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CASE REPORT

Secretory carcinoma of the parotid gland in a pediatric patient: an unusual report and literature update

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Abstract:

A 16-year-old male patient exhibited a nodular lesion measuring 5.0 centimeters in its greatest diameter in the right parotid gland. This lesion had been present for a period of two years, without any associated symptoms. Upon palpation, the lesion was characterized as demarcated, firm, and painless. The patient underwent surgical excision, and the initial hypothesis was that the lesion was a pleomorphic adenoma (PA). Microscopically, the tumor exhibited a variable growth pattern between cribriform and micropapillary areas, with neoplastic cells positive for mammaglobin, S-100, and Pan-Trk. Immunohistochemistry was employed to substantiate the diagnosis of secretory carcinoma (SC). Two years following the surgical intervention, no signs of recurrence or complications have been observed. Although rare, secretory carcinoma (SC) in pediatric patients has been documented in the literature and can mimic benign neoplasms due to its mild characteristics.

Keywords: Secretory carcinoma; MASC; Salivary glands; Diagnosis; Case report.

INTRODUCTION

Secretory carcinoma (SC) of the salivary gland, previously designated "Mammary Analogue Secretory Carcinoma (MASC)", was initially delineated by Skálová et al.[1]. It exhibits morphological, immunohistochemical, and molecular characteristics analogous to those observed in breast SC, as both glandular tissues originate from the same embryonic ectoderm[1,2]. In addition to the salivary glands and the breast, it has also been found in other locations, including the thyroid, lung, endometrium, and lacrimal glands[3–6].

Prior to its recognition, this tumor was primarily diagnosed as a zymogen-poor acinar cell carcinoma (ACC), due to its microscopically variable growth pattern. In SC, the microcystic and tubular areas may contain eosinophilic material with a characteristic "bubbly" appearance, as observed in previous studies[7,8].

Approximately 70% of SC cases occur in the parotid gland, followed by the minor salivary glands and, less frequently, the submandibular gland. The mean age at diagnosis is 46.5 years, with the disease being rare in the pediatric and adolescent population. Some systematic reviews have already characterized pediatric cases reported in the literature[9–11]. Given the low frequency of this neoplasm in younger patients, we present a case of secretory carcinoma in the parotid gland of a 16-year-old patient, along with an updated literature review aiming to estimate its prevalence in the pediatric population.

Statement of Clinical Significance
This case report highlights the rare occurrence of secretory carcinoma (SC) in a 16-year-old male, emphasizing the importance of considering SC as a differential diagnosis in pediatric patients with parotid gland lesions. Early recognition, aided by histopathologic and immunohistochemical analysis, can prevent misdiagnosis and ensure appropriate treatment, ultimately improving patient outcomes.

CASE REPORT

A 16-year-old male patient was referred to the Oncology Control Center of the State of Amazonas, Brazil, with a complaint of a nodular lesion in the right parotid region, with an approximate evolution of two years. A clinical examination of the patient revealed a normochromic, firm, and painless tumor measuring approximately 5 cm in diameter (Figure 1A). Given the

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clinical suspicion of pleomorphic adenoma (PA), a surgical excision of the lesion was performed.

Gross examination revealed a specimen measuring 5.0 × 4.5 × 2.5 cm, weighing 30 g, with a firm and elastic consistency, and an extensive cystic area devoid of content. Microscopically, the neoplasm was found to consist of macro- and microcystic spaces lined by multiple layers of epithelial cells forming structures reminiscent of "Roman bridges" (Figure 1B, 1C). Adjacent to these structures, cell clusters with cribriform (Figure 1D), micropapillary (Figure 1E), and solid patterns were observed within a fibrous stroma (Figure 1F). The neoplastic cells exhibited a variety of distinctive features, including eosinophilic cytoplasm, small vacuolated nuclei with prominent nucleoli, and occasional mild pleomorphism (Figure 1F). Eosinophilic secretions were also present within the glandular lumens (Figure 1G).

The tumor exhibited no discernible capsule, and surgical margin analysis revealed the absence of neoplastic cells. No evidence of perineural or angiolymphatic invasion was found, and preserved glandular parenchyma was seen adjacent to the lesion. In light of these findings, a diagnosis of intraductal carcinoma was initially considered, and immunohistochemical analysis was requested.

