CASE REPORT

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Ameloblastic carcinoma of the maxilla: a report of two cases and a review of the literature

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Abstract (J Korean Assoc Oral Maxillofac Surg 2016;42:43-46)

Ameloblastic carcinoma is a malignant form of ameloblastoma defined by histological evidence of malignancy in primary, recurrent, or metastatic tumor. Such a tumor is rare, and the maxilla is an unusual site. Due to its rarity, the characteristics of this tumor in the maxilla have not been well described. Case 1: A 55-year-old, ill-appearing Nigerian male presented to our center with left maxillary swelling of seven-year duration. The swelling had been slow-growing and painless until one year prior, when the growth became rapid and was coupled with severe pain. The swelling affected both oral function and facial esthetics, and the patient reported difficulty breathing. There was a maxillary, ulcerated swelling extending from teeth 12 to 18 and blocking the left nostril. The involved teeth were moderately mobile. Case 2: A 32-year-old male farmer presented with recurrent right maxillary swelling of six-year duration. Prior to this episode, he had undergone surgery for ameloblastoma (follicular type). The present swelling was fungating through the skin and protruding into the right nostril. Ameloblastic carcinoma is an aggressive odontogenic tumor that requires aggressive surgical treatment.

Key words: Ameloblastic, Carcinoma, Maxilla

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I. Introduction

Histologically benign ameloblastoma accounts for 1% to 3% of tumors and cysts of the jaw[1-3]. Ameloblastic carcinoma (AC), on the other hand, is even rarer; until 2011, fewer than 70 cases had been reported in the English literature[4]. Malignancy in ameloblastoma has been the subject of controversy for a number of years; because of its rarity, there is confusion in terminology, histopathogenesis, origin, cytologic characteristics, and clinical behavior[4]. The World Health Organization (WHO) classification of odontogenic tumors published in 1972 recognized odontogenic carcinomas as malignant ameloblastoma, primary intraosseous carcinoma, and other cancers arising from the odontogenic epithelium[5]. However, there was no provision for AC or similar lesions[5]. In 1983, Shafer et al.[6] introduced the term 'ameloblastic carcinoma' to describe a malignant epithelial odontogenic tumor that histologically retains the features of ameloblastic differentiation and exhibits cytological features of malignancy in a primary or recurrent tumor. In the most recent classification by the WHO, odontogenic carcinomas include metastasizing ameloblastoma, AC, primary intraosseous carcinoma, ghost cell odontogenic carcinoma, and clear cell odontogenic carcinoma[7].

ACs meeting WHO criteria might arise as a result of malignant changes in a preexisting benign ameloblastoma (secondary type) or might develop *de novo* as a primary AC. This tumor exhibits malignant histopathological features independent of the presence of metastasis[8], whereas malignant ameloblastomas metastasize with well differentiated benign cells[9].

According to Kruse et al.[10], most cases (67%) of AC are located in the mandible, with the rest occurring in the maxilla. In their evidence-based review of cases occurring over 60 years, they found only 27 maxillary cases of AC, which

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occurred at a mean age of 54.4 years and a male:female ratio of 2.7:1[10]. In a previous report of odontogenic tumors collected over the course of 20 years in our center, only one case of mandibular AC was reported[11]. Since maxillary AC is so rare, we present two cases from our center and highlight the management of these patients in our environment.

II. Cases Report

1. Case 1

A 55-year-old, ill-appearing Nigerian male presented to our center with a left maxillary swelling of seven-year duration. The swelling was initially slow growing and painless until one year prior, when its growth became rapid and was coupled with severe pain. The swelling affected both oral function and facial esthetics, and the patient reported difficulty breathing. Maxillary ulcerated swelling extending from teeth 12 to 18 with a blocked left nostril. The associated teeth were moderately mobile. An incisional biopsy of the swelling showed palisading epithelial cells surrounding a collagenized stroma with some basalloid and few stellate reticulum cells, as shown in Fig. 1. The swelling was diagnosed as AC, and the patient was offered surgical treatment. After baseline investigations, hemi-maxillectomy was performed. Repeat histopathological data confirmed the previous diagnosis. The patient recovered well and was discharged on the seventh day postoperative, with a feeding plate fabricated preoperatively. He was reviewed three weeks later, and an obturator was fabricated for him. We did not prescribe radiotherapy as he had no evidence of metastasis; however, the need for periodic reviews to detect recurrence was stressed. The patient maintained postoperative review visits for one year; he was admitted five-year postsurgery for a snake-bite. Unfortunately, he died in the hospital from unsuccessful management of the snake-bite.

