwannoma in different countries was 40.3 years (age range: 11–82 years). Out of 26 articles, six were published in India, five cases were in Iran, and three cases were reported in Korea. In general, several cases of oral ancient schwannoma were reported in regions of Southeast Asia.

With regard to the location of the tumor, seven cases of oral schwannoma were reported to be on the floor

Table 1: Evaluation of variables associated with ancient schwannoma based on literature review

| Authors/publication year (reference) | Country | Age | Gender | Location of schwannoma | Size | Duration of disease | Reported complications | Type of treatment | Follow-up | Diagnosis |
|--|--------------|-----|--------|---|--------------------------|---------------------|------------------------------|--|-----------|---|
| Eversole and Howell (1971) ^[6] | USA | 58 | Female | Floor of mouth and ventral tongue | 25 mm | Not known | Asymptomatic | Surgical excision | Unknown | Histopathological examination: Hypocellular network of collagen fibers with a nodular pattern of concentric whorls |
| Subhashraj <i>et al.</i> (2009) ^[7] | India | 19 | Male | Periapical region of left Lower first premolar | 31 mm x 24 mm x 12 mm | 8 months | Asymptomatic, enlarging mass | Surgical excision using high labial incisions | 18 months | Histopathological examination: Proliferation of spindle cells without atypia arranged in nuclear palisades with degenerative changes and hyalinization |
| Marks <i>et al.</i> (1976) ^[8] | South Africa | 65 | Female | Floor of mouth (right) | 35 mm | - | Asymptomatic | Surgical excision | Unknown | - |
| McCoy <i>et al.</i> (1983) ^[9] | USA | 36 | Female | Maxillary posterior vestibule (left) | 2.0 cm x 1.5 cm | 14 months | - | Surgical excision | Unknown | Staining of histological specimens with Sirius red stain and tumor viewing with polarized light |
| Dayan <i>et al.</i> (1989) ^[10] | Israel | 52 | Female | Maxillary vestibule (left) | 9 mm | - | Asymptomatic | - | Unknown | Diagnosis: Morphology on light and electron microscopy |
| Nakayama <i>et al.</i> (1996) ^[11] | Japan | 40 | Female | Floor of mouth and ventral tongue | 5.5 cm x 3.0 cm x 3.0 cm | 2 months | Asymptomatic | Surgical excision | Unknown | Degenerative nuclear atypia in neoplastic Schwann cells, unknown calcification, no hyalinization extensive |
| Ledesma <i>et al.</i> (1999) ^[12] | Mexico | 21 | Female | Floor of mouth and ventral tongue | 3 cm | 5 months | Asymptomatic | Surgical excision | Unknown | - |
| Chen <i>et al.</i> (2006) ^[13] | Taiwan | 34 | Male | Left anterior mouth floor | 3 cm x 3 cm x 2.5 cm | 18 years | Asymptomatic | Encapsulated tumor removed by blunt dissection | 2 years | Microscopic examination: Encapsulated tumor with solid cellular areas, hypocellular areas and a large cystic space, degenerative changes, and hyalinization |
| Kim <i>et al.</i> (2011) ^[14] | Korea | 66 | Female | Buccal region of left lower first premolar area | 2.0 cm x 1.3 cm x 1.0 cm | 13 years | Asymptomatic | Complete excision using Intraoral approach | 9 months | Histopathological examination: Well-demarcated, unencapsulated lesion, curled form, poorly defined cytoplasm, and oval nuclei S-100 protein: Positive |
| | | 35 | Female | Left mandible body | 3.0 cm x 1.5 cm x 2.0 cm | - | Paresthesia | Incomplete surgery | Died | Histopathological examination: Spindle cells in fascicles Immunohistochemical evaluation: Positive and negative for pan Cytokeratin |

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Table 1: Contd...

