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Pulmonary Metastasis of Salivary Duct Carcinoma Diagnosed by FNAC: A Case Report.

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ABSTRACT

Salivary duct carcinoma (SDC) is a rare, aggressive malignancy of the salivary glands, most often arising from the parotid gland and characterized by histologic resemblance to ductal carcinoma of the breast. Although salivary duct carcinoma (SDC) frequently metastasizes to distant organs such as the lungs, liver, and bones, the detection of its pulmonary spread using fine-needle aspiration cytology (FNAC) is exceptionally rare and not well documented in conventional medical literature. We report a case involving a 61-year-old man with a known history of parotid gland malignancy who later presented with a mass located in the perihilar region of the lung. FNAC of the lung lesion revealed cytomorphological features consistent with metastatic SDC, confirmed by immunohistochemistry on cell block prepared. This report underscores the diagnostic utility of FNAC, cell block and immunohistochemical profiling in evaluating lung mass, particularly in patients with a history of high-grade salivary malignancies.

Keywords: Salivary duct carcinoma, FNAC, lung metastasis, cytology, immunohistochemistry, parotid gland carcinoma.

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INTRODUCTION

Salivary duct carcinoma (SDC) is an aggressive epithelial malignancy of the salivary glands, initially characterized by Kleinsasser and colleagues in 1968. It accounts for approximately 1–3% of all salivary gland malignancies, most commonly affecting the parotid gland in elderly males [1, 2].

Due to its aggressive nature, SDC often exhibits perineural invasion, vascular invasion, and early metastasis to regional lymph nodes and distant organs. Among distant metastatic sites, the lungs are frequently involved [3]. However, in most instances, the diagnosis of pulmonary metastasis is made using imaging and biopsy or by cytological evaluation of pleural effusion [4]. The role of FNAC in diagnosing metastatic SDC directly from a pulmonary nodule has not been well documented, and to our knowledge, few to no cases have been reported in the literature.

This report documents a rare case of metastatic SDC diagnosed on FNAC of a solitary lung lesion, supplemented by immunohistochemistry on the cell block prepared, and discusses its cytomorphologic features, differential diagnosis, and importance of clinical correlation.

Case Presentation

A 61-year-old male presented to the pulmonology outpatient clinic with complaints of persistent dry cough, fever, and intermittent right-sided chest discomfort for two months. There was history of low of weight and appetite. There was no history of hemoptysis. His medical history was significant for a high-grade right parotid gland tumor diagnosed five years ago, for which he underwent right extended radical parotidectomy and right modified radical neck dissection followed by adjuvant radiotherapy. Histopathological evaluation had confirmed the diagnosis of salivary duct carcinoma.

On physical examination, the patient was afebrile, and chest auscultation was unremarkable. A high-resolution computed tomography (HRCT) scan of the chest revealed a large right perihilar heterogeneously enhancing pulmonary solid mass lesion measuring approximately 5.9x4 cm involving right upper lobe along with multiple similar masses in the right lung likely bronchogenic carcinoma with evidence of mediastinal lymphadenopathy (Figure 1).