Immunohistochemistry revealed strong positivity for AE1/AE3 (Figure 2A), mammaglobin (Figure 2B) and S-100 protein (Figure 2C), as well as focal expression of Pan-Trk (Figure 2D) and GATA-3 (Figure 2E). Conversely, calponin (Figure 2F), androgen receptor (Figure 2G) and p63 protein (Figure 2H) exhibited negative staining. The correlation between morphological and immunophenotypical findings confirmed the diagnosis of secretory salivary gland carcinoma. The patient has been subject to follow-up over a period of two years, with no evidence of recurrence or metastasis.

DISCUSSION

Malignant neoplasms of the salivary glands are frequently misdiagnosed as benign due to their indolent growth and the absence of pain or ulceration. In the present case, PA was initially considered the most probable diagnosis, given its high prevalence in the parotid gland and its clinical resemblance to other salivary lesions[12]. In contrast, SC of the salivary gland is a rare entity, lacking specific clinical features that enable reliable distinction from other salivary gland neoplasms.

SC typically presents as a painless, slow-growing mass, most commonly arising in the parotid gland, and tends to occur in individuals in their fifth decade of life[13,14]. Although some patients may report discomfort, pain is an uncommon clinical finding[15]. The present case is considered rare due to the patient's age (16 years), which falls outside the typical age range,

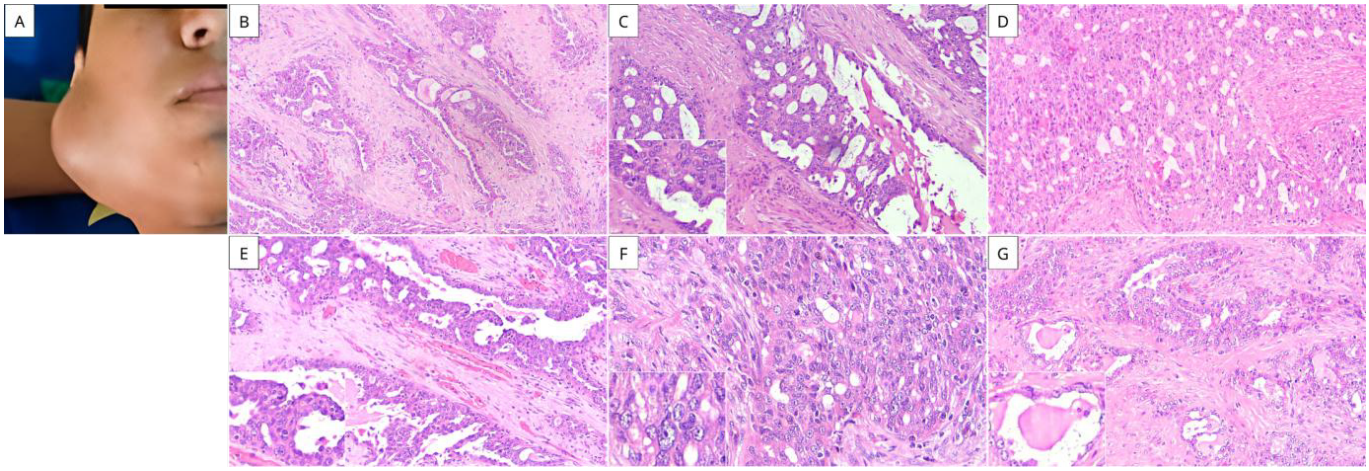

Figure 1. Clinicopathological features of SC. **A)** Extraoral view showing increased volume in the right parotid region. **B, C)** Histopathological sections in hematoxylin and eosin (H&E) revealing a large cystic space lined by multiple layers of neoplastic epithelial cells, forming structures reminiscent of Roman bridges. **D)** Adjacent areas displaying a cribriform growth pattern. **E)** In some areas, the cyst-lining epithelium shows papillary projections into the cystic lumen, resembling a micropapillary architecture. **F)** In other regions, a solid growth pattern is observed. At higher magnification, the neoplastic cells demonstrate eosinophilic cytoplasm, small nuclei with prominent nucleoli, and visible mitotic figures. **G)** Additionally, amorphous eosinophilic secretions are present within the cystic spaces.

