SAGE Open Medical Case Reports
Volume 6: 1–5

DOI: 10.1177/2050313X18780842
journals.sagepub.com/home/sco
SAGE

Myoepithelial carcinoma of the parotid gland: A case of adequate fine-needle aspiration cytology specimens rendering a conclusive diagnosis possible

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Abstract

An 80-year-old male presented with a history of a hard right parotid mass that had gradually increased in size, with subsequent facial paralysis. A fine-needle aspiration biopsy was performed. The cytologic specimens contained a substantial number of sheet-like clusters or small groups of a mixture of plasmacytoid, oval to spindled, or large epithelioid cells having hyperchromatic pleomorphic nuclei, abundant cytoplasm with occasional inclusion body-like materials, and prominent nucleoli, in a relatively clear background. We first interpreted it as a carcinoma, suggestive of myoepithelial differentiation. Radical parotidectomy was performed, and a gross examination of the neoplasm revealed a non-capsulated and ill-defined tumor lesion, with a grayish or yellowish cut surface, associated with fat invasion. On a microscopic examination, the tumor was predominantly composed of the solid proliferation of atypical cells including a mixture of oval to spindled, plasmacytoid, or epithelioid cells, often arranged in a trabecular and reticular growth pattern with patchy eosinophilic hyalinized stroma. Immunohistochemistry showed that the carcinoma cells were specifically positive for p63, cytokeratins, and vimentin. Finally, electron microscopy demonstrated that their phenotype was consistent with a myoepithelial origin containing many bundles of variably thin actin filaments. Therefore, we finally made a diagnosis of myoepithelial carcinoma, defined as the malignant counterpart of benign myoepithelioma. We should be aware that owing to its characteristic cytological features, cytopathologists may be able to make a correct diagnosis of myoepithelial carcinoma, based on multiple and adequate samplings.

Keywords

Myoepithelial carcinoma, parotid gland, cytopathology, myoepithelioma

Date received: 6 April 2018; accepted: 14 May 2018

Introduction

Myoepithelial carcinoma (MC) is very rare among epithelial salivary gland neoplasms and accounts for less than 1% of cases, although it might be more common than generally believed.[1,2] MC of the salivary gland is defined as the malignant counterpart of benign myoepithelioma, displaying exclusively myoepithelial differentiation,[1] and often poses a diagnostic challenge to clinicians and cytopathologists, since its entity is much more difficult to diagnose pre-operatively on small, inadequate samples. Indeed, the World Health Organization (WHO) classification in 2005 simply defined MC as an infiltrative myoepithelial neoplasm, morphologically

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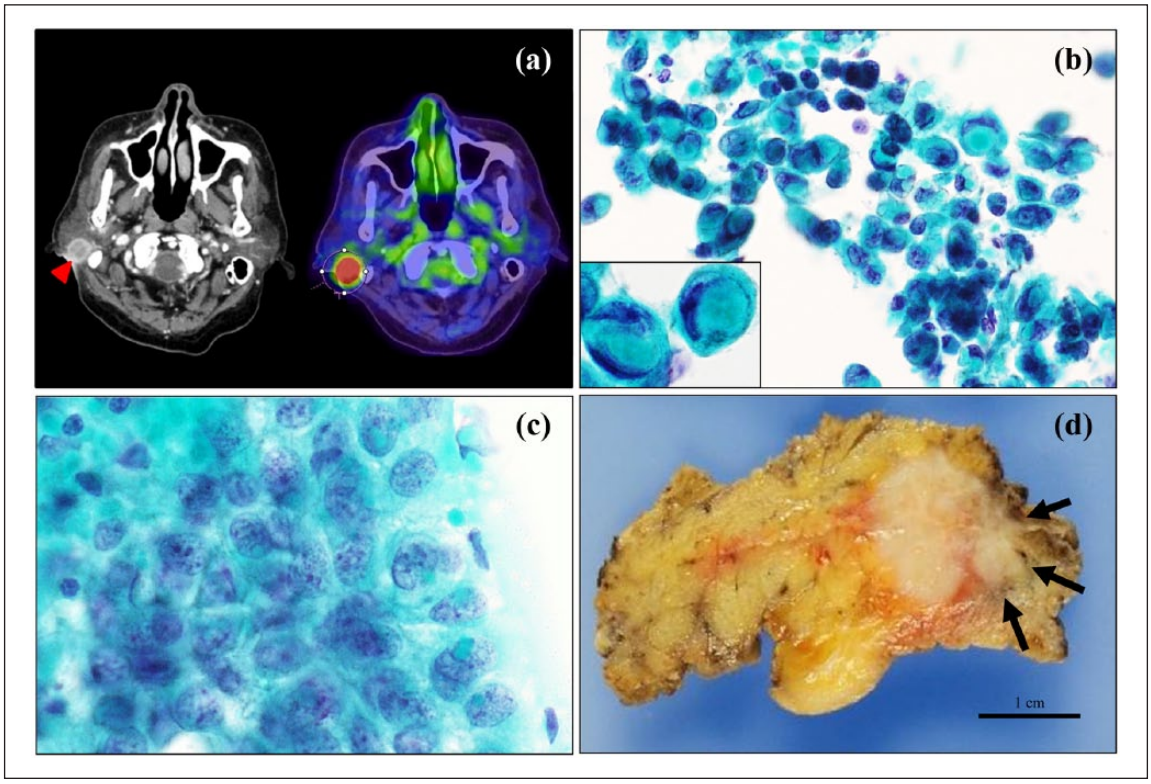