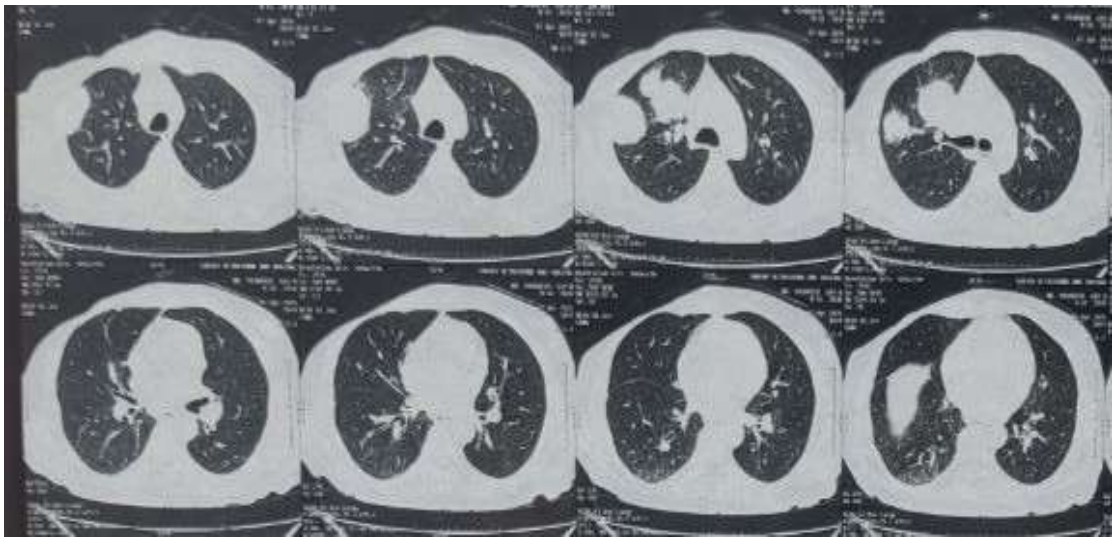

Figure 1: HRCT scan of the chest revealed a large right perihilar heterogeneously enhancing pulmonary solid mass lesion involving right upper lobe.

An ultrasound-guided fine-needle aspiration cytology (FNAC) of the pulmonary mass was carried out using a 22-gauge needle. The aspirate was moderately cellular, and smears stained with hematoxylin and eosin (H&E) and Papanicolaou showed cohesive clusters, diffuse sheets, papillaroid clusters and singly dispersed atypical epithelial cells having high N:C ratio, round to oval overlapping nuclei, prominent nucleoli, and moderate amount of ill-defined cytoplasm. The cytological features were positive for malignancy- poorly differentiated carcinoma (Figure 2).

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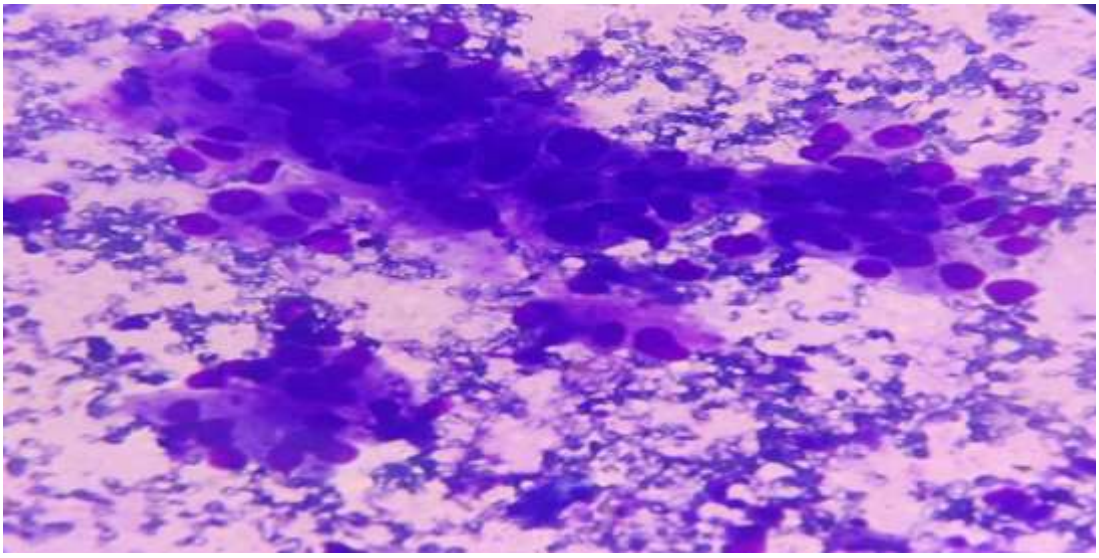

Figure 2: Atypical epithelial cells having high N:C ratio, round to oval overlapping nuclei, prominent nucleoli, and moderate amount of ill-defined cytoplasm (Leishman; 400x).

Given the clinical context, an immunohistochemical panel was performed on cell block sections. Cell block sections show atypical epithelial cells arranged in clusters, diffuse sheets and dispersed singly revealing nuclear pleomorphism, irregular nuclear contour and moderately abundant cytoplasm (Figure 3).

