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The Scoring of Defects of the Alveolar Process in Human Crania

Scoring methods for interalveolar and alveolar resorption, furcation involvement, fenestrations and dehiscences in the alveolar process of human skull material are presented.

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In order to obtain consistent paleopathological and/or paleogenetical data on populations represented by skeletal remains, it is necessary to use standardized methods of investigation.

A description will be given of revised methods used to determine the extent of pathologic as well as physiologic (with possible genetic background) defects of the alveolar process in dry skull material. Four types of bony defects are distinguished:

1. interalveolar and alveolar resorption
2. furcation involvement (equivalent to interradicular resorption)
3. fenestration
4. dehiscence.

The first two are lesions typical of periodontal disease. The latter two possibly increase the susceptibility for periodontal disease, but may be accepted as normal genetic variations in the bony structure (Schectman, Ammons, Simpson & Page, 1972).

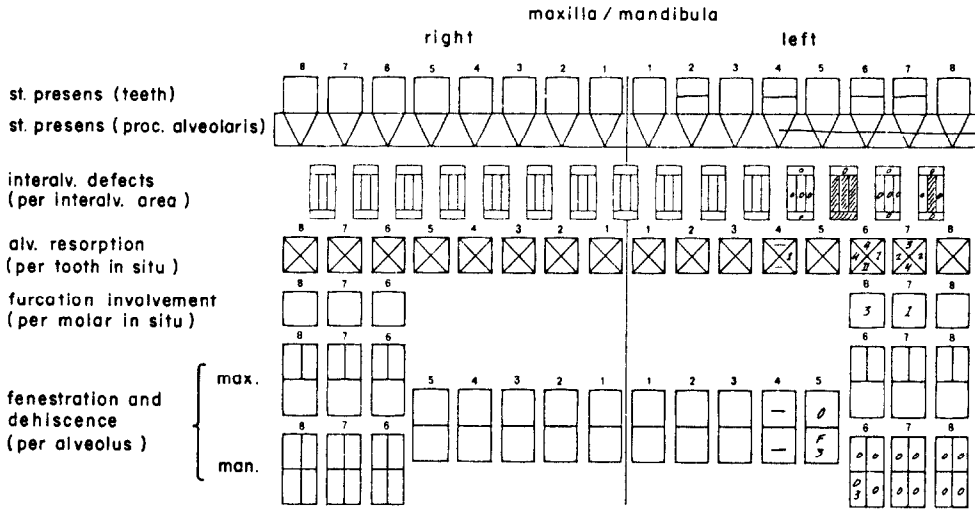
When these four types of defects are scored according to the methods presented, not only the prevalence of each of these defects in different populations may be calculated but also information about differences in localization, morphology and/or severity of the bony changes is obtained. Paleodemographic (in particular longevity), paleogenetic and paleoenvironmental (climate, diet, way of life, medical care) data may provide specific insight into the pathogenesis of these defects, which is not to be obtained from investigations only of recent populations. Vice versa the study of these defects may contribute to these paleogenetic and paleoenvironmental data.

The scoring methods are based on the appearance of defects in early medieval crania from one of the cemeteries ("de Heul") of the Dutch Carolingian commercial town

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Figure 1. Scoring form with an example.



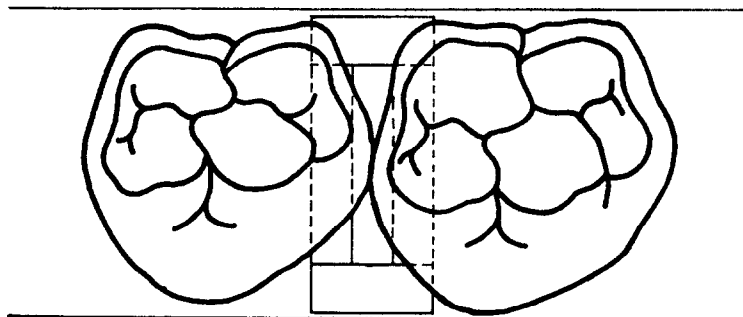
Dorestad, recently excavated in the Netherlands. The methods will be explained following the scoring form (Figure 1).

First the teeth and parts of the alveolar process subject to scoring are presented in a *status presens*.

In order to make a detailed scoring of the *interalveolar defects* the interalveolar area is divided into 5 sections on the scoring form (Figure 2). The area in which the cortical plate displays periodontal destruction is shaded. In this way the horizontal distribution of the defect is indicated. The division of the area is made so that it is possible to denote specific types of defects as craters, hemisepta and inconsistent margins (Prichard, 1965). In order to obtain information about the alveolar resorption in a vertical direction, the distance from the cemento-enamel junction along the root surface to the alveolar crest is measured (Figure 3). The measurement is done on four sides of each tooth; mesial, vestibular, distal and lingual. The vestibular and lingual measurement of mandibular molars are taken on the mesial roots. In the case of maxillary molars the buccal measurements are taken on the mesiobuccal root. Obviously these measurements can only be performed on teeth *in situ*.

To score defects in the interradicular region (*furcation involvement*), measurements are taken by placing a periodontal probe (Hu-Friedy, Williams) buccally into the furcation

Figure 2. Scoring interalveolar defects.



