

3-D MORPHOLOGIC CHARACTERIZATION TO OPTIMIZE MANDIBULAR DISTRACTION IN PATIENTS WITH PIERRE ROBIN SEQUENCE

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Background: In patients with Pierre Robin sequence (PRS), optimal airway outcomes are achieved when mandibular distraction osteogenesis (MDO) is the primary surgical intervention. Although a number of studies have attempted to characterize the mandibular morphology of patients with PRS, the quantitative metrics generated to date cannot be easily translated to guide surgical planning and distractor vector selection. This study compares control mandibles to those of infants with non-syndromic PRS to characterize their morphological variance in a manner relevant to distraction, examines whether morphologic measurements can predict which patients will require MDO, and shows how airway view grades vary among patients requiring MDO.

Materials/Methods: From October 2010 to March 2019, patients under 2-months-old with non-syndromic PRS were identified and age and sex-matched to control patients. Demographic and peri-operative data were recorded, including airway view grades. Computed tomography (CT) scans from these patients were used to generate 3-dimensional mandibular models. Independent reviewers identified the following anthropometric landmarks: bilateral condylions, bilateral gonions, and the menton. Linear and angular measurements were made. Wilcoxon rank sum and two sample t-tests were performed. A p-value of < 0.05 was considered statistically significant.

Results: A total of 24 patients (mean age 0.64 months) with a diagnosis of non-syndromic PRS and 24 control patients were included in this study. Patients with PRS were found to have shorter ramus heights (16.7mm vs 17.3mm; $p=0.346$) and shorter mandibular body lengths (35.3mm vs 39.3mm; $p<0.001$) compared to controls. Gonial angles were more acute (125.3° vs 131.3° ; $p<0.001$) and inter-gonial angles were more obtuse (94.2° vs 80.4° ; $p<0.001$) in PRS patients compared to controls. No significant differences in mandibular measurements were found among patients requiring MDO vs conservative management, nor among patients requiring MDO with high vs low airway grades.

Conclusions: This study cohort is the largest and youngest PRS patient population studied to date. The observed statistically significant differences in mandibular body length and inter-gonial angle suggest that univector distraction of the mandibular body should allow for normalization of mandibular morphology in patients with non-syndromic PRS. Our findings also indicate that determining the optimal treatment modality for airway obstruction in patients with PRS remains a clinical decision.