CASE REPORT

Synovial sarcoma of the floor of the mouth: a rare case report

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Abstract

Background: Head and neck Synovial sarcoma (SS) accounts for 3–10% of all total body SS. It is rare to find it in the oral cavity, especially on the floor of the mouth.

Case presentation: We present a 44-year-old Chinese male, who had been misdiagnosed as fibroadenoma, with a swelling on the right submandibular region for more than 3 months. The radiology examinations and the pathology results indicate the diagnosis of SS of the floor of the mouth. The patient only had a surgical operation, without radiotherapy and chemotherapy. At the first follow-up, the patient exhibited no clinical or radiographic complications, and the patient was asymptomatic on subsequent visits.

Conclusions: Misdiagnosis results the delay of diagnosis and treatment of SS. Immunohistological analysis might be the most important tool to confirm the diagnosis of SS.

Keywords: Synovial sarcoma, The floor of the mouth, Diagnosis, Surgical treatment, Case report

Background

Synovial sarcoma (SS) is a rare malignant neoplasm of unknown histological origin, accounting for 5.6% ~ 10% of all soft tissue sarcomas [1]. It is generally believed as originating from primitive undifferentiated or pluripotent mesenchymal cells [2]. Most studies have found that the age of patients with SS ranged from 15 to 40 years old [3], and approximately 66% of the patients were male [4]. The tumor usually occurs in close association with tendon sheaths, bursae, and joint capsules, primarily in the para-articular regions of the extremities. Head and neck SS accounts for 3–10% of all total body SS, with high incidences in the hypopharynx, the postpharyngeal region, and the parapharyngeal space [5, 6]. It’s rare to found it in the oral cavity, especially on the floor of the mouth. As we know, only 31 intraoral cases have been reported and 2 of them were on the floor of the mouth [1]. The diagnosis of oral SS is difficult because of atypical clinical features and obscure location. Here we present a case report of SS that was previously misdiagnosed as fibroadenoma.

Case presentation

A 45-year-old male reported that he had a swelling approximately 5.2 × 2.8 × 5.9 cm on the right submandibular region for more than 2 months and was admitted to the local hospital. At the local hospital, the diagnosis of fibroadenoma on the floor of mouth was made. An incisional biopsy was performed under guidance of ultrasound and was submitted for histopathologic examination, the examination revealed that expansion of the lymphatic vessels could be seen in the right sublingual. After an intra-oral excision in the floor of mouth of the right submandibular region (Inferior to the mylohyoid), the immunohistochemistry showed Vimentin was positive, Ki-67 percentage was about 35%, CD34, S-100, CK, P63 and LCA were negative. After discharged from that hospital, he felt that the swelling had grown again in the same area, even rapidly in the near week.

One month after the first operation at local hospital, the patient was referred to our hospital for a growth nodule on the floor of the mouth, associated with pain, numbness, and dyspnea. Intraoral examination revealed a proliferative and ulcerated mass measuring approximately 6.0 × 1.0 cm in the right sublingual involving the right floor of the mouth extending from the alveolus of the left mandibular cuspid to the right mandibular 2nd molar teeth and extending anteriorly crossing the midline of the tongue. The mass was firm, with an unclear...
border, and the surface covered with black pseudomem-
branous (Fig. 1). Computed tomography (CT) demon-
strated multiple lymph node metastases in the right
neck, bilateral submandibular and submental region
(Fig. 2a, b), and a mass on right sternocleidomastoid
muscle (Fig. 2b, c). Positron Emission Tomography-
Computed Tomography (PET-CT) also confirmed the
CT demonstration. The hematoxylin and eosin (HE)-
stained section revealed the tumor composed of spindle
cells with a higher proportion of nuclei, also with indis-
tinct cytoplasmic borders (Fig. 3). The immunohisto-
chemistry revealed epithelial membrane antigen (EMA),
CD99, TLE-1, and Bcl-2 were positive while SMA,
CD34, CK, CD68, P63, LCA, and S100 were negative.
The above results were consistent with a histopatho-
logical diagnosis of SS. The patient developed severe dys-
pnea and lips cyanosis 1 day before the operation and
emergency tracheotomy was performed.

