4. Some General Remarks on Histological Diagnosis

Morphologically speaking, the conditions known as 'fibro-osteo-cemental lesions' are generally characterized by the fact that they contain few components. Stroma comprising connective tissue is always present, though the density of its cell content may vary, and it is this stroma which produces the hard mineralized component of the lesion. The tissue produced can either be woven bone, which may or may not contain osteoblasts, or lamellar bone tissue, or even on occasion peculiarly layered, spherical, darkly colored structures which are referred to as 'cementicles'.

The more recent literature published on the subject of 'fibro-osteo-cemental lesions' has attempted to isolate the various entities covered by the term and to differentiate them from each other. The presence or absence of cementum-like histological structures has often been regarded as a distinguishing characteristic in this connection. It has also been maintained, in a study by Reed [1963], that a lesion can be correctly diagnosed as fibrous dysplasia only if it contains no lamellar bone.

In the past, the presence of lamellar bone in lesions which had been diagnosed as fibrous dysplasia has caused a considerable amount of confusion. An earlier study by Reed [1959] represents what one might describe as the 'purist' point of view. It holds that polyostotic fibrous dysplasia is caused by maturation of a woven bone coming to a standstill when it is in its metaplastic phase, on which point it concurs with the earlier work by Lichtenstein [1938]. The view that it was possible for fibroblasts to bring about metaplasia of the bone was partly based on the histochemical findings of Changus [1957] and Jeffree and Price [1965]. Many authors have observed high alkaline phosphatase activity
in the fibroblasts found in fibrous dysplasia lesions, and it is certainly an indication that these stroma cells do have osteoblastic potential. Nevertheless, Pepler [1956] did describe cases of ossifying fibroma which had similar histochemical attributes. The purists hold that the presence of lamellar bone or peripheral osteoblastic structures utterly rules out any diagnosis of fibrous dysplasia. One study whose findings are somewhat at variance with this view is that by Jaffe [1953]. In it he states that when fibrous dysplasia occurs in the skull, it ossifies faster than in other bones. Waldron [1970] and Dahlgren et al. [1969] regard the presence of trabeculae of both woven and lamellar bone and peripheral osteoblastic structures as possible in cases of fibrous dysplasia. A study by Eversole et al. [1972] covering 75 cases of monostotic fibrous dysplasia in other bones and 34 cases of cranio-facial fibrous dysplasia shows that in 39% of the cases in the first group and 37% of those in the second, lamellar bone occurs. When lamellar bone is present, care should be taken to distinguish it from peripheral, reactive bone formations. Spheroid structures, similar in appearance to cementicles and grouped together in layers, often predominate in all or at least part of the tissue affected by fibro-osseous lesions. When they do occur, it is difficult to determine precisely what effect they should have on the diagnosis returned. A number of authors [Cahn, 1951; Zimmerman et al., 1958; Hamner et al., 1968; Small and Goodman, 1973; Tomeo, 1978] found ovoid calcifications of this type to be present in many cases of ossifying fibroma of the jaw. In view
of the similarity between these structures and genuine cementicles, these authors describe the conditions in which they are present as 'cementifying fibroma' or 'cemento-ossifying fibroma'. Indeed, Hamner et al. [1968] divide fibroma up into four separate subgroups, which they describe as cementoid, osteoid, mixed (i.e. cemento-osteoid) and fibrous respectively. The criteria used to distinguish between these four subgroups are (1) the presence or absence of calcification; (2) the chromatic characteristics of these structures when stained with hematoxylin and eosin; (3) the distance between the dark and light lines of parallel birefringence presented by the trabeculae of mineralized tissue when viewed microscopically under polarized light. In their study, Waldron and Giansanti [1973b] do not appear to contest these distinctions, though they are noticeably cautious in their approach towards them. In their view, it would be more appropriate to classify cementifying and ossifying fibroma as separate and distinct phases of the same pathological process.