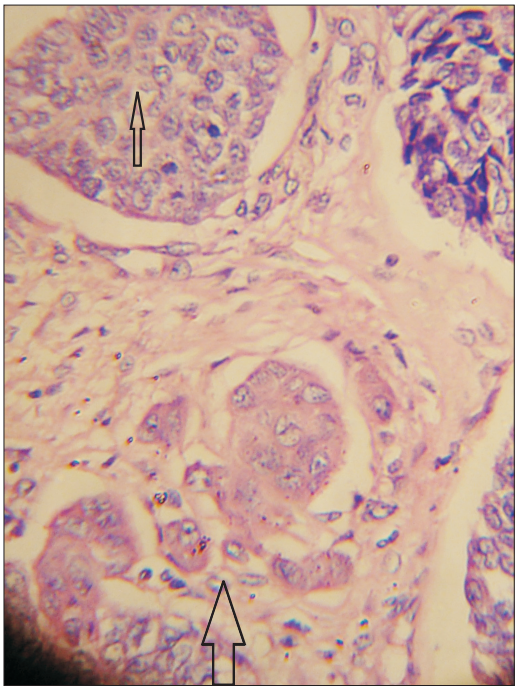

Fig. 1. Ameloblastic carcinoma shows extensive follicular basaloid (H&E staining, ×400). Arrows indicate the transformed malignant area showing basaloid malignant cells with focal stromal invasion.
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2. Case 2

A 32-year-old male farmer presented with recurrent right maxillary swelling with six-year duration. Prior to this episode, he had undergone surgery for ameloblastoma (follicular type). The swelling fungated through the skin and protruded into the right nostril. A photograph of the swelling is shown in Fig. 2. Intraorally, the left maxilla was absent, and the teeth in the right maxilla were mobile with whole maxilla involvement. Preoperative incisional biopsy results showed ameloblastoma mixed type (plexiform and follicular). A posteroanterior chest radiograph showed no metastasis, and the patient was offered surgical resection. After baseline investigations were performed, right hemi-maxillectomy with excision of the involved soft tissue was performed. The postoperative histopathology result showed ameloblastoma. However, we were unsure of this diagnosis during surgery

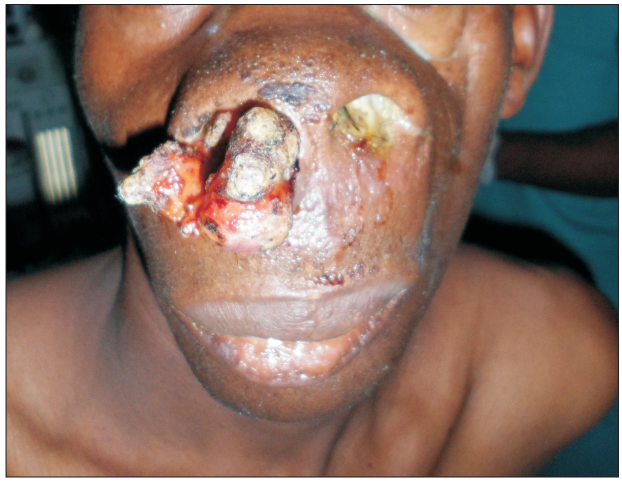

Fig. 2. Case 2, with a lesion protruding from the nose.
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and so performed hemi-maxillectomy with some soft tissue excision; the whole specimen was sent for histology. The histopathology result (Fig. 1) showed a highly cellular tumor growing in nests with anastomosing cords and a papillary configuration comprising cells with round to slightly irregular nuclei, a coarse to vascular chromatin pattern, and prominent nucleoli. The cells exhibited peripheral palisading surrounded by stellate reticulum-like connective tissue in areas. Other areas showed highly atypical cells with markedly pleomorphic nuclei and abundant mitoses. The fibroconnective stroma had areas of necrosis. The resection margins were also involved, and a diagnosis of AC was made. These features are shown in Fig. 3. The patient was referred for radiotherapy but did not attend due to a paucity of funds. For the same reason, an obturator could not be delivered to him at discharge. At the time of this report, he had been followed-up for six months for surveillance of residual tumor.

III. Discussion

Regezi et al.[12] reported that the incidence of AC is greater than that of malignant ameloblastoma by a 2:1 ratio. More cases of AC have been reported in the mandible than the maxilla[10]. This is similar to the worldwide predilection of benign ameloblastoma for occurrence in the mandible. Therefore, cases of AC in the maxilla are worthy of closer review. In a study by Corio et al.[13], while no age was exempt, the mean age of AC occurrence was 30.1 years. This is similar to the mean age of 32 years given by Ramesh et al.[14]. The mean age of our study subjects was 43.5 years, reflecting the broad age of occurrence of AC. It is unlikely that AC has any sexual predilection, as more males were found by Kruse et al.[10], who reported a male to female ratio of 2.7:1, while Ramesh et al.[14] showed a contrary female to male ratio of 3:2. Both of our patients were males. Therefore, features such as metastasis pattern, histopathological factors, and gender predilection—contrary to AC of the mandible—have only been presented in single case reports[10]. The first clinical sign in 61.5% of cases was swelling, while bleeding, ulceration, or fistula was only found in 15.4% of AC in the maxilla. Therefore, it might be assumed that patients presented with an already progressive form of malignancy at first sight[10]. Our patients presented with swelling, skin ulceration, and pain. According to Ramesh et al.[14], only 19 cases of AC in the maxilla have been reported, indicating the value of our two cases of this rare tumor.