Figure 1. The findings of neck CT and ^{18}F-FDG PET/CT at surgery, FNA cytomorphologic, and gross examinations of the MC specimens. (a) Neck CT (left) shows an enhanced and relatively well-demarcated nodule with a central low-density area, measuring approximately 22 mm × 18 mm in diameter, arising from the right parotid gland (arrowhead). An axial maximum intensity projection image on coregistered ^{18}F-FDG PET/CT (right) shows an overtly hypermetabolic area in the right parotid gland, corresponding to the neck CT finding. (b) The FNA cytology specimen (Papanicolaou staining) contains a substantial number of small groups or single cells of a mixture of plasmacytoid (inset), oval to spindled, or large epithelioid cells having hyperchromatic pleomorphic nuclei, abundant cytoplasm with occasional inclusion body-like materials, and prominent nucleoli, in a relatively clear background. Original magnification: ×400. (c) Furthermore, the FNA cytology (Papanicolaou staining) shows a substantial number of sheet-like clusters of atypical myoepithelial-like cells. Original magnification: ×400. (d) A gross examination from the surgical specimen shows a non-capsulated and ill-defined tumor lesion with a grayish to yellowish cut surface, measuring 18 mm × 16 mm in diameter, partly associated with surrounding fat invasion (arrows). Bar = 1 cm.

and cytopathologically similar to myoepithelioma in part.[2] Furthermore, MC typically presents as an asymptomatic mass, like myoepithelioma, until it displays wide growth with subsequent facial paralysis. Patients with MC tend to develop metastasis due to infiltrative, progressive, and locally destructive behavior.[1–3] Therefore, an early accurate diagnosis and radical surgical treatment for MC should allow for an improved quality of life and increased survival rates.[3,4] However, very few reports have described the cytological features of MC and/or myoepithelioma on fine-needle aspiration (FNA) specimens.

We herein report an extremely rare case of MC originated from the parotid gland, potentially rendering conclusive diagnosis possible on adequate FNA cytology specimens.

Case presentation

A male patient in his early 80s with double primary colonic and prostatic adenocarcinomas 4 and 2 years ago, respectively, had a chief complaint of a gradual increase in size of a hard mass of the right parotid gland with subsequent facial paralysis. Laboratory data, including blood cell count, blood chemistry, and tumor markers, were within normal limits, with the exception of mildly decreased total protein (6.2 g/dL) level and white blood cell count (4100/μL). Neck computed tomography (CT) showed an enhanced and relatively well-demarcated nodule with a central low-density area, measuring approximately 22 mm × 18 mm in diameter, arising from the right parotid gland (Figure 1(a)). Full-body CT revealed no definite evidence of metastases or neoplastic foci in the lymph nodes or other organs. In addition, an axial maximum intensity projection (Figure 1(b)) image on a coregistered ^{18}F-FDG positron emission tomography (PET)/CT revealed an overtly hypermetabolic area in the right parotid gland, corresponding to the above neck CT finding. The specimen from the FNA cytology sample (Figure 1(b) and (c)) contained a substantial number of small groups, single cells (Figure 1(b)), or sheet-like clusters (Figure 1(c)) of a mixture of plasmacytoid, oval to spindled, or large epithelioid cells having hyperchromatic

