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Case Report

# Advanced Adenoid Cystic Carcinoma of the Maxillary Sinus Invading the Cavernous Sinus and Skull Base in a Patient on Long-Term Bicalutamide: A Case Report

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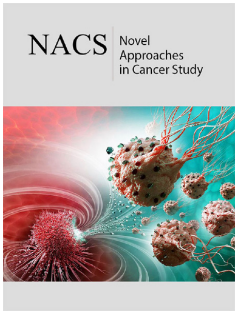


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## Abstract

A 39-year-old man presented with a 9-year history of right-sided facial swelling due to adenoid cystic carcinoma of the right maxillary sinus, confirmed by biopsy in 2017 showing cribriform architecture, c-KIT positivity, HER2 negativity, and intermediate androgen receptor expression (7-8%). Initially declining surgery, he received imatinib (400mg daily, 2021-2023), achieving radiological stability (tumor 8.2 × 5.3 × 7.9cm to 7.7cm) without regression. Progression ensued with cavernous sinus invasion, internal carotid artery encasement (no occlusion), bilateral orbital apex involvement, optic neuropathy (right-eye blindness, ptosis), and skull base destruction, rendering the tumor unresectable. Bicalutamide (50mg daily, January 2024-October 2025; 26 months) induced initial partial response (slight size reduction, necrosis by June 2024) but failed to prevent marked progression by October 2025 (midline-crossing mass with bilateral ethmoid/orbital/sphenoid erosion). Therapy switched to Lenvatinib (January 2026), then Adriamycin-cyclophosphamide chemotherapy amid ongoing bilateral vision compromise and cranial neuropathies. This case illustrates sequential targeted attempts (c-KIT/AR inhibition) in AR-positive maxillary ACC with extreme perineural/skull base aggression, highlighting diagnostic/treatment challenges and need for novel trials.

**Keywords:** Adenoid cystic carcinoma; Salivary gland tumor; Cavernous sinus; Invasion; Diagnostic/treatment challenge

**Abbreviations:** ACC: Adenoid Cystic Carcinoma; MSGTs: Malignant Salivary Gland Tumors; TNM: Tumor, Nodes, and Metastasis; EMA: Epithelial Membrane Antigen; CD117: Cluster of Differentiation 117; p63: Tumor protein p63; ASMA: Alpha-Smooth Muscle Actin; CT: Computed Tomography; CE: Contrast-Enhanced; AR: Androgen Receptor; MSI: Microsatellite Instability; MMR: Mismatch Repair Proficient; R/M: Recurrent/Metastatic; SDCs: Salivary Duct Carcinomas; HER2: Human Epidermal Growth Factor Receptor 2; c-KIT: Cellular KIT Proto-oncogene; ADT: Androgen Deprivation Therapy; PIK3CA: Phosphatidylinositol-4,5-Bisphosphate3-Kinase Catalytic subunit Alpha; IHC: Immunohistochemistry

## Introduction

Adenoid cystic carcinoma (ACC) represents a distinctive subtype of malignant salivary gland tumor, most frequently arising from minor salivary glands and notorious for its slow growth, propensity for perineural invasion, and delayed onset of distant metastasis. Malignant salivary gland tumors (MSGTs) constitute fewer than 5% of all head and neck cancers, underscoring their relative rarity yet clinical significance [1]. Among these, ACC stands out as one of the predominant histological types, with a predilection for intraoral minor salivary

glands, lesser involvement of the parotid gland, and infrequent occurrence in the nasal cavity or paranasal sinuses [2]. Clinically, ACC often masquerades as a benign lesion in its early phases, amenable to straightforward surgical excision; however, it evolves into a relentlessly aggressive malignancy over time, predominantly affecting individuals aged 40 to 60 years.

What sets ACC apart in the spectrum of salivary gland neoplasms is its enigmatic clinical trajectory: an indolent primary growth phase belies extensive local infiltration and perineural dissemination, culminating in distant metastases that may emerge years or even decades later [3]. Macroscopically, ACC manifests as a firm, grayish mass exhibiting infiltrative borders, frequently eroding adjacent structures such as the maxillary bone. Histopathologic ally, it displays a heterogeneous architecture encompassing cribriform (most characteristic), tubular, and solid patterns, with the latter correlating to poorer outcomes. Key prognostic determinants include tumor dimensions, histological grade, TNM stage, regional lymph node status, perineural involvement, and surgical margin clearance [4].

