International Journal of Research in Medical Sciences
Kashyap N et al. Int J Res Med Sci. 2025 May;13(5):2207-2210
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20251338

Case Report

Immunohistochemical findings in tubular pattern of adenoid cystic carcinoma affecting the palate: a pathological perspective

Nikita Kashyap[1], Aravindan S.[2]*, Sudipta Rakshit[2], Jay G. Ray[2]

[1]Department of Oral and Maxillofacial Pathology, Post Graduate Institute of Dental Sciences and Research, Rohtak, Haryana, India
[2]Department of Oral and Maxillofacial Pathology, Dr. R. Ahmed Dental College and Hospital, Kolkata, West Bengal, India

Received: 10 March 2025
Revised: 14 April 2025
Accepted: 18 April 2025

***Correspondence:**
Dr. Aravindan S.,
E-mail: aravindanssa1996@gmail.com

ABSTRACT

Adenoid cystic carcinoma (ADCC) is a rare and aggressive epithelial neoplasm of the major and minor salivary glands. It affects 1% of all malignant neoplasms of the oral and maxillofacial region and 22% of all salivary gland malignancies. Most common site affected is palate followed by parotid region, tongue and floor of mouth. It is commonly seen in middle aged population with slight female predilection. Clinically, it is characterized by asymptomatic and slow growth with high propensity for local recurrence and distant metastasis. Diagnosis of ADCC is usually with the help of clinical features, radiographic features and histologic features. It is characterized by the proliferation of ductal (luminal) and myoepithelial cells showing 3 histopathological patterns i. e., cribriform, tubular and solid. We report a case of a 74-year-old male diagnosed with ADCC of the palate, focusing on the clinical presentation, histopathological features, and immunohistochemical profile.

Keywords: Adenoid cystic carcinoma, CD-117, Palate, Perineural invasion, Tubular pattern

INTRODUCTION

Adenoid cystic carcinoma (ADCC) is a rare and aggressive malignant neoplasm that originates in both the minor and major salivary glands. It is an infrequent lesion, as it represents approximately 1% to 2% of all malignant neoplasms of the head and neck, and up to 10% to 15% of all malignant salivary gland neoplasms.[1-3] The most common intraoral site for minor salivary gland tumors is the hard palate, followed by the base of the tongue[4] where up to 96% of all tumors are malignant, and ADCC represents 30% of them.[5] Most ADCC patients are in their fifth and sixth decade of life and females are slightly more affected than males. It grows with a slower rate, in comparison with other carcinomas, and has a low prevalence of spreading into local and regional lymph nodes. Distant metastasis is quite common, with the highest prevalence in the lungs, followed by bones, liver, and brain.[6] The infiltrative capacity is the hallmark of this carcinoma because of which multiple local recurrences are common despite aggressive surgical and irradiation therapy.[7,8]

It has recently been found that c-kit (CD-117), a tyrosine kinase receptor involved in growth and development of normal tissues and in ADCC.[9,10] Previous studies have found its expression in 78% of 45 cases and in 78.5% of 14 cases, which led some to consider the use of tyrosine kinase inhibitors such as imatinib mesylate as an adjuvant and/or therapeutic tool to manage distant metastases.[11-13]

CASE REPORT

A 74-year-old male patient presented with a chief complaint of pain and ulceration in the palatal region, persisting for the past two months. Extra oral examination

revealed no abnormalities, and there was no evidence of lymphadenopathy. His medical history was unremarkable. The patient had a 30-year history of chronic smoking. On intraoral examination, an ulcerated endophytic lesion was present in the mid palatal region accompanied by erythematous changes. The ulceration was smaller in size initially and gradually increased to present size (Figure 1).

CT scan revealed a heterogeneously attenuating hard palate and left depending maxillary sinus mass with surrounding structural involvement and bone destruction of base of left maxillary sinus (Figure 2). A provisional diagnosis of squamous cell carcinoma was made based on clinical and radiological findings. The clinical differential diagnosis included malignant salivary gland neoplasms.

