# P9-2

# Anatomical Limitations and Influencing Factors for Molar Distalization

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## Introduction

- Molar distalization can relieve dentition crowding for non-extraction orthodontic treatment.[1] The treatment success depends strongly on the clinician's thorough understanding of the posterior region of the alveolar bone, exceeding which will result in periodontal complications.[2,3] The application of CBCT makes an accurate representation of retromolar region anatomy possible.[4]
- The individual variations in available distance indicated that patient characteristics have significant effects on the retromolar region.[5] However, the anatomical limitations and influencing factors on the retromolar regions of mild skeletal malocclusion remain vague.

## Objective

- To investigate the available distance and corresponding cortical bone thickness (CBT) in the Class II maxilla and Class III mandible.
- To provide reference plane for assessing molar distalization potential in the orthodontic treatment planning.
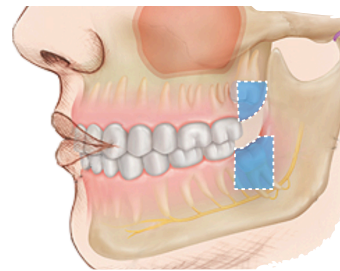


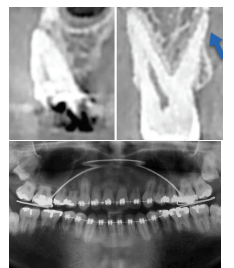Fig 1. Schematic illustration of retromolar region.

Fig2. Complications induced by orthodontic treatment

## Methods and Materials

120 standard-compliant patients were classified into equal groups of skeletal Class II and Class III, and subsequently stratified by vertical growth pattern, age, sex, and presence of third molar. The CBCT scans were taken and measured as follows: (Figure 3-6. Methods used in the study.)
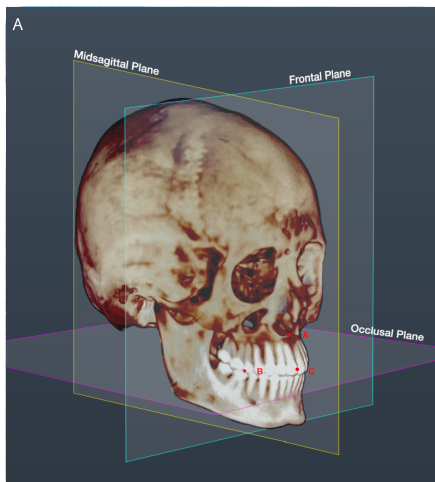


**Fig 3. Initial orientations.** Posterior occlusal line (POL) connecting the buccal cusps of molars at occlusal levels.
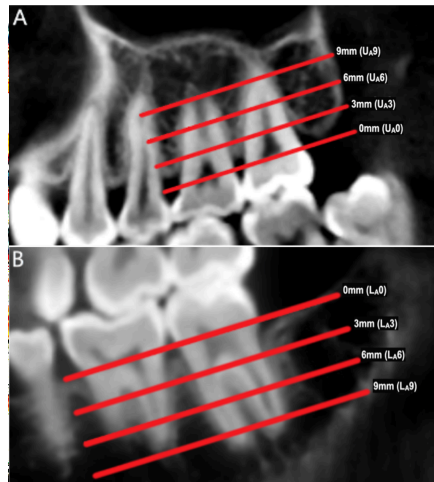
**Fig 4. Levels establishment.** Axial: from 2nd molar CEJ and parallel to POL. Coronal: from 2nd molar root and perpendicular to POL.
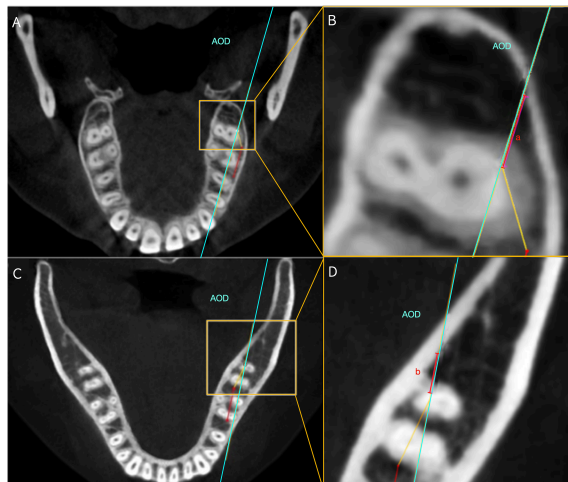
**Fig 5. Available distance measurement.** Distance along POL from the 2nd molar root to the inner cortex of retromolar region on $U_A$ and $L_A$ levels.
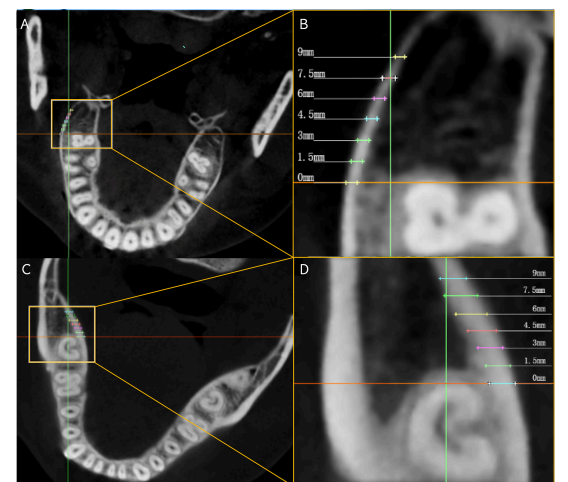
**Fig 6. CBT measurement.** With reference to the planes of available distance，measured at 3 * 7 = 21 loci on the UC and LC levels