This case report details a 39-year-old male diagnosed with early-stage ACC of the maxillary sinus who initially opted against surgical intervention. Over time, the tumor pursued an unusually aggressive course, marked by extensive invasion into the cavernous sinus and skull base. Notably, long-term therapy with the androgen receptor blocker bicalutamide yielded a meaningful response, highlighting potential therapeutic avenues in this challenging malignancy.

## Case Presentation

### Case History/Examination

A 39-year-old male presented to the oncology clinic in November 2023 with right-sided facial swelling of 8-9 years duration. He had been diagnosed with adenoid cystic carcinoma (ACC) on biopsy of the hard palate in 2017. Histopathology revealed small-to-medium neoplastic cells with oval or angulated hyperchromic nuclei and slightly eosinophilic cytoplasm arranged in tubular and cribriform patterns, with myxoid material in the pseudo-glandular spaces. Immunohistochemistry showed positivity for EMA, CD117, CyclinD1, ASMA, and p63. Surgery was advised but declined by the patient. He was subsequently seen by another physician in 2021 and commenced on imatinib 400 mg daily, which was continued until 2023.

On presentation in October 2023, the patient complained of right eye pain and ptosis. Intraoral examination revealed a hyperemic hard palate with an erosive lesion extending to the left alveolar ridge. Ocular examination of the right eye demonstrated ptosis, conjunctival congestion, complete loss of vision (no light perception), and an absent pupillary light reflex.

### Investigations and treatment

A contrast-enhanced CT of the brain, neck and chest performed in September 2023 revealed a large heterogeneously enhancing soft tissue mass in the right maxillary sinus measuring 8.2 × 5.3 × 7.7cm (Figure 1A,1B). Axial and coronal images demonstrated aggressive sinus wall destruction with extension into the right ethmoid and sphenoid sinuses, nasal cavity, and nasopharynx, along with posterolateral spread into the pterygopalatine fossa, pterygoid plates and right parapharyngeal space. Superiorly, the mass invaded the right orbit via the orbital floor, involving the orbital apex and extraocular muscles, with erosion of the orbital roof. Intracranially, there was involvement of the right cavernous sinus with abutment of the cavernous segment of the right internal carotid artery without evidence of occlusion, and abutment of the medial temporal lobe (Figure 2A, 2B). Bone window imaging confirmed extensive osseous destruction of the maxillary sinus walls, orbital floor, bilateral pterygoid plates, ethmoid and sphenoid sinus walls, clivus, and skull base, with a moth-eaten permeative pattern consistent with aggressive malignancy (Figure 3).