An incisional biopsy was performed following histopathological evaluation. Histopathological examination revealed fibrovascular connective tissue stroma showing presence of acinar and myoepithelial cells arranged in tubular and cribriform pattern. The ductal cells were cuboidal with eosinophilic cytoplasm. The myoepithelial cells were angulated and basaloid. The cyst-like spaces among the tumoral cells contained eosinophilic or basophilic material. The tubular pattern consisted of small ducts lined by several cuboidal cells which contained hyalinized material (Figure 3). Based on the following features, differential diagnosis of ADCC and polymorphous adenomacarcinoma.

Immunohistochemistry (IHC) was performed to confirm the diagnosis and to rule out other adenocarcinomas containing basaloid cells. C-kit (CD-117) antigen was diffusely positive in the tumoral cells (Figure 4).

Following the confirmed diagnosis, the patient was referred to a higher oncology center for further management and definitive treatment. However, the patient was subsequently lost to follow-up, and no additional clinical information regarding treatment or outcomes could be obtained.

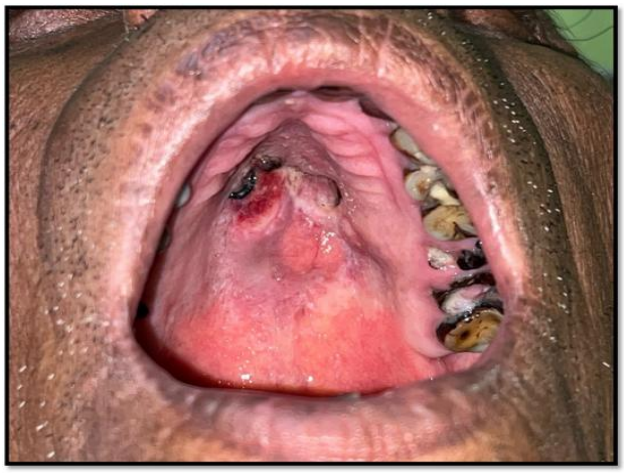

Figure 1: Intraoral clinical photograph of an ulcerative lesion on hard palate with area of necrosis.

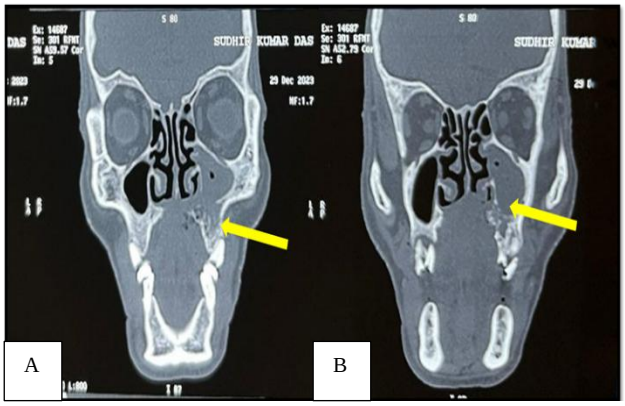

Figure 2 (A and B): Coronal CT scan image showing an ill-defined osteolytic lesion involving the maxilla (yellow arrows). The lesion demonstrates bone destruction and extension into the adjacent structures.