(Figure 4). The probe must rest on the crestal bone and must be kept parallel to the occlusal plane. The calibrations are read by looking along the buccal surface of the tooth, so that both buccal roots can be seen in a direct line. The classification is as follows:

Figure 3. Scoring alveolar resorption, vestibular measurement.

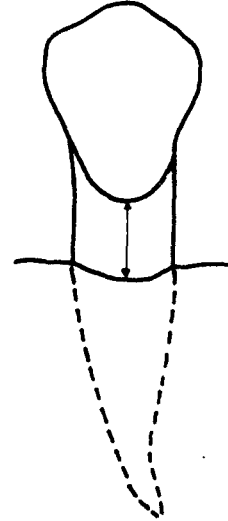
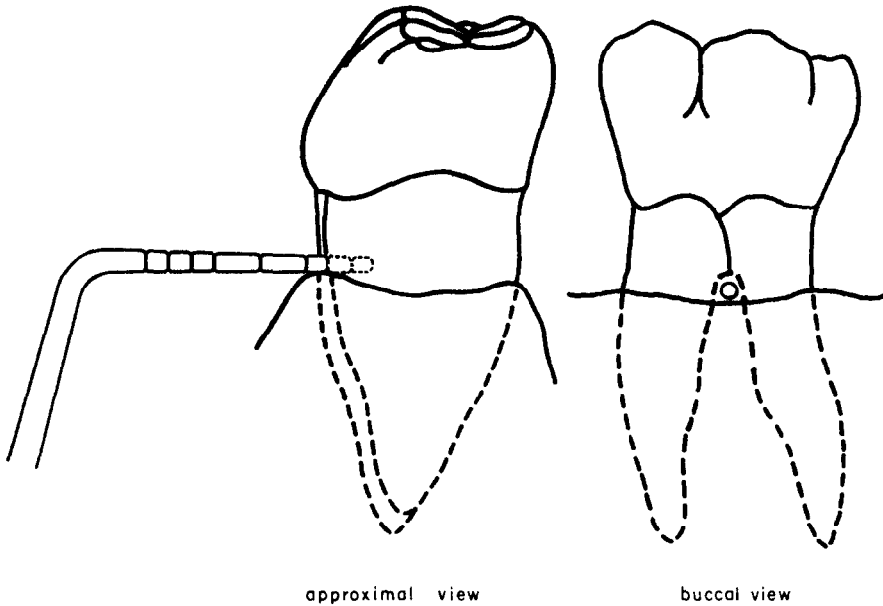


Figure 4. Scoring furcation involvement.



0: no observable furcation.

1: entrance of possible furcation ≤ 1 mm accessible.

2: entrance of possible furcation >1 mm accessible, but not passable.

3: open furcation, passable, one can see through it, or pass the probe through.

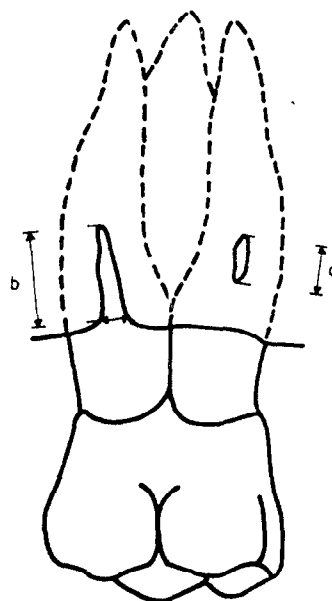
In case of classification 1 and 2 the possibility of a root fusion cannot be excluded.

Fenestration and dehiscence are quite similar types of defects. The occurrence of both appear to be influenced by the size and form of the alveolar process as well as the thickness and curvature of the roots and their location in the dental arch.

A *fenestration* is defined as a circumscribed perforation in the vestibular or lingual plate of the alveolar process. If present, the size of the defect (length in millimeters, measured in the longitudinal direction of the root) is recorded (Figure 5).

A *dehiscence* is difficult to define clearly. It can be described as a defect in the vertical direction from the alveolar crest of the bony covering of the root. It must be bordered mesially and distally by alveolar bone in order to distinguish it from large interproximal defects. To distinguish a dehiscence from shallow dips of the alveolar crest it was decided that the length of the defect must be greater than the cervical width. This length is defined as the distance from an imaginary continuous alveolar crest to the apex of the defect and expressed in millimeters (Figure 5). Post-mortem loss of the teeth does not interfere with the scoring of fenestration and dehiscence. Both defects are scored per alveolus and on both the vestibular and the oral side.

Figure 5. Scoring fenestration (a) and dehiscence (b).



The classifications of various defects of the alveolar process presented here are preferred to those already in use. The classification of infrabony pockets (i.e. osseous defects caused by periodontal disease) according to the number of osseous walls present (being either three, two, or one, or a combination of these situations) as developed by Goldman & Cohen (1958) and the classification of various types of infrabony pockets by Prichard (1965), (craters, hemisepta, inconsistent margins), are designed for clinical use and seem to be less applicable when used on skull material. It is felt that the scoring methods presented here are more pertinent in the examination of skull material. An investigation using these methods in order to determine periodontal destruction in samples of medieval Dutch skulls is in progress.

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