| Authors/publication year (reference) | Country | Age | Gender | Location of schwannoma | Size | Duration of disease | Reported complications | Type of treatment | Follow-up | Diagnosis |
|--|---------|-----|--------|---|---------------|---------------------|---|---|-----------|---|
| Salehinejad <i>et al.</i> (2011) ^[15] | Iran | 27 | Female | Ramus and angle region of left mandible | | 2 years | Asymptomatic | Surgery by retromolar incision and blunt dissection | 9 months | Photographs: Schwann cells in fibrous with stromal myxoid changes Clinical diagnosis: Ameloblastoma and myxoma Immunohistochemical evaluation: Positive |
| Amirchaghm <i>et al.</i> (2010) ^[16] | Iran | 14 | Male | Gingiva | 1.5 cm | 1 year | Asymptomatic | Surgical excision | Unknown | Immunohistochemical evaluation: Strong positive staining for S-100 protein Microscopic examination: Encapsulated tumor, solid cellular and hypocellular areas, large cystic space Degenerative changes: Hyalinization and calcification Histopathological examination: Well-demarcated, unencapsulated lesion, curled form, poorly defined cytoplasm, and oval nuclei S-100 protein: Positive |
| Bilici <i>et al.</i> (2011) ^[17] | Turkey | 45 | Male | Tip of the tongue | 3 cm | Not known | Disturbance in articulation and swallowing | Excised under local anesthesia | Unknown | Histopathological examination: Well-demarcated, unencapsulated lesion, curled form, poorly defined cytoplasm, and oval nuclei S-100 protein: Positive |
| Humber (2011) ^[18] | Canada | 82 | Female | Upper lip extending from the midline to the canine eminence | 2 cm | 2 years | Firm mass and intermittent mild paresthesia | Surgical excision | 5 years | Immunohistochemical evaluation: Strong positive staining for S-100 protein |
| Kim <i>et al.</i> (2000) ^[19] | Korea | 29 | Female | Origin of the lingual nerve | 4 cm | 4 years | Swelling | Surgical excision | 1 year | - |
| Salehinejad <i>et al.</i> (2009) ^[20] | Iran | 40 | Male | Gingival of left mandible | 19 mm x 17 mm | 6 months | Asymptomatic | Surgical excision | 5 years | Immunohistochemical evaluation: Positive for S-100 protein Histopathological examination: Proliferation of spindle cells with palisaded arrangements around central acellular |
| Tobita <i>et al.</i> (2008) ^[5] | Japan | 60 | Male | Buccal mucosa | 2.0 cm | 23 years | Asymptomatic | Surgical excision | Unknown | Immunohistochemical evaluation: Positive |
| Zehlicke <i>et al.</i> (2006) ^[21] | Germany | 55 | Female | Floor of the mouth | 40 mm | 3 months | Asymptomatic | Surgical excision | Unknown | Biopsy: Unencapsulated lesion, Antoni A and B regions arranged in a palisading pattern Immunohistochemical evaluation: Positive |

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Table 1: Contd...

