Case Report

Ameloblastic carcinoma ex ameloblastoma of the maxilla

Theerachai Kosanwat, Sopee Poomsawat, Rachai Juengsomjit

Department of Oral and Maxillofacial Pathology, Faculty of Dentistry, Mahidol University, Bangkok, Thailand

Abstract

Ameloblastic carcinoma (AC) is a rare malignant odontogenic tumor. Approximately 138 cases were reported. The majority of these cases occurred in the mandible. Only 57 cases were located in the maxilla. Most of AC cases occur in a primary type. Little is known about AC secondary type (dedifferentiated) since only six cases have been reported. All of previous six cases occurred in the mandible. Here, we presented the first case of maxillary AC secondary type (dedifferentiated) in a 46-year-old female. The first excisional biopsy was diagnosed as basal cell ameloblastoma. Then, the patient underwent partial maxillectomy. A recurrence occurred 17 months later. At this time, tumor cells with cytological atypia were clearly detected. A diagnosis of AC was rendered. Two years later, the patient suffered from another recurrence and received a wide excision with a diagnosis of AC. We considered our case as AC secondary type (dedifferentiated). We discussed the histopathological findings that may be helpful in making a diagnosis of AC. In addition, we consider that the basaloid pattern may be related to malignant transformation in ameloblastoma.

Keywords: Ameloblastic carcinoma, basal cell pattern, clear cell, dedifferentiated, maxilla

Address for correspondence: Theerachai Kosanwat, Lecturer, Department of Oral and Maxillofacial Pathology, Faculty of Dentistry, Mahidol University, Bangkok, Thailand.
E-mail: theerachai.kos@mahidol.ac.th
Received: 05.06.2017, **Accepted:** 17.07.2018

INTRODUCTION

Ameloblastic carcinoma (AC) is a rare malignant odontogenic tumor. It can occur as a primary type that develops *de novo* or as a secondary type (dedifferentiated) that develops from preexisting ameloblastoma.[1] Most ACs occur in the posterior mandible, but about one-third of cases were found in the maxilla.[2-4] Patients vary in age from 4 to 90 years old with an average age of 44 years old. The male-to-female ratio was 1.75:1.[4] Common clinical sign of AC is rapid swelling.[5-9] Histopathological features of AC combine the characteristics of ameloblastoma with atypical cytology.[1,7,10]

The majority of AC appears to be of the primary type.[11-15] Little is known about AC secondary type (dedifferentiated) since only six cases have been reported.[11-13,15] All of previous six cases occurred in the mandible. This article presented a case of AC occurring in the maxilla. This case was previously diagnosed as ameloblastoma 17 months ago. We, therefore, regarded our case as AC secondary type (dedifferentiated). We also described the details regarding the histopathological features of the first excisional biopsy of ameloblastoma and the recurrent AC. Because the histopathological features of the first excisional biopsy were consistent with ameloblastoma with basal cell pattern, we consider that the basaloid appearance may be related to malignant transformation in ameloblastoma.

CASE REPORT

A 46-year-old female was referred to the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry,

Access this article online

Quick Response Code:

Website: www.jomfp.in

DOI: 10.4103/jomfp.JOMFP_116_17

How to cite this article: Kosanwat T, Poomsawat S, Juengsomjit R. Ameloblastic carcinoma ex ameloblastoma of the maxilla. J Oral Maxillofac Pathol 2019;23:S58-62.

Mahidol University, for an evaluation of a swelling left cheek with intermittent pain and numbness of the upper lip. Patients observed a swelling extending from the left lower canthus (the corner of the eye) to the left cheek approximately 6 months ago. Furthermore, blurred vision was experienced.

Extraoral examination revealed a swelling at the left cheek, left inferior concha and alar of nose. This swelling was rubbery in consistency. Left upper lip had tenderness. The lymph nodes were within normal limit.

Intraoral examination revealed buccal and palatal swelling of the maxilla. Buccal swelling extended from tooth number 11 to the left tuberosity, whereas palatal swelling involved approximately three-fourth of the palate. The covering mucosa was normal. The area of teeth number 21–24 was an edentulous area. Teeth number 11, 12, 25, 26 and 27 had first to second degree mobility and were positive to electric pulp test.

Radiographic examination with periapical and panoramic films showed a destruction of alveolar bone of teeth number 11, 12 and 25. Water's radiograph revealed that a left maxillary sinus was unclear, but the wall of the sinus could be traced. Under anesthesia, an incisional biopsy was performed.

