

[\[Print Version\]](#)

[\[PubMed Citation\]](#) [\[Related Articles in PubMed\]](#)

The Angle Orthodontist: Vol. 68, No. 5, pp. 409–418.

Mandibular morphology in subjects with Class III malocclusions: Finite-element morphometry

G.D. Singh, BDS, PhD;^{a, b} J.A. McNamara, Jr., DDS, PhD;^c S. Lozanoff, PhD^d

^aG.D. Singh, BDS, PhD, Dept. of Dental Surgery and Periodontology, Dundee Dental Hospital & School, University of Dundee, Park Place, Dundee DD1 4HR, Scotland, UK E-mail:
g.d.singh@dundee.ac.uk

^bG.D. Singh, Dept. of Dental Surgery and Periodontology, Dundee Dental Hospital & School, University of Dundee, Scotland, UK.

^cJ.A. McNamara Jr., Dept. of Orthodontics and Pediatric Dentistry, School of Dentistry, and Center for Human Growth and Development, University of Michigan, Ann Arbor, Mich.

^dS. Lozanoff, Depts. of Anatomy, Reproductive Biology, and Surgery, John A. Burns School of Medicine, University of Hawaii, Honolulu, Hawaii.

ABSTRACT

The absence of physical restraint may be associated with a mandibular allometry that contributes to mandibular prognathism. Cephalographs of 73 prepubertal children of European American descent with untreated Class III malocclusions were traced and eight mandibular landmarks digitized. The resulting eight-noded geometries were normalized, and the mean Class III geometry compared with the equivalent Class I average. Procrustes analysis established statistical difference ($p < 0.05$) between these mean configurations. A color-coded finite-element (FEM) analysis was used to localize differences in morphology. Comparing Class III and normal mandibular configuration for changes in size, FEM revealed positive allometry of the mandibular corpus and around supramentale (15% increase in size), with reductions (30%) between the incisor alveolus and menton. For changes in shape, mandibular configurations were predominantly isotropic, with the exception of the anisotropic anterior region in the Class III subjects. Incremental growth differences are consistent with the view that the absence of physical restraint is associated with mandibular prognathism.

KEY WORDS: Class III, Finite element, Mandible, Morphology, Morphometry.

Submitted: December 1996

Accepted: May 1997.

