Adenomatoid Odontogenic Tumor: A Case Report with Immunohistological Profile

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Abstract. The adenomatoid odontogenic tumor (AOT) is an uncommon tumor of odontogenic origin, composed of odontogenic epithelium and characterized by slow but progressive growth. We report a rare case of AOT in an 18-year-old, who presented with a palpable bony-hard swelling in the anterior maxillary region. The tumor was radiographically well-defined, and exhibited unilocular radiolucency. Histologically, the appearance was of solid nodules of cuboid or columnar cells of odontogenic epithelium, forming typical nests or duct-like structures. Immunohistochemistry was positive for cytokeratins (CK) CK5/6, CK17, CK19 and negative for KI-67. The results were consistent with a diagnosis of AOT. Conclusion. A case of AOT is presented, emphasizing on the importance of recognizing neoplasms arising in odontogenic tissues. Recurrences seldom occur, and surgical cure is recommended.

The adenomatoid odontogenic tumor (AOT) is a benign hamartomatous non-invasive lesion, first-described by Steensland in 1905 (1). However, a variety of other terms have been used to describe this tumor, and Unal et al. (2) produced a list of all reported AOT nomenclatures; these include adenoameloblastoma, ameloblastic adenomatoid tumor, adamantinoma, epithelioma adamantium and teratomatous odontoma. Philipsen and Birn suggested the name “adenomatoid odontogenic tumor”, which is now widely used (3). In the 2005 WHO classification, AOT is included under “odontogenic epithelium with mature, fibrous stroma without odontogenic ectomesenchyme” (4).

Three clinical-pathological variants of AOT have been identified: intraosseous follicular, intraosseous extrafollicular, and peripheral. The follicular type is a central intraosseous lesion associated with an impacted tooth, while extrafollicular intraosseous AOT has no relation with a non-erupted tooth. The peripheral variant arises as a gingival fibroma or epulis attached to the labial, almost exclusively in the anterior maxillary gingiva. Intraosseous AOT may be found in association with non gingiva (5).

The age at which AOT occurs ranges from 3 to 82 years; the male-female ratio is 1:1.9 (6, 7). The lesion almost exclusively occurs intraosseously, with a 2.1:1 preference for the maxilla over the mandible (8). The rare peripheral type occurs almost exclusively in the anterior maxillary gingiva. Intraosseous AOT may be found in association with non-erupted permanent teeth (follicular type), in particular the four canines, which together account for 60% of cases; the maxillary canines alone account for 40%. The lesions are typically asymptomatic, but may cause cortical expansion and displacement of adjacent teeth.

Radiographically, AOT usually appears unilocular, although a few multi-locular cases have been reported. It must be differentiated from dentigerous cysts, which most frequently occur as a pericoronal radiolucency in the jaws. The dentigerous cyst encloses only the coronal portion of the impacted tooth, whereas AOT usually exhibits radiolucency surrounding both the coronal and the radicular aspects of the involved tooth (9). Irregular root resorption is seldom reported (10). Displacement of neighboring teeth due to tumor expansion is more common than root resorption. Minute, variable-shaped radiopacities are frequently found within the lesion; these are calcified deposits, and occur in 78% of AOTs. The extraosseous, peripheral, or gingival types of AOT are rarely detected radiographically, but there may be slight erosion of the underlying alveolar bone cortex (11). We present a case of AOT and highlight the immunohistological profile.

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Case Report

An 18-year-old woman was referred to our institute due to the 12 weeks presence of a non-painful neoformation in the right anterior maxilla, between the lateral incisor and canine, and which had increased in size. Intra-oral examination revealed a single diffuse swelling in the left anterior maxillary region, measuring about 1.4 × 1.0 cm (Figure 1). On palpation, the swelling was hard and non-tender.

Intraoral and panoramic radiography revealed a well-circumscribed unilocular radiolucency measuring about 1.4 × 1.0 cm, in correspondence with the lateral incisor and canine, with enlargement of the interdental space, and mesially displaced root (Figure 2).

Before removal, it was decided to perform a fine-needle aspiration of the lesion for cytological examination; this produced non-diagnostic material, due to the presence of abundant erythrocytes. A provisional diagnosis of a benign bony neoplasm of odontogenic or non-odontogenic origin was made. The patient underwent surgical curettage under local anesthesia.

The lesion was removed with a Deka erbium laser operating at 2,940 nm (Figure 3). Under local anesthesia, achieved with 2% carbocaine and 1:100,000 adrenalin, a full-thickness mucosal flap incision was performed along the marginal line from the maxillary right lateral incisor to the canine, with a 300-600 micron sapphire tip, (power setting) of 140 mJ, (frequency) of 20 Hz, with pulsed modality, water spray at 80-100 ml/min.

Using the same tip, but setting the instrument to 180 mJ power, frequency 15 Hz, pulsed modality, a breach was made in the bone, isolating and removing the neoformation, which presented a diameter of circa 1.5 × 1.2 cm.
Sutures were placed, using silk 4/0 suture thread with V1 needle, and a 0.2% chlorhexidine gel was applied; the patient was instructed to apply this gel twice daily for two weeks.

The neoformation was sent for histopathological examination, and a diagnosis of “AOT” was rendered.