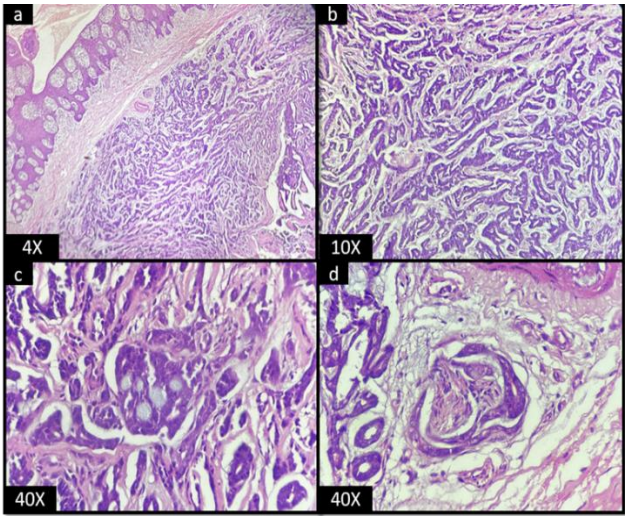

Figure 3 (A-D): Hematoxylin and eosin (H and E) stained sections at (a) 4X showing infiltrative tumor islands within the subepithelial connective tissue. (b) 10X highlighting a tubular and cribriform growth pattern. (c) 40× demonstrating hyperchromatic basaloid tumor with areas of hyalinized stroma and tubular structures characteristic of ADCC. (d) High-power view (40×) showing perineural invasion.

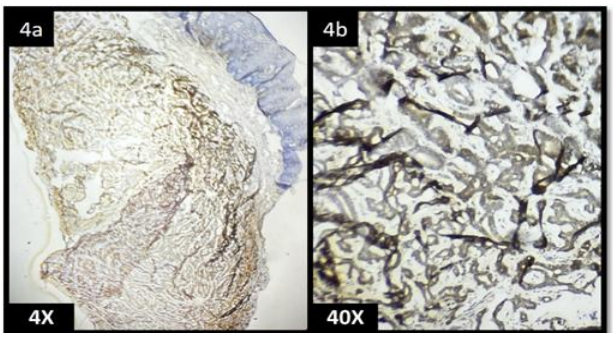

Figure 4 (A and B): IHC sections of CD117 diffusely positive in tumor cells.

DISCUSSION

The world health organization (WHO) has defined ADCC as “an invasive carcinoma composed of epithelial and myoepithelial neoplastic cells arranged in tubular, cribriform, and solid patterns associated with basophilic matrix and reduplicated basement membrane material, often associated with MYB, MYBL1 or NFIB rearrangement”.[14] ADCC is the most frequently diagnosed malignant tumor in the minor salivary glands and is also among the most common cancers affecting the major salivary glands, including the parotid, submandibular, and sublingual glands. It can also involve the lacrimal and ceruminous glands, as well as other regions in the head and neck, such as the nasal and paranasal sinuses, trachea, and larynx.[15-17]

ADCC was initially described by Robin, Lorain, and Laboulbene in two articles published in 1853 and 1854, in which they detailed a parotid tumor and two nasal tumors. They observed the tumor's characteristic cribriform cell pattern under the microscope and noted its propensity to invade surrounding tissues and spread along nerves.[18] In 1856, Billroth suggested the name "cylindroma" for this tumor, but it wasn't until 1930 that Spies introduced the term ADCC. Even after Robin and his associates recognized its main features, the tumor was originally thought to be a benign mixed tumor variation. Its malignant character was later established by Dockerty and Mayo.[2] ADCC is believed to originate from the mucous-secreting glands, specifically from the intercalated ducts. Electron microscopy indicates that it develops from cells capable of differentiating into both epithelial and myoepithelial cells.[19]

It has been referred to as "one of the most biologically aggressive and unpredictable tumors in the head and neck region."[20] The most common presenting symptom is a slowly growing mass, followed by pain attributed to its tendency for perineural invasion.[21] Lymph node involvement is uncommon, but in ADCC with high-grade transformation (ADCC-HGT), the clinical course tends to be accelerated, with a high propensity for lymph node metastasis. Distant metastases are frequent, most commonly to the lungs, followed by bone, liver, and brain.[22]

Histopathologically, ADCC consists of two main cell types, ductal and myoepithelial cells. The former cell type has eosinophilic cytoplasm and uniform round nuclei, and the latter has clear cytoplasm and hyperchromatic angular nuclei. There are three patterns for ADCC: cribriform, tubular, and solid patterns. The cribriform pattern, which is the most frequent, appears as clusters of basaloid cells encircled by cyst-like spaces of varying sizes, creating a "Swiss cheese" appearance. The tubular histological subtype presents a similar appearance, but with cells organized into nests that are surrounded by varying amounts of frequently hyalinized eosinophilic stroma. The solid subtype manifests aggregates of basaloid cells without tubular or pseudocystic formations. Due to the common occurrence of polymorphism in ADCC, it is possible to observe all three of the previously mentioned patterns within a single specimen. As a result, MD Anderson developed a pathological grading system, which has since gained global recognition and adoption.[6]

Grade I was tubular and cribriform together without a solid pattern. Grade II was mostly cribriform, with less than 30% of solid pattern. Grade III was solid being the predominant subtype.