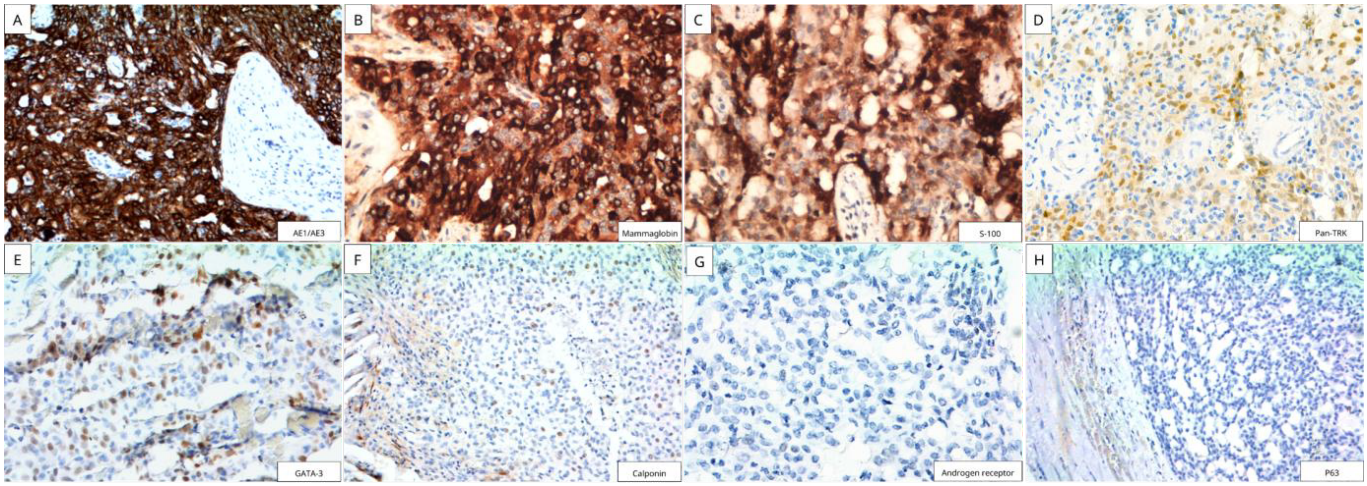

Figure 2. A-C) AE1/AE3 (200x), mammaglobin (200x) and S-100 protein (200x) exhibit intense positivity in the neoplastic cells. **D)** Additionally, Pan-Trk is found to be focally positive in the cytoplasm of tumor cells (200x). **E)** GATA-3 (200x) was weakly positive. **F-H)** While calponin (200x), androgen receptor (400x), and p63 (200x) were negative.

thereby underscoring the importance of including SC in the differential diagnosis of pediatric salivary gland tumors.

Histologically, SC closely resembles SC of the breast, often exhibiting an unencapsulated growth pattern with diverse architectures, predominantly microcystic, tubular, and solid. Neoplastic cells typically display eosinophilic cytoplasm, vesicular nuclei, prominent nucleoli, mild pleomorphism, and infrequent mitotic figures. A distinctive histologic hallmark is the presence of eosinophilic "bubbly" secretions within glandular lumina[16,17]. Although SC is generally classified as a low-grade malignancy, cases of high-grade transformation have been documented[18]. In the present case, histologic evaluation revealed features consistent with a low-grade neoplasm, with no evidence of perineural or lymphovascular invasion, necrosis, or significant cytologic atypia, and preservation of adjacent salivary parenchyma.

The morphological features of SC frequently overlap with those of other salivary gland neoplasms, such as acinic cell carcinoma (ACC) and intraductal carcinoma (IC), complicating the histopathologic diagnosis. As such, immunohistochemical and molecular analyses are essential for accurate classification.

According to Skalova et al.[19], the distinction between SC and ACC relies on three principal criteria:

1. SC cells lack the basophilic cytoplasmic granules characteristic of ACC;
2. SC demonstrates strong and diffuse immunoreactivity for S-100 and mammaglobin; and
3. SC is typically negative for DOG1[20].

Several studies have emphasized that, although identification of the ETV6-NTRK3 fusion is diagnostically relevant, SC can be reliably diagnosed based on classic histopathological features — particularly when supported by positive staining for S-100 and mammaglobin, along with negative immunoreactivity for DOG1 and p63[17,21,22]. Notably, p63 positivity is more suggestive of IC, as it typically marks the basal layer of duct-like structures. In contrast, SC usually lacks p63 expression or exhibits only focal staining[22-24].