Histopathological examination demonstrated a submucosal mass in a mature collagenous fibrous connective tissue covered by parakeratinized stratified squamous epithelium. The odontogenic epithelial tumor cells were arranged in follicle and cord patterns. Individual tumor island or cord consisted of two cellular features. The peripheral cells were cuboidal or columnar cells with reversed nuclear polarization and nuclear palisading. The central cells were basaloid cells with hyperchromatic nuclei and scant cytoplasm. Mitotic activities of these basaloid cells can be observed. Squamous metaplasia was detected in a few islands. Based on these microscopic features, the diagnosis of ameloblastoma with basal cell pattern was made.

The treatment plan of this lesion was partial maxillectomy under sedation. The essential histopathological features of the excisional biopsy were similar to the incisional biopsy. Generally, ameloblastomatous tumor cells were arranged in a follicular pattern. Ameloblast-like cells at the periphery of the islands were obviously observed. Most of the central cells were basaloid cells, whereas central stellate reticulum-like cells were occasionally noted [Figure 1a and b]. Therefore, the histopathological diagnosis of ameloblastoma with basal cell pattern was rendered.

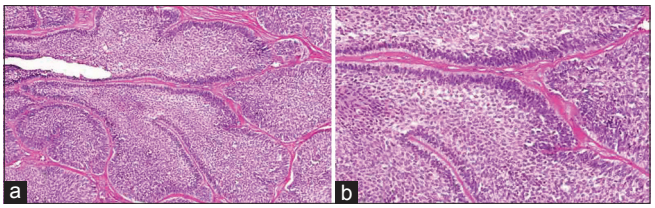

Figure 1: Histopathological examinations of H&E-stained sections (a) this tumor consists of several islands of ameloblastic epithelium in a scant fibrous connective tissue (b) the peripheral tumor cells are columnar cells with reversed nuclear polarization, nuclear palisading, whereas central tumor cells are basaloid cells ([a] ×50; [b] ×100)

After follow-up for 17 months, a prosthodontist referred this patient back to the Department of Oral and Maxillofacial Surgery to evaluate the two nodules at the left nasal cavity and left maxillary sinus. These masses were red in color and soft in consistency. Under local anesthesia, an incisional biopsy was generated.

Histopathological examination of the first recurrence revealed that the majority of the tumor islands resemble basaloid ameloblastoma. However, in some areas, atypical tumor cells showing cellular pleomorphism and nuclear hyperchromatism were detected [Figure 2a and b]. Occasionally, low columnar or cuboidal cells arranging themselves in duct-like patterns were observed. In some tumor islands, eosinophilic hyalinized materials and squamous metaplasia were found. Therefore, the diagnosis of this incisional biopsy was AC. Then, wide excision was performed. Histopathological features of an excisional biopsy were similar to incisional biopsy. However, many clear cells were observed. Mitotic activities were more frequently noted. In addition, invasion of cartilage by tumor cells was detected [Figure 2b]. Therefore, a diagnosis of AC was confirmed.

After 2 years, patient returned to the Department of Oral and Maxillofacial Surgery because of swelling above the left lower eyelid and cheek. The swelling was soft in consistency without tenderness. The lymph nodes were within normal limit. Endoscopy revealed a slough tissue at the nasal cavity and in the left maxillary sinus.

Radiographic examination with Water's view revealed homogeneous radiopaque mass at the nasal cavity and in the left maxillary sinus. Computer tomography revealed that the tumor mass destroyed both lateral and inferior walls of the left orbit as well as the lateral oblique muscle. Tumor mass also compressed a left orbit and pushed it anteriorly [Figure 3a and b]. Treatment plan was wide excision with suprahyoid neck dissection and reconstruction with radial forearm free flap. Histopathological examination of excisional tissue confirmed a diagnosis of AC. The patient is still alive 7 years postoperatively.

