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Mesenchyme Meets Epithelium: Immunohistochemical Challenges in Sarcomatoid Carcinoma

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ABSTRACT

Sarcomatoid carcinomas are biphasic tumors proven to be monoclonal dedifferentiated forms of conventional Squamous Cell Carcinomas which is characterized by a dysplastic epithelial component and a stromal element with invasive fusiform or spindle-shaped cells. The clinical and histopathologic characteristics make it very difficult to distinguish Sarcomatoid Carcinoma from conventional Squamous cell Carcinoma. The present case depicts a 74 year old male patient with a chief complaint of a large, irregular, multilobulated, exophytic soft tissue growth, having brownish black appearence involving bilateral maxillary alveolar ridge and buccal sulcus region since 1month . Incisional biopsy was performed – soft tissue was processed and finally the paraffin block was sent for

immunohistochemical analysis. The dilemma in diagnosis was resolved by microscopic observation of invading atypical epithelial cells into the stroma and the epithelial as well as mesenchymal lineage was confirmed through immunopositivity for Vimentin, CK7 & EMA.

KEYWORDS
Sarcomatoid Carcinoma, Biphasic tumors, Dedifferentiated, Epithelial lineage, Mesenchymal lineage, Immunohistochemistry.

INTRODUCTION

Sarcomatoid carcinoma(SC) is a rare and aggressive variant of Squamous Cell Carcinoma (SCC) characterized by biphasic histological features. This malignancy, first described by Virchow in 1865 as Carcinosarcoma, consists of two distinct cellular components: a squamous cell and a spindle cell .[1] Over the years, it has been given various names, such as Spindle Cell Carcinoma (SPCC), Metaplastic carcinoma, and Carcinosarcoma, with different theories proposed regarding the origin of the spindle cell component. Some suggest that it could be a reactive stromal response, while others propose it may represent a transformation of SCC into a pseudosarcomatous appearance. Alternatively, these tumors also called as collision tumors, where SCC and Sarcoma grow together, or Carcinosarcomas, originating from a single stem cell.[2] Recent molecular studies suggest that these tumors have a monoclonal origin, with differentiation occurring from a non-committed stem cell, which gives rise to both epithelial and mesenchymal components. This emerging evidence supports the unified origin for the tumor's dual components.[12]

The tumor typically presents as a rapidly growing, sessile or pedunculated ,ulcerative mass which commonly affects various sites in the oral cavity which includes tongue, buccal mucosa, gingiva, alveolar mucosa, and palate. Patients may experience symptoms such as pain, swelling, difficulty in chewing or speech disturbances, depending on the tumor's size and location. Given its aggressive nature, SC is associated with poor prognosis due to its high metastatic potential, and it is often associated with risk factors such as smoking, alcohol consumption, and prior radiation exposure.[4,11]

The tumor's heterogeneity, variability in marker expression creates a diagnostic challenge. SC requires careful differentiation from other spindle cell lesions, necessitating a combination of histopathological and immunohistochemical studies for accurate diagnosis. Understanding its biological behavior, genetic profile, and response to therapies is crucial for improving outcomes and guiding effective treatment protocols.[12]

CASE PRESENTATION

A 74 year old male patient from a semiurban area reported with presence of intra oral soft tissue lesions which causes difficulty while having food.

Extra oral examination revealed a diffuse swelling present over bilateral middle third of the face with obliteration of nasolabial fold with slight elevation of right external nares. Intra orally presence of a large, multilobulated dome shaped, brownish black coloured , soft to firm, nontender, haemorrhagic soft tissue lesion occupying left maxillary alveolar ridge involving both dented and edentulous area for last 3 to 4 months in relation to missing 24, 25 and 26.The patient is having a separate mucosal ulcerated lesion over right maxillary attached gingiva in relation to 17 extending upto gingivobuccal sulcus with hemorrhagic areas since 3 to 4 months.

Clinical differential diagnosis was made after gross clinical examination and list are as follows,

1. Melanoma
2. Malignancy
3. Major ulcer.
4. Pyogenic granuloma

Investigations

Panaromic radiograph showed absence of 17,24,25,26,36,43, with diffuse irregular alveolar bone loss.

Chest X ray PA view revealed the evidence of bilateral coarse bronchovascular margin with solitary, large,well defined radiolucent space occupying lesion involving upper and middle lobe of left lung with complete obliteration of left costophrenic angle.

The incisional biopsy was performed from the representative site of the growth under local anesthesia after obtaining written consent from the patient after all the preoperative investigations.