In the present case, the immunohistochemical profile revealed positivity for AE1/AE3, S-100, Pan-TRK (Trk A, B, and C), GATA-3, and mammaglobin, and negativity for p63, calponin, and androgen receptor. Among these markers, Pan-TRK expression is particularly noteworthy, as it can support the diagnosis when interpreted in conjunction with the characteristic morphologic features. The NTRK gene family comprises three proto-oncogenes — NTRK1, NTRK2, and NTRK3 — encoding the TRKA, TRKB, and TRKC proteins, respectively. The utility of Pan-TRK immunohistochemistry in detecting NTRK gene fusions remains under discussion; nonetheless, it has emerged as a sensitive and specific screening tool, particularly in resource-limited settings where gold-standard molecular techniques such as fluorescence in situ hybridization (FISH) or reverse transcription-polymerase chain reaction (RT-PCR) are unavailable[25]. Thus, even in the absence of molecular confirmation of the ETV6-NTRK3 fusion, the diagnosis of SC may be confidently rendered based on a combination of classic histopathological and immunohistochemical findings[22,26,27].

In addition to the ETV6–NTRK3 fusion, which is widely regarded as the molecular hallmark of SC, other gene rearrangements have been identified, including ETV6–RET, ETV6–MET, EGFR–SEPT14, and VIM–RET[28-30]. These findings suggest underlying genetic heterogeneity and underscore the need for comprehensive molecular profiling to enhance diagnostic precision and distinguish SC from other morphologically overlapping salivary gland neoplasms.

To identify cases of pediatric SC, a systematic search was conducted in PubMed, Embase, and Scopus databases, supplemented by a manual search in Google Scholar and reference lists. Search terms included "Mammary Analogue Secretory Carcinoma," "Secretory Carcinoma," "MASC," "Salivary Gland Secretory Carcinoma," in combination with "Pediatric," "Child," "Children," "Adolescent," "Infant," "Young Patient," and "Juvenile," using Boolean operators appropriate to each database. Inclusion criteria comprised cases of SC in patients aged ≤18 years, reported in case series, case reports, or retrospective/clinicopathological studies. Studies lacking essential clinical information, systematic reviews, and conference abstracts were excluded. The initial search yielded 1.256 articles. After removing duplicates and applying eligibility criteria, 49 studies were included in the final analysis. To date, approximately 68 pediatric SC cases have been identified (Supplementary Material 1).

Table 1 summarizes the clinical characteristics of 68 pediatric cases, outlining a well-defined demographic and clinical profile. The mean age was 13.4±3.6 years, with a slight male predominance (54.4%). The parotid gland was the most commonly affected site (76.5%), followed by the submandibular gland (10.3%). Among the 29 cases with symptom data, most tumors presented as painless masses (82.8%), with an average duration of 16 months. The mean tumor size was 2.9±2.8 cm. Surgical excision alone was the primary therapeutic modality (77%), while recurrences occurred in 10.2% of cases, and lymph node involvement was observed in 13%. Among the 47 patients with follow-up data, all were disease-free (NED) after a mean follow-up of 33.4 months.

Histologically, the microcystic/cystic/macrocystic pattern was the most frequent (86.2%), followed by solid (53.4%) and papillary (36.2%) patterns. Perineural invasion (12.5%), lymphovascular invasion (3.4%), and necrosis (22.2%) were relatively uncommon findings. Immunohistochemically, mammaglobin and S-100 expression were consistently positive in 97.6% and 100% of cases, respectively, whereas DOG1 and p63 were negative in most cases (Table 2). Additional markers are detailed in Supplementary Material 1.

Table 1. Clinical characteristics of the 68 pediatric cases of salivary gland secretory carcinoma identified in the literature.

Age	68 cases
Mean±SD	13.4±3.6
Median, mode	14, 15
Sex	68 cases – n (%)
Male	37 (54.4)
Female	31 (45.6)
Site	68 cases – n (%)
Parotid gland	52 (76.5)
Submandibular gland	7 (10.3)
Lip	4 (5.9)
Buccal mucosa	2 (2.9)
Hard palate	2 (2.9)
Maxillary sinus	1 (1.5)
Symptoms	29 cases – n (%)
Painless	24 (82.8)
Painful	4 (13.8)
Facial palsy	1 (3.4)
NI	39
Evolution (months)	34 cases
Mean±SD (Range)	16 ± 15.5 (0.46–60)
Median, mode	12, 24
NI	34
Size (cm)	51 cases
Mean±SD	2.9±2.8 (0.9–20)
Median, mode	2.5, 1.5
NI	17
Treatment	61 cases – n (%)
Surgery (S)	47 (77)
Surgery+radiotherapy (S+RT)	4 (6.6)
Surgery+neck dissection (S+ND)	4 (6.6)
Other combinations	6 (9.8)
NI	7
Recurrence	49 cases – n (%)
Yes	5 (10.2)
No	44 (89.8)
NI	19
Metastasis	54 cases - n (%)
Yes (6 regional and 1 unspecified)	7 (13)
No	47 (87)
NI	14
Outcome (months)	47 cases – n
NED (4–155, mean: 33.4)	47
NI	21
Country	68 cases – n (%)
USA	26 (38.2)
Indian	10 (14.7)
Japan	9 (13.2)
France	6 (8.8)
Brazil	2 (2.9)
Others	15 (22.1)