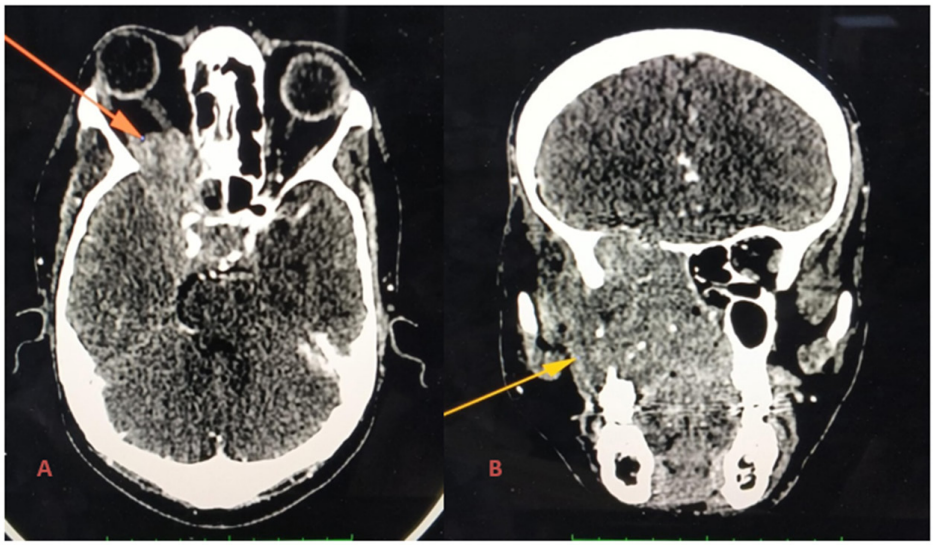


**Figure 1 (A, B):** Contrast-enhanced CT of the paranasal sinuses and skull base.

Axial and coronal contrast-enhanced CT images show a large, heterogeneously enhancing soft tissue density mass centered in the right maxillary sinus, Arrows indicate the areas of tumor extension and critical structure involvement. showing aggressive expansion with destruction of the sinus walls. The lesion extends into the right ethmoid and sphenoid sinuses, nasal cavity, and nasopharynx, with involvement of the turbinates and nasal septum. Posterolateral spread into the pterygopalatine fossa and pterygoid plates, and further extension into the right parapharyngeal space is noted. Superiorly, the mass invades the right orbit via the orbital floor, involving the orbital apex and adjacent extraocular muscles, with erosion of the orbital roof. Intracranial extension is characterized by involvement of the right cavernous sinus and extension to the foramen lacerum, with abutment of the cavernous segment of the right internal carotid artery without evidence of occlusion. The lesion abuts the medial temporal lobe without associated parenchymal edema.

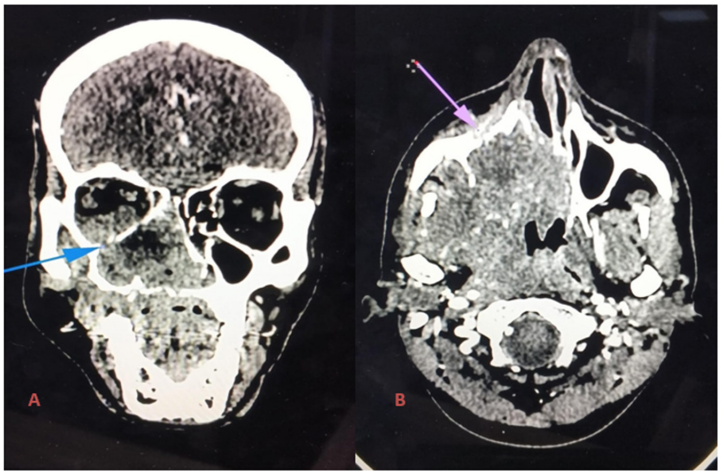


**Figure 2 (A, B):** Soft tissue window
Contrast-enhanced CT images reveal a large, heterogeneously enhancing mass centered in the right maxillary sinus with extension into the nasal cavity, ethmoid and sphenoid sinuses, orbit, cavernous sinus, and parapharyngeal space, abutting the internal carotid artery without luminal compromise. Arrows indicate the areas of tumor extension and critical structure involvement.

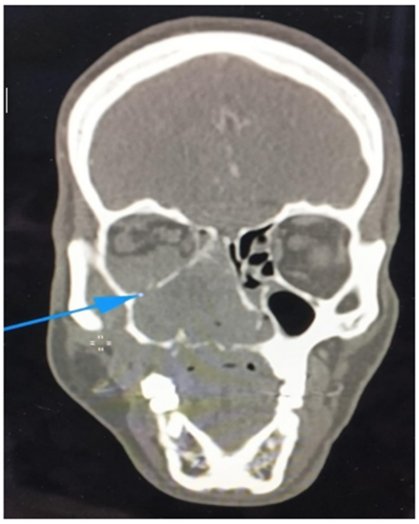

**Figure 3:** Bone Window
Axial and coronal CT images in bone window demonstrate extensive osseous destruction centered in the right maxillary sinus, with erosion of the anterior, medial, posterior, and superior walls. There is involvement of the orbital floor and focal erosion of the orbital roof, facilitating intraorbital extension. The lesion shows destruction of the medial and lateral pterygoid plates with extension into the pterygopalatine region. Erosion of the walls of the ethmoid and sphenoid sinuses is also noted. Posteriorly, there is irregularity and erosion of the clivus and skull base, with extension toward the foramen lacerum. The bony margins appear moth-eaten and permeative, consistent with an aggressive malignant process.

A CT scan from January 2023 had measured the mass at 8.2 × 5.3 × 7.9cm; a repeat scan in June 2023 after 14 months of imatinib showed 8.2 × 5.3 × 7.7cm, indicating radiological stability without regression. Further immunohistochemical workup in 2023 revealed HER2/neu negativity, intermediate androgen receptor (AR) positivity at 7-8%, intact microsatellite instability (MSI), and proficient mismatch repair (MMR).