The H and E-stained sections revealed the presence of ovoid to polygonal cells with vesicular to hyperchromatic nuclei, anisonucleosis and bizarre mitosis. The connective tissue appears to be highly cellular and having abundant number of neoplastically altered cells being characterized by pronounced features of cellular and nuclear pleomorphism, nuclear hyperchromatism, cellular atypia with mitotic figure. There is also presence of appreciable amount of focal necrosis and hemorrhagic areas.

IHC panel confirms intense immunoposivity of neoplastically altered malignant cells towards CK7, EMA,Vimentin and negativity towards P 63, Desmin, HMB 45 .
Based on clinico-pathological and immuno-histochemical evaluation the case was confirmly diagnosed as Sarcomatoid Carcinoma.

DISCUSSION

Sarcomatoid Carcinoma (SC) is a rare and aggressive variant of Squamous Cell Carcinoma (SCC) that presents significant challenges in diagnosis and management due to its conglomerated histological features. This overlapping nature of this tumor leads to diagnostic dilemma vis a vis delays in treatment.[5]

Recent studies suggest that SC may have a monoclonal origin, with both epithelial and mesenchymal components arising from a single stem cell. Genetic analyses revealed that SC exhibit a concordant loss of heterozygosity and aneuploidy patterns, which further supports the hypothesis of divergent differentiation within a single tumor. According to the recent review, it was hypothesized that elevated MDM2 expression via gene amplification represented an alternative mechanism to P53 mutation to down regulate the P53 signaling pathway which promote tumour progression in sarcoma. This molecular insight helps to clarify the pathogenesis of SC, providing a deeper understanding of its aggressive nature and the need for targeted therapeutic approaches. [12]

These lesions commonly occurs in middle-aged to elderly individuals, with a male predominance. The age range typically spans from the second to the ninth decade, with a mean age of diagnosis around the fifth decade of life.[2,3] The present case report involves a 74-year-old male, which is consistent with the typical demographic profile for this malignancy.

Sarcomatoid carcinoma of the oral cavity comprises less than 1% of all tumors of the oral cavity Vishwanathan et al.[2] in their study of 103 cases of SC reported an incidence of 17.5% in the larynx and 63.1% in the oral cavity with respect to head and neck region. In oral cavity the most common affected site is the tongue but it can arise in various locations, as demonstrated in this case where the lesion originated from the maxillary alveolar ridge. This atypical presentation demonstrates the variability of SC in terms of anatomical location, further complicating the diagnostic process.

This case report highlights the importance of recognizing the clinical, histopathological, and immunohistochemical features of SC for timely diagnosis and management, particularly when the tumor presents in atypical locations, as seen in this patient.

Clinically, SC presents as a rapidly growing, often ulcerated mass, which may be painful or associated with difficulties in swallowing, chewing and phonation as seen in present case. The patient also exhibited signs of systemic involvement, including lung lesions with obliteration of the left costophrenic angle, indicative of metastasis. These features are consistent with the known aggressive nature of SC, which is characterized by early metastasis and rapid disease progression. SC frequently presents at an advanced stage due to its tendency to rapidly spread to distant sites, which often results in a poor prognosis.[6]

Biopsied tissue sample with H&E-stained sections revealed the presence of ovoid to polygonal cells with vesicular to hyperchromatic nuclei, anisonucleosis and bizarre mitosis. The connective tissue appears to be highly cellular and having abundant number of neoplastically altered cells being characterized by pronounced feature of cellular and nuclear pleomorphism, nuclear hyperchromatism, cellular atypia

with mitotic figure concomitantly there is appreciable amount of focal necrosis and hemorrhage ,further supporting the aggressive behavior of the tumor. These findings are consistent with the histopathological features observed in the present case also.[11]
Though histopathological evaluation remains the gold standard for diagnosing the disease but here this evaluation considered the entire gamut of epitheloid as well as spindle cell malignancies.[7]

Thus, Immunohistochemistry plays a pivotal role in confirming the diagnosis and distinguishing the tumor from other spindle cell tumors. In the present case, the IHC panel showed positive staining for Cytokeratin (CK), Epithelial membrane antigen(EMA) and Vimentin. Positive staining for CK, EMA suggest that the tumor has a epithelial origin .Where as Vimentin positivity depicts it aslo has a mesenchymal lineage. The negative staining for P63, Desmin, HMB45 helped exclude the diagnosis of conventional SCC,Leiomyosarcoma and Melanoma respectively. [1,4]