NED: no evidence of disease; NI: no information; SD: standard deviation; RT: radiotherapy; CH: chemotherapy.

At the molecular level, the ETV6-NTRK3 fusion was identified in 74.4% of the tested cases, representing the most common genetic alteration. Isolated ETV6 rearrangements (20.9%) and rare fusions involving ETV6–RET and EGFR–SEPT14 were also observed. Collectively, these findings delineate the clinicopathological, immunohistochemical, and molecular landscape of pediatric SC, reinforcing its indolent behavior and distinctive biology within the spectrum of salivary gland neoplasms.

CONCLUSION

SC of the salivary gland is a rare neoplasm in children, often misdiagnosed due to its clinical and morphological resemblance to other lesions. This case, occurring in a young patient, highlights the importance of including SC in the pediatric differential diagnosis. Its characteristic histological features, combined with a supportive immunohistochemical profile, enable an accurate diagnosis even in the absence of advanced molecular testing. An analysis of 68 pediatric cases demonstrates an indolent tumor behavior, with high survival rates and rare recurrences.

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AUTHORS' CONTRIBUTIONS

TFM: data curation, writing – original draft. SCOB: conceptualization, writing – review & editing. MRM: conceptualization, writing – review & editing. JC: writing – review & editing. TNLK: conceptualization, investigation, supervision. RGC: conceptualization, investigation, supervision.

CONFLICT OF INTEREST STATEMENT

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Table 2. Pathological characteristics of the 68 pediatric cases of salivary gland secretory carcinoma identified in the literature.

Histologic pattern	58 cases – n (%)
Microcystic/Cystic/Macrocystic	50 (86.2)
Solid	31 (53.4)
Papillary/Papillary-cystic	21 (36.2)
Tubular/Microtubular	19 (32.8)
Others (lobular, cribriform, trabecular, cords)	12 (20.7)
NI	10
Perineural invasion	40 cases – n (%)
Negative	35 (87.5)
Positive	5 (12.5)
NI	28
Lymphovascular invasion	31 cases – n (%)
Negative	28 (96.6)
Positive	1 (3.4)
NI	37
Necrosis	18 cases – n (%)
Negative	14 (77.8)
Positive	4 (22.2)
NI	50
Immunohistochemistry	
Mammaglobin	42 cases – n (%)
+	41 (97.6)
-	1 (2.4)
NI	26
S-100	55 cases – n (%)
+	55 (100)
-	0 (0)
NI	13
DOG-1	27 cases – n (%)
+ (f)	1 (3.7)
-	26 (96.3)
NI	41
P63	27 cases – n (%)
+ (f)	3 (11.1)
-	24 (88.9)
NI	41
Ki-67/MYB1 Mean (Min-Max)	22.5 (10–60)
NI	51
Molecular status	43 cases – n (%)
ETV6-NTRK3	32 (74.4)
ETV6-rearrangement	9 (20.9)
ETV6-RET*	2 (4.7)
EGFR-SEPT14*	1 (2.3)
NI/NT	25

*Both mutations were identified in one patient. NI: no information, NT: no tested.

