

Assessment of Permanent Maxillary Lateral Incisors in Non-syndromic Unilateral Cleft Lip/Palate

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OBJECTIVE

To evaluate the relationship between cleft severity and lateral incisor presence, position, and segmental location in patients with non-syndromic unilateral complete cleft lip and palate using cone beam computed tomography (CBCT).

BACKGROUND

Cleft lip and palate (CLP) is a common craniofacial anomaly frequently associated with dental abnormalities, particularly involving the maxillary permanent lateral incisor. This tooth is often affected by agenesis, positional changes, and morphological variations due to disruption of normal embryologic development in the cleft region [1].

Permanent lateral incisors adjacent to the cleft demonstrate considerable variability in position, including buccal or palatal displacement and location within either the proximal or distal segment. These variations are clinically significant, as they influence orthodontic management, arch development, and timing of secondary alveolar bone grafting [4].

Cone beam computed tomography (CBCT) has improved the evaluation of dental structures in cleft patients by providing three-dimensional visualization of tooth position and surrounding bone, allowing for more accurate assessment compared to conventional imaging [2].

While numerous studies have described the prevalence and characteristics of lateral incisor anomalies in cleft populations, there remains limited evidence regarding the relationship between cleft severity and lateral incisor position. Emerging evidence suggests that localized anatomical factors may play a greater role than overall severity classification [3]. However, this relationship has not been clearly established, particularly using CBCT-based analysis.

Therefore, the aim of this study was to evaluate the association between cleft severity and permanent maxillary lateral incisor presence, buccal-palatal position, and segmental location in patients with non-syndromic unilateral complete cleft lip and palate using CBCT.

MATERIALS AND METHODS

A retrospective chart review was conducted of Children's Medical Center Dallas Dental, Orthodontic, and Craniofacial patients. Data was collected through review of Epic documentation, and Dexis and Dolphin imaging software. Inclusion criteria: Patients with a diagnosis of non-syndromic unilateral complete cleft lip and palate, who were seen at CMC between 2015-2025.

Evaluation included assessment of CBCT imaging to determine presence or absence of the maxillary permanent lateral incisor on the cleft side, buccal-palatal position of the lateral incisor and segmental location of the lateral incisor relative to the cleft (proximal or distal segment). Cleft severity was categorized using a predefined ordinal scale (2-4) based on clinical documentation.

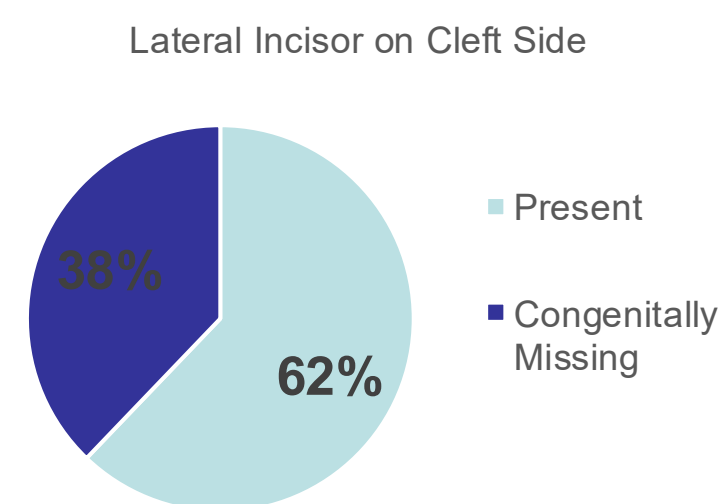
RESULTS

Out of the 753 patients initially identified with cleft lip and palate, 679 were excluded due to absence of CBCT imaging, presence of syndromic or bilateral cleft lip and palate, or loss to follow-up. A total of 74 subjects were included in the study.

A total of 74 subjects with unilateral cleft lip and palate were included in the analysis. Initial cleft severity ranged from 2 to 4, with the majority of subjects classified as severity 4, indicating a distribution skewed toward more severe cleft presentations.

