Section: Pathology

Case Series

NAVIGATING THE UNCOMMON: A CLINICO-PATHOLOGICAL CASE SERIES OF RARE SALIVARY GLAND NEOPLASMS

Janani Karthik[1], Vindu Srivastava[2], Navya PT[3], Kundhavai Chandrasekaran[4], G R M Vignesh[5]

[1]*Final Year Postgraduate, Department of Pathology, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam, Tamil Nadu, India*
[2]*Professor and Head, Department of Pathology, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam, Tamil Nadu, India.*
[3]*Associate Professor, Department of Pathology, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam, Tamil Nadu, India.*
[4]*Assistant Professor, Department of Pathology, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam, Tamil Nadu, India.*
[5]*Final Year Postgraduate, Department of Pathology, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam, Tamil Nadu, India*

Received *: 06/05/2026*
Received in revised form *: 20/06/2026*
Accepted *: 04/07/2026*

Corresponding Author:
Dr. Kundhavai Chandrasekaran, Assistant Professor, Department of Pathology, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam, Tamil Nadu, India.
Email: kundhavaipath@gmail.com

DOI: 10.70034/ijmedph.2026.3.116

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (3); 712-718

ABSTRACT

Background: Salivary gland neoplasms represent a heterogeneous group of neoplasms with diverse histopathological featureswith multiple uncommon variants that can make diagnosis difficult.

Case Presentation: This case series presents six uncommon salivary gland neoplasms: two Basal Cell Adenomas (BCA), one Canalicular Adenoma (CA), two Epithelial-Myoepithelial Carcinomas (EMC), and one Salivary Duct Carcinoma (SDC). BCA and CA are benign monomorphic adenomas that typically arise in specific anatomical locations—the parotid gland and the minor salivary glands, respectively. In contrast, EMC and SDC are malignant salivary gland neoplasms. EMC is a low-grade carcinoma characterized by biphasic epithelial and myoepithelial differentiation and generally exhibits indolent biological behavior. Conversely, SDC is a rare, high-grade, and highly aggressive malignancy with a marked propensity for local recurrence, regional lymph node metastasis and distant dissemination.

Conclusion: By correlating the clinical presentation with gross, histopathological and immunohistochemical finding along with review of relevant literature, this case series highlights the key histological and immunohistochemical characteristics essential for precise diagnosis and appropriate treatment of this rare neoplasm in the salivary glands.

By correlating the clinical presentation with gross, histopathological, and immunohistochemical finding along with review of relevant literature, this case series highlights the key histological and immunohistochemical characteristics essential for precise diagnosis and appropriate treatment of this rare neoplasm in the salivary glands.

Keywords: Basal cell adenoma, Canalicular adenoma are rare benign neoplasms.

INTRODUCTION

Tumors of the salivary glands are comparatively rare, representing 3-4% of all head and neck neoplasms. Among these, the parotid gland is the site most commonly affected, representing about 70% of these cases. Among parotid gland tumours approximately three- quarters are benign, whereas the remaining one quarter are malignant. Benign lesions are broadly classified into pleomorphic adenoma and monomorphic adenomas, the later including all non pleomorphic benign salivary gland tumours.[1]

Among the monomorphic adenomas, two noteworthy but uncommon types are observed:

Basal Cell Adenoma (BCA): This neoplasm is considered the third most frequently occurring tumor of the parotid gland, constituting roughly 1-3% of all reported cases. It is mostly seen in individuals between the fifth and sixth decades of life and shows a higher incidence in females. Although it may develop in minor salivary glands, it commonly originates in the parotid gland.[1]

Canalicular Adenoma (CA): This adenoma is also uncommon, constituting 1-3% of all reported cases. It predominantly affects older adults, typically between the fifth and the seventh decade of life and is more frequently observed in females. The lesion shows a strong predilection for specific sites most often arising from the minor salivary glands within the oral cavity.[2]

Epithelial myoepithelial carcinoma (EMC): This uncommon malignant tumour primarily arises in the Salivary glands and comprises of nearly 1-2% of all tumours in this area. It is generally classified as low-grade carcinoma, as it carries a relatively low risk of regional lymph nodes spread or distant metastasis.[3]

Salivary duct carcinoma (SDC): This is an uncommon malignancy that predominantly occurs in men older than 50 years. It constitutes approximately 5–10% of all malignant salivary gland tumors. The majority of cases originate in the major salivary glands, particularly the parotid gland, while less frequently arising in the minor salivary glands, lacrimal gland and the sinonasal region.[4]

CASE PRESENTATION:

Case 1: Basal Cell Adenoma

A patient presented with an 8-month history of a left parotid swelling. Examination revealed a 3x2 cm, firm, non-tender mass. Grossly, the superficial parotidectomy specimen contained a well-circumscribed, homogenous lesion with focal cystic space [Figure 1]. Microscopy showed a well-circumscribed tumor [Figure 2] comprising uniform basaloid cells organized in tubular, membranous, and solid configurations, with eosinophilic luminal secretions and a peripheral palisade arrangement. The adjacent salivary tissue was unremarkable [Figure 3].