From our preoperative review, all patients were diagnosed before evidence of metastasis. Among the reviewed cases by Kruse et al.[10], 34.6% revealed metastasis, and 23.1% demonstrated local recurrence. In 26.9% of cases, there was pulmonary metastasis, while only one case involved neck lymph nodes[10]. This high percentage of pulmonary metastasis emphasizes the importance of its detection using either computed tomography or positron emission tomography scans, as well as the need for long-term follow-up. In addition to these screening methods, increasing serum calcium has been considered to be a predictor of metastasis, even though such an increase is unspecific due to its association with osteolysis[10].

Imaging investigations are important in tumor assessment. Radiology might show a poorly defined radiolucency, sometimes with focal radio-opacities. Computed tomography and

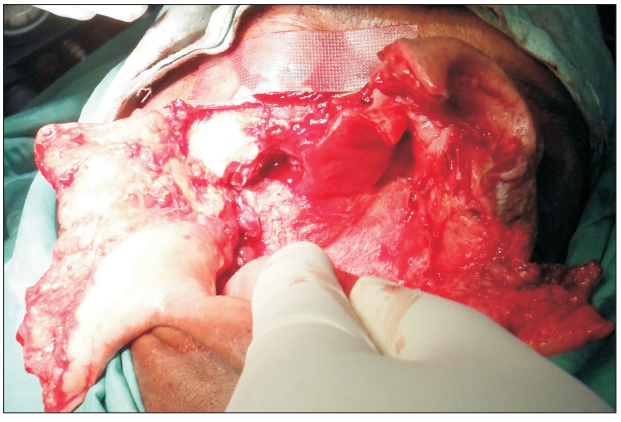

Fig. 3. Intraoperative photograph.
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Fig. 4. Postoperative photograph.
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magnetic resonance imaging offer more detailed information[4].

Ramesh et al.[14] believe that most cases of AC occur *de novo*, with very few cases of malignant dedifferentiation of ameloblastoma. Dedifferentiation tends to occur spontaneously in ameloblastoma or due to repeated surgical procedures or therapeutic radiation. Our first case was possibly *de novo* AC, while the second case could have been due to malignant transformation of a previously treated ameloblastoma.

Differential diagnoses of AC includes primary intra-alveolar carcinoma, kerato-ameloblastoma, acanthomatous ameloblastoma, squamous odontogenic tumor, and squamous cell carcinoma arising in the lining of an odontogenic cyst[14,15]. In the maxilla, visceral neoplasms including the invasion of bone by a tumor from adjacent soft tissue or paranasal sinus, squamous cell carcinoma, and basal cell carcinoma must be ruled out. In these case reports, the presence of odontogenic cells excluded visceral neoplasms and non-odontogenic epithelial tumours like basal and squamous cell carcinomas.

The adequate treatment and prognosis of AC remains unclear due to the rarity of this tumor and the lack of well-documented patients[16]. Surgery is the main stay of treatment[14,16], with adjuvant radiotherapy[16] applied in some patients. Surgical treatment decisions were made as with other highly malignant epithelial tumors, including prophylactic and therapeutic excision of involved lymph nodes[17]. For intraosseous AC, as in case 1, the effectiveness of radiotherapy has been questioned[10,15]; however, Philip et al.[18] have suggested adjuvant radiotherapy in patients with positive resection margins, multiple positive lymph nodes, extracapsular spread, perineural invasion, and those for whom salvage surgery would be inefficient. In case 2 (Fig. 4), the presence of positive excision margins indicates benefit from high-dose carbon ion radiotherapy, as reported by Jensen et al.[19]. However, our patient was unable to afford the megavoltage radiotherapy available in other treatment centers in Nigeria. Whatever the treatment given, lifelong clinical and radiographic follow-up after treatment is essential as metastasis can occur even following treatment[20]. The rarity and unusual behavior of this tumor make accurate diagnosis of AC difficult. Recurrence and metastatic spread can be expected with inadequate treatment as maxillary AC appears to have a more unfavorable prognosis than that in the mandible[14].

In conclusion, AC is an aggressive odontogenic tumor that requires aggressive surgical treatment. Most patients are lost to follow-up, reasoning that a tumor-free status indicates lifelong safety. Being in a resource-limited region, we wonder if our patients will heed our advice of postoperative radiotherapy, especially considering that it is more expensive than surgery in our center.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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