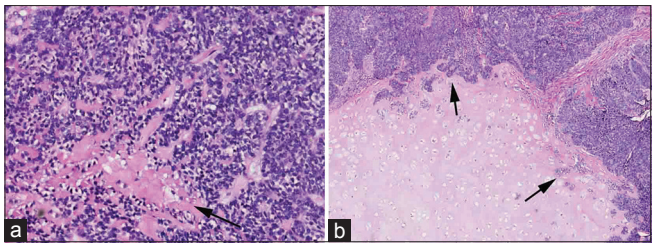

Figure 2: Histopathological examinations of H&E-stained sections (a) this area shows that tumor cells with nuclear hyperchromatism do not arrange themselves in a follicular pattern. Eosinophilic hyalinized materials (arrow) are detected (b) tumor cells (arrows) invade into the cartilage ([a] ×200; [b] ×50)

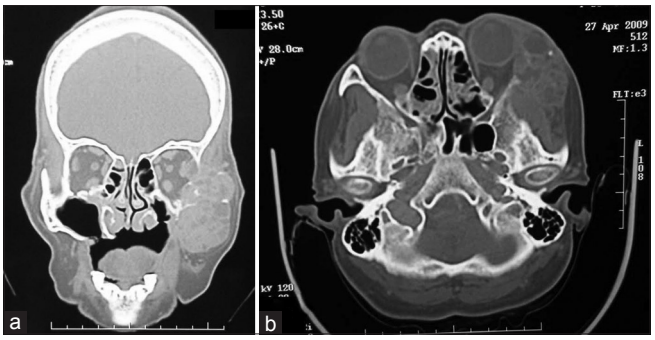

Figure 3: Computed tomography images showing (a) tumor mass destructs both lateral and inferior wall of a left orbit (bone window, coronal view). (b) Tumor mass invades left lateral oblique muscle and push left orbit anteriorly (bone window, axial view)

DISCUSSION

In this report, we presented a case of AC occurring in the maxilla of a 46-year-old female. We considered that this case was AC secondary type (dedifferentiated) because our case was initially diagnosed as ameloblastoma with basal cell pattern. Approximately 138 cases of AC were reported. Most cases were found in the mandible. Maxillary involvement was uncommon.[3] At present, 57 cases of AC in the maxilla were found.[16] Most of AC cases occurred as a primary type. Only six cases were the secondary type (dedifferentiated) and all of them occurring in the mandible. Here, we present the first case of AC secondary type (dedifferentiated) occurring in the maxilla.

According to English-language literature, six cases of AC secondary type (dedifferentiated) were found.[11-13,15,17] The age range for the patients was between 17 and 75 years old. Male-to-female ratio was 2:1. As mentioned earlier, all six cases occurred in the mandible. Two cases of them developed in preexisting ameloblastoma.[13,17] Similar to our case that tumor developed after one recurrence, the other four cases of AC arose after single or multiple recurrences of ameloblastoma.[11,12,15,17] We, therefore, attempted to compare the details of the histopathological features of our case with these four cases. Unfortunately, the information was very limited. There was one case that the patient did not receive the first biopsy. The tumor recurred after the patient had undergone radium therapy for 3 years.[17] For the other three cases, the histopathological features of the first biopsy were not described. Only the diagnoses were given. They were consistent with conventional type ameloblastoma,[12] plexiform ameloblastoma with granular cell component,[11] and ameloblastoma with an atypical component.[15] In the present case, the histopathological features of the first excisional biopsy were consistent with ameloblastoma with basal cell pattern. The basal cell pattern was a rare variant of ameloblastoma.[10] In our case, most tumor cells were basaloid in appearance. They were arranged in island and cord patterns. Only some tumor cells showed large and hyperchromatic nuclei. Mitotic figures were occasionally detected. Atypical cytology or abnormal growth pattern was not found. Therefore, it was diagnosed as ameloblastoma with basal cell pattern. Interestingly, it has been reported that the early transition stage of the secondary (dedifferentiated) AC is the presence of basaloid cells in the area of stellate reticulum structure.[1] The characteristic was also observed in our case. Therefore, pathologists should be aware of the basaloid cell in ameloblastoma and pay more attention to investigate atypical cytological features. We also consider that the basaloid pattern may be related to malignant transformation in ameloblastoma.

