

Abstract

Objectives: Neonatal cheiloplasty is a relatively new, modified surgical protocol used to treat orofacial cleft defects affecting both the lip and palate. The primary aim of this thesis was to evaluate the growth and development of palates in individuals with unilateral complete cleft lip and palate during the pubertal period (ages 12 and 15) and to subsequently compare these findings with the growth and development of palates in a control group of healthy individuals of the same age. The secondary aim was to conduct a pilot study on the longitudinal growth of the palate in boys with unilateral complete cleft lip and palate aged 12 and 15 years. The final objective was to monitor the variability and morphological changes in the palates of both cleft-affected and healthy individuals using methods of geometric and classical morphometry, and subsequently to evaluate the differences between the two groups.

Materials and methods: All materials were sourced from the Czech population and were based on both cross-sectional and longitudinal data. The material included 46 three-dimensional dental scans of palates from healthy male individuals aged 12 and 15 years, collected between 1975 and 2004. Additionally, 20 three-dimensional dental scans of palates from individuals with unilateral complete cleft lip and palate aged 12 years post-neonatal cheiloplasty, and 8 three-dimensional dental scans of palates from individuals with unilateral complete cleft lip and palate aged 15 years post-neonatal cheiloplasty, were obtained from 2021 to 2023. The morphological development of these individuals and the subsequent comparison of the groups were analyzed using geometric morphometry and multivariate statistics.

Results: According to the results of geometric morphometry, individuals with unilateral cleft lip and palate post-neonatal cheiloplasty exhibited greater variability at both 12 and 15 years of age compared to the healthy control group. The variability in cleft-affected individuals did not decrease over the three-year period. Color maps and superimpositions identified similar growth and shape trends between the cleft-affected group and the control group. However, according to both geometric and classical morphometry, cleft-affected individuals exhibited significantly reduced anteroposterior, depth, and posterior width dimensions compared to the control group at both 12 and 15 years of age. Longitudinal monitoring of cleft-affected individuals over the three-year period did not show a significant increase in palatal length. Comparison of healthy individuals with those who underwent classical cheiloplasty at age 12 indicated a negative

impact of neonatal cheiloplasty combined with one-stage palatoplasty on anteroposterior growth and reduced posterior width, but did not show a negative impact on palatal depth.

Conclusion: Based on the results of geometric and classical morphometry analyses, it can be concluded that neonatal cheiloplasty combined with one-stage palatoplasty negatively affects palatal length in the anteroposterior direction and moderately affects posterior width at the level of the first permanent molars at ages 12 and 15 years. However, over the three-year period, these individuals showed significant approximation to the physiological state of healthy individuals, particularly in terms of posterior width and palatal depth.

Keywords: Neonatal cheiloplasty, pubertal growth spurt, geometric morphometry, craniofacial growth, palatal development.