NATURAL HEAD POSITION: A PHOTOGRAPHIC METHOD AND AN EVALUATION OF CRANIAL REFERENCE PLANES IN CEPHALOMETRIC ANALYSIS

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Clinical Dentistry (Orthodontics)

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3. Signed Statement

This report contains no new material that has been accepted for the award of any other degree or diploma in any other university. To the best of my belief, it contains no material previously published except where due reference is made in the text.

I give consent for this copy of my thesis, when deposited in the University library, to be made available for loan and photocopying.

David P. Madsen
25th October, 2007

4. Summary

Commonly used craniofacial reference planes such as Frankfort Horizontal (FH) and sella nasion (SN) have shortcomings including their variable inter-individual orientation when related to true horizontal (HOR). Therefore, the aim of this study was to evaluate the potential usefulness of a range of craniofacial reference planes to HOR including those which have not been investigated before: Krogman-Walker line (KW line), neutral horizontal axis, foramen magnum line and posterior maxillary plane. A sample of 57 (38 female, 19 males) consecutive, pre-treatment orthodontic subjects aged 12 to 18 were photographically recorded in a standing mirror guided natural head position (NHP). Cephalograms taken at the same time were traced, oriented to a plumb line (true vertical) transferred from the photograph, and measured for statistical analysis. Thirty nine of these subjects were photographically recorded 2 months later to test the reproducibility of NHP.

The results showed that the variability of the 11 selected craniofacial reference planes related to HOR was generally high. The planes illustrating lowest variability to HOR were FH and KW line with standard deviations of 4.6° and 4.7°, respectively. These, however, showed about double the variation in NHP reproducibility (Dahlberg 2.1°). The KW line and palatal plane were also oriented closest to HOR on average. Therefore, KW line and palatal plane are potential substitutes for the commonly used reference planes in the absence of a reliable NHP. However, NHP still represents a more valid craniofacial reference system than the investigated reference planes.