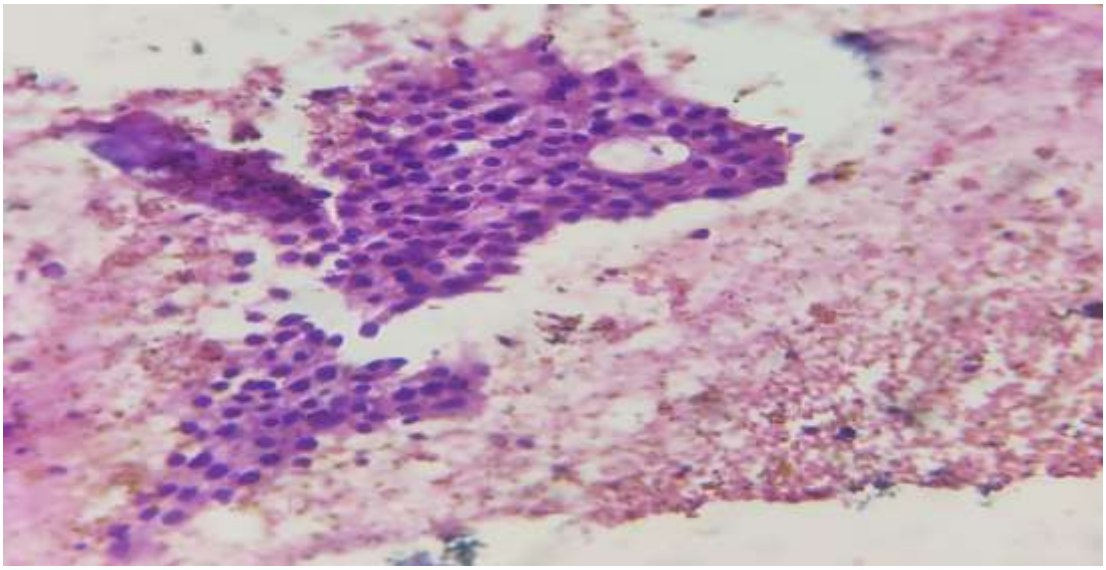

Figure 3: Cell block section shows atpical epithelial cells arranged in clusters, diffuse sheets and dispersed singly revealing nuclear pleomorphism, irregular nuclear contour and moderately abundant cytoplasm (H&E; 400X).

Immunohistochemical analysis revealed that the tumor cells exhibited strong positivity for androgen receptor (AR), HER2, GCDFP-15, and cytokeratin 7 (CK7) (Figure 4). They were negative for thyroid transcription factor-1 (TTF-1), napsin A, and p63. This distinct immunoprofile was consistent with a diagnosis of metastatic salivary duct carcinoma.

So, the final impression rendered was metastatic deposits from salivary duct carcinoma.

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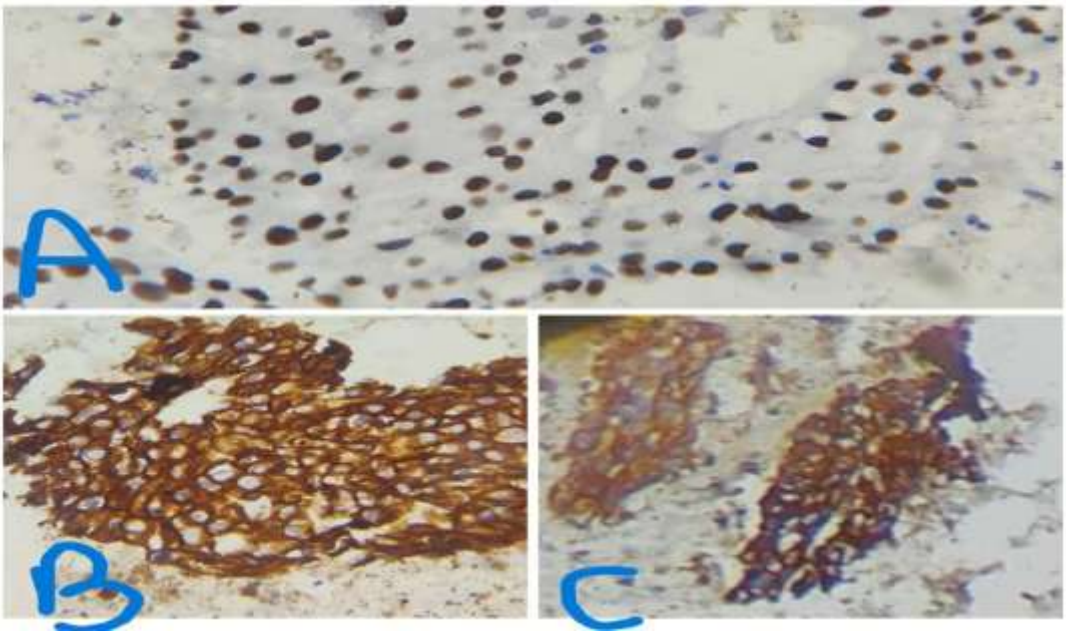