The differential diagnosis of sarcomatoid carcinoma is broad, encompassing a variety of spindle cell lesions, including Inflammatory Pseudotumors, sarcomas, and other biphasic malignancies. One of the main challenges in diagnosing SC lies in the overlap of histological features with other malignancies. This case exemplifies the diagnostic complexity, as the clinical presentation of hemorrhagic, ulcerated lesions with significant alveolar bone loss could easily be mistaken for other oral cancers. Immunohistochemical markers, such as p63 and HMB45, are crucial in excluding other diagnoses and confirming SC. Furthermore, the exclusion of conventional SCC, as demonstrated in the present case, is vital since treatment strategies differ significantly between these conditions.[6]

The management of sarcomatoid carcinoma remains challenging, particularly given its rarity and aggressive clinical behavior. Surgery is the mainstay of treatment, often in combination with radiotherapy or chemotherapy. However, the effectiveness of radiotherapy as a primary modality has been reported as limited, and the high likelihood of metastasis complicates treatment outcomes. In this case, the radiological evidence of lung metastasis indicates that the patient's disease had progressed significantly, highlighting the poor prognosis typically associated with SC. Literature reports indicate that SCs with minimal carcinomatous components may respond better to sarcoma-directed therapies, as evidenced by studies on metaplastic carcinoma of the breast.However, due to the scarcity of clinical data, further research is needed to refine treatment protocols for SC.

The survival rate of Sarcomatoid Carcinoma is generally considered poor, with a median survival rate around 10 months and a 5-year survival rate estimated at approximately 15% due to its aggressive nature.[9]

Mohsina Hussain et al in a study in the year 2023 repots out of 23 patients with SC,11 patients having survival rate of 8.72 months (ranging from 2 to 18 months).[9]

However, the exact survival rate depends on the location of the tumor, stage at diagnosis, and individual patient factors.
The prognosis of sarcomatoid carcinoma is generally poor due to its high metastatic potential, resistance to conventional therapies, and late-stage presentation at diagnosis. As reported by previous authors SC of the head and neck region is often associated with worse outcomes compared to other SCC variants. Early detection remains the key to improving survival rates, emphasizing the importance of prompt diagnosis and aggressive treatment strategies.[8,9]

Sarcomatoid carcinoma is a rare, aggressive malignancy that poses significant diagnostic and therapeutic challenges. This case revealed the importance of early recognition and the use of advanced diagnostic tools, including histopathological examination and immunohistochemistry, to distinguish SC from other spindle cell neoplasms. [5]

CONCLUSION

Sarcomatoid carcinoma of the oral cavity is a rare and aggressive malignancy, characterized by its unique biphasic histological features and challenging clinical presentation..

The unusual presentation in the maxillary alveolar ridge highlights the tumor's variability in anatomical distribution, emphasizing the need for heightened

clinical suspicion, especially for lesions deviating from conventional locations. The diagnostic complexity is further compounded by its ability to mimic other malignancies, necessitating a thorough combination of histopathological evaluation and immunohistochemical studies to establish a definitive diagnosis.[10]

The aggressive behaviour, evidenced by rapid local invasion and systemic metastasis, presents significant challenges in prognosis and management. As seen in this case, advanced-stage disease at diagnosis often limits therapeutic options and depicted the importance of early detection and prompt intervention.

A multidisciplinary approach, incorporating surgical excision, radiotherapy, and chemotherapy, remains the cornerstone of treatment, though the rarity of sarcomatoid carcinoma limits the availability of standardized protocols. Future advancements in understanding the tumour's biological behaviour and response to therapies may provide new avenues for improving patient outcomes. This case serves as a reminder of the critical role of collaboration among healthcare professionals in navigating the complexities of rare and aggressive malignancies like sarcomatoid carcinoma.

REFERENCES

Mahajan A, Mohanty S, Ghosh S, Urs AB, Khurana N, Gupta S. Sarcomatoid carcinoma of the oral cavity: A diagnostic dilemma. Head Neck Pathol. 2017 Dec;11(4):458-463. doi: 10.1007/s12105-017-0783-x.

Viswanathan S, Rahman K, Pallavi S, Sachin J, Patil A, Chaturvedi P, D'Cruz A, Agarwal J, Kane SV. Sarcomatoid (spindle cell) carcinoma of the head and neck mucosal region: A clinicopathologic review of 103 cases from a tertiary referral cancer centre. Head Neck Pathol. 2010 Dec;4(4):265-275. doi: 10.1007/s12105-010-0204-4.

Ide F, Mishima K, Saito I. Sarcomatoid salivary duct carcinoma of the oral cavity. Virchows Arch. 2003 Aug;443(6):686-689. doi: 10.1007/s00428-003-0876-1.

