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# Mucoepidermoid carcinoma arising from a glandular odontogenic cyst of posterior maxilla and further development into a radiation-induced second primary squamous cell carcinoma

**KEYWORDS**
Central mucoepidermoid carcinoma;
Glandular odontogenic cyst;
Mastermind-like 2 (MAML2) gene rearrangement;
Fluorescent in situ hybridization (FISH);
Second primary squamous cell carcinoma

Glandular odontogenic cyst (GOC) and central mucoepidermoid carcinoma (cMEC) are rare diseases affecting the jawbone, sharing similar radiographic and histopathologic features. Previous reports have suggested a potential link between GOC and cMEC development, although this concept remains debated. This report presented a case of cMEC arising from a GOC, confirmed through mastermind-like 2 (MAML2) gene rearrangement analysis, followed by the further development into a radiation-induced second primary oral squamous cell carcinoma (OSCC) during the five-year follow-up.

A 64-year-old female patient presented with a mass at the left infraorbital area for one year. Panoramic radiography and cone-beam computed tomography (CBCT) revealed a multilocular radiolucency involving the left posterior maxilla and maxillary sinus (Fig. 1A and B). Biopsy results indicated an odontogenic cyst with GOC features, leading to an enucleation of the GOC. Microscopic examination of the specimen revealed the coexistence of cMEC and GOC components (Fig. 1C, D, E, and F). To confirm these distinct pathologies, fluorescent in situ hybridization (FISH) targeting the MAML2 gene was performed. The cMEC segment exhibited MAML2 rearrangement, while both the GOC component within the same specimen and the previous biopsy sample tested negative for gene rearrangement (Fig. 1G and H), strongly suggesting a cMEC's development from the pre-existing GOC. Subsequent adjuvant radiotherapy was administered, and the patient remained uneventful during the periodic follow-up.

However, after a five-year follow-up, spontaneous exfoliation of the left upper second and third molars at the previous tumor site accompanied by the poor wound healing and the appearance of a granular mucosal surface was found (Fig. 1I and J). Incisional biopsy confirmed the histopathological diagnosis of an oral squamous cell carcinoma (OSCC). The patient underwent the partial maxillectomy and selective neck dissection. The excised specimen revealed a moderately-differentiated squamous cell carcinoma from the overlying gingiva with a small focus of residual cMEC within the bone (Fig. 1K to P). No recurrence was detected during the 15-month follow-up.

Given the shared histopathological and radiographic features between GOC and cMEC, discussions have arisen regarding their potential pathologic relationship, including the possibility of a cMEC arising from a GOC. Some case reports have supported this malignant transformation, confirmed by the FISH or immunohistochemical studies.[1–3] MAML2 rearrangements, present in up to 75 % of MEC

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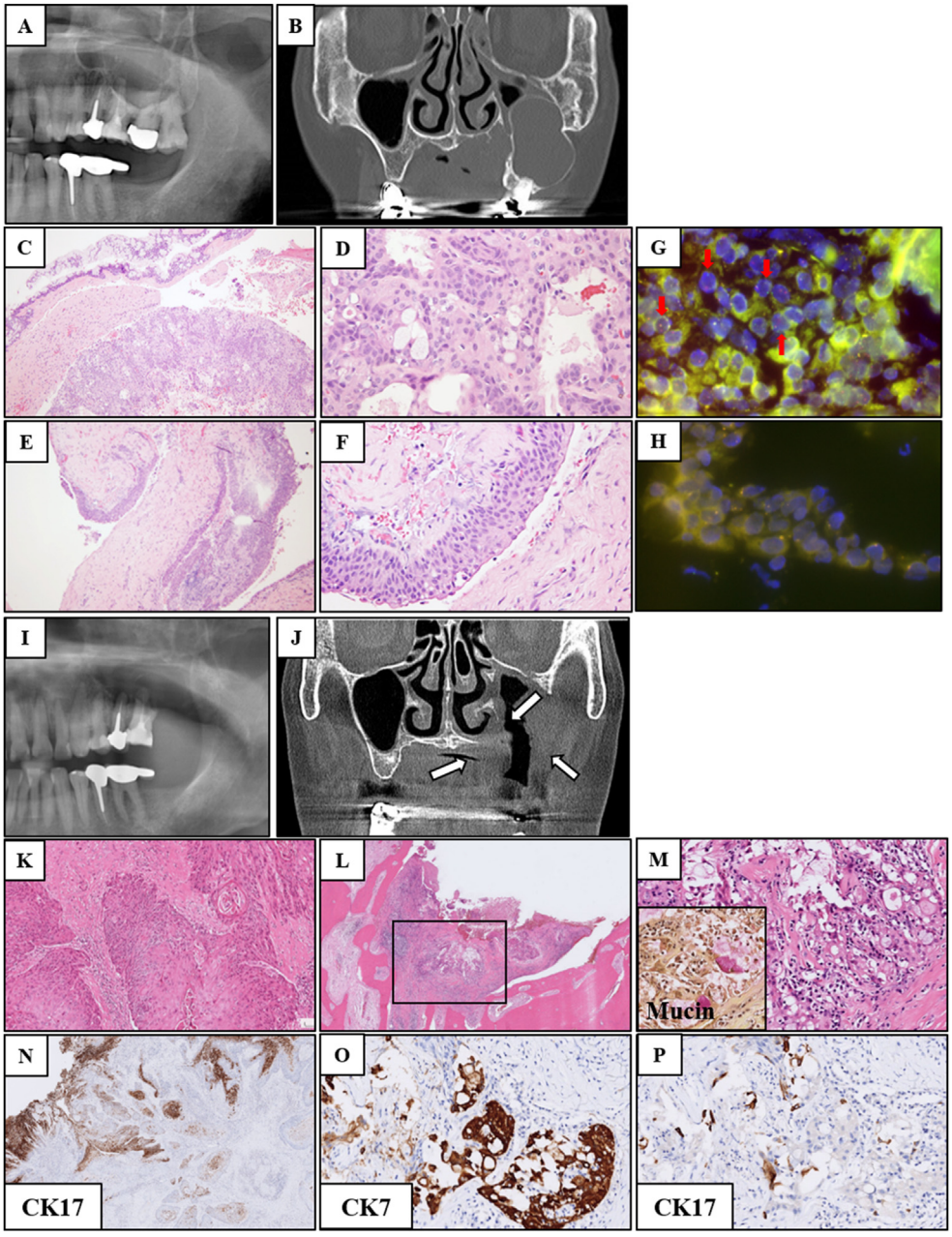


