



## BACKGROUND

Cleft lip and palate is one of the most common craniofacial anomalies affecting 1 in every 1,600 babies. Due to the frequency of orofacial clefts, it is important for pediatric dentists to be familiar with the unique health care needs of these patients.

The craniofacial team consists of surgeons, medical specialists, dental specialists, and allied health professionals that coordinate the surgeries and treatments needed by those with orofacial clefts. For patients with cleft lip and palate, multiple surgeries are often needed including cheiloplasty, palatoplasty, rhinoplasty, and alveolar bone grafting. The first surgeries to repair the cleft typically occur within the first year of life with bone grafting typically occurring several years later.

Although the surgeries are critical to repairing the deficiency, these repairs often have many unwanted sequelae, such as: maxillary hypoplasia, otitis media, speech pathology, bifid uvula, dental malocclusion, and velopharyngeal incompetence. Of importance, are the changes in the maxilla, which can have effects on the airway. Amongst the literature, there is some variability in accepted oral airway volumes for healthy pediatric patients. The normal average airway volume for children ages six to eight is 7.18 cm<sup>3</sup>, for children ages nine to eleven it is 8.39 cm<sup>3</sup> and for children ages twelve to fourteen it is 11.62 cm<sup>3</sup>. With cleft lip and palate surgery and the potential changes in maxillary dimensions, changes to oral airway volume are possible.

## OBJECTIVE

To compare the oral airway volumes in healthy pediatric dental patients with those who have repaired unilateral cleft lip and palate.

## MATERIALS AND METHODS



Figure 1: Determination of airway volume using Dolphin software.

- Retrospective chart review.
- Inclusion criteria: patients with unilateral cleft lip and palate who are otherwise healthy, ages 6-14, and who have had a cone beam computed tomography (CBCT) scan.
- 83 patients who have unilateral cleft lip and palate that are seen by CMC Dallas craniofacial team, 52 patients were excluded due to age or were not considered to be healthy.
- 31 patients included in the study.
- Group 1: Ages 6-8 (N=12)
- Group 2: Ages 9-11 (N=13)
- Group 3: Ages 12-14 (N=5)
- The data was analyzed using Dolphin 3D software.
- Airway was analyzed from the posterior nasal spine to the position of the tip of the epiglottis as described by Schendel, et. al.
- Dolphin software automatically calculates airway volume and area based on defined parameters (Figure 1).

## RESULTS

- For each of the three groups, a one-sample t-test was performed to compare the data to the corresponding literature value.
- For Group 1, the average value was 8.96 cm<sup>3</sup> which was not statistically significant compared to the literature value of 7.18 cm<sup>3</sup> (*P*-value of .13).
- For Group 2, the average value was 9.91 cm<sup>3</sup> which was not statistically significant compared to the literature value of 8.39 cm<sup>3</sup> (*P*-value of .07).
- For Group 3, the average value was 9.14 cm<sup>3</sup> and this was statistically significant compared to the literature value of 11.62 cm<sup>3</sup> (*P*-value of .03).
- As depicted in Figure 2, the average for each group is depicted as an "X" and the median is depicted with a corresponding-colored line.
- A red line depicts what the comparative literature value is for each group.
- Only Group 3 shows a significant difference.

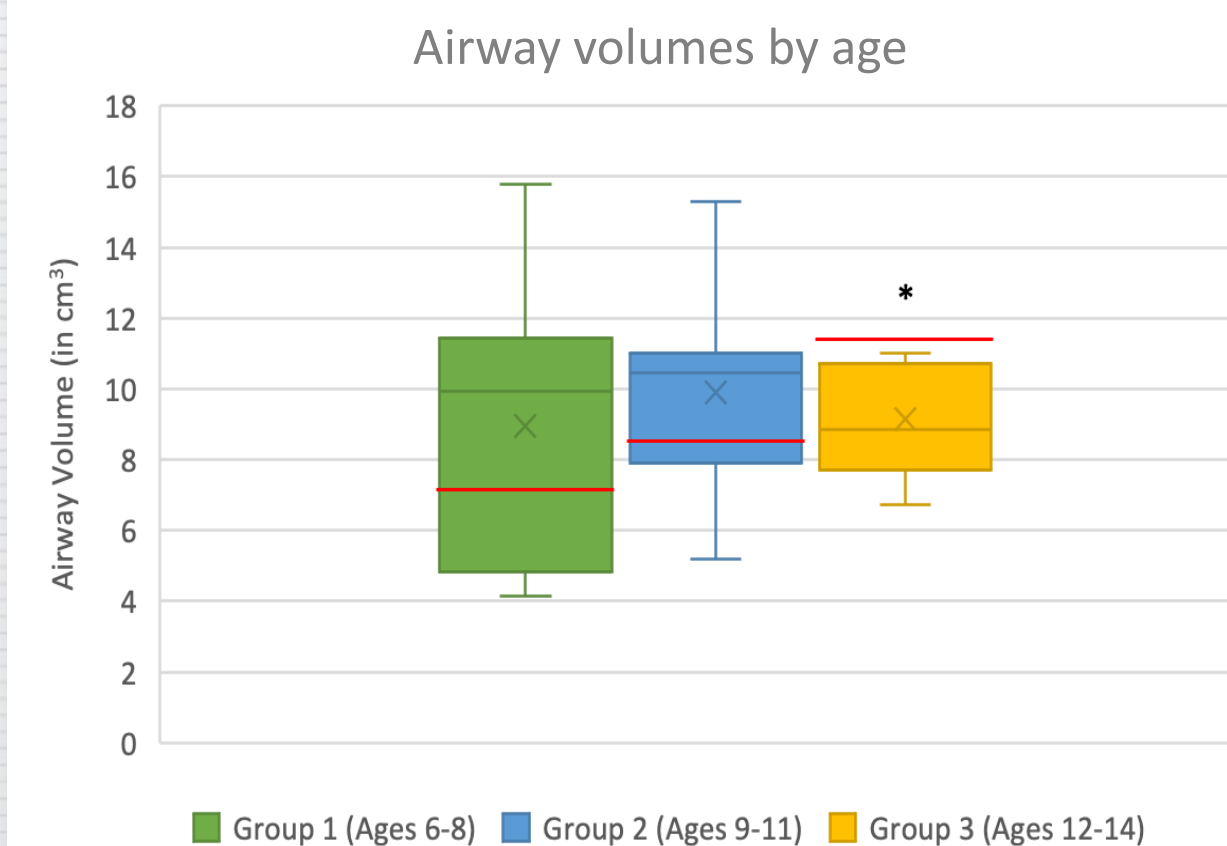


Figure 2: Airway volumes for each age group with comparison to the literature value.

## DISCUSSION

Interestingly, of the 31 patients that were analyzed, Group 1 and Group 2 both had an average airway volume that was higher than the corresponding literature value. However, neither of these results was statistically significant. Only Group 3 had a statistically significant result and as expected it was lower than the literature value. These results are surprising given that one would expect all three groups to have significantly lower airway volumes compared to patients of the same age without cleft lip and palate. The limited data set may be a contributing factor to these findings and thus additional research with a larger patient pool is needed.

## CONCLUSIONS

1. Unilateral cleft lip and palate patients in the age range of 12-14 years have a significantly smaller airway volume compared to patients of the same age without cleft lip and palate.
2. Larger data set needed to determine if there are significant differences in airway volumes for patients in other age ranges.

## REFERENCES

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