Figure 1: Gross image shows well circumscribed, homogenous tan, white lesion with focal cystic space

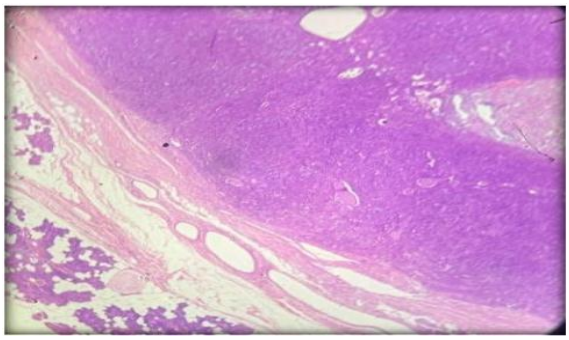

Figure 2: In scanner view, Hemotoxylin and Eosin stain shows normal salivary gland tissue with well circumscribed tumor

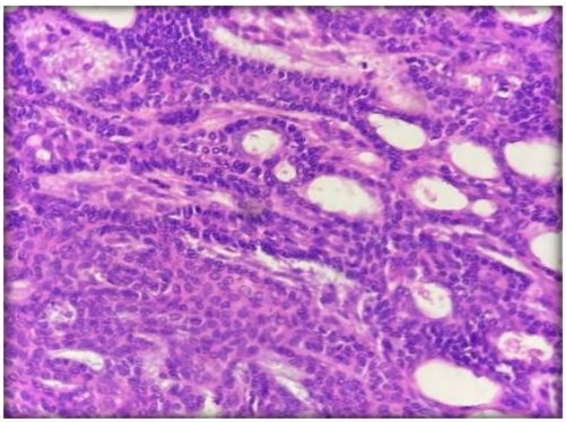

Figure 3: In 40x H&E shows uniform basaloid cells arranged in tubular, membranous and solid pattern with eosinophilic luminal secretion and peripheral palisading.

Case 2: Basal Cell Adenoma

A patient reported a right facial swelling for 4 years. Examination revealed a 5x4 cm, welldefined, firm mass. FNA cytology was classified according to Milan system of IVB "Neoplasm of uncertain malignant potential" [Figure 4]. The macroscopic evaluation of the parotidectomy specimen revealed a tumor characterised by a solid and cystic mass. Microscopy revealed a well-encapsulated lesion of basaloid cells are organised in trabecular, tubular and nest-like formations, encapsulated by myoepithelial cells, with regions exhibiting hyalinization and cystic degeneration. No necrosis or perineural invasion was identified [Figure 4&5].

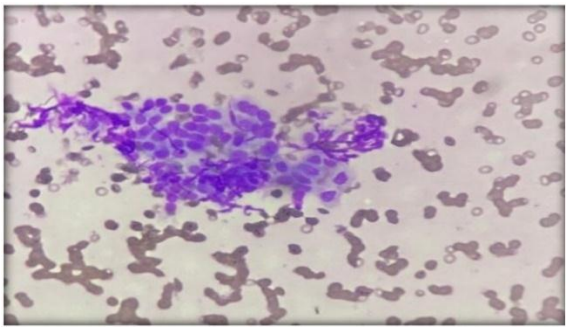

Figure 4: In 40X view of Fine needle aspiration cytology shows Milan system of IVB- Neoplasm of uncertain malignant potential

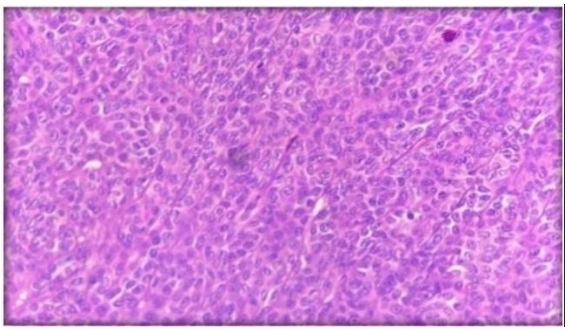

Figure 5: In 40X view of Hemotoxylin and Eosin stain shows well-encapsulated lesion with basaloid cells are organised in trabeculae, tubules and nests surrounded by myoepithelial cells and regions exhibiting hyalinisation and cystic degeneration.

