G33 Cephalometric Analysis of Historic Native American Arikara

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The goal of this presentation is to provide attendees with knowledge of a number of dentoskeletal parameters that can help illustrate the relationship of the maxillae, the mandible, and the maxillary and mandibular dentitions to the facial profile.

This presentation will impact the forensic science community by providing the cephalometric analyses on the adult Native American Arikara, which will provide additional information on facial profiles for this historic Great Plains population.

Profile changes over the sample's 232-year time span, if there were any, can be surmised. The proposition being considered is, will a dentoskeletal relationship change enough in approximately 232 years to affect a facial profile change?

This study was conducted on the cephalograms of a historical adult Native American population. The Arikara remains were from five anthropological excavation sites in South Dakota: Rygh (1600-1650), Mobridge (1600-1700), Sully (1650-1700), Larson (1679-1733), and Leavenworth (1802-1832). The time elapsed was approximately 232 years (1600-1832).

Cephalograms of adult Native American Arikara skulls in the sample were made by the University of Tennessee Department of Oral & Maxillofacial Surgery in Knoxville, TN. Fifty-five of the cephalograms were determined to be acceptable for cephalometric analyses. Five cephalograms were from Rygh, 7 from Mobridge, 5 from Sully, 17 from Larson, and 21 from Leavenworth. These cephalograms were digitized and the Dolphin imaging system was used to perform the analyses. Measurements used were taken from the Steiner analysis and the Tweed analysis, both of which are commonly used in orthodontics. From the Steiner analysis, the SNA, SNB, and interincisal angles were used. From the Tweed analysis, the FMA, FMIA, and IMPA were used (Tweed triangle).

SNA measures the angle made by the intersection of lines drawn from the Sella to Nasion and from Nasion to Point A (subspinale). The mean SNA is 82 degrees, so an SNA greater than that suggests a protrusive maxillae while an SNA less than that suggests a retrusive maxillae. SNB measures the angle made by the intersection of lines drawn from the Sella to Nasion and from Nasion to Point B (supramentale). The mean SNB is 80 degrees, so an SNB greater than that suggests a protrusive mandible and an SNB less than that suggests a retrusive mandible. SNA and SNB, therefore, evaluate skeletal protrusion or retrusion relative to the cranial base. The interincisal angle is the angle formed by the intersection of lines drawn along the long axes of the maxillary and mandibular central incisors. The mean interincisal angle is 130 degrees. An interincisal angle less than that reflects protrusive incisors and an angle greater than that reflects retrusive incisors.

The Tweed triangle consists of FMA (the Frankfort-Mandibular plane Angle – the angle formed when the Frankfort horizontal plane intersects with the mandibular plane), FMIA (the Frankfort-Mandibular Incisal Angle – the angle formed when Frankfort horizontal plane intersects the line bisecting the long axis of the mandibular central incisor), and the IMPA (the Incisor-Mandibular Plane Angle – the angle formed by a line that bisects the long axis of the mandibular central incisor and intersects the mandibular plane).

With these measurements, two types of protrusion/retrusion can be determined: skeletal and dental. As noted above, SNA and SNB measure skeletal protrusion/retrusion relative to cranial base. FMA is a skeletal measurement of vertical dimension. Dental protrusion occurs when FMIA is less than normal (60-70 degrees) and/or the interincisal angle is less than 130 degrees. An IMPA greater than normal (85-95 degrees) indicates a protrusion of the mandibular dentition.

Review of the analyses of the 55 cephalograms confirmed that there was no statistically significant change in any of the values during the 232-year period. Therefore, the facial profiles of the sample population quite probably did not change over the time span.

Native American Arikara, Cephalogram, Dentoskeletal Relationship

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