Huey RW, Makawita S, Xiao L, Matamoros A, Estrella JS, Overman MJ, Varadhachary GR, Raghav K. Sarcomatoid carcinoma presenting as cancers of unknown primary: a clinico pathological portrait. BMC Cancer. 2019 Dec;19:965. doi: 10.1186/s12885-019-6155-6.

Anderson CE, Al-Nafussi A. Spindle cell lesions of the head and neck: An overview and diagnostic approach. Diagn Histopathol. 2009 May;15(5):264-272.

Thompson LDR. Squamous cell carcinoma variants of the head and neck. Curr Diagn Pathol. 2003 Dec;9:384-396.

Kwon GY, Choi YJ, Song MS, Yun KI. Sarcomatoid carcinoma of the mandible: Report of a case. J Korean Assoc Oral Maxillofac Surg. 2010 Aug;36(3):228-232. doi: 10.5125/jkaoms.2010.36.3.228.

Jordan RC, Regezi JA. Oral spindle cell neoplasms: A review of 307 cases. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2003 May;95(5):717-724.

Hussain M, Gandhe S, Menak D, Pawar Y, Dhondge R, Shaikh AA, Roy S, Nagarkar R. Exploring the aggressiveness of sarcomatoid carcinoma of the oral cavity - An institutional experience. Indian J Pathol Microbiol. 2023 Oct;66(4):378-383. doi: 10.1007/s12070-023-03823-0.

Munakata R, Cheng J, Nakajima T, Saku T. Spindle cell carcinoma of the gingiva: Report of an autopsy case. J Oral Pathol Med. 1998 Mar;27(3):180-184.

Barnes L, editor. *Surgical pathology of the head and neck*. 3rd ed. Pittsburgh: University of Pittsburgh Medical Center; 2009.

Sciot R. MDM2 amplified sarcomas: a literature review. *Pathologica.* 2021 Apr;113(2):83–89. doi:10.32074/1591-951X-131. PMID: 33799733; PMCID: PMC8001728.

FIGURE AND LEGENDS

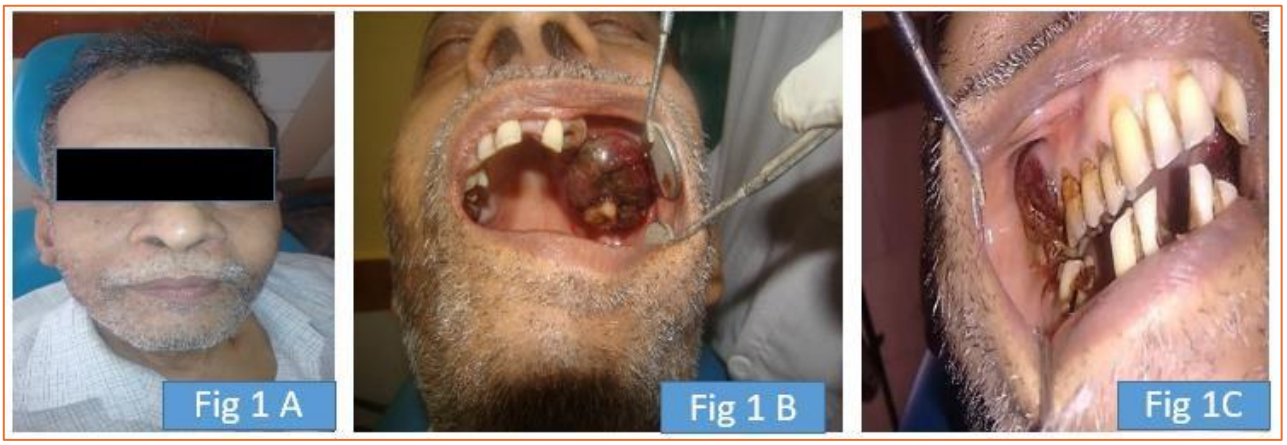

Fig 1A-showing Extra oral profile of the patient with diffuse swelling over middle 3rd of face and obliteration of nasolabial fold with slight elevation of right external nares, Fig 1B and 1C- Intra oral photograph revealed large, multi lobulated dome shaped ,brownish black soft tissue growth occupying left maxillary alveolar ridge and A separate ulcerated growth over right maxillary attached gingiva in relation to 17 extending upto gingiva, buccal sulcus with haemorrhagic areas.