The surgical treatment included primary tumor resec-
tion, cervical lymph node dissection, and anterolateral
musculocutaneous flap reconstruction (Figs. 4, 5, 6, 7),
During the operation, about 0.5 × 0.5 × 1 cm tissue was
harvested from the anterior, posterior, internal, external,
and basal parts of the surgically removed area. The frozen
biopsy results indicated complete excision of the tumor.
And 9 days after surgery, the patient was discharged.

Within 1 year after surgery, the patient was seen in
our outpatient clinic every month to check the recovery
and whether there was recurrence or lymph node metas-
tasis. Six months later, the first radiographic postopera-
tive follow-up showed no recurrence. One year after
surgery, PET-CT examination was performed, and the
patient had no recurrence and distant metastasis. Then
the patient was followed up at six monthly intervals and
is still alive with no evidence of recurrence after 46
months since undergoing curative intent surgery.

Discussion and conclusions
The causes and tissue origin of SS
Synovial sarcoma (SS) was first documented by Simon in
1865 [7] and was so named in 1934 by Sabrazes et al. [8].
The causes and pathogenesis of SS remain unknown. it is
generally accepted that SS is derived from mesenchymal
stem cells with multiple differentiation potential, and not
from synovial tissue [9]. Nearly 90 to 95% of SS demon-
strates specific t (x; 18) (p11.2-q11.2) chromosomal trans-
location that forms the SYT-SSX fusion gene [9–11],
which promotes synovial sarcoma cells through the Wnt /
β-catenin, PcG, and ERK signaling pathways [12]. More-
over, TGF-β1, Smad, Snail, and Slug are also involved in
the development of SS through the EMT pathway [13].

Clinical manifestations
SS usually occurs in the lower limbs and trunk, espe-
cially in the periarticular soft tissues [4]. Head and neck
SS accounts for 3–10% of all total body SS [5]. SS lacks
typical clinical manifestations, about 50% of presents
with pain, some with dysphagia, dyspnea, hoarseness,
headache, limited mouth opening, bleeding and lower lip
numbness caused by nerve oppression when occurs in
the oral cavity [14, 15]. It is usually a slow-growing
tumor increasing in size over 1 to 2 years, which is vary-
ing from 3 to10 cm [3]. SS could easily be confused with
benign tumors in the early stage, as the gradual increase
of tumor size, which shows the same symptoms as oral
squamous cell carcinoma.

For tumors that have recurred multiple times or diam-
eter > 5 cm, the growth rate tends to accelerate and may
cause an emergency. In this case, the patient’s tumor
rapidly increased with surface bleeding after admitted to
our hospital. Moreover, he even suffered from severe
dyspnea due to the tumor and clot blocking the airway.
According to the postoperative tumor anatomy, the cen-
tral part of the tumor showed liquefaction necrosis with
some dark brown liquid (Fig. 7), which may infer to be
related to the cause of dyspnea. Therefore, physicians
should always pay more attention to the patient’s breath-
ing and oxygen saturation for patients with tumor near-
ing the tongue or soft palate, especially for those with
rapid growth or surface bleeding. Preventive tracheos-
tomy may be considered to prevent suffocation.

Diagnosis and differential diagnosis
In our case, the patient was previously diagnosed as fibro-
adenoma because of the rarity of SS and lack of typical

![Fig. 1 The tumor was located on the right floor of mouth and ventral part of tongue, with bleeding and necrosis on the surface. Due to poor hygiene conditions in the mouth of the patient, there are food residues, etc., and the surface of the tumor is white. The black part is the tumor tissue of ischemic necrosis. Extra oral examination revealed limited mouth opening that was about 1.5 cm.](image-url)
clinical and imaging manifestations. Although Pantomography, CT, MRI, and PET-CT can be used as diagnostic tools, smaller SSs often show similar imaging features to benign tumors on CT and MR imaging [16, 17]. Despite the lack of specific imaging findings, CT and MRI are still useful for determining the location of the primary tumor, adjacent tissue infiltration, and metastasis.

