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Research Paper

ODONTOGENIC CYSTS & TUMORS CLASSIFICATION – ANTECEDENTS

Medical Science

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ABSTRACT

Pierre Paul Broca produced a monograph on tumor classification which also included classification of odontogenic tumors. Terminology used to describe malignant epithelial odontogenic tumors has varied since WHO published the initial consensus on the taxonomy of odontogenic tumors. Minor changes were introduced in the second edition. It is only in very recent years that additional knowledge has accumulated and refined the classification. This review emphasizes on reasons for modification by each author and the recent acceptance.

Introduction:

Odontogenic tumors are lesions derived from epithelial, ectomesenchymal or both the elements that have been part of the tooth-forming apparatus1,2. Odontogenic cysts are the most common type of cysts occurring within the jaws. They arise as a result of proliferation and cystic degeneration of odontogenic epithelial rests.3

The first attempt to classify odontogenic cysts and tumors was published by Broca in 1868, following which numerous works have been done. It was not until the 1960´s, when a group of experts from different countries, sponsored by the World Health Organization produced a consensus-based classification aimed to define the clinico-pathological criteria necessary to diagnose these entities. These efforts lead in 1971 to the publication of the first edition of the "Histological classification of odontogenic tumors, jaw cysts and allied lesions", which had professors Jens J. Pindborg and Ivor R.H. Kramer as editors.4 The classification was based on the concept suggested in 1958 that characteristic interactions between epithelial and ectomesenchymal tissue elements occurring during normal tooth development also operate to a certain extent in the pathogenesis and histodifferentiation of odontogenic tumors.4,5

Prevalence of odontogenic lesions:

Odontogenic tumors (OT) and cyst are uncommon lesions accounting for < 2-3 % of all oral and maxillofacial specimens sent for diagnosis to oral pathology services. If viewed as a percentage of all tumors in the human body, this figure is reduced to a conservative estimate of approximately 0.002 -0.003%. More than 95% of all odontogenic tumors reported in large series are benign and around 75% are represented by odontomas, ameloblastomas and myxomas.1

History:

The earliest journal report of an odontogenic tumor was published in 1839 which was a bony-hard lesion of maxillary bicuspid region that in today's terminology would be diagnosed as cementoblastoma. A complex odontoma was reported in American Journal of Dental Science in 1848. It was however, the renowned French dentist, the founder of modern dentistry, Pierre Fauchard, who in 1746 provided first accurate description of an odontoma .1

In 1869, the French physician and professor of Pathology and clinical surgery, Pierre Paul Broca produced a monograph on tumor classification which also included classification of odontogenic tumors. Bland-Sutton's contribution in1888 lay down to what could be called modern OT taxonomy by basing his classification upon the nature of the particular cells of the tooth germ from which the tumor arose. They included odontogenic cysts and fibrous osteogenic tumors in his classification, but the term odontoma remained as the common designation for any tumor of odontogenic origin.1

In 1930, Ivy and Churchill introduced the term ameloblastoma. The connective tissue odontomes became fibromas or cementomas according to their structure. Thoma and Goldman in 1946 modified the classification introduced by Bland- Sutton in 1888. They considered enamel pearls as developmental malformations rather than neoplasms. Pindborg and Clausen in 1958 suggested OT to be a result of epithelial-mesenchymal interaction with cellular changes in tumor pathogenesis. On this basis tumors were divided into two main groups: epithelial and mesodermal.1

Depending on the ability of the epithelium to induce changes in surrounding mesenchymal tissue, the epithelial tumors were further subdivided into two groups:

- Comprising pure epithelial tumors with no inductive changes in the connective tissue, like ameloblastoma and calcifying epithelial odontogenic tumor.
- Composed of epithelial tumors that do show inductive changes in the mesenchyme.
- These tumors comprised a soft tissue type and those characterized by occurrence of hard dental tissue, dentinomas and odontomas.
- Mesodermal tumors covered odontogenic fibroma (fibrosarcoma) , odontogenic myxoma and cementifying fibroma .