Case 3: Canalicular Adenoma

A patient arrived with a three-year history of swelling in the left parotid gland and experienced challenges in mouth opening. A 4x3 cm, firm, mobile mass was noted. Grossly, the tumor was well-circumscribed and solid. Microscopy showed an encapsulated neoplasm made up of uniform cells primarily organised in a canalicular, beaded formation, with intraluminal hyaline secretions and scant stroma. No significant atypia or pleomorphism was seen [Figure 6&7].

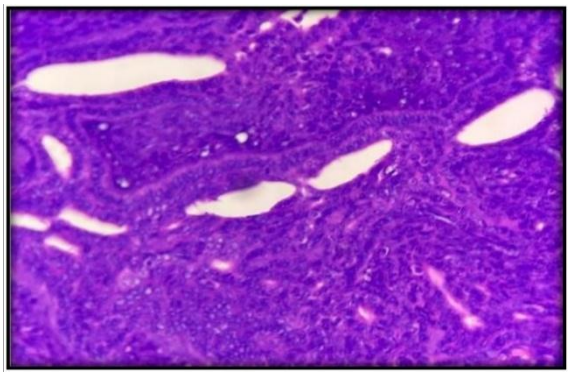

Figure 6: In 40X view of Hematoxylin and Eosin stain showed encapsulated neoplasm made of monomorphic cells organised predominantly in a canalicular beaded fashion, with intraluminal hyaline secretions and scant stroma.

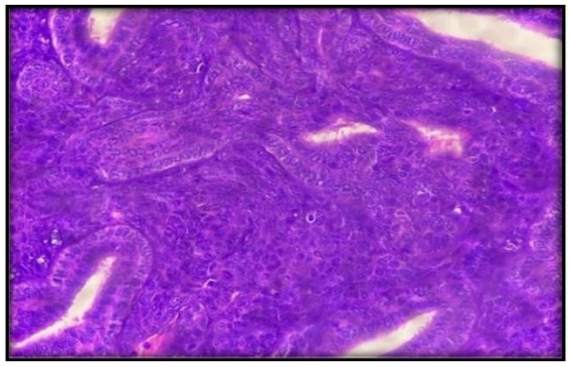

Figure 7: In 40X view of Hematoxylin and Eosin stain showed encapsulated neoplasm made of monomorphic cells organised predominantly in a canalicular beaded fashion, with intraluminal hyaline secretions and scant stroma.

Case 4: Epithelial-Myoepithelial Carcinoma

A patient had a 7-month history of a right parotid swelling, which was firm to hard on examination. The gross specimen showed a nodular, well-defined tumor homogenous tan, white lesion with focal cystic space [Figure 8]. Microscopy revealed an unencapsulated tumor with a characteristic bilayered arrangement: inner luminal cells exhibiting eosinophilic cytoplasm alongside peripheral polygonal cells characterized by clear cytoplasm. The tumor displays an invasive growth pattern with extension into the adjacent adipose tissue. Perineural invasion was identified [Figure 9&10]

Immunohistochemistry- Epithelial membrane antigen (EMA) showed positivity in the inner ductal epithelial cells [Figure 11] whereas S100 highlighted the outer myoepithelial cells [Figure 12].

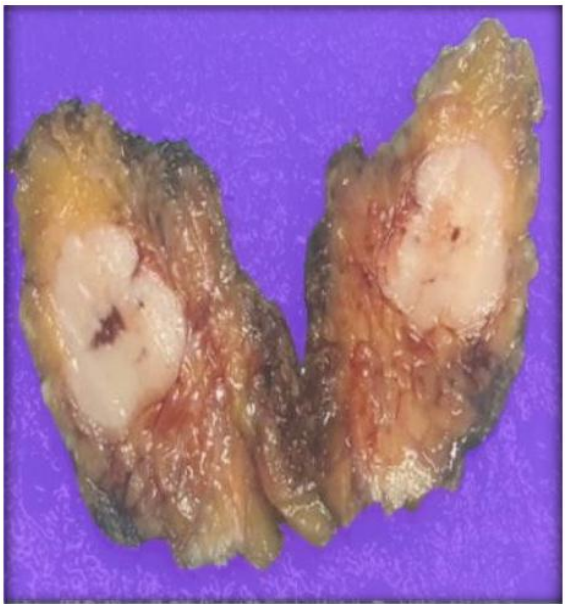

Figure 8: Gross image shows well circumscribed, nodular with homogenous tan, white lesion with focal cystic space.