Synovial sarcoma can be classified into three major histopathological subtypes: 1) monophasic SS containing uniform spindle cells or epithelial cells, 2) biphasic SS composed of epithelial cells arranged into glandular structures with spindle cells arranged into fascicles, 3) poorly differentiated SS characterized by the presence of spindle and/or round blue cells [18]. In histology, synovial sarcoma needs to be differentiated from metastatic adenocarcinoma, malignant fibrous histiocytoma (MFH) and fibrosarcoma. However, due to the diversity of morphological manifestations, the pathological diagnoses of atypical cases are very difficult [19].

The other cause of misdiagnosis might be the previous immunohistochemistry lacked some key immune marker detection such as EMA, CD99, TLE-1, and Bcl-2, etc. So far, there is no single immunological marker specific to synovial sarcoma has been found. SS shows positive of TLE-1, AE1 / AE3, EMA, CK7, CK19, Vimentin, Bcl-2, CD99, and S-100 while generally shows negative express of CD34, CD31, actin (HHF-35) or Myoglobin [20, 21]. Some studies reported that TLE-1 expression, a sensitive and specific marker for SS, could be as high as 90%, and Bcl-2 expression rate was 93%, CD99 was 73%, While S100 was locally expressed in 21% of cases [22–24].

For some cases with atypical histological morphology or confusing results of immunohistochemistry, detection
of SYT-SSX fusion gene by molecular biology or cytogenetic technology can be used to help diagnose with synovial sarcoma [20]. It was said that nearly 90 to 95% of SS demonstrated specific t (x; 18) (p11.2-q11.2) chromosomal translocation that forms the fusion gene SYT-SSX [9–11]. The detection rate of FISH was about 80% and RT-PCR was 83.8%, and the combined detection rate of both was 92.9% [25].

Treatment and prognosis
The optimal approach to the treatment of SS is still unclear and there is no standard treatment protocol [6]. It is recommended wide-local excision [20], and adjuvant radiation with or without chemotherapy [9]. At present, for synovial sarcoma in head and neck, simple surgical treatment can be recommended for smaller and superficial lesions; but for the larger and deeper SS, surgery and radiotherapy combined treatment can be considered since it is difficult to perform completely extended resection as many nerve and vessels involved in the head and neck region. The defects after resection can be repaired with flap transfer [26].

In our case, chemotherapy was not performed. The importance of chemotherapy has not been widely acknowledged due to the lack of evidence that chemotherapy was associated with improved overall survival. According to the Yang’s report [27], after observation of 21 patients with synovial sarcoma of the head and neck, it was found that postoperative chemotherapy slightly prolonged the time for the occurrence of distant metastasis but showed no significant difference for the overall survival rate or local recurrence. On the other hand, radiotherapy for oral tumors sometimes leads to adverse effects such as radiation mucositis, ulceration, and osteoradionecrosis [1]. According to Zhou’s report [28], for soft tissue sarcoma of the maxillofacial region, the five-year survival rate of those who underwent preventive cervical lymph node dissection was higher than those who did not undergo cervical lymph node dissection.

The prognosis of synovial sarcoma is often associated with tumor location, size, patients’ age, surgical procedure, degree of differentiation [29]. Generally believed that: 1) age < 60 years old, 2) total tumor dimension < 5 cm, 3) extensive calcification, 4) appropriate surgical resection, 5) a high degree of tumor differentiation, extensive hemorrhagic necrosis and high mitosis index, 6) tumor without distant metastasis, will lead to good prognosis [30–32]. However, due to the insidious onset, patients see doctors always because of discomfort or dysfunction with large tumors, and the curative effect is often poor, the recurrence or metastasis generally occurs in the first two years after the initial treatment [1]. The recurrence rate is 20.8% and the metastatic rate is 29.2%, the most common metastatic sites are lung, followed by local lymph nodes and bone [1, 30–32]. The three-year survival rate is about 50% [33].

In this case, as the rarity SS tumor, the patient was misdiagnosed at the local hospital. Immunohistological analysis might be the most important tool to confirm
the diagnosis of SS. Surgical treatment focus on primary tumor resection without chemotherapy might be considered according to the patient’s situation.