Generally, the histopathological features of AC are characterized by malignant cytological features in combination with the overall histopathological pattern of ameloblastoma. A tall columnar cellular morphology with pleomorphism, mitotic activity, focal necrosis, perineural invasion and nuclear hyperchromatism may be present. Peripheral palisading, with reverse or inverted nuclear polarity, is present. A stellate reticulum structure is usually found.[1] In two large series of AC, the presence of clear cell, hyalinization material, hypercellularity and closely packed basaloid cell were frequently observed.[7,18] However, since many of these features are not seen in the same tumor and no single histopathological feature can be used to identify AC,[18] it is sometimes difficult to make a diagnosis of this tumor. Moreover, AC may histopathologically resemble many tumors such as squamous odontogenic tumor,[1,4,8] intraosseous squamous cell carcinoma,[1,3,4] clear cell odontogenic carcinoma,[1,7,18] metastatic tumor containing clear cell,[1,7] or even ameloblastoma which may show some mitotic figures.[2,18]

Practically, to distinguish AC from ameloblastoma may be difficult, particularly in an AC that shows only the focal area of cytological atypia. Therefore, pathologists must

thoroughly examine many sections of the excised tumor. Many studies demonstrated that some markers in the immunohistochemistry may be helpful in the differential diagnosis of ACs.[2,18-20] For example, ACs showed high expression of CK18, CK19, p16, p53 and Ki-67 compared with ameloblastomas.[18] However, more cases are still needed to draw this conclusion.

In the first recurrence of our case, important histopathological features including the presence of clear cell, hyalinized material and nuclear hyperchromatism were clearly observed in the excised specimen. Importantly, invasion of cartilage was clearly seen. Therefore, a diagnosis of AC was made at this time. Two studies reported that clear cells were commonly found in AC.[7,18] Hall *et al*. found that clear cells were noted in 9/14 cases.[7] In support of Hall *et al*.'s work, Loyola *et al*. showed 11/17 cases of AC containing clear cells.[18] Hall *et al*. proposed that the presence of clear cells (>15% of tumor cells) strongly suggests the diagnosis of AC.[7] In addition to the presence of clear cells, other common histopathological findings in AC were hypercellularity, hyalinization in the stroma, closely pack basaloid cells and pseudosarcomatous or undifferentiated cells of the central cells.[7,18]

The patient of this report has suffered from two recurrences. One of the important factors that contribute to its recurrence is the maxillary location. Because the proximity of maxilla to vital structures including the orbit, cranial base and pterygomaxillary fossa, causes difficulty for surgeon to gain a good access or obtain clear surgical margins.[1] The histopathological features of this case may also play a role in the recurrences. A number of clear cells were found in this case. Our findings are in line with Hall *et al*.'s study which observed that patients with clear cells had more recurrences of tumors than patients without clear cells. Moreover, 75% of the patients who died of tumor had clear cells.[7]

The treatment of AC is still controversial because of its rarity. Although there is no consensus on the treatment,[6,8,9,16] the "radical" surgery, resection with 2–3 cm bone margins, is the current modality for the treatment of AC.[4,21] McClary *et al*. studied various treatment procedures of AC in 59 cases. They reported that the recurrent rate of patients treated by surgical therapy alone was not different from those of patients treated with surgery with adjuvant radiation.[21] However, some authors described that radiotherapy may be beneficial for postoperative patients who have locally recurred or those with residual disease after resection.[17,22-24] The role of chemotherapy in AC remains unclear.[6,20] The prognosis of AC is poor. The recurrent rate was 50%–90%, whereas the metastatic rate has been reported about 30%. The most common site of metastasis is the lung, but brain or bone has also been reported.[4,8,21-23] Close periodic reassessment with follow-up at least 10 years is recommended.[4]

CONCLUSION

We presented a case of AC occurring in the maxilla. Histopathological diagnosis of AC is challenging because it shows a wide spectrum of microscopic features. Mixture of benign and malignant areas may be presented within the same tumor. Nevertheless, some histopathological features, including hypercellularity, increasing in mitotic activity and presence of clear cells or basaloid cells, may suggest a diagnosis of AC. In addition, the presence of clear cells in this present case may contribute to aggressive behavior. The treatment guideline of diagnosis and treatment of AC still remains elusive due to its rarity. Thus, more cases of AC are needed to be documented.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Acknowledgment

We would like to thank Associate Professor Dr. Suchaya Pornprasertsuk-Damrongsri for radiographic interpretation.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Barnes L, Eveson J, Reichart P, Sidransky D. World Health Organization Classification of Tumours. Pathology and Genetics of Head and Neck Tumours. Lyon: IARC Press; 2005.
2. Akrish S, Buchner A, Shoshani Y, Vered M, Dayan D. Ameloblastic carcinoma: Report of a new case, literature review, and comparison to ameloblastoma. J Oral Maxillofac Surg 2007;65:777-83.
3. Kallianpur S, Jadwani S, Misra B, Sudheendra US. Ameloblastic carcinoma of the mandible: Report of a case and review. J Oral Maxillofac Pathol 2014;18:S96-102.
4. Benlyazid A, Lacroix-Triki M, Aziza R, Gomez-Brouchet A, Guichard M, Sarini J. Ameloblastic carcinoma of the maxilla: Case report and review of the literature. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007;104:e17-24.
5. Nai GA, Grosso RN. Fine-needle aspiration biopsy of ameloblastic