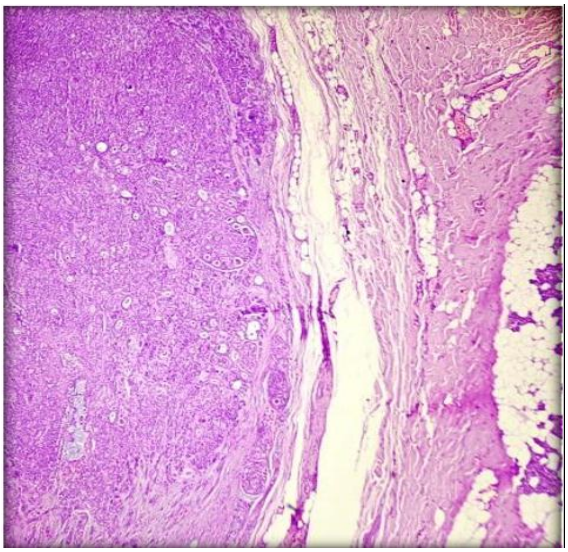

Figure 9: In scanner view, Hemotoxylin and Eosin stain shows normal salivary gland tissue with well circumscribed tumor.

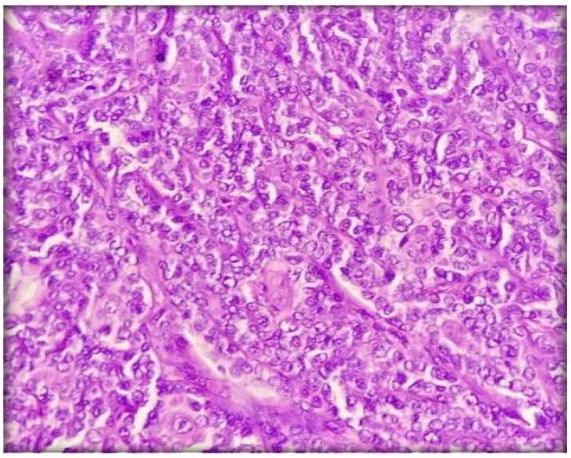

Figure 10: In 40x view shows H&E showing characteristic bilayered arrangement: inner luminal cells exhibiting eosinophilic cytoplasm alongside peripheral polygonal cells characterised by clear cytoplasm. The tumor demonstrated infiltrative growth into surrounding adipocytes with focal perineural invasion.

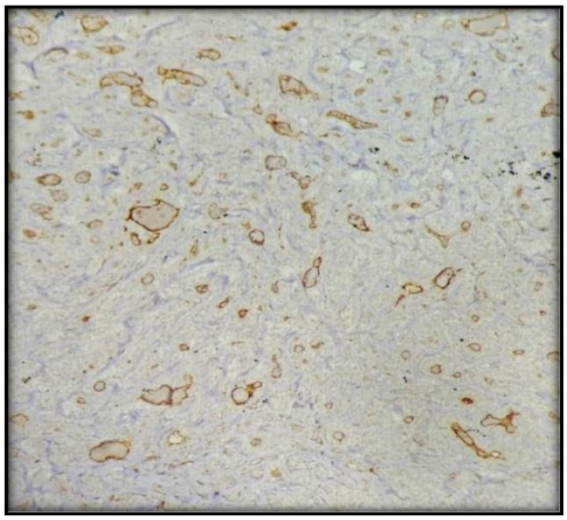

Figure 11: Epithelial membrane antigen (EMA) showed uptake of inner epithelial component

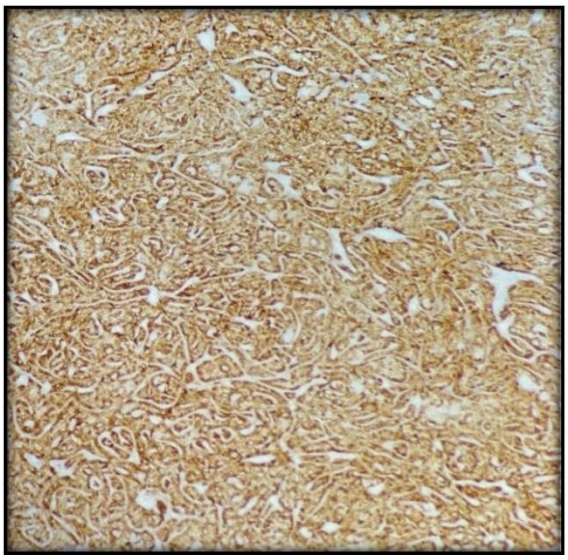

Figure 12: S100 demonstrates positivity for outer myoepithelial cells.