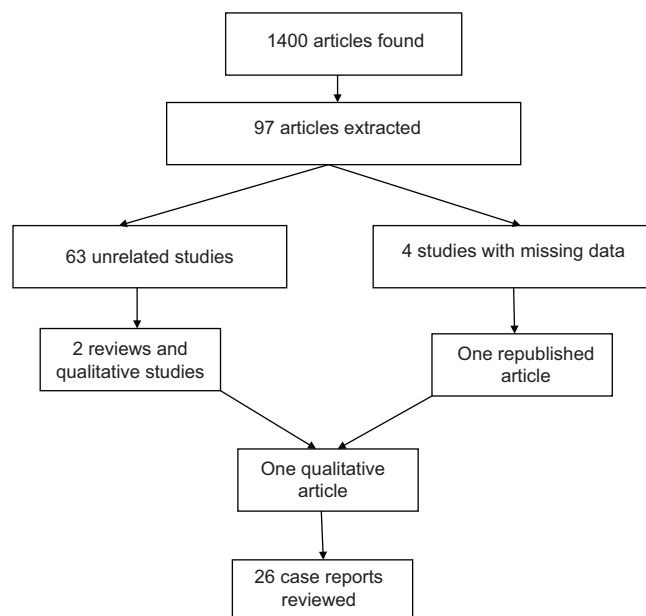
| Authors/publication year (reference) | Country | Age | Gender | Location of schwannoma | Size | Duration of disease | Reported complications | Type of treatment | Follow-up | Diagnosis |
|--|---------|-----|--------|---|--------------------------|---------------------|---|--|-----------|--|
| Lee <i>et al.</i> (2013) ^[22] | Korea | 29 | Female | Left side of the tongue | 2.3 cm x 3.3 cm x 3.0 cm | 10 years | Asymptomatic | Surgical excision | Unknown | Microscopic examination: Antoni Type-A region with highly ordered cellularity, Antoni B area with less ordered cellular Degenerative changes: Hyalinization and focal nuclear atypia with no mitotic figures Immunohistochemical examination: S-100 positive |
| Gainza-Cirauqui <i>et al.</i> (2013) ^[23] | Spain | 35 | Female | Anterior portion of the hard palate | 2.0 cm x 1.5 cm | 5 years | Asymptomatic | Surgical excision | 2 years | Biopsy: Spindle cells with long basophilic nuclei on a peripheral disposition, irregular, and hypocellular areas Degenerative changes: Mild pleomorphism, bizarre nuclei, dilated blood vessels Immunohistochemical evaluation: Positive |
| Balasubramaniam <i>et al.</i> (2014) ^[24] | India | 40 | Female | Left cheek region extending superiorly to the infraorbital region | 6 cm x 5 cm | 8 months | Asymptomatic | Surgical excision | 2 years | CT-scan: Hypodense lesion involving infratemporal fossa Histopathological examination: Interlacing fascicles of spindle cells overall Histoarchitecture: Ancient schwannoma |
| Muruganandhan <i>et al.</i> (2013) ^[25] | India | 22 | Male | Dental facility with growth in the right back tooth region | 2 cm x 2 cm | 6 months | Slight bleeding on manipulation | Surgical excision | 3 months | Histopathological examination: Circumscribed cellular mass, spindle-shaped with oval/blunt elongated nuclei, insignificant mitotic activity |
| Sayed <i>et al.</i> (2012) ^[4] | India | 46 | Male | Right side of the submandibular region | 7.5 cm x 3.5 cm x 2.5 cm | 2 years | Change in voice and dysphagia for the last 5 months | Surgical excision | Unknown | Histological findings: Well-circumscribed lesion with multiple cystic yellowish region, short fascicles of spindle cells with eosinophilic cytoplasm Immunohistochemistry: Immunoreactive to S-100 protein |
| Wanjari <i>et al.</i> (2013) ^[26] | India | 68 | Female | Below the left lower jaw | 7.5 cm x 4.5 cm x 4 cm | 23 years | Asymptomatic | Under general anesthesia, surgically removed | Unknown | Histopathological examination: Glistening, smooth, capsulated, and whitish-gray in color with dark gray areas Microscopic examination: Encapsulated, richly vascular tumor, solid cellular region with stromal hyalinization |

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Table 1: Contd...

| Authors/publication year (reference) | Country | Age | Gender | Location of schwannoma | Size | Duration of disease | Reported complications | Type of treatment | Follow-up | Diagnosis |
|--|---------|-----|--------|-----------------------------|--------------------|---------------------|------------------------|-------------------|-----------|--|
| Salehinejad <i>et al.</i> (2010) ^[27] | Iran | 23 | Female | Lower mandible | 1 cm x 3 cm x 5 cm | 4 months | Pain | Surgical excision | 10 months | Microscopic evaluation: Proliferation of spindle cells with palisaded arrangements Immunohistochemical evaluation: Positive |
| Shetty <i>et al.</i> (2011) ^[28] | India | 42 | Male | Left side of lower mandible | 5 cm x 7 cm | 4 years | Asymptomatic | Resected | 6 months | Histopathological examination: Spindle cells with elongated nuclei arrangement |
| Jahanshahi <i>et al.</i> (2011) ^[29] | Iran | 11 | Female | Lower jaw | 5.5 cm x 5 cm | 2 months | Pain and paresthesia | Surgical excision | 3 months | Clinical examination: Revealed a right mandibular expansion without tenderness Panoramic radiograph: A well-circumscribed, unilocular radiolucent lesion with thin sclerotic borders CT-scan: A solitary well-defined central mass |