World Health Organization (WHO) collaborating centre established in 1966 attended by Professors Ivor Kramer, University of London and Jens Pindborg drafted a tentative classification including the jaw cysts. In year 1971 the classification of OTs, cysts and allied lesions was published. WHO classification of epithelial jaw tumors (1971) was based on the behavior with a broad division of the lesions into "benign" or "malignant" tumors. WHO histological typing of odontogenic tumors, jaw cysts and allied lesions, from the first edition, 1971 included three main divisions: "Neoplasm's and other tumors related to the odontogenic apparatus", "Neoplasm's and other lesions related to bone", and "epithelial cysts".6

Twenty one years later, in 1992 a second edition: 'Histological typing of odontogenic tumors ' appeared. In this second edition , the benign category is subdivided into three groups : lesions in which there is odontogenic epithelium without (morphologically identifiable) odontogenic ectomesenchyme ; lesions in which both of these elements are identifiable (some lesions

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in this group show inductive changes leading to the formation of one or more of the dental hard tissue) ; and lesions in which odontogenic ectomesenchyme appears to predominate, although in some instances , odontogenic epithelium may be included. There are also substantial changes in section on ameloblastomas, while some lesions designated in the first edition have been moved to another part of the classification or merged into different subgroups. Variations discussed include desmoplastic ameloblastoma and keratoameloblastoma.7

In year 2000, the International agency for research on cancer (IARC) in Lyon, France started a series on WHO classification of tumors. In early 2002, Philipsen and Reichart updated a revision of second classification. Advances made were origins and interactions of odontogenic tissues in tumor development. Classification approved at the editorial and consensus conference held in Lyon, France (WHO/ IRAC) in July 2003 in conjunction with the preparation of the new WHO blue book volume pathology and genetics of tumors of head and neck includes 5

A. Benign tumors:

Odontogenic epithelium with mature, fibrous stroma; odontogenic ectomesenchyme not present	**Odontogenic epithelium with odontogenic ectomesenchyme with or without dental hard tissue formation**	**Mesenchyme and / or odontogenic ectomesenchyme with or without included odontogenic epithelium**
Ameloblastoma	Ameloblastic fibroma	Odontogenic fibroma
Squamous odontogenic tumor	Ameloblastic fibrodentinoma & Ameloblastic fibroodontoma	Odontogenic myxoma or fibromyxoma
Calcifying epithelial odontogenic tumor	Odontoma- complex and compound	Cementoblastoma
Adenomatoid odontogenic tumor	Odontoam-eloblastoma	
Keratinizing cystic odontogenic tumor	Calcifying cystic odontogenic tumor	

B. Malignant tumors

- Metastasizing , malignant ameloblastoma
- Ameloblastic carcinoma
- Primary intraosseous squamous cell carcinoma (PIOSCC)
- Clear cell odontogenic carcinoma
- Ghost cell odontogenic carcinoma
- Malignant tumors (odontogenic sarcomas)
- Ameloblastic fibrosarcoma
- Ameloblastic fibro-dentino- and fibro-odontosarcoma

C. **Neoplasms and other lesions occurring in the maxillofacial skel**eton

- Osseous neoplasms - Osseous fibroma
- Non-neoplastic lesions
- Fibrous dysplasia
- Osseous dysplasia
- Central giant cell lesion
- Cherubism
- Aneurysmal bone cyst
- Simple bone cyst

An important aspect associated with definition of the first group of tumors lie in the characteristics of the tumor stroma. The stroma is relatively acellular and fibrous in contrast to others. Odontogenic fibroma represents a rare and controversial tumor. At present two variants can be distinguished: the epithelium –poor type and the epithelium- rich type, formerly known as simple and complex (or WHO) types respectively. A wealth of clinical and molecular evidence has indicated that the odontogenic keratocyst (OKC) has been regarded as a benign cystic neoplasm. OKC is now termed as Keratinizing cystic odontogenic tumor due to its aggressive nature and high recurrence rate[8].

Conclusion:

The classification schemes and terminologies used to describe odontogenic lesions have undergone various modifications since 1971 when the WHO published the initial consensus on the taxonomy of odontogenic tumors. Minor changes were introduced in the second edition in 1992. It is only in very recent years the additional knowledge has accumulated that resulted in refining the classification of both benign and malignant odontogenic tumors. Changes in the classification help us to understand not only the pathogenesis of the tumor but also to determine behavior and prognosis of the tumor.

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