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ANALYSIS OF EARLY FETAL FACIAL GROWTH AND JAW RELATIONSHIPS

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Objectives: Abnormal jaw relationships can be a warning sign of the presence of congenital anomalies. During the late second and third trimesters the jaw relationship is hypothesized to be stable allowing for detection of abnormal jaw position. This study aims to analyze growth of the jaws in 2D and 3D during the early fetal period of 10-20 weeks in normally human conceptuses.

Methods: Lateral and frontal radiographs were available from a collection of 197 fetal specimens aged 10-20 weeks gestation, of these 28 specimens were selected for micro-CT scanning. Inclusion and exclusion criteria were applied and 16 linear and 6 angular measurements were made on digitized radiographs and micro-CT volume renderings. Linear regression models were used to analyze the relationship between the data collected and age in days of the specimens.

Results: 141 frontal radiographs, 121 lateral radiographs and 25 micro-CT scans met the inclusion criteria. All linear measurements of the maxilla and mandible show a positive association with increasing age in days with age significantly predicting the size of the maxilla and mandible in all three planes of space. Both the maxilla and mandible increased more in width than length or height. Between 10-20 weeks, age in days was a significant ($P<0.001$) but moderate predictor of the jaw relationship. When the radiographic data was divided into two groups; age in days was a significant ($P<0.001$) but weak predictor of jaw relationship during the 10-14 week period but not a significant ($P<0.054$) predictor of the jaw relationship during the 15-20 week period.

Conclusions: During the early fetal period the maxilla and mandible grow more in width than height or length. Age in days is a strong predictor of maxillary and mandibular size in all three planes of space but is only predictive of jaw relationships in the 10-14 week period.

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