CT: Computed tomography



PRISMA Flow Diagram: Screening process of articles in the current review.

of the mouth, with the tumor size ranging between 9 mm and 7.5 cm. Moreover, duration of disease ranged between 2 months and 23 years, and tumor recurrence was reported in none of the reviewed articles.

DISCUSSION

While Schwannomas are normally asymptomatic, they might be associated with pain and discomfort, especially with the involvement of submucosal areas. Etiology of schwannoma remains unknown.^[30] In general, the majority of extracranial and intracranial schwannomas are benign, and the malignancy rate of these tumors is estimated at 5%. Approximately, 9%–14% of malignant schwannomas are detected in the head and neck,^[31] which may cause complications such as pain, hoarseness, dysphagia, and cranial nerve neuropathies.^[32]

Schwannomas originate from the vagus nerve and sympathetic fibers in the extracranial regions of the head and neck, and about 10%–40% of these tumors are of unknown origin.^[33]

According to the literature, occurrence of half of the schwannomas are essentially correlated with a certain nerve.^[34] Oral schwannomas are of two main types: submucosal nodule, which resembles a cyst, and nonencapsulated, which is commonly located below the basal layer of the mucous membrane. It is

noteworthy that the first type has a higher prevalence than the second type.^[7]

Ancient schwannoma is a rare tumor that appears in hypocellular tissues and is associated with long-standing degenerative changes.^[7] These lesions are slow-growing, solitary, exophytic, and nonindurated. In addition, they have a smooth surface and are normally well circumscribed.^[34,35]

These benign neurogenic tumors were first discovered by Ackerman and Taylor.^[35] Ancient schwannoma occasionally affects the areas in the head and neck, however, as much as 25%–40% of all schwannomas occur in these regions.^[36] Ancient schwannomas are rare (prevalence rate: 1%), with the majority of the tumors spotted on the tongue, followed by other locations including the palate, buccal mucosa, lips, and gingiva.^[34] Ancient schwannomas account for a low percentage of oral schwannomas.^[36]

Assessment of age, tumor size, and gender in patients with schwannoma

The first case of intraoral ancient schwannoma was reported by Eversole and Howell in 1971.^[6] Chen *et al.* reported a case of ancient schwannoma located in the oral cavity.^[13] Unlike Chen *et al.* study, in other studies all cases of oral ancient schwannoma were reported in female patients.^[6,8-11]

Oral schwannomas most frequently appear during the fourth and fifth decades of life,^[34,37] with a higher prevalence rate among women in all age groups.^[7,18,29,38,39] According to the literature, the majority of the patients with oral ancient schwannoma were female,^[6,8-12] and only nine cases were male.^[4,5,7,16,17,20,25,28,39]

According to the results of the present review, patients with oral ancient schwannoma were within the age range of 11–82 years. Generally, age distribution of patients with schwannoma is variable since these lesions could be present for several years before the manifestation of symptoms.^[34] It seems that mean age of the patients with oral ancient schwannoma is higher than other types of schwannoma.

Furthermore, findings of the current review indicated that mean age of the patients with ancient schwannoma was 40.3 years, which could be affected by different variables such as the location of schwannoma. Despite the fact that patients with ancient schwannoma are usually older, these tumors have been reported to be extremely rare in patients aged 70 or 80 years.^[18,40,41]

In terms of tumor size, oral ancient schwannomas are normally larger compared to conventional schwannomas despite their slow growth rate.^[34] Size of conventional schwannomas is approximately 1–4 cm, while they might be larger if located in the mediastinal and retroperitoneal regions. In the reviewed cases, size of oral ancient schwannomas ranged between 9 mm and 7 cm.