In November 2023, the multidisciplinary tumor board determined the lesion to be unresectable due to extensive skull base and local involvement. The patient declined chemotherapy following detailed counselling. Given the intermediate AR positivity on IHC, bicalutamide 50mg once daily was commenced in January 2024.

### Outcome and Follow-up

An interim CT scan in February 2024, after approximately six weeks of bicalutamide, demonstrated responding disease with a slight reduction in tumor size. A CT scan in June 2024 showed stable mass dimensions with an increased necrotic component, progressive maxillary sinus wall erosion, and further abutment of the medial temporal lobe; bicalutamide was continued.

At follow-up in March 2025, the patient reported bilateral ocular tenderness more pronounced on the right, with unchanged right eye ptosis and blindness. In October 2025, after 26 months of bicalutamide, a contrast-enhanced CT of the face, neck, and brain demonstrated marked disease progression. The mass had crossed the midline with destructive involvement of both maxillary sinus walls, bilateral pterygoid plates and muscles, sphenoid sinus walls, clivus, and right zygomatic arch. Extension into the right infratemporal fossa with temporalis and masseter muscle involvement was noted. Inferiorly, the tumor involved the hard and soft palate and adjacent buccal mucosa. Superiorly, extension into bilateral ethmoid sinuses, both orbital apices, bilateral proximal optic nerves, right proximal extraocular muscles, and bilateral orbital roofs was demonstrated. Bilateral cavernous sinus and internal carotid artery encasement persisted without arterial occlusion; the nasopharynx and right Eustachian tube remained involved.

Bicalutamide was discontinued in January 2026 and switched to Lenvatinib. The patient subsequently developed moderate left eye optic dysfunction in addition to pre-existing severe right eye involvement. A repeat CT scan in February 2026 confirmed further progression with extensive bilateral orbital roof destruction, bilateral extraocular muscle involvement, bilateral Eustachian tube involvement, and bilateral mastoid air cell and middle ear cavity opacification, with persistent but non-occlusive bilateral cavernous sinus and internal carotid artery encasement. Following clinical stabilization, the patient was commenced on Adriamycin plus cyclophosphamide chemotherapy.

## Discussion

Adenoid Cystic Carcinoma (ACC) is the rare neoplasm of salivary glands, characterized by slow growth, perineural invasion and distant metastasis. Involvement of nasal cavity and paranasal sinus is rare and poorly described [5]. In the present case, we reported a patient with ACC of right maxillary sinus, initially, the presenting complain of patient was only right sided facial swelling but after further disease progression the condition of the patient started to become more complicated with extensive local invasion. The histopathological features of preoperative biopsy revealed characteristics features of ACCs, demonstrating the cribriform pattern along with other typical morphological findings. Different histologic patterns of ACCs have distinctive radiologic features, which can facilitate accurate preoperative diagnosis [6].

The tumor invaded the cavernous sinus. The cavernous sinus is a small and complex anatomic structure with many cranial nerves passing through it, so invasion of the cavernous sinus often occurs due to the perineural spread and subsequently results in the apparent symptoms of cranial nerve palsy [7]. Due to extensive destruction of the cavernous sinus of right side, the patient complaint of his right eye ptosis and loss of vision, also after physical examination there was loss of corneal reflex. Initially, ACCs of paranasal sinuses may be resectable, however, in advanced stages, following extensive local invasion or distant metastasis, the surgical management become significantly more complex and challenging. Recommended treatment is a combination of surgery and adjuvant radiotherapy whenever possible, Chemotherapy should be reserved for the palliative setting, preferably in patients with symptomatic, progressive disease [5]. In the patient, the ACC was of destructive type as the soft tissue mass had extensively invaded the bony structures, and caused their destruction. The growth pattern of maxillary sinus ACCs can be classified into an expansible type with minimal bony defects and a destructive type with extensive bony defects [4]. The tumor demonstrated HER2/neu negativity and c-KIT positivity in immunohistochemistry, commonly seen in ACCs. The patient was treated with imatinib for 2 years. Although imatinib is not considered a standard therapeutic agent for ACCs. Imatinib is a c-KIT tyrosine kinase inhibitor that is currently successfully used in the field of cancer therapy, especially against chronic myelogenous leukemia and gastrointestinal stroma cell tumor. It occupies the tyrosine kinase active site, leading to a decrease in activity [8]. The prolonged administration for two years in this patient reflects and individualized therapeutic approach. There was no purposeful response of imatinib 400mg daily, the disease continued to progress. Niladri et al. [9] in his study of phase II trial on 28 patients with advanced salivary adenoid cystic carcinoma concluded that imatinib combined with cisplatin may have a role in metastatic or locally advanced adenoid cystic carcinoma of the salivary glands, or both. Partial response is not necessarily the most important clinical outcome. The combination of imatinib and cisplatin may stabilize the disease, which would be a clinical benefit for patients [10]. But at that time our patient was reluctant for chemotherapy, so, cisplatin did not give to the patient. The CT scan of patient in January 2023, after 2 years of imatinib 400mg, showed the approximate size of mass 8.2 x 5.3 x 7.9cm, while in June 2023, the size of mass was 8.2 x 5.3 x 7.7cm, at this time the imatinib has been stopped due to further condition of patient, this demonstrated