Histology. Gross examination of the enucleated specimen revealed uniform reddish-white soft tissue, measuring 1.5 cm × 1.2 cm. The tumor tissue was embedded in paraffin, and 4-μm thick sections were cut and stained with hematoxylin-eosin. Microscopical examination revealed a tumor of the odontogenic epithelium with duct-like structures. Spindle-shaped cells formed sheaths and a whorled mass. Areas of glandular or ductal patterns were intermixed with occasional spherical calcifications. Eosinophilic, amorphous, uncalcified material was observed within the lesion (Figure 4).

Immunohistochemistry. For immunohistochemistry, the avidin-biotin complex (ABC) method was applied. Sections were de-paraffinized with xylene for 15 min before rehydration through graded alcohol to water. Antigen retrieval was performed on the slides by placing them in a
with stellate reticulum; furthermore, its usual location is in the
Ameloblastoma has a characteristic lining, and an arrangement
amyloid-like eosinophilic material is also present.

Cells, along with smaller cells with hyperchromatic nuclei;
calcifying spherules within the eosinophilic cytoplasm of large
odontoma. CEOT exhibits larger and more numerous
(CEOT), ameloblastic fibroma, and ameloblastic fibro-
ameloblastoma, calcifying epithelial odontogenic tumor
present. In general, differential diagnosis is versus

Discussion

The histogenesis of AOT is still uncertain, although
recent findings strongly indicate that it derives from a
complex system of dental laminae or their remnants. It is
often considered to be a hamartomatous lesion, rather than
a true neoplasm (18), and debate is still lively as to
whether AOT should be considered a hamartoma or a
neoplasm (10).

All variants of AOT are well-encapsulated, and present an
identical benign behavior. Conservative surgical enucleation
or curettage is the treatment of choice, and only rarely does
recurrence arise (10). For periodontal intra-bone defects
caused by AOT, guided tissue regeneration with the
membrane technique, after complete removal of the tumor,
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Results

The findings of Immunohistochemistry are summarized in
Table I. The tumor cells showed strong reactivity for CK 5/6,
CK17 and CK 19 (Figures 5-7). The average MIB1 index for
ki67 was low (around 2%).

A panel of monoclonal antibodies was used for the
following markers (Table I): (CK5/6), (CK17), (CK19) and Ki-
67. Slides with the primary antibodies were incubated
overnight at room temperature in BSA. Negative controls were
incubated with an irrelevant primary antibody. Positive
controls were run using human specimens carrying the
antigens investigated. Monoclonal antibody binding was
visualized using the Envision+ System HRP (Dakocytomation
with DAB DAKO) as substrate chromogen. Sections were
counterstained with hematoxylin. Immunoreactivity was
evaluated in terms of location and intensity. To quantify the
staining properties of tumor cells, intensity of the staining
reaction was graded as negative (–), weakly (+), moderately
(++) or strongly (+++) positive.

Table I. Immunohistochemical findings of the current case.

<table>
<thead>
<tr>
<th>Antibody</th>
<th>Supplier</th>
<th>Dilution</th>
<th>Clone</th>
<th>Antigen retrieval</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>CK5/6</td>
<td>DAKO</td>
<td>1:400</td>
<td>D5/16 B4</td>
<td>Citrate pH=6</td>
<td>+</td>
</tr>
<tr>
<td>CK17</td>
<td>DAKO</td>
<td>1:100</td>
<td>MNF116</td>
<td>&quot;</td>
<td>+</td>
</tr>
<tr>
<td>CK19</td>
<td>DAKO</td>
<td>1:50</td>
<td>RCK108</td>
<td>&quot;</td>
<td>+</td>
</tr>
<tr>
<td>Ki-67</td>
<td>DAKO</td>
<td>1:200</td>
<td>MIB1</td>
<td>&quot;</td>
<td>+2%</td>
</tr>
</tbody>
</table>

CK , Cytokeratin; Ki-67 (proliferative index); +, positive staining.

bath of 10 mM citric acid (pH 6) and boiling for 16 min
using an autoclave.

In vitro, the coexpression of cytokeratin and
vimentin points to the neoplastic nature of the entity, and is in agreement with
earlier reports on AOT immunohistochemistry (1-13). Mineralized and hyaline material does not exhibit
immunohistochemical reactivity for cytokeratin, as would be
expected. In vitro, the coexpression of cytokeratin and
vimentin in the oral epithelium is well known (14). In the
present case, the immunohistochemical profile (strongly
positive for CK 5/6, CK17 and CK19) was consistent with
other reports (15, 16), supporting a cystic or gingival
epithelium profile.

The proliferation rate of AOT, in terms of Ki-67-positive
tumor cells, is reported to be low in general (15, 18) and
accounted for fewer than 1% of nuclei; the present results
concerning Ki-67 are in line with those reports.

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caused by AOT, guided tissue regeneration with the
membrane technique, after complete removal of the tumor,
is recommended (19). The patient described in this case
report is still healthy, without recurrence, 24 months after
local excision, and is currently being followed-up.

Conclusion. The case of AOT presented emphasizes on the
importance of recognizing neoplasms arising in odontogenic
tissues. AOT has histopathological features making
differential diagnosis sometimes difficult, and the clinical
and radiographic features also often present similarities to
those of the odontogenic cyst; immunohistochemistry could be of assistance in this connection. Although recurrences are rare, follow-up is recommended.

References