Degenerative changes of ancient schwannomas could be associated with increased size and duration of the tumor.^[42] In the current study, duration of the disease was found to be variable, ranging between 2 months and 23 years. As such, reported cases by Wanjari *et al.* and Tobita *et al.* had the longest duration (23 years) compared to other studies.^[5,26] Furthermore, diameter of the tumors was reported to be 2 cm in the study by Tobita *et al.* and 7.5 cm × 4.5 cm × 4 cm in the study by Wanjari *et al.*^[26]

Location and complications of schwannoma

Oral schwannomas are often located on the tongue. In their research, Gallo *et al.* estimated the incidence rate of intraoral schwannomas at 11.7%, equally detected on the tongue and pharynx.^[43] Occurrence of tongue schwannoma is correlated with the hypoglossal nerve; these lesions have a slow growth rate and may cause pain, loss of taste, and motor function disorders. Although the majority of oral schwannomas appear on the tongue, intraoral ancient schwannomas are mostly identified on the floor of the mouth.^[6,8-11]

According to the findings of the present review, the majority of the reported cases of intraoral ancient schwannoma were identified on the anterior portion of the tongue.^[15] Ancient schwannomas rarely occur in the gingival area; in this regard, Amirchaghm *et al.* reported a case of encapsulated tumor consisting of solid and cystic areas, which was the second reported case of ancient schwannoma on the gingiva.^[16]

In another research, Salehinejad *et al.* presented two cases with large intraosseous ancient schwannomas, which extended from the lingula to the mandibular second molar.^[15,27]

Most of cases of ancient schwannoma are asymptomatic; nevertheless, symptoms such as pain, paresthesia, dysphagia, and neurological alterations are observed in cases with large tumors, depending on the anatomy of the affected region.^[29,23]

Swelling, paresthesia, and pain are the most common complications caused by intraoral ancient

schwannoma.^[44] In the present review, only one case of painful schwannoma was verified in the literature.^[27] Moreover, two cases had paresthesia^[14,18] and discomfort associated with the swelling of the palate.^[17,19]

Diagnosis and treatment

Clinically, no differences have been reported between intraoral ancient schwannomas and ordinary schwannomas;^[14] therefore, it is not possible to distinguish between ancient schwannoma and other types of these lesions.^[13]

This tumor may cause degenerative changes associated with nuclear characteristics without a mitotic form.^[13] Furthermore, these lesions cannot be distinguished from other types of schwannoma.^[7] In other words, they may be confused with other malignant tumors due to the presence of nuclear atypia and hyperchromasia or misdiagnosis of myxoid neurofibroma and nerve sheath myxoma.^[42] Therefore, histological evaluation is necessary to evaluate suspected lesions.^[22]

Predominant histopathological findings on ancient schwannomas have depicted these tumors as encapsulated lesions consisting of a mixture of spindle cells, and pathological findings in this regard are quite distinct.^[39] In the present study, well-circumscribed submucosal swellings from the surrounding tissues were observed in all the reported cases.

Histopathologically, schwannoma tissues are categorized into two patterns of Antoni A and Antoni B. Antoni A regions have high cellularity and are composed of densely packed, spindle cells arranged in palisades. On the other hand, Antoni B regions have more myxoid structures and two nuclear palisades with nuclear alignments in rows in an eosinophil zone, which consists of cytoplasmic frills, basal lamina, and collagen fibers in between, which are known as Verocay bodies.^[20]

Thin reticulin fibers, fusiform cells, and curled nuclei are visible in the Antoni A region, encompassing a variety of cells without evident borders. In general, Antoni A region is composed of different cells without apparent borders.^[2,13,30] In the Antoni B region, tissues of Schwann cells are spotted in a random arrangement.^[20]

In the presence of alternating patterns in Antoni A and B regions, histopathological diagnosis of schwannoma is usually unequivocal; this finding was observed in all the studied articles. In the study conducted

by Shetty *et al.*, schwannoma was diagnosed after identifying the cells located under Antoni A and B patterns. In the Antoni A area, the cells were in a close arrangement, forming short bundles and interlacing fascicles. In addition, parallel rows were detected around the palisading nuclei (i.e., Verocay bodies), whereas in the Antoni B area, the cells were arranged haphazardly within loosely textured matrices.^[41]

