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Estimation of nasal tip position using lateral cephalometric X-ray images in Japanese male children: Applications in facial reconstruction

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Abstract Facial reconstruction is a forensic anthropological technique based on a database of facial soft tissue thickness; however, the information available is generally insufficient to completely reconstruct facial features. While most soft tissue in the craniofacial region is strongly adherent to the bony surface, a few areas, such as the ears, nose, and lip regions, are not. Yet these are vital features for forensic identification and are used in everyday life in facial recognition. For such features, forensic anthropologists investigating age, sex, ancestry, and facial appearance must often rely upon bony information alone. Determination of nasal tip position in adults from the skull has been reported by several researchers. However, data for determining nasal tip position from the juvenile skull have not been reported. The aim of this study was to establish and apply a simple discriminative method of identification of nasal tip location in unidentified juvenile human skeletal remains through an investigation of the cranial base in the current Japanese juvenile population. The result would be applicable for not only the research described above but also estimation of growth of mid facial profile (i.e. estimation of patterns of bony and cartilaginous framework of the nose by diseased palatal clefts etc.) and aesthetic standards. Lateral cephalometric X-ray images were used to measure soft tissue thickness in subjects undergoing orthodontic treatment. Two reference planes were set on the skull radiograph (one had already been set at the beginning of facial reconstruction). After tracing the facial profile and plotting soft tissue and bony landmarks, nine dimensions of distances (length and length ratio) and angles between these landmarks and the nasal tip were measured. A prediction function for the nasal tip was

derived from these measurements. This study reports a simple and reliable method of nasal tip prediction for use in forensic facial reconstruction from incomplete human juvenile skulls.

Key words Facial reconstruction, Forensic anthropology, Nasal tip prediction, Nose profile

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