



F6 Identification Aids For Non-Alveolar Mandibular Fragments

David L. Scott, DDS*, 901 Austin Road, Graham, TX 76450; David R. Senn, DDS, Center for Education and Research in Forensics, UTHSCSA - Dental School, Mail Code 7919, 7703 Floyd Curl Drive, San Antonio, TX 78229-3900

The purpose of this research is to explore the possibility and practicality of making dental identifications from specific edentulous areas of fragmented mandibles by comparison to pre-extraction antemortem records. Previous research reports have established that bone trabeculae and nutrient canal patterns in the mandible exhibit combinations of individual features that are distinctive, and in the absence of disease and/or trauma remain identifiable over time. This study explores how long those patterns remain identifiable after extraction of the teeth in the area.

Trabecular pattern and distinctive alveolar sockets have been used for identification purposes. This study focuses on the area of the mandible from the mandibular canal superiorly to and including the apical 1/3 of roots in the area from the bicuspid to the third molars. The area between the mandibular canal and the region of previous root apices in the bicuspid/molar region will be referred to as the mandibular canal-apex area (MCA area). The mental foramen and mandibular canal are used as reference points for orientation on edentulous radiographs.

This presentation will impact the forensic community and/or humanity by providing another tool to aid in identifications.

Hypothesis: It is possible to positively identify an edentulous mandibular fragment by comparison to earlier radiographs of the same mandible when teeth were present regardless of the time since the teeth were lost or interval since antemortem radiographs were taken.

Method: Radiographs of extraction sites in the MCA area from selected subjects were examined. The time interval between the antemortem and "postmortem" radiographs ranged from 5 years to over 30 years with a mean interval of 15 years. The post extraction cases involved denture, partial denture, and fixed bridge cases, as well as cases where no prosthesis was placed. Trabecular pattern and other radiographically distinguishing characteristics were evaluated, digitally enhanced, and noted. Using Adobe Photoshop 7.0 the noted distinguishing characteristics on each radiograph were compared using grids and location coordinates. Print enlargements with transparent overlays were used to highlight radiographic points of similarity. Radiographs were scanned at 600dpi in grayscale. Using Adobe Photoshop 7.0 levels and filters were used to enhance distinctive features. Since radiographs vary greatly in quality and sharpness many of the software features and adjustments to enhance images were employed. The mandibular canal and the mental foramen served as landmarks for alignment. Computer-enhanced prints with transparent overlays were used to demonstrate findings.

Technique: If antemortem radiographs exist, take a 9 shot "postmortem" grid with x (suspected projection geometry) as starting point at center and expand the grid in 5 degree increments.

If antemortem films do not currently exist or a large number of fragments are to be examined a wider grid (25 shots) may assure similar projection geometry comparison to the original operator's technique.

Findings: Trabeculation patterns vary greatly with the angulations used. Consequently, other factors must be considered for orientation of images. Any and all landmarks and artifacts can yield useful information. Even when radiographic technique is accurately duplicated, the loss of teeth and the passage of time complicate identifying the underlying deep trabecular pattern. Factors that may decrease identification potential include masticatory load from prostheses, periodontal destruction, medical conditions including osteoporosis, and surgical trauma from difficult extractions.

Conclusion: Success rates in making this type of identification improve when antemortem radiographs are of reasonably good quality. Over time trabeculation and other features in the MCA area retain some distinguishing characteristics even after a segment has become edentulous. For identification purposes, evaluation and comparison of trabecular patterns, bony landmarks, mandibular canals, foramina, anomalies, artifacts, nutrient canals, and cortical bone patterns are useful features. Success with this technique is dependent on attention to detail and near duplication of radiographic projection geometry. Computer-aided techniques that objectively register and compare images with varying projection geometries would be most helpful in these cases. The lack of consistent, co-planar reference points in edentulous areas makes the use of that technique unlikely.

Dental Identification, Edentulous, Trabecular Pattern