**Figure 1** Radiographic, histological, immunostaining, and fluorescent in situ hybridization (FISH) images of our case. (A and B) Panoramic and cone-beam computed tomography (CBCT) images displaying a multilocular radiolucency in the left posterior maxilla and maxillary sinus. (C and D) Microscopic examination revealed a cystic lesion with multiple epithelial nests composed of epidermoid cells, intermediate cells, and mucous cells dispersed in the fibrous connective tissue stroma (H&E; original magnification; C, 4x; D, 40x). (E and F) Cystic component lined by the nonkeratinized stratified squamous epithelium with mucous cells and intraepithelial microcysts, suggestive of a glandular odontogenic cyst (GOC) (H&E; original magnification; E, 4x; F, 20x). (G) MAML2 break-apart FISH demonstrating positive gene rearrangement in the cMEC component (arrow). (H) MAML2 break-apart FISH demonstrating no gene rearrangement in the GOC component. (I and J) Panoramic and CBCT images revealing nearly complete cortical bone resorption in the left posterior maxilla and an oro-antral communication (arrows). (K) Microscopic examination revealed a moderately-differentiated OSCC with keratin formation (H&E; original magnification; 10x). (L and M) Microscopic examination showed a small focus of residual cMEC within the bone and the presence of the pink mucous cells highlighted by the mucicarmine stain (H&E; original magnification; L, 4x; M, 40x). (N) Immunohistochemical studies revealed that the surface stratified squamous epithelial tumor cells were positive for CK17 staining (immunostain; original magnification; 2x). (O and P) Immunohistochemical studies revealed that the epithelial nests of the residual cMEC exhibited positivity for CK7, with a few scattered cells being positive for CK17 (immunostain; original magnification; O and P, 20x).

cases but absent in GOC cases, serve as a genomic marker distinguishing these two entities.[4] In our case, the initial bone biopsy indicated a GOC, leading to the enucleation of the cyst. Only upon comprehensive lesion evaluation did we discover the presence of a cMEC alongside a GOC, prompting the subsequent adjuvant radiotherapy. Whole specimen assessment and the FISH analysis proved crucial in establishing the definitive diagnosis and treatment plan, underscoring the potential for malignant transformation of a GOC into a cMEC.

A second primary OSCC later developed at the previous tumor site, possibly associated with the radiotherapy. According to a recent retrospective study,[5] radiation-induced second primary OSCC has an incidence of 0.21 %, with a latency period ranging from 1.0 to 34.0 years (median 9.0 years). This case emphasizes the need for a long-term vigilant follow-up to detect early signs of such malignant transformation.

## Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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## References

1. Maruyama S, Mori T, Yamazaki M, et al. Central mucoepidermoid carcinoma arising directly from a glandular odontogenic cyst of the mandible: a case report. *Diagn Pathol* 2021;16:61.
2. Dymek M, Książek M, Lewandowski B. Transformation of a glandular odontogenic cyst into mucoepidermoid carcinoma of the mandible: a case report. *Dent Med Probl* 2019;56:311—6.
3. Nagasaki A, Ogawa I, Sato Y, et al. Central mucoepidermoid carcinoma arising from glandular odontogenic cyst confirmed by analysis of MAML2 rearrangement: a case report. *Pathol Int* 2018;68:31—5.
4. Bishop JA, Yonescu R, Batista D, Warnock GR, Westra WH. Glandular odontogenic cysts (GOCs) lack MAML2 rearrangements: a finding to discredit the putative nature of GOC as a precursor to central mucoepidermoid carcinoma. *Head Neck Pathol* 2014;8:287—90.
5. Liu C, Liao L, Wu G, et al. Radiation-induced second primary squamous cell carcinoma of the oral cavity after radiotherapy for nasopharyngeal carcinoma. *Oral Oncol* 2020;109:104863.

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