Presence of Lateral Incisor on the Cleft Side

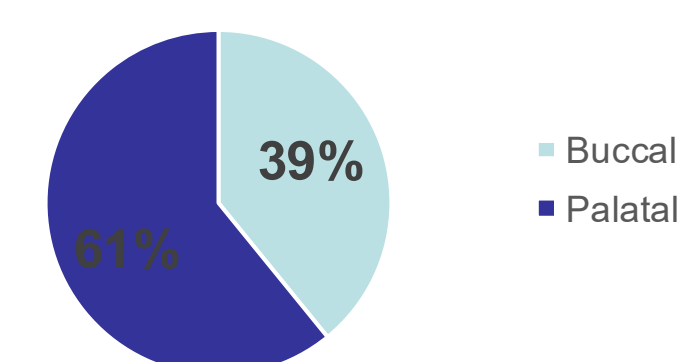
The lateral incisor was present in 46 of 74 subjects (62.2%) and congenitally missing in 28 of 74 subjects (37.8%), demonstrating that while the lateral incisor is frequently present in cleft patients, agenesis remains common



Buccal-Palatal Position of the Lateral Incisor

Among cases in which the lateral incisor was present and position could be determined (n=46), the tooth was more frequently located in a palatal position (n=28, 60.9%) compared to a buccal position (n=18, 39.1%)

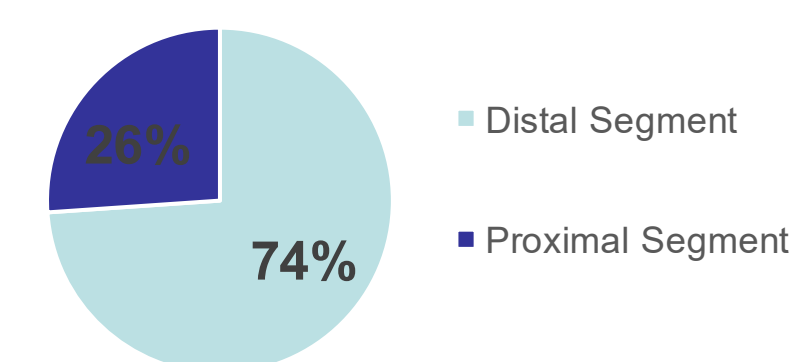
Buccal-Palatal Position of Lateral Incisor



Segmental Location of the Lateral Incisor

Evaluation of segmental position revealed that the lateral incisor was predominantly located in the distal segment (n=34, 73.9%), while 12 of 46 teeth (26.1%) were located in the proximal segment.

Segment Location of Lateral Incisor



Association Between Cleft Severity and Lateral

Incisor Position

Logistic regression analysis was performed to evaluate the relationship between cleft severity and lateral incisor position.

Buccal-Palatal Position

The model was not statistically significant ($\chi^2=0.078$, $df=2$, $p=0.962$). The odds ratio for the association between cleft severity and buccal-palatal position was 1.5 (95% CI: 0.306-4.844, $p=0.78$), indicating no statistically significant relationship

Segmental Location

Similarly, no statistically significant association was identified between cleft severity and segmental location of the lateral incisor. The odds ratio for the association between cleft severity and segment location was 1.174 (95% CI: 0.258-5.351, proximal segment $p=0.889$, distal segment $p=1.043$)

DISCUSSION

Cleft severity was not significantly associated with lateral incisor position, including both buccal-palatal orientation and segmental location. Although a trend was observed (OR = 1.5), the wide confidence interval and non-significant p-value indicate low statistical reliability.

The lateral incisor was present in most patients (62.2%), with a tendency toward palatal positioning (60.9%) and distal segment localization (73.9%), suggesting consistent spatial patterns independent of cleft severity.

These findings may be influenced by a skewed severity distribution and the multifactorial nature of dental development in cleft patients. Factors such as local anatomy, cleft morphology, and individual developmental variability likely play a greater role than severity alone. Cleft severity does not appear to be a primary determinant of lateral incisor position, emphasizing the need for individualized, imaging-based assessment in treatment planning for patients with cleft lip and palate

CONCLUSION

1. Cleft severity does not appear to be a primary determinant of lateral incisor position.

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