Abbreviations
CT: Computed tomography; EMA: Epithelial membrane antigen; HE: The hematoxylin and eosin; MFH: Malignant fibrous histiocytoma; PET-CT: Positron Emission Tomography-Computed Tomography; RT-PCR: Reverse Transcription-Polymerase Chain Reaction; SS: Synovial sarcoma

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Authors’ contributions
KW performed biopsy for diagnosis. FZ collected data and patient history. YW analyzed the patient data and wrote the article with KW. All authors read and approved the final manuscript.

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Availability of data and materials
The complete data and materials described in the case report are not publicly available due to anonymity purposes but are available from the Department of Oral and Maxillofacial Surgery, The Second Xiangya Hospital of Central South University on reasonable request.

Ethics approval and consent to participate
Authors declare that the need of ethic approval was waived due to the anonymous nature of the report. Local ethics committee ruled that no formal ethics approval was required in this particular case.

Consent for publication
The patient provided written consent to publish this case report.

Competing interests
The authors declare that they have no competing interests with regards to authorship and/or publication of this paper.

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References
1. Meer S, Coleman H, Altini M. Oral synovial sarcoma: a report of 2 cases and a review of the literature. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2003;96(3):306–15.
2. Grayson W, Nayler SJ, Jena GP. Synovial sarcoma of the parotid gland. A case report with clinicopathological analysis and review of the literature. S Afr J Surg. 1998;36(1):52–4 discussion 34-5.
3. Sraavya T, Sivarananji V, Bhat V, Rao G. Primary biphasic synovial sarcoma of gingiva: Report of a rare case. J Oral Maxillofac Pathol. 2014;18(1):77.
4. Mahesh KTS, Ponnuswamy IA, David MP, Shihhare P, Puttaranganayak MI, Sinha P. Synovial sarcoma of the Buccal mucosa: a rare case report. Case Rep Dent. 2013;2013:1–5.
5. Amble FR, Olsen KD, Nascimento AG, Footle RL. Head and neck synovial sarcoma, Otolaryngol Head Neck Surg. 1992;107(5):631–7.
6. Harb WJ, Luna MA, Patel SR, Ballo MT, Roberts DB, Sturgis EM. Survival in patients with synovial sarcoma of the head and neck: association with tumor location, size, and extension. Head Neck. 2007;29(8):731–40.
7. Bukawa H, et al. Monophasic epithelial synovial sarcoma arising in the temporomandibular joint. Int J Oral Maxillofac Surg. 2003;32(8):762–5.
8. Zaidi S, Anafah M. Poorly differentiated monophasic synovial sarcoma of the mediastinum. Indian J Pathol Microbiol. 2011;54(2):384.
9. de Almeida-Lawall M, et al. Synovial sarcoma of the tongue: case report and review of the literature. J Oral Maxillofac Surg. 2009;67(4):914–20.
10. Tao Q, Qiao B, Wang Y, Hu F. Diagnosis and treatment of primary synovial cell sarcoma that occurred in the left mandible body: a case report and literature review. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2011;111(2):e12–20.
11. Wang H, Zhang J, He X, Niu Y. Synovial sarcoma in the Oral and maxillofacial region: report of 4 cases and review of the literature. J Oral Maxillofac Surg. 2008;66(1):161–7.
12. Pretto D, Barco R, Rivera J, Neel N, Gustavson MD, Eid JE. The synovial sarcoma translocation protein SYT-SSX2 recruits β-catenin to the nucleus and associates with it in an active complex. Oncogene. 2006;25(20):3661–9.