## Results

1. **The anatomical limit of retromolar region distributed differently in the maxilla and mandible.**

Table 1. Comparison of available distance among three axial levels

| | Level of Measurement | | | F | P |
|---|---|---|---|---|---|
| **Class II Maxilla** | $U_A3$ | $U_A6$ | $U_A9$ | 6.717 | 0.002** |
| | $4.06 \pm 1.93$ | $4.93 \pm 2.05$ | $5.75 \pm 2.26$ | | |
| **Class III Mandible** | $L_A3$ | $L_A6$ | $L_A9$ | 9.711 | 0.000** |
| | $4.65 \pm 2.70$ | $3.61 \pm 2.07$ | $2.80 \pm 1.96$ | | |

2. **Patients with hyperdivergent growth pattern had the least available distance. (Fig 7)**

3. **Presence of the third molar influenced insignificantly available distance.**
The values of available distance were normally distributed in third molar absent/present, age and sex with no significant differences ($p > 0.05$).
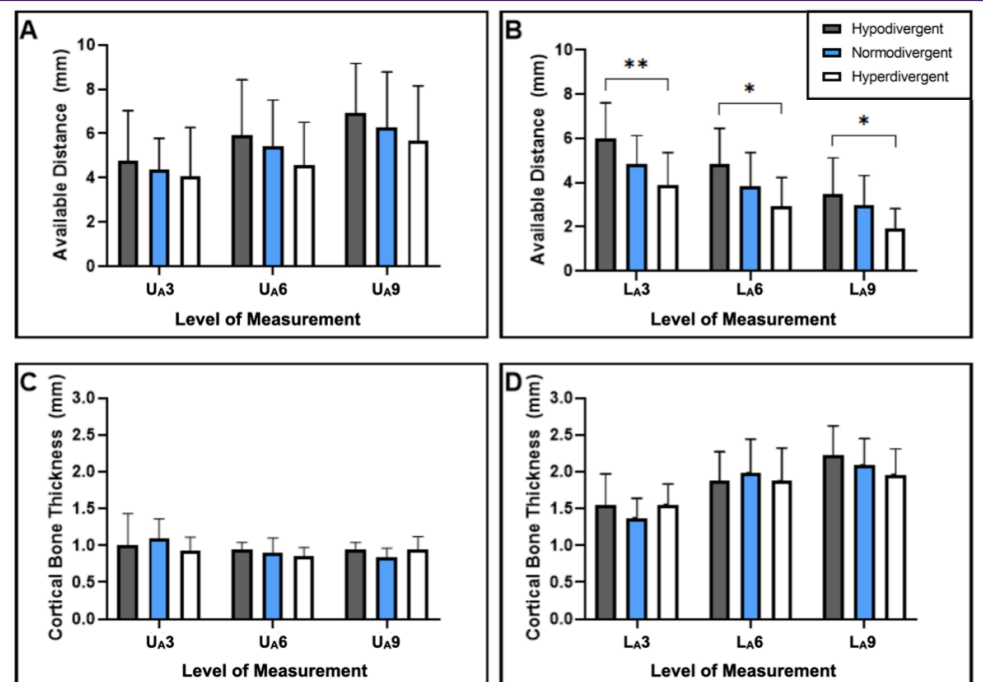


Fig 7. Available distance along AOD and CBT at each level.

## Conclusions

1. The anatomical limit for molar distalization is closer to coronal level in the Class II maxilla, and apical level in the Class III mandible.
2. Hyperdivergent growth pattern have the smallest available distance and the highest risk of cortex contact in molar distalization.
3. Clinicians can get much valuable information of available distance by axial slices of CBCT images, especially with regards to limit levels.

## Acknowledgments

Reference
1. Chae JM. *Am J Orthod Dentofacial Orthop*, 2006.
2. Garib D. *Dental Press J Orthod*, 2010.
3. Consolaro A. *Dental Press J Orthod*, 2014.
4. Kim SJ. *Am J Orthod Dentofacial Orthop*, 2014.
5. Zhao Z. *Angle Orthod*, 2020.