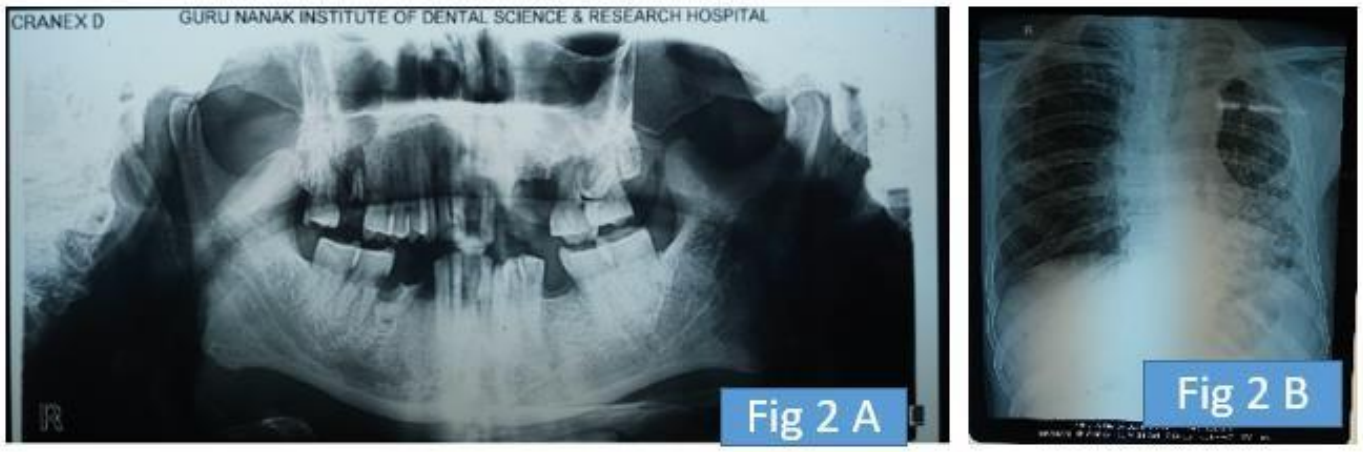

Fig 2A - OPG showing diffuse irregular alveolar bone loss is seen with osteolytic areas in relation to 17,24,25,26, Fig 2B - Chest X ray PA View showing bilateral coarse bronchovascular margin with solitary, large,well defined radio lucent SOL involving upper and middle lobe of left lung – primary or secondary deposit with complete obliteration of left costrofrenic angle

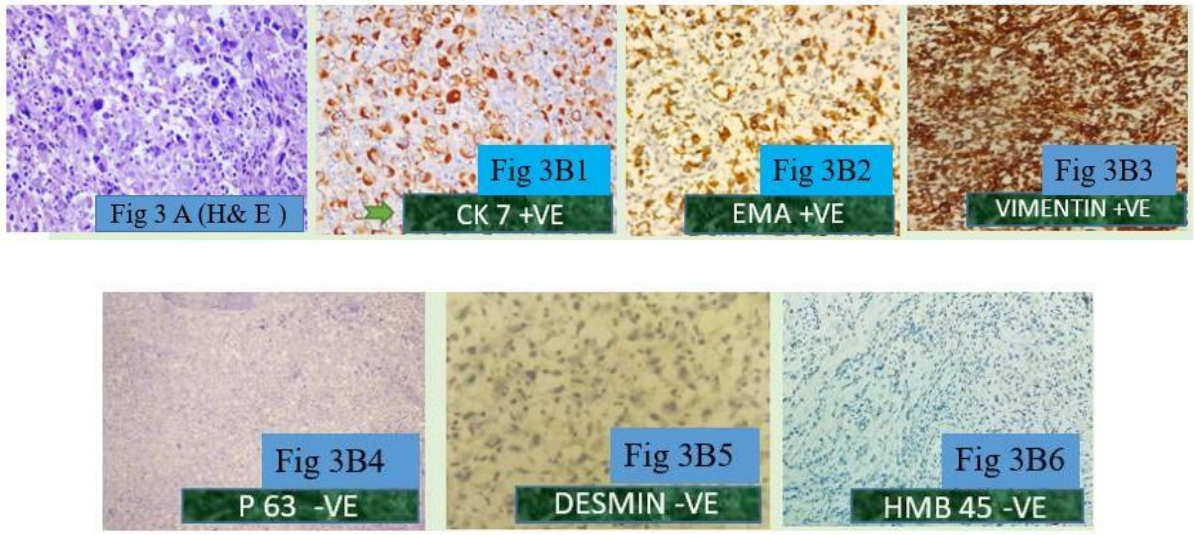

Fig 3A H& E Stained section revealed -ovoid to polygonal epithelial cells with vesicular , hyperchromatic nuclei, anisonucleosis and bizarre mitosis.Connective tissue showed marked cellular and nuclear atypia.Fig 3B1 to 3B6 IHC panel showed intense immunoposivity towards CK 7,EMA, Vimentin and negativity towards P 63,Desmin,HMB 45