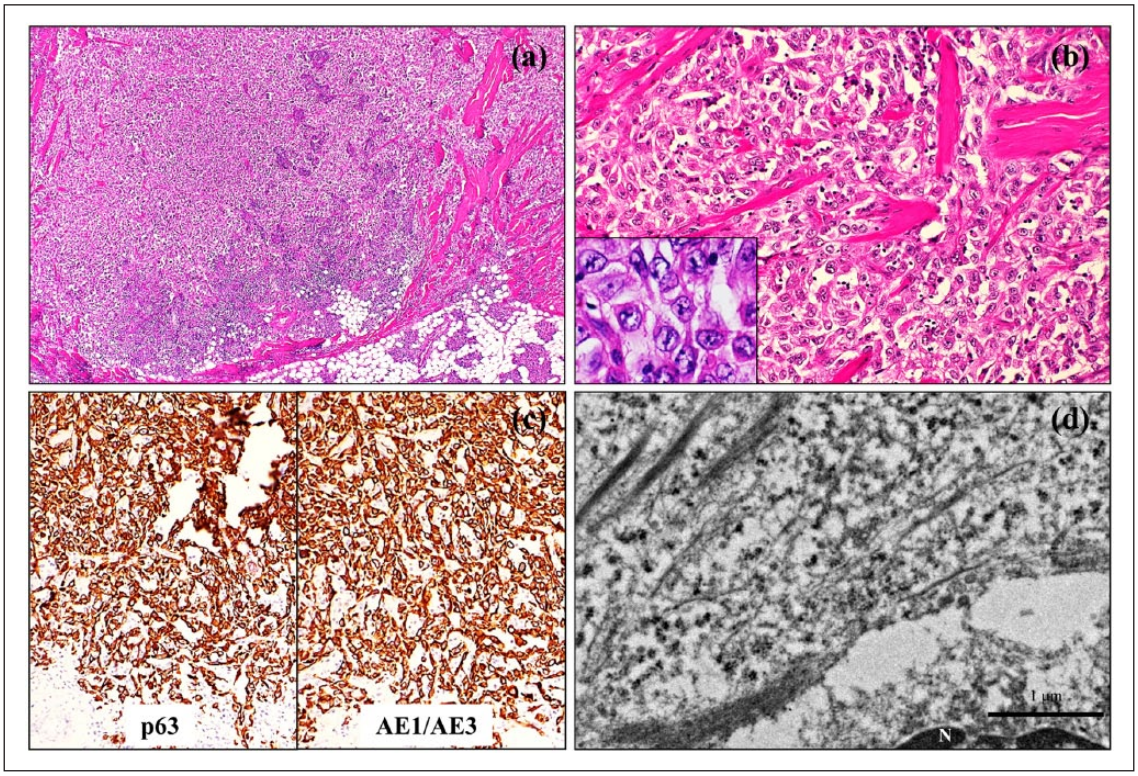

Figure 2. Microscopic and ultrastructural examinations of the parotid gland MC. (a) Microscopically, this tumor is predominantly composed of the solid proliferation of atypical cells, involving the surrounding fat. Original magnification: ×40. (b) Those proliferating tumor nests contain a mixture of oval to spindled, plasmacytoid, or epithelioid cells, often arranged in a trabecular and reticular growth pattern with a patchy eosinophilic hyalinized stroma. On a high-power view, the neoplastic cells have medium-sized, hyperchromatic and enlarged nuclei, often conspicuous nucleoli, and abundant clear to eosinophilic cytoplasm (inset). Original magnification: ×200 (inset, ×400). (c) Immunohistochemical findings show that those carcinoma cells are specifically and diffusely positive for p63 (left) and cytokeratins, including AE1/AE3 (right). Original magnification: ×100. (d) Electron microscopy shows that the phenotype of the carcinoma cells exhibits myoepithelial differentiation, containing many bundles of variably thin actin filaments. Bar = 1 μm. N: nucleus.

pleomorphic nuclei, abundant cytoplasm with occasional inclusion body-like materials, and prominent nucleoli, in a relatively clear background, on Papanicolaou stain (Figure 1(b)). There was no definite evidence of a necrotic or hemorrhagic background. Giemsa staining showed no metachromatic stroma. We first interpreted this picture as indicating carcinoma, suggestive of myoepithelial differentiation. Radical parotidectomy was thus performed, and a gross examination revealed a non-capsulated and ill-defined tumor lesion with a grayish to yellowish cut surface, measuring 18 mm × 16 mm in diameter, partly associated with surrounding fat invasion (Figure 1(d)). Resection was deemed likely to be complete by this histopathological examination.