REFERENCES

1. Skálová A, Vanecek T, Sima R, Laco J, Weinreb I, Perez-Ordonez B, et al. Mammary analogue secretory carcinoma of salivary glands, containing the etv6-ntrk3 fusion gene: a hitherto undescribed salivary gland tumor entity. Am J Surg Pathol. 2010;34(5):599-608. https://doi.org/10.1097/PAS.0b013e3181d9efcc
2. Nisar Z, Pol JN, Jagdale RV, Phadke MD, Kadkol GA. Mammary analogue secretory carcinoma: aAn Indian experience of a novel entity. Indian J Pathol Microbiol. 2020;63(Supplement):S134-40. https://doi.org/10.4103/ijpm.ijpm_757_18
3. Saliba M, Mohanty AS, Ho AL, Drilon A, Dogan S. Secretory carcinoma of the thyroid in a 49-year-old man treated with larotrectinib: protracted clinical course of disease despite the high-grade histologic features. Head Neck Pathol. 2022;16;16(2):612-20. https://doi.org/10.1007/s12105-021-01386-6
4. Huang T, McHugh JB, Berry GJ, Myers JL. Primary mammary analogue secretory carcinoma of the lung: a case report. Hum Pathol. 2018;74:109-13. https://doi.org/10.1016/j.humpath.2017.10.027
5. Kusuyama Y, Yoshida M, Imai H, Hosomichi T, Mabuchi Y, Yokota H. Secretory carcinoma of the endometrium. Acta Cytol. 1989;33(1):127-30. PMID: 2916359.
6. Hyrcza MD, Andreasen S, Melchior LC, Tucker T, Heegaard S, White VA. Primary secretory carcinoma of the lacrimal gland: report of a new entity. Am J Ophthalmol. 2018;193:178-83. https://doi.org/10.1016/j.ajo.2018.06.019
7. Akhtar N, Atiq A, Loya A, Hassan U, Hussain M, Abu-Bakar M, et al. Secretory carcinoma of salivary gland: a clincopathological analysis. J Ayub Med Coll Abbottabad. 2020;32(4):481-6. PMID: 33225648.
8. Damjanov I, Skenderi F, Vranic S. Mammary Analogue Secretory Carcinoma (MASC) of the salivary gland: a new tumor entity. Bosn J Basic Med Sci. 2016;16(3):237-8. https://doi.org/10.17305/bjbms.2016.1321
9. Alves LDB, Melo AC, Farinha TA, Araujo LHL, Thiago LS, Dias FL, et al. A systematic review of secretory carcinoma of the salivary gland: where are we? Oral Surg Oral Med Oral Pathol Oral Radiol. 2021;132(4):e143-e152. https://doi.org/10.1016/j.oooo.2020.04.007
10. Vasanthi V, Ramadoss R. Secretory carcinoma of salivary gland – a systematic review of pediatric case reports and case series. J Oral Maxillofac Pathol. 2021;25(2):327-31. https://doi.org/10.4103/0973-029X.325236
11. Ngouajio AL, Drejet SM, Phillips DR, Summerlin DJ, Dahl JP. A systematic review including an additional pediatric case report: pediatric cases of mammary analogue secretory carcinoma. Int J Pediatr Otorhinolaryngol. 2017;100:187-93. https://doi.org/10.1016/j.ijporl.2017.07.004
12. Lima-Souza RA, Leonel ACLS, Almeida OP, Castro JFL, Carvalho EJA, Perez DEC. Salivary gland cystadenocarcinoma: rare neoplasm in buccal mucosa. Oral Oncol. 2021;118:105314. https://doi.org/10.1016/j.oraloncology.2021.105314
13. Boon E, Valstar MH, van der Graaf WTA, Bloemena E, Willems SM, Meeuwis CA, et al. Clinicopathological characteristics and outcome of 31 patients with ETV6-NTRK3 fusion gene confirmed (mammary analogue) secretory carcinoma of salivary glands. Oral Oncol. 2018;82:29-33. https://doi.org/10.1016/j.oraloncology.2018.04.022
14. Tjahjono R, Chin R, Iqbal F. Mammary analogue secretory carcinoma of the parotid gland: a case report. Otolaryngology Case Reports. 2018;6:7-9. https://doi.org/10.1016/j.xocr.2017.11.003
15. Luo W, Lindley SW, Lindley PH, Krempl GA, Seethala RR, Fung KM. Mammary analog secretory carcinoma of salivary gland with high-grade histology arising in hard palate, report of a case and review of literature. Int J Clin Exp Pathol. 2014;7(12):9008-22. PMID: 25674280.
16. Yassin-Kassab A, Gainor D, Sufyan AS. Atypical presentation of mammary analogue secretory carcinoma of the lip. Ear Nose Throat J. 2022;101(5):NP212-NP217. https://doi.org/10.1177/0145561320957756
17. Shah AA, Wenig BM, LeGallo RD, Mills SE, Stelow EB. Morphology in conjunction with immunohistochemistry is sufficient for the diagnosis of mammary analogue secretory carcinoma. Head Neck Pathol. 2015;9(1):85-95. https://doi.org/10.1007/s12105-014-0557-1
18. Asai S, Sumiyoshi S, Yamada Y, Tateya I, Nagao T, Minamiguchi S, et al. High-grade salivary gland carcinoma with the ETV6-NTRK3 gene fusion: a case report and literature review of secretory carcinoma with high-grade transformation. Pathol Int. 2021;71(6):427-34. https://doi.org/10.1111/pin.13100
19. Skalova A. Mammary analogue secretory carcinoma of salivary gland origin: an update and expanded morphologic and immunohistochemical spectrum of recently described entity. Head Neck Pathol. 2013;7(Suppl 1):S30-6. https://doi.org/10.1007/s12105-013-0455-y
20. Chênevert J, Duvvuri U, Chiosea S, Dacic S, Cieply K, Kim J, et al. DOG1: a novel marker of salivary acinar and intercalated duct differentiation. Mod Pathol. 2012;25(7):919-29. https://doi.org/10.1038/modpathol.2012.57
21. Bishop JA. Unmasking MASC: bringing to light the unique morphologic, immunohistochemical and genetic features of the newly recognized mammary analogue secretory carcinoma of salivary glands. Head Neck Pathol. 2013;7(1):35-9. https://doi.org/10.1007/s12105-013-0429-0
22. Hernandez-Prera JC, Holmes BJ, Valentino A, Harshan M, Bacchi CE, Petersson F, et al. Macrocystic (mammary analogue) secretory carcinoma: an unusual variant and a pitfall in the differential diagnosis of cystic lesions in the head and neck. Am J Surg Pathol. 2019;43(11):1483-92. https://doi.org/10.1097/PAS.0000000000001309
23. Skálová A, Gnepp DR, Lewis Jr JS, Hunt JL, Bishop JA, Hellquist H, et al. Newly described entities in salivary gland pathology. Am J Surg Pathol. 2017;41(8):e33-e47. https://doi.org/10.1097/PAS.0000000000000883
24. Laco J, Švajdler Jr M, Andrejs J, Hrubala D, Hácová M, Vaněček T, et al. Mammary analog secretory carcinoma of salivary glands: a report of 2 cases with expression of basal/myoepithelial markers (calponin, CD10 and p63 protein). Pathol Res Pract. 2013;209(3):167-72. https://doi.org/10.1016/j.prp.2012.12.005
25. Csanyi-Bastien M, Lanic M-D, Beaussire L, Ferric S, François A, Meseure D, et al. Pan-TRK immunohistochemistry is highly correlated with NTRK3 gene rearrangements in salivary gland tumors. Am J Surg Pathol. 2021;45(11):1487-98. https://doi.org/10.1097/PAS.0000000000001718
26. Shukla S, Kashyap A, Sharma S, Kamal L. Mammary analogue secretory carcinoma – a salivary gland neoplasm: case report of an exceptionally rare tumour. Journal of Clinical and Diagnostic