Figure 4 : The tumor cells showed strong positivity for (A) androgen receptor (AR); (B) CK7; and (C) GCDFP-15+ (IHC; 400x).

DISCUSSION

Salivary duct carcinoma is a rare yet highly aggressive tumor arising from the salivary glands. It predominantly arises in the parotid gland and occurs in the sixth to seventh decades of life, showing a strong male predominance [5]. SDC is often diagnosed at an advanced stage due to its rapid growth, tendency for perineural and lymphovascular invasion, and early dissemination [6].

The cytomorphological characteristics of SDC in primary sites include clusters of large epithelial cells with granular cytoplasm, prominent nucleoli, and comedo necrosis. Cribriform and papillary architectures are frequently seen [7].

Pulmonary metastasis of salivary duct carcinoma diagnosed through fine-needle aspiration cytology (FNAC) is exceedingly uncommon. In the few reports available, such metastasis has usually been detected by pleural fluid cytology rather than direct FNAC of pulmonary nodules.[8] Haddad et al. (2018) described metastatic SDC diagnosed in pleural effusion, highlighting features such as three-dimensional clusters, nuclear pleomorphism, and background necrosis [9]. To our knowledge, no prior case has definitively documented lung metastasis of SDC diagnosed via FNAC of a parenchymal lesion.

Immunohistochemistry plays a pivotal role in confirming the diagnosis, especially when evaluating metastatic lesions in the lung. AR and HER2 are frequently expressed in SDC, with GCDFP-15 and GATA-3 serving as additional markers.[10] The absence of TTF-1 and napsin A helps exclude primary pulmonary adenocarcinoma, while negative p63 helps differentiate from squamous cell carcinoma [11].

In this case, the immunoprofile (AR+, HER2+, GCDFP-15+, TTF-1−, p63−) was diagnostic of metastatic SDC.

The cytological differential diagnosis of a pulmonary lesion with these features included Primary lung adenocarcinoma, Metastatic prostate carcinoma and Metastatic SDC. Comprehensive immunohistochemistry with a tailored panel is essential for accurate diagnosis.

Early identification of metastatic SDC is vital for prognosis and treatment planning. Patients with HER2-overexpressing tumors may benefit from trastuzumab-based regimens, and androgen receptor antagonists have also shown efficacy in AR-positive cases [12]. While the role of surgery in lung metastasis remains debatable, systemic therapy remains the mainstay in disseminated disease.

Our case illustrates that FNAC, coupled with immunohistochemistry, can be an effective diagnostic tool for pulmonary metastasis of SDC, especially in patients with a known history of salivary gland malignancy.

CONCLUSION

Metastasis of salivary duct carcinoma to the lung is not uncommon, but its diagnosis through FNAC of a lung mass is exceedingly rare. This case highlights the diagnostic utility of FNAC and immunohistochemistry in such rare scenarios. Awareness of this possibility among cytopathologists is essential, especially in patients with a history of SDC. Accurate cytologic diagnosis facilitates timely and appropriate therapeutic interventions.

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