Microscopically, the tumor was predominantly composed of a solid proliferation of atypical cells (Figure 2(a)) including a mixture of oval to spindled, plasmacytoid, or epithelioid cells, often arranged in a trabecular and reticular growth pattern with a patchy eosinophilic hyalinized stroma (Figure 2(b)). On a high-power view, these neoplastic cells had medium-sized, hyperchromatic and enlarged nuclei, often conspicuous nucleoli, and abundant clear to eosinophilic cytoplasm (Figure 2(b)). Mitotic figures were rarely encountered. Furthermore, these tumor nests partly invaded the surrounding fat but there was no perineural infiltration (Figure 2(a)). Immunohistochemical findings showed that the carcinoma cells were specifically and diffusely positive for p63 (Figure 2(c)), cytokeratins, including AE1/AE3 (Figure 2(c)) and CK5/6, and vimentin, whereas they were negative for epithelial membranous antigen (EMA), low-weight cytokeratin (Cam5.2), S-100 protein, α-smooth muscle actin (α-SMA), bcl-2, and CEA. The Ki67 (MIB-1) labeling index was approximately 15% in the proliferating atypical cells of the tumor nests. Electron microscopy showed that this phenotype was consistent with myoepithelial differentiation, as many bundles of variably thin actin filaments were observed (Figure 2(d)).

Based on these features, we ultimately made a diagnosis of MC, arising from the right parotid gland. No overt benign pleomorphic adenoma components were noted in our thorough investigation. To date, we have completed approximately 1 year of routine follow-up since the surgery, and the patient remains well without recurrences or metastases.

Discussion

Since the overall biological behavior of MCs of the salivary glands is generally poor, aggressive clinical treatment in the early stage is the only hope for a good prognosis, owing to the higher-grade, and infiltrative and destructive nature of the tumor with frequent recurrences and distant metastases to the lung.[1–5] It is therefore critical to establish an accurate preoperative diagnosis by FNA cytology, which has shown good clinical utility for diagnosing salivary gland tumors. However, the cytological features of MCs have rarely been described in detail in the published literature, due to the rarity of these lesions, accounting for less than 1% of all epithelial salivary gland neoplasms.[1–3] To our knowledge, this is only the second case report of MC, with a focus on its cytomorphologic findings,[6] although there have been some cytopathological review papers of MC.[7,8]

The cytological features of MCs variably reflect the histopathological ones and are typically diverse at times lacking malignant characteristics.[1,6–8] FNA cytologically shows small to large clusters or single cells of spindled, plasmacytoid, epithelioid, or clear cells, or a mixture of these cells, suggestive of myoepithelial differentiation.[1,2,6–8] These tumor clusters/cells display the presence and/or absence of significant nuclear hyperchromatism and pleomorphism or abnormal mitotic figures, along with scant to abundant fragments of metachromatic stroma, often without any evidence of necrosis or hemorrhaging.[1,6–8] In this context, not only myoepithelioma but also cellular pleomorphic adenoma should be included in the differential diagnoses of MC. Furthermore, epi-myoepithelial carcinoma is another important differential diagnosis, but its cytology findings are considered to show bimodal population of large clear myoepithelial cells and small cuboidal ductal cells, forming tubular, trabecular, and/or pseudopapillary structures, with the occasional absence of metachromatic stroma.[1,6] As in the present case, since the specimens were adequate, the cytologic features were similar to those of MC, as described above, even though benign myoepitheliomatous foci or stromal fragments have very rarely been reported. However, a conclusive and accurate diagnosis of MC after distinguishing from myoepithelioma based on cytology alone might be impossible to achieve due to cytomorphologic variety, sampling errors, a lack of considerable experience, and/or misinterpretation. Therefore, in any cases with a strong clinical suspicion of malignant salivary gland tumors, multiple rounds of CT-guided (if possible) FNA cytology should be performed and that suspicion should be raised to alert the cytopathologists, at the very least.

Finally, the findings of the current immunohistochemical analyses suggest that immunostaining for specific myoepithelial markers, such as p63, along with MIB-1 labeling indices on cytological smears or cell block preparations might be useful for the differential diagnosis with myoepithelioma, pleomorphic adenoma, or epi-myoepithelial carcinoma.

Conclusion

We encountered a case of MC arising from the parotid gland, tentatively diagnosed as a carcinoma, suggestive of myoepithelial differentiation, on the examination of FNA samples cytology. All cytopathologists should be aware that not only the clinicopathological characteristic feature but also multiple, adequate FNA specimens might lead to a correct and conclusive diagnosis. Further cytomorphological studies with the collection and examination of a larger number of MC cases will be further required to determine whether or not cytology specimens alone can distinguish MC from other important salivary gland tumors.

Acknowledgements

The authors would like to thank Dr Toshitaka Nagao, Department of Anatomic Pathology, Tokyo Medical University, Tokyo, Japan, for his constructive and helpful suggestions/comments and correct diagnosis, and they would also like to thank Mrs Yuka Hiramatsu for her expert technical assistance.

Availability of data and materials

The data set supporting the findings and conclusions of this case report is included within the article.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

Our institution does not require ethical approval for reporting individual cases or case series.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Informed consent

Written informed consent was obtained from the patient on admission for his anonymized information to be published in this article.

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