Case 5: Epithelial-Myoepithelial Carcinoma

A patient had a 5-month history of a left parotid swelling, which was hard in consistency. The gross specimen showed a well-defined tumor homogenous tan, white lesion with focal cystic space. Microscopic examination revealed an unencapsulated, infiltrative epithelial neoplasm exhibiting a characteristic bilayered cellular architecture. The tumor was composed of inner luminal cells with abundant eosinophilic cytoplasm, surrounded by an outer layer of polygonal cells with clear cytoplasm. Tumor cells were arranged in nests infiltrating the surrounding stroma. The neoplasm demonstrated an invasive growth pattern with extension into the adjacent adipose tissue. Perineural invasion was not identified.

Immunohistochemistry- Epithelial membrane antigen (EMA) showed positivity in the inner ductal epithelial cellswhereas S100 highlighted the outer myoepithelial cells.

Case 6: Salivary duct carcinoma

A patient presented with history of swelling in the right parotid gland for 8months with hard consistency. The gross examination revealed a salivary gland tissue received in fragments along with right cervical lymph nodes (level Ia, Ib, II, III and IV). Microscopic examination revealed an infiltrating high-grade carcinoma arranged in nests, cords, cribriform and papillary patterns within a desmoplastic stroma [Figure 13] Tumor cell exhibited abundant eosinophilic cytoplasm, marked nuclear pleomorphism, high N:C ratio and prominent nucleoli [Figure 14] Extensive comedo necrosis and focal foamy cell change are noted. Lymphovascular and perineural invasion are present. 11 out of 25 lymph nodes showed metastatic tumor deposit.

Further immunohistochemical evaluation was advised; however, the patient was lost to follow-up after surgery.

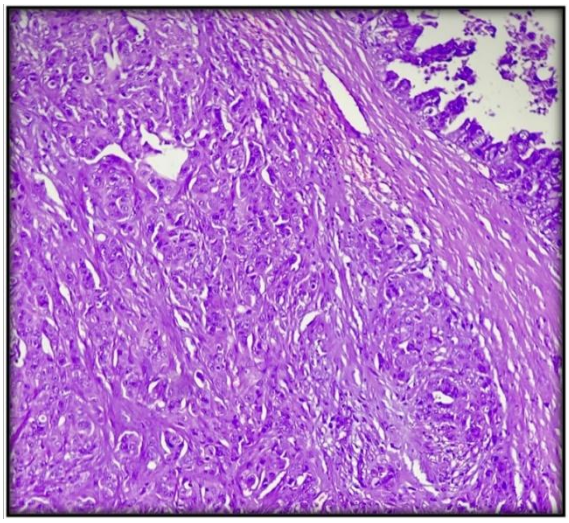

Figure 13: Salivary duct carcinoma showing tumor cells arising from ductal cells on the top left corner of the picture.

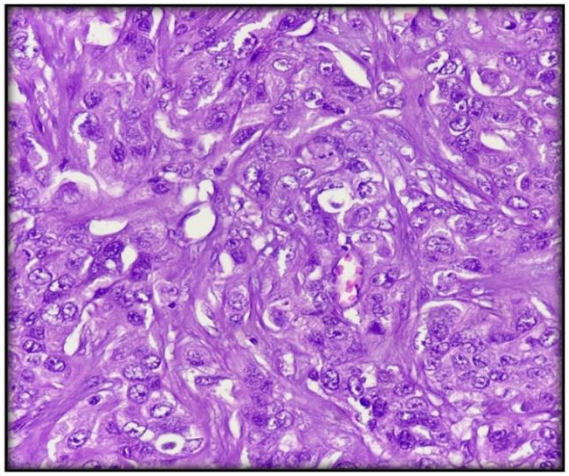

Figure 14: Tumor cells exhibit abundant eosinophilic cytoplasm, marked nuclear pleomorphism, high N:C ratio and prominent nucleoli with mitotic figures.