that the tumor size remained essentially stable between these 6 months, with only a minimal reduction of 0.2cm in one dimension, suggesting radiological disease stability rather than regression. Furthermore, the benefit of imatinib was that it causes less toxicity compared to others. Inhibitors of these kinases may therefore be expected to show anti-tumor effect, possibly with fewer side effects than those associated with conventional anticancer chemotherapy [9]. After the imatinib was stopped the patient was then treated with bicalutamide, bicalutamide (Casodex®) is a new non-steroidal anti androgen developed for use in patients with prostate cancer. The efficacy and tolerability of bicalutamide as monotherapy and as combination therapy for patients with advanced prostate cancer have been evaluated in randomized clinical trials [11]. A further area of interest includes hormone therapies such as androgen deprivation therapy (ADT), particularly for Recurrent/Malignant Salivary Duct Carcinomas (R/M SDCs), due to the overexpression of AR. However, AR positivity is no longer a sufficient predictive biomarker of efficacy [12]. Toshiaki et al in his study of hormonal receptor expression in different types of salivary duct carcinoma, included 8 patients with adenoid cystic carcinoma which were completely negative for AR [13]. Immunohistochemical analysis in this case revealed androgen receptor intermediate positivity 7-8%. Given this finding, patient was treated with bicalutamide for 2 years. While a study of a patient with salivary duct carcinoma was given one year treatment with combined bicalutamide and Alpelisib showed best response, the patient was started on tab Alpelisib 300mg and tab bicalutamide 50mg orally daily to target the PIK3CA and AR pathways, respectively. While on Alpelisib, he developed hyperglycemia at 2 weeks of therapy requiring treatment with oral metformin and dose reduction of Alpelisib from 300mg to 250mg and eventually to 200mg orally daily, which was well tolerated. He has been continued on this regimen for the past 12 months, and subsequent scans have shown near-complete metabolic response to treatment with Alpelisib and bicalutamide combination [14]. While Gondivkar SM et al. [13] in his literature review of Adenoid Cystic Carcinoma concluded that Controversy exists regarding the most effective treatment of ACC and there is lack of reliable information about the clinical behavior of ACC in response to treatment. Further clinical trials needed to evaluate the effectiveness of treatment on improving quality of life and survival rates [15,16].

## Conclusion

This case of maxillary sinus adenoid cystic carcinoma demonstrates relentless local progression despite 2 years each of imatinib (disease stabilization) and bicalutamide (transient response), culminating in bilateral cavernous sinus/orbital invasion and carotid encasement-yet no distant metastases by March 2026. While surgery-radiotherapy remains ideal for resectable disease, unresectable scenarios underscore reliance on off-label targeted agents guided by IHC (c-KIT/AR), though responses wane, prompting cytotoxic escalation.

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## Ethical Statement

Written informed consent was obtained from the patient for the publication of this case report.

## Data Availability Statement

All relevant data are included within the article. Further inquiries can be directed to the corresponding author.

## Consent

Written informed consent was taken from the patient to publish this case.

## Funding

No funding was received for this work.

## Conflicts of Interest

The authors declare no conflicts of interest.

## Authors' Contribution

All authors (H.H., H.K.A., M.A.A., A.M., N.P., N.N., G.J., P.S.) contributed to the conception, drafting, and critical revision of the manuscript and approved the final version for submission.

