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Evaluating the effect of midpalatal corticotomy-assisted rapid maxillary expansion on the upper airway in young adults using computational fluid dynamics