DISCUSSION

Basal Cell Adenoma (BCA)

Incidence, Classification, and Demographics: BCA is considered a non-malignant neoplasm that most frequently arises in the parotid gland. It constitutes approximately 1-3% of all benign epithelial tumors of the salivary gland.[5] More than 70% of these tumours typically develop in the major salivary glands, most commonly involving the parotid gland, while a small proportion arises from the minor salivary glands, particularly those located in the upper lip. It predominantly affects women in the 5th and 7th decade of life, although certain histological variants may demonstrate a more balanced gender distribution.[1]

In addition, BCA shows a notable association with Brooke-spiegler syndrome, a hereditary condition in which patients may develop extracutaneous manifestations, including BCAs involving the parotid gland.[1]

Histology and Subtypes: BCA usually presents as well circumscribed lesion measuring under 3cm in size. Histologically it is mainly composed of organised cords and nests of basaloid cells, characterised by a distinct peripheral layer of basal cells and the presence of hyaline, basement membrane like material. An important diagnostic feature is the lack of diverse stromal components that are typically seen in pleomorphic adenomas[5]

BCA is categorised into four histological patterns:

- **Solid:** Composed of compact nests made entirely of basloid cells
- **Trabecular:** Characterised by slender cords and interlacing strands formed by basaloid cells Tubular: Demonstrate numerous small ducts like structures within the tumor
- **Membranous:** Distinguished by a relatively more aggressive growth tendency and abundant deposition of basement membrane like material.[1]

Prognosis, Recurrence, and Treatment: The overall prognosis of BCA is generally favourable. The solid, trabecular and tubular variants are associated with very low recurrence rates, whereas the membranous type demonstarets a comparatively higher likelihood of recurrence, estimated at approximately 25%.[6]

Total surgical removal is regarded as the preferred treatment modality. Although enucletaion may be performed in select benign cases, it is not routinely recommended because of the increased risk of local recurrence. Therefore, adequate removal through standard surgical approaches- such as superficial or total parotidectomy is preferred, particularly when the deep lobe is involved, given the greater potential for malignant transformation.[6]

Diagnostic Immunohistochemistry:

Immunohistochemically, BCA typically demonstrates strong positivity for Pan cytokeratin and CK5/6, with moderate expression of Calponin and mild reactivity for P63 and Ki-67 proliferation index, which helps distinguish BCA from its malignant counterpart, basal cell adenocarcinoma (BCAC). For its malignant behaviour, basal cell adenocarcinoma, in contrast, shows higher cell proliferation, as evidenced by an elevated KI-67 labelling index and more pronounced expression of P63.[7]

Basal Cell Adenocarcinoma (BCAC):

Histopathological analysis reveals that basal cell adenocarcinoma closely resembles basal cell adenoma: the difference is based on clear cut features indicative of malignant behaviour. These include an infiltrative growth pattern, increased mitotic activity and evidence of vascular or perineural invasion. Although it remains controversial whether preexisting basal cell adenomas can undergo malignant transformation, studies have reported such progression in approximately 4.3% of cases. Despite being classified as a carcinoma, it generally carries a relatively favourable prognosis owing to its low-grade biological behaviour.[6]

Canalicular Adenoma (CA)

Overview and Clinical Presentation: Canalicular adenoma is an uncommon nonmalignant epithelial tumor which arises primarily from the minor salivary glands within the oral cavity. Previously considered a subtype of BCA, now it's been recognised as a distinct entity since its classification by the world health organisation in 1991. It represents fewer than 1% of all salivary gland tumors and affects older adults, with the peak occurrence between 50 and 70 years of age, with a higher prevelant among females. Approximately 80% of cases occur on the upper lip, which is regarded as the classical site, while less frequently affected sites include the buccal mucosa, hard palate, tongue, and floor of mouth.[8]

Clinical Features: Clinically, CA typically presents as a painless, gradually enlarging submucosal nodule. The lesion is commonly well circumscribed,

firm and mobile on palpation. An estimated 87% of cases presents as a single, well-defined nodule and around 13% occur as multiple or multifocal lesions.[9]

Histologic and Immunohistochemical Features: Canalicular adenoma is usually well circumscribed and contains uniform epithelial cells in interconnecting cords, often in a parallel pattern of double rows giving it a characteristic "beaded" or canal like appearance when histopathologically examined. On histological examination, the supporting stroma is loose and vascular with areas of myxoid or hyalinised change.[2]

Tissue morphology of these neoplastic cells has uniform nuclei and finely granular chromatin and indicates very low mitotic activity with no evidence of significant necrosis. Intraluminal squamous aggregates are reported in nearly 61% of cases, and microlith formation is identified in approximately half of the documented specimens.[9]

Canalicular adenoma is found to have diffuse positivity for pan cytokeratin and S100 protein in IHC and glial fibrillary acidic protein (GFAP) presents as linear staining along the luminal surfaces. Other markers such as c-KIT, Vimentin and SOX10 may also exhibit variable expression.[2]

Differential Diagnosis and Treatment: Differentiation from the other salivary gland tumors is required for accurate diagnosis. Unlike CA, basal cell adenoma more commonly arises in major salivary glands and exhibit dual cell populations. CA, in contrast, favors the upper lip and lacks identifiable myoepithelial cells.

