Pathology of Mesenchymal and Mixed Tissue Tumors of Odontogenic Origin

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Previously, the odontogenic tumors had been divided into tumors of ectodermal, mesodermal and mixed origin according to the germ layers from which tumor arose\(^1\). More recently, however, it has been suggested that the histo-and morpho-differentiation in odontogenesis require the close interplay between epithelial and mesenchymal tissues and, therefore, the classification of odontogenic tumors should be based upon the inductive effect of one dental tissue upon another\(^2,a)\).

Fig. 1 outlines this concept. Briefly, the ameloblastic epithelium induces dental papilla formation (Fig. 2) with subsequent odontoblastic differentiation of the fibroblasts. Then, dentin formation starts and is followed by the functional maturation of the ameloblasts to produce enamel matrix on the surface of developing dentin. It should be noted that dentin will not form in the absence of odontogenic epithelium and enamel will not form unless some dentin has been deposited. Such interrelationships of dental tissues during odontogenesis are important to understand their coexistence in so-called “mixed” odontogenic tumors. This concept was introduced in the WHO International Histological Classification of Tumour Series (1971)\(^4\).

Odontogenic tumors are divided into three groups: \((1)\) epithelial tumors without inductive changes in the connective tissue, \((2)\) epithelial tumors with inductive changes in the connective tissue, and \((3)\) mesenchymal tumors. Fig. 3 shows the correspondence of benign odontogenic tumors according to the WHO Classification to this categorization. The second group approximately accords with the classical mixed odontogenic tumors. The calcifying odontogenic cyst is excluded, as it is a non-neoplastic cystic lesion and belongs to the WHO Tumor Group only because it often shows marked inductive changes in the cyst wall and is seen in combination with an odontoma. The melanotic neuro-ectodermal tumor of infancy is not odontogenic in origin.
Fig. 2 Ameloblastic epithelium (Am) with formation of dental papilla (DP) in immature odontoma. X100.

1. Ameloblastoma
2. Calcifying epithelial odontogenic tumor
3. Ameloblastic fibroma
4. Adenomatoid odontogenic tumor
5. Calcifying odontogenic cyst
6. Dentinoma
7. Ameloblastic fibro-odontoma
8. Odonto-ameloblastoma
9. Complex odontoma
10. Compound odontoma
11. Fibroma
12. Myxoma
13. Cementomas
14. Melanotic neuro-ectodermal tumor of infancy

(1) Epithelial tumors without inductive changes in connective tissue
(2) Epithelial tumors with inductive changes in connective tissue
(3) Mesenchymal tumors

Fig. 3 WHO classification of benign odontogenic tumors and grouping based on inductive principles.

and may occur in other parts of the body not bearing teeth.

1. Epithelial tumors with inductive changes in connective tissue

In this group of tumors, the odontogenic epithelium is present and exerts an inductive effect upon the adjacent mesenchymal tissue. Explanation will be focused to the histopathological aspects and possible interrelationships of these tumors. Although the adenomatoid odontogenic tumor is placed in this group because of the presence of osteodentin indicative of inductive change, the lesion is not referred to here since it has generally been classified as a simple epithelial tumor and thereby was already the topic at the preceding seminar.

(1) Ameloblastic fibroma

This is a good example of true mixed tumor in which both odontogenic epithelium and connective tissue proliferate in a neoplas-