carcinoma of the mandible: A case report. Braz Dent J 2011;22:254-7.
6. Pundir S, Saxena S, Rathod V, Aggrawal P. Ameloblastic carcinoma: Secondary dedifferentiated carcinoma of the mandible: Report of a rare entity with a brief review. J Oral Maxillofac Pathol 2011;15:201-4.
7. Hall JM, Weathers DR, Unni KK. Ameloblastic carcinoma: An analysis of 14 cases. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007;103:799-807.
8. França DC, Moreira JM Jr., De Aguiar SM, De Carvalhos AA, Goiato MC. Ameloblastic carcinoma of the maxilla: A case report. Oncol Lett 2012;4:1297-300.
9. Li J, DU H, Li P, Zhang J, Tian W, Tang W. Ameloblastic carcinoma: An analysis of 12 cases with a review of the literature. Oncol Lett 2014;8:914-20.
10. Neville BW, Damm DD, Allen CM, Chi AC. Oral and Maxillofacial Pathology. 4th ed. Philadelphia: WB Saunders; 2016.
11. Cizmecý O, Aslan A, Onel D, Demiryont M. Ameloblastic carcinoma ex ameloblastoma of the mandible: Case report. Otolaryngol Head Neck Surg 2004;130:633-4.
12. Cox DP, Muller S, Carlson GW, Murray D. Ameloblastic carcinoma ex ameloblastoma of the mandible with malignancy-associated hypercalcemia. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2000;90:716-22.
13. Karakida K, Aoki T, Sakamoto H, Takahashi M, Akamatsu T, Ogura G, *et al*. Ameloblastic carcinoma, secondary type: A case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;110:e33-7.
14. Yoon HJ, Hong SP, Lee JI, Lee SS, Hong SD. Ameloblastic carcinoma: An analysis of 6 cases with review of the literature. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;108:904-13.
15. Yoshioka Y, Toratani S, Ogawa I, Okamoto T. Ameloblastic carcinoma, secondary type, of the mandible: A case report. J Oral Maxillofac Surg 2013;71:e58-62.
16. Moro A, Foresta E, Gasparini G, Pelo S, Forcione M, Cristallini EG, *et al*. Ameloblastic carcinoma of the maxilla: A case report and an updated review of the literature. Oncol Lett 2016;12:4339-50.
17. Slootweg PJ, Müller H. Malignant ameloblastoma or ameloblastic carcinoma. Oral Surg Oral Med Oral Pathol 1984;57:168-76.
18. Loyola AM, Cardoso SV, de Faria PR, Servato JP, Eisenberg AL, Dias FL, *et al*. Ameloblastic carcinoma: A Brazilian collaborative study of 17 cases. Histopathology 2016;69:687-701.
19. Yoon HJ, Jo BC, Shin WJ, Cho YA, Lee JI, Hong SP, *et al*. Comparative immunohistochemical study of ameloblastoma and ameloblastic carcinoma. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2011;112:767-76.
20. Kar IB, Subramanyam RV, Mishra N, Singh AK. Ameloblastic carcinoma: A clinicopathologic dilemma – Report of two cases with total review of literature from 1984 to 2012. Ann Maxillofac Surg 2014;4:70-7.
21. McClary AC, West RB, McClary AC, Pollack JR, Fischbein NJ, Holsinger CF, *et al*. Ameloblastoma: A clinical review and trends in management. Eur Arch Otorhinolaryngol 2016;273:1649-61.
22. Bruce RA, Jackson IT. Ameloblastic carcinoma. Report of an aggressive case and review of the literature. J Craniomaxillofac Surg 1991;19:267-71.
23. Dhir K, Sciubba J, Tufano RP. Ameloblastic carcinoma of the maxilla. Oral Oncol 2003;39:736-41.
24. Ward BB, Edlund S, Sciubba J, Helman JI. Ameloblastic carcinoma (primary type) isolated to the anterior maxilla: Case report with review of the literature. J Oral Maxillofac Surg 2007;65:1800-3.