Striated duct adenoma can be distinguished by its tightly packed ductal structures and scant stromal component. It is also important to exclude malignant entities such as polymorphous adenocarcinoma and adenoid cystic carcinoma, which characteristically demonstrate cribriform architecture and perineural invasion.

Management primarily involves complete surgical excision. Ennucleation may be considered in selected cases, and recurrence rates are low, generally around 5%.[2]

Epithelial-Myoepithelial Carcinoma (EMC)

Clinical and Pathological Definition: EMC is a rare low-grade tumour of the salivary glands, constituting fewer than 1% of all salivary gland neoplasm and approximately 2% of malignant cases.[10] Historically regarded as benign lesions due to its indolent clinical behaviour, it was later classified as distinct malignant entity by the World Health Organization in 1991. EMC is defined by its characteristic biphasic cellular components consisting of both epithelial and myoepithelial components.[3]

Demographics and Prevalence: EMC most commonly affects older adults, peak incidence at 6th to 7th decades of life and a mean age at presentation falling at 60 years of age. A mild female predominance is observed. The parotid gland is site most often involved, whereas the submandibular and minor salivary glands are affected less frequently.[10]

Gross and Clinical Features: Clinically EMC exactly presents as a slowly enlarging, lobulated mass. Clinical findings can be variable. Some individuals are asymptomatic, whereas others may report pain, swelling, signs of facial nerve involvement, including occasional facial nerve pals.[3]

Diagnostic Histology and Immunohistochemistry: Microscopic examination shows EMC demonstrates a biphasic architectural pattern, comprising an inner lining of ductal epithelial cells surrounded by an outer layer of clear myoepithelial cells. Immunohistochemistry has been shown to be very important in verifying this dual cellular pattern. The inner epithelial cells exhibit pan cytokeratin and epithelial membrane antigen (EMA) positivity and outer myoepithelial cells exhibit strong reactivity for markers including S100 protein and smooth muscle actin (SMA).[3] These immunoprofiles are critical in distinguishing EMC from other tumors with morphological features similar to that of the other salivary gland neoplasm.

Updated and Specific Immunohistochemical Marker: Recent investigations have been able to demonstrate immunohistochemical detection of HRAS Q61R mutations as a diagnostic tool. Yukiko Nakagure and Masahiro Urano have also reported very high sensitivity and specificity of HRAS Q61R immunostaining in diagnostic marker, especially in complicated cases.[11]

Salivary duct Carcinoma (SDC)

Epidemiology and Clinical Presentation: Salivary duct carcinoma (SDC) is a rare, high-grade epithelial malignancy accounting for approximately 1–3% of salivary gland cancers. It predominantly arises in the major salivary glands, particularly the parotid, and most commonly affects older men. SDC is characterized by aggressive biological behavior, with frequent local recurrence, regional lymph node involvement, early distant metastasis, and poor overall survival.[12]

The exact etiology remains uncertain, although isolated cases have been associated with chronic obstructive sialadenitis and IgG4-related sclerosing disease. Clinically, patients usually present with a rapidly enlarging salivary gland mass, often accompanied by facial nerve dysfunction due to local invasion.[12] Approximately 20–60% of cases arise from pre-existing pleomorphic adenoma, making SDC the most common subtype of carcinoma ex pleomorphic adenoma.[4]

Histopathological Features: Histologically, SDC closely resembles high-grade invasive ductal carcinoma of the breast. It is composed of infiltrating ducts, nests, and cribriform or papillary structures lined by pleomorphic epithelial cells with abundant eosinophilic cytoplasm, prominent nucleoli, frequent mitoses, and characteristic comedo-type necrosis. Less common variants include sarcomatoid, mucin-rich, invasive

micropapillary, oncocytic, and rhabdoid forms, some of which are associated with a more aggressive clinical course.[13]

Immunohistochemical Profile:

Immunohistochemically, diffuse androgen receptor (AR) positivity is a characteristic feature and an important diagnostic marker, particularly when combined with GATA3 and GCDFP-15 expression. SDC is typically negative for p63, which helps distinguish it from high-grade mucoepidermoid carcinoma. In diagnostically challenging cases, the absence of estrogen receptor (ER) and progesterone receptor (PR) expression assists in differentiating SDC from metastatic breast carcinoma.[4,13]

Molecular Alterations: Molecularly, SDC frequently demonstrates HER2 overexpression or amplification along with recurrent alterations involving TP53, PIK3CA, HRAS, and PTEN. Additional actionable abnormalities involving BRAF, NTRK, and RET have also been identified. Most tumors are microsatellite stable and exhibit a low tumor mutational burden, limiting the effectiveness of immune checkpoint inhibitors.[4]