According to histological patterns, ADCC can be classified into high and low grades. Low-grade ADCC consists of grades I (predominantly tubular, no solid areas or occasionally solid areas) and II (predominantly cribriform, 30% solid component. It is common for tumors to show transitions between the three histological patterns.[8] The solid subtype is the most aggressive and is prone to poor prognosis and a higher frequency of mutations.[9]

The grade III solid histological pattern can be confused with ADCC-HGT due to some similarities with cellular atypia, occasional comedoiform necrosis, and frequent mitotic figures. However, the cells show a different aspect (solid-type cells: basaloid, small, hyperchromatic nuclei with scarce cytoplasm. ADCC-HGT: larger, more pleomorphic, and vesicular nuclei and balance between nucleus and cytoplasm). Some other aspects differentiate ADCC from the solid subtype of ADCC-HGT, which is highly prone to lymph node metastases, high rates of mitotic labeling and increased expression of Ki-67, as well as high expression of p53.[10]

Differential diagnosis includes polymorphous adenocarcinoma, Basaloid squamous cell carcinoma (BSCC), basal cell adenoma, basal cell adenocarcinoma, epithelial-mypepithelial carcinoma and pleomorphic adenoma.[12]

Immunohistochemical studies have shown that the pseudocysts test positive for periodic acid-Schiff reagent and Alcian blue, and they contain components of the basement membrane, including type IV collagen, heparan sulfate, and various laminin isoforms. Epithelial cells are positive for carcinoembryonic antigen and epithelial membrane antigen. Duct lining cells exhibit positivity for C-kit (CD117), while myoepithelial cells are positive for S-100 protein, calponin, p63, smooth muscle actin, and myosin.[16-17]

CONCLUSION

In conclusion, ADCC represents a complex and biologically aggressive malignancy with distinct histological features, particularly the tubular pattern observed in palatal lesions. Understanding the intricacies of its morphology and the associated immunohistochemical markers is crucial for accurate