13. Saito T, Nagai M, Ladanyi M. SYT-SSX1 and SYT-SSX2 interfere with repression of E-cadherin by snail andslug: a potential mechanism for aberrant Mesenchymal to epithelial transition in human synovial sarcoma. Cancer Res. 2006;66(14):6919–27.
14. Tatsuki U, Hasegawa T, Beppu Y, et al. Synovial sarcoma of the soft tissues: prognostic significance of imaging features. J Comput Assist Tomogr. 2004;28(1):140–4.
15. Kronsdorf MJ. Malignant soft-tissue tumors in a large referral population: distribution of diagnoses by age, sex, and location. Am J Roentgenol. 1995;164(1):129–34.
16. Rangheard AS, Vanel D, Valia J, et al. Synovial sarcomas of the head and neck: CT and MR imaging findings of eight patients. Am J Neuroradiol. 2001;22(5):851–7.
17. Hirsch RJ, et al. Synovial sarcomas of the head and neck: MR findings. Am J Roentgenol. 1997;169(4):1185–8.
18. Jayasooriya PR, Madawalagamage LN, Mendis BRN, Lombardi T. Diagnostic approach to synovial sarcoma of the head and neck illustrated by two cases arising in the face and Oral cavity. Dermatopathology. 2016;3(1):13–22.
19. Spillane AL, Athern R, Judson R, Fisher C, Thomas JMA. Synovial sarcoma: a Clinicopathologic, staging, and prognostic assessment. J Clin Oncol. 2000;18(22):3794–803.
20. Vig T, Thomas M, Pai R, et al. Primary Synovial Sarcoma arising from gingivo-buccal sulcus harbouring SS18-SSX2 positive fusion transcript: The 1st reported case in English literature. J Stomatol Oral Maxillofac Surg. 2018;119(3):220–3.
21. Basile LE, Hoch B, Dillon JK. Synovial sarcoma of the tongue: report of a case. J Oral Maxillofac Surg. 2016;74(1):95–103.
22. Jagdis A, Rubin BP, Tubbs RR, Pacheco M, Nielsen TO. Prospective evaluation of TLE1 as a diagnostic Immunohistochemical marker in synovial sarcoma. Am J Surg Pathol. 2009;33(12):1743–51.
23. Kosemehrnetoglu K, Kvasa JA, Folpe AL. TLE1 expression is not specific for synovial sarcoma: a whole section study of 163 soft tissue and bone neoplasms. Mod Pathol. 2009;22(7):872–8.
24. Villarocel-Salinas J, Campos-Martinez J, Ortiz-Hidalgo C. Synovial sarcoma of the tongue confirmed by molecular detection of the SYT-SSX2 fusion gene transcript. Int J Surg Pathol. 2012;20:386–9.
25. Kanemitsu S, Hisaoka M, Shimajiri S, Matsuyama A, Hashimoto H. Molecular detection of SS18-SSX fusion gene transcripts by cRNA in situ hybridization in synovial sarcoma using formalin-fixed, paraffin-embedded tumor tissue specimens. Diagn Mol Pathol. 2007;16(1):19–17.
26. Mettman A, Myers LL, Carrick K. Synovial Sarcoma of the cheek. Ear Nose Throat J. 2009;88(10):1385–9.
27. Zhou Z. Surgical treatment of soft tissue sarcoma in oral and maxillofacial region. J Oral Maxillofac Surg. 1991;29–13.
28. Wushou A, Miao X-C. Tumor size predicts prognosis of head and neck synovial sarcoma. Jpn J Clin Oncol. 2010;37(24):345.
29. Zhou Z. Surgical treatment of soft tissue sarcoma in oral and maxillofacial region. J Oral Maxillofac Surg. 1991;29–13.
30. Bukachevsky RP, Pincus RL, Shechtman FG, Sarti E, Chodosh P. Synovial sarcoma of the head and neck: report of 1st case and review of the literature. Otolaryngol Head Neck Surg. 2001;22(5):851–7.
31. Kanemitsu S, Hisaoka M, Shimajiri S, Matsuyama A, Hashimoto H. Molecular detection of SS18-SSX fusion gene transcripts by cRNA in situ hybridization in synovial sarcoma using formalin-fixed, paraffin-embedded tumor tissue specimens. Diagn Mol Pathol. 2007;16(1):19–17.
32. Mettman A, Myers LL, Carrick K. Synovial Sarcoma of the cheek. Ear Nose Throat J. 2009;88(10):1385–9.
33. Ameerally P, Sira S, Barrett A, Hollows P. Synovial sarcoma of the hard palate. Br J Oral Maxillofac Surg. 2004;42(3):361–3.

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