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Skeletal jaw relationships: a quantitative assessment using elliptical Fourier functions

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ABSTRACT

Elliptical Fourier functions (EFF) were generated for the boundary outlines of the hard tissue craniofacial complex including the maxilla, mandible, and cranial base in order to quantitatively describe adult patients (n=98) who were initially classified into nine skeletal groups by a combination of conventional cephalometric measures and clinical judgement. The mean residual fit of the EFF-predicted points and the original digitized data for the individual subjects ranged from .42 mm to .61 mm with a mean of 52 mm suggesting an accurate fit. Visual inspection of the individual plots confirmed this. Predicted classifications from a step-wise discriminant analysis based on EFF amplitudes were compared with the original classifications. The discordance rates for A-P and vertical plane classification were 21% and 13% respectively with an overall discordance rate of 33%. In general, a cluster analysis using EFF amplitudes did not identify clusters very similar in membership to the original groups; however, it was marginally successful in identifying members of the more severe groups and, like discriminant analysis, appeared to be more sensitive to vertical morphological differences. The overall lack of agreement between classifications and clusters based on EFF amplitudes and the original classifications may indicate that traditional skeletal categories such as those used in this study do not actually represent discrete groups.

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