Treatment and Targeted Therapy: Surgical resection with appropriate neck management remains the primary treatment, often followed by adjuvant radiotherapy in high-risk cases. Platinum- and taxane-based chemotherapy is commonly used for recurrent or metastatic disease. The frequent expression of AR and HER2 has enabled the use of androgen deprivation therapy and HER2-targeted agents, including trastuzumab-based regimens, which have shown encouraging clinical outcomes. Comprehensive molecular profiling is increasingly recommended in advanced disease to identify patients who may benefit from targeted therapies or precision oncology clinical trials.[4]

CONCLUSION

The present case series highlights six cases representing four uncommon salivary gland neoplasms: basal cell adenoma, canalicular adenoma, epithelial-myoepithelial carcinoma, and salivary duct carcinoma. Accurate diagnosis relies on careful correlation of clinical findings with histopathological and immunohistochemical features. Recognition of their characteristic microscopic patterns—including the basaloid architecture of basal cell adenoma, the beaded canalicular arrangement of canalicular adenoma, the biphasic epithelial-myoepithelial pattern of epithelial-myoepithelial carcinoma, and the high-grade ductal morphology with comedo-type necrosis of salivary duct carcinoma—is essential for appropriate diagnosis, prognostication, and patient management.

REFERENCES

1. Dosemane D, Khadilkar MN, Chandy N, Jayasheelan S. A presentation of basal cell adenoma: a case report. J Med Case Rep. 2024;18(1):483.
2. Papanikos V, Kouroukli O, Kakouris V, Dais P. Differential diagnosis of a canalicular adenoma: a case report and literature review. Cureus. 2025;17(1):e78166.
3. Dharma Kumar KG, Manoj MA, Sarodaya V, Mayekar C. Epithelial-myoepithelial carcinoma of the parotid: a needle in a haystack of carcinomas. J Surg Case Rep. 2025;2025(5):100105.
4. Masahiro Nakaguro, Yasuharu Tada, William C. Faquin, Peter M. Sadow, Lori J. Wirth, Takashi Nagao. Salivary duct carcinoma: updates in histology, cytology, molecular biology, and treatment. Cancer Cytopathol. 2020;128(10):693-703.
5. Al Qooz F, Alanazi M, Al Olaimat MS, Malahmeh T, Alzoubi ZR. Submandibular basal cell adenoma: a rare presentation. Hum Pathol Rep. 2024;35:300729.
6. Yoon S, Kim Y, Moon SH. Basal cell adenoma of parotid gland: two case reports and literature review. Arch Craniofac Surg. 2023;24(4):179-184.
7. Bhagat Singh AD, Majumdar S, Ghosh AK, Gandi L, Choudaha N, Sharma I, et al. Basal cell adenoma: clinicopathological, immunohistochemical analysis and surgical considerations of a rare salivary gland tumor with review of literature. Niger J Surg. 2015;21(1):31-34.
8. Muthukumar R, Rajasekaran S, Prabakaran S, Namasivaya Navin RB, Balaji D, Gowthame K, et al. Canalicular adenoma of parotid: a rare case report. Indian J Otolaryngol Head Neck Surg. 2024;76(5):4713-4716.
9. Karakostas P, Matiakis A, Mylonas AI, Anagnostou E, Poulopoulos A. Canalicular adenoma of minor salivary gland: report of a case and a brief review of the literature. Hell Arch Oral Maxillofac Surg. 2021;22(1):13-17.
10. Okuyama K, Michi Y, Kashima Y, Tomioka H, Hirai H, Yokokawa M, et al. Epithelial-myoepithelial carcinoma of the minor salivary glands: case series with comprehensive review. Diagnostics (Basel). 2021;11(11):2126.
11. Masahiro Nakaguro, Tanigawa M, Hirai H, Yamamoto Y, Urano M, Takahashi RH, et al. The diagnostic utility of RAS Q61R mutation-specific immunohistochemistry in epithelial-myoepithelial carcinoma. Am J Surg Pathol. 2021;45(7):885-894.
12. Roderick H. W. Simpson. Salivary duct carcinoma: new developments—morphological variants including pure in situ high-grade lesions; proposed molecular classification. Head Neck Pathol. 2013;7(Suppl 1):S48-S58.
13. Schmitt NC, Kang H, Sharma A. Salivary duct carcinoma: an aggressive salivary gland malignancy with opportunities for targeted therapy. Oral Oncol. 2017;74:40-48.