Ancient schwannomas are slow-growing, benign tumors with long-standing evolution in their differential diagnosis from salivary gland tumors and connective tissue tumors.^[23] One of the most common histological characteristics of ancient schwannomas is the atypical nuclei, which is associated with secondary degenerative changes caused by these tumors.^[23,34,37]

Hyalinization and mucoid deposition, cyst formation, increased blood vessels, hemorrhage, and calcification are the most frequent secondary degenerative changes associated with ancient schwannoma.^[22] Schwannomas rarely emerge in the oral cavity; consequently, diagnosis of these lesions should be confirmed through microscopic examinations.^[34] By showing protein S-100 and nuclear export signal, fusiform Schwann cells could be used to identify the neural origin of different lesions.^[3,15,45]

Radiological approaches, such as computed tomography (CT) and magnetic resonance imaging (MRI), could be used for the differential diagnosis of schwannomas, especially to evaluate different neoplastic processes involving the floor of the mouth. In addition, panoramic X-ray could be a complementary diagnostic measure for oral schwannomas; as such, this method was used in all the reviewed studies.^[33]

MRI is an essential element in the diagnosis of these lesions to yield reliable data in this regard. Furthermore, this method could be useful in cases with enlarged tumors or uncertain diagnostic biopsy. However, it is possible that tumor borders are not accurately defined or separated from the peripheral tissue.^[33] On T1-weighted images in MRI, schwannomas appear as soft, well-bounded, isointense lesions, while on T2-weighted images, hypointensity and hyperintensity are detected in the central and peripheral areas of the lesion. Large schwannomas have an inhomogeneous appearance due to the lack of cystic degeneration of the core area. Multifocal hypointense portion on T2-weighted images is the most common characteristic of ancient schwannomas,

which explains the misleading diagnosis of hemorrhagic lesions.^[22]

Generally, MRI is the most efficient imaging method to examine the base of the tongue since the resulting image is clear and well demarcated.^[30] Through methods such as CT-scan and MRI, valuable data could be obtained for the accurate diagnosis of schwannoma, while biopsy and histopathological examination are essential to the definitive diagnosis of these lesions.^[2]

Surgical excision is considered the first-line treatment for these lesions since no malignant transformation was detected in any of the reported cases with intraoral ancient schwannoma.

Complete excision of schwannomas lowers the risk of tumor recurrence.^[3,30]

Oral ancient schwannoma is not considered an aggressive neoplasm. However, malignant schwannomas have been observed in some patients, along with ancient schwannomas in other regions.^[14] Surgical excision is considered the first-line treatment for these lesions with preservation of the neighboring structures.^[14] No malignant transformation was detected in any of the reported cases with intraoral ancient schwannoma.

Limitations

In the review of the literature, some studies lacked the key information regarding the reported cases, diagnostic methods, and proposed interventions. Therefore, many studies were excluded due to the lack of plausibility of case presentations or accurate and sufficient data. Furthermore, reporting of the included studies could not be performed based on the CARE statement for the same reason.

CONCLUSION

According to the results of this study, ancient schwannoma is a benign lesion with favorable prognosis. Depending on the histopathological nature and extent of the lesion, surgical procedures are normally performed on patients with ancient schwannoma. Evaluation of differential diagnoses of schwannoma is of paramount importance since these lesions might be indistinguishable from other malignant tumors. Moreover, in some cases, the dense cellular nature of spindle cells with hyperchromatism and mitosis may lead us to the false diagnosis of the malignancy. In conclusion, histopathological

examinations and immunohistochemical analysis are essential to the accurate diagnosis of schwannomas. As for the treatment of these lesions, surgical excision of the tumor with the preservation of the neighboring structures is considered effective.

Acknowledgments

We would like to thank all the people who participated in this study. This study had no financial support.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or non-financial in this article.

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