diagnosis and effective management. The use of IHC not only aids in distinguishing ADCC from other salivary gland tumors but also enhances our understanding of its biological behavior. As research continues to advance, a deeper comprehension of AdCC's pathogenesis and its various histological presentations will contribute to improved diagnostic strategies and therapeutic approaches, ultimately benefiting patient outcomes.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Dutta NN, Baruah R, Das L. Adenoid cystic carcinoma - Clinical presentation and cytological diagnosis. Indian J Otolaryngol Head Neck Surg. 2002;54(1):62-4.
2. Dockerty MB, Mayo CW. Primary tumors of the submaxillary gland with special reference to mixed tumors. Surg Gynecol Obstet. 1942;74:1033-45.
3. Kim KH, Sung MW, Chung PS, Rhee CS, Park CI, Kim WH. Adenoid cystic carcinoma of the head and neck. Arch Otolaryngol Head Neck Surg. 1994;120(7):721-6.
4. Khafif A, Anavi Y, Aviv J, Fienmesser R, Calderon S, Marshak G. Adenoid cystic carcinoma of the salivary glands: a 20-year review with long term follow-up. Ear Nose Throat J. 2005;84(10):662-7.
5. Luna-Ortiz K, Carmona-Luna T, Cano-Valdez AM, Mosqueda-Taylor A, Herrera-Gómez A, Villavicencio-Valencia V. Adenoid cystic carcinoma of the tongue–clinicopathological study and survival analysis. Head Neck Oncol. 2009;1(1):1-6.
6. Karimi A, Parhiz A, Eslamiamirabadi N, Moradzadeh Khiavi M, Derakhshan S. Adenoid cystic carcinoma of buccal mucosa: A report of two rare cases and review of literature. Clin Case Rep. 2020;9(1):1-8.
7. Pushpanjali M, Sujata DN, Subramanyam SB, Jyothsna M. Adenoid cystic carcinoma: An unusual presentation. J Oral Maxillofac Pathol. 2014;18(2):286-90.
8. Perzin KH, Gullane P, Conley J. Adenoid cystic carcinoma involving the external auditory canal. clinicopathologic study 16 cases. Cancer. 1982;50(12):2873-83.
9. Silva FJ, Azevedo Junior JC, Ralph AC, Pinheiro JD, Calcagno DQ, Freitas VM. Salivary glands adenoid cystic carcinoma: a molecular profile update and potential implications. Front Oncol. 2023;13:1-4.
10. Seethala RR, Hunt JL, Baloch ZW, Livolsi VA, Leon Barnes E. Adenoid cystic carcinoma with high-grade transformation: a report of 11 cases and a review of the literature. Am J Surg Pathol. 2007;31(11):1683-94.
11. Andreadis D, Epivatianos A, Poulopoulos A, Nomikos A, Papazoglou G, Antoniades D, et al. Detection of c-kit (CD 117) molecule in benign and malignant salivary gland tumours. Oral Oncol. 2006;42(1):57-65.
12. Aslan DL, Oprea GM, Jagush SM, Gulbahce HE, Adams GL, Gaffney PM, et al. C-kit expression in adenoid cystic carcinoma does not have an impact on local or distant tumor recurrence. Head Neck. 2004;27(12):1028-34.
13. Alcedo JC, Fabrega JM, Arosemena JR, Urrutia A. Imatinib mesylate as treatment for adenoid cystic carcinoma of the salivary glands: report of two successfully treated cases. Head Neck. 2004;26(9):829-31.
14. WHO Classification of Tumours Editorial Board. Head and Neck Tumours. 5th ed. Lyon: IARC. 2023.
15. Bjørndal K, Krogdahl A, Therkildsen MH, Overgaard J, Johansen J, Kristensen CA, et al. Salivary gland carcinoma in Denmark 1990-2005: a national study of incidence, site and histology. Results of the Danish Head and Neck Cancer Group (DAHANCA). Oral Oncol. 2011;47(7):677-82.
16. Vander Poorten VL, Balm AJ, Hilgers FJ, Tan IB, Loftus-Coll BM, Keus RB, et al. Prognostic factors for long term results of the treatment of patients with malignant submandibular gland tumors. Cancer. 1999;85(10):2255-64.
17. Azar T, Abdul-Karim FW, Tucker HM. Adenoid cystic carcinoma of the trachea. Laryngoscope 1998;108(9):1297-300.
18. Stell PM. Adenoid cystic carcinoma. Clin Otolaryngol Allied Sci. 1986;11(4):267-91.
19. Yaga US, Gollamudi N, Mengji AK, Besta R, Panta P, Prakash B, et al. Adenoid cystic carcinoma of the palate: Case report and review of literature. Pan Afr Med J. 2016;24:106.
20. Conley J, Dingman DL. Adenoid cystic carcinoma in the head and neck (cylindroma). Arch Otolaryngol. 1974;100(2):81-90.
21. Coca-Pelaz A, Rodrigo JP, Bradley PJ, Vander Poorten V, Triantafyllou A, Hunt JL, et al. Adenoid cystic carcinoma of the head and neck--An update. Oral Oncol. 2015;51(7):652-61.
22. Xia Y, He X. Adenoid cystic carcinoma with high-grade transformation. Pathology. 2024;56(1):136-8.

Cite this article as: Kashyap N, Aravindan S, Rakshit S, Ray JG. Immunohistochemical findings in tubular pattern of adenoid cystic carcinoma affecting the palate: a pathological perspective. Int J Res Med Sci 2025;13:2207-10.