Research.. 2018;12(4):ED01–ED02. https://doi.org/10.7860/JCDR/2018/32039.11351
27. Oza N, Sanghvi K, Shet T, Patil A, Menon S, Ramadwar M, et al. Mammary analogue secretory carcinoma of parotid: is preoperative cytological diagnosis possible? Diagn Cytopathol. 2016;44(6):519-25. https://doi.org/10.1002/dc.23459
28. Black M, Liu CZ, Onozato M, Iafrate AJ, Darvishian F, Jour G, et al. Concurrent identification of novel EGFR–SEPT14 fusion and ETV6–RET fusion in secretory carcinoma of the salivary gland. Head Neck Pathol. 2020;14(3):817-21. https://doi.org/10.1007/s12105-019-01074-6
29. Rooper LM, Karantanos T, Ning Y, Bishop JA, Gordon SW, Kang H. Salivary secretory carcinoma with a novel ETV6-MET fusion: expanding the molecular spectrum of a recently described entity. Am J Surg Pathol. 2018;42(8):1121-6. https://doi.org/10.1097/PAS.0000000000001065
30. Skalova A, Vanecek T, Martinek P, Weinreb I, Stevens TM, Simpson RHW, et al. Molecular profiling of mammary analog secretory carcinoma revealed a subset of tumors harboring a novel ETV6-RET translocation: report of 10 cases. Am J Surg Pathol. 2018;42(2):234-46. https://doi.org/10.1097/PAS.0000000000000972