## References

1. Omar TA, El Didi F, Nawar WM (2013) A potential role for sex hormone receptor antagonists in treatment of malignant salivary gland tumours, as compared to breast cancer: A review of literature. Tanta Dental Journal 10(2): 75-85.
2. Monteiro B, Grempel R, Gomes D, Godoy G, Miguel M (2014) Adenoid cystic carcinoma mimicking an oroantral fistula: a case report. International Archives of Otorhinolaryngology 18(2): 221-225.
3. He S, Li P, Zhong Q, Hou L, Yu Z, et al. (2017) Clinicopathologic and prognostic factors in adenoid cystic carcinoma of head and neck minor salivary glands: A clinical analysis of 130 cases. American Journal of Otolaryngology 38(2): 157-162.
4. Koorosh Rahmani, Shokouh Taghipour Zahir, Mohammad Baghi Yazdi, Alireza Navabazam (2017) Aggressive adenoid cystic carcinoma of maxillary sinus in a 43-Year-Old male: Rare case report and review of literature. Case Reports in Medicine 2017: 2324717.
5. Kato H, Kanematsu M, Sakurai K, Mizuta K, Aoki M, et al. (2013) Adenoid cystic carcinoma of the maxillary sinus: CT and MR imaging findings. Jpn J Radiol 31(11): 744-749.
6. Michel G, Joubert M, Delemazure AS, Espitalier F, Durand N, et al. (2013) Adenoid cystic carcinoma of the paranasal sinuses: Retrospective series and review of the literature. European Annals of Otorhinolaryngology, Head and Neck Diseases 130(5): 257-262.
7. Lee YC, Lee TJ, Tsang NM, Huang Y, Hsu CL, et al. (2018) Cavernous sinus involvement is not a risk factor for the primary tumor site treatment outcome of Sinonasal adenoid cystic carcinoma. Journal of Otolaryngology - Head & Neck Surgery 47(1): 12.
8. Moriki T, Ueta S, Takahashi T, Mitani M, Ichien M, et al. (2001) Salivary duct carcinoma: Cytologic characteristics and application of androgen receptor immunostaining for diagnosis. Cancer 93(5): 344-350.
9. Niladri Ghosal, Kathleen Mais, Patrick Shenjere, Julyan P, Hastings D, et al. (2011) Phase II study of cisplatin and imatinib in advanced salivary adenoid cystic carcinoma. British Journal of Oral and Maxillofacial Surgery 49(7): 510-515.
10. Li Y, Hao D, Song X, Zhang C (2021) Computed tomography and magnetic resonance imaging of adenoid cystic carcinoma in the maxillary sinus:

a retrospective study with radiologic-histopathologic correlations. Oral Surg Oral Med Oral Pathol Oral Radiol 31(1): 111-121.

11. Papaspyrou G, Hoch S, Rinaldo A, Rodrigo JP, Takes RP, et al. (2011) Chemotherapy and targeted therapy in adenoid cystic carcinoma of the head and neck: A review. Head Nec 33(6): 905-911.

12. Broseghini E, Carosi F, Berti M, Compagno S, Ghelardini A, et al. (2025) Salivary gland cancers in the era of molecular analysis: The role of tissue and liquid biomarkers. Cancers (Basel) 17(4): 660.

13. Gondivkar SM, Gadbail AR, Chole R, Parikh RV (2011) Adenoid cystic carcinoma: A rare clinical entity and literature review. Oral Oncol 47(4): 231-236.

14. Pfeffer MR, Talmi Y, Catane R, Symon Z, Yosepovitch A, et al. (2007) A phase II study of Imatinib for advanced adenoid cystic carcinoma of head and neck salivary glands. Oral Oncol 43(1): 33-36.

15. Ito FA, Ito K, Coletta RC, Vargas PA, Lopes MA, et al (2009) Immunohistochemical study of androgen, estrogen and progesterone receptors in salivary gland tumors. Braz Oral Res 23(4): 393-398.

16. Sheth H, Kumar P, Shreenivas A, Sambath J, Pragya R, et al. (2021) Excellent response with Alpelisib and bicalutamide for advanced salivary duct carcinoma with PIK3CA mutation and high androgen receptor expression-a case report. JCO Precis Oncol 5: PO.20.00436.