Eversole et al. [1972] found that these cementicle-like layered structures occurred in 15-20% of the cases of cranio-facial fibrous dysplasia covered by their study. A number of other authors found these cementicle-like structures in fibro-osseous lesions occurring in non-cranio-facial bones. Van Horn et al. [1963], for example, cite ten cases of noncranio-facial fibrous dysplasia in which particles of cementum were present, and Friedman and Goldman [1969] mention two cases of a lesion they term 'cementoma', one occurring in the humerus and the other in the femur. Volume 19 of the WHO classification [Shanmugaratnam, 1978] contains a slide showing cementifying fibroma occurring in the paranasal cavities.
Langdon et al. [1976] proposed that the distinction between ossifying and cementifying lesions be dropped since it is not possible, on the basis of a histological examination, to differentiate between bone and cementum with absolute certainty and since cementum-like calcifications have been shown to occur in fibro-osseous lesions whatever their location. These authors also put forward the view that ossifying fibroma is not the only pathological entity of its kind, but rather just one of a whole range of fibro-osseous lesions. In their view, this range of fibro-osseous lesions should also include fibrous dysplasia. Chromatic, histochemical and optical criteria have all been applied in the numerous attempts which have been made to differentiate between osteoid and cementum. So far, no method has yet been evolved which can produce absolutely satisfactory and definitive results. Hamner et al. [1968], for example, state that genuine cementum particles are characterized by their shape, which is similar to a droplet or a sphere, and by the fact that their matrices have relatively low cell density. They go on to remark that, although coarse cells or cementoblasts can be observed in the peripheral area of the fibro-osseous lesions they describe as ‘cementifying fibroma’ and ‘cemento-ossifying fibroma’, they are neither as prominent nor as numerous as the osteoblasts which occur in the peripheral areas of classic fibrous dysplasia.

12 Clinical Pathology of Fibro-Osteo-Cemental Lesions

Table I. Histological typing of odontogenic tumors, jaw cysts, and allied lesions [Pindborg and Kramer, 1971]

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lesions. Giansanti [1970] gives details of other characteristics of cementum which he regards as distinctive and which have apparently enabled him to distinguish successfully between cementum and osteoid. He found, for example, that cementum tended to be magenta-colored and was highly basophilic when subjected to hematoxylin and eosin stain tests, whereas osteoid was markedly acidophilic. He also states that cementum has a characteristically regular structure of collagenous fiber bundles which can be detected microscopically under polarized light. In the course of his investigations with a polarization microscope, he observed that the dark and light lines of parallel birefringence presented by the trabeculae were fine in cases where cementum was present, whereas they were noticeably coarser and more widely spaced when osteoid was involved. These observations raised a number of interesting questions which were considered in detail in the study by Eversole et al. [1972]. If the calcified material contained in a cranio-facial lesion is diagnosed as cementum, one is then faced with the problematic task of determining precisely what type of cemental lesion is involved. Periapical cemental dysplasia and cementifying fibroma are the two cemental lesions which are the most difficult to distinguish from fibrous dysplasia and ossifying fibroma. In many cases it would seem impossible to differentiate between cementifying and ossifying lesions on the basis of histological evidence alone. Makek [1977] published a study which attempted to distinguish definitively between fibrous dysplasia and ossifying fibroma. As a first step the total surface area of each of the lesions considered was measured and expressed in terms of square millimeters. In each case this total surface area was then compared to the area covered
by newly formed bone and spindle-cell stroma. It emerged that in cases of fibrous dysplasia the proportion of the total surface area of the lesion occupied by newly formed bone tissue and spindle-cell stroma remained constant from case to case, whereas in cases of ossifying fibroma it varied considerably. As a criterion for differential diagnosis, this relationship between the surface area of the lesion covered by newly formed bone tissue and spindle cells and the total surface area of the lesion provided satisfactory results. However, it should be pointed out that this study considered lesions occurring in the ribs only, and that when the same technique was used to differentiate between the same types of lesion occurring in the jaw-bones, the results obtained were inconclusive.

The diagnosis of osteogenic and odontogenic lesions of the jawbones was brought a great step forward when Pindborg and Kramer's [1971] WHO classification was published (table I). This was the first comprehensive description of these lesions and the first to recommend terminology for international use. As such, it has undoubtedly fulfilled its authors' stated aim of facilitating and improving communication among cancer workers. As the authors point out, it reflects the state of knowledge at the time (1971) and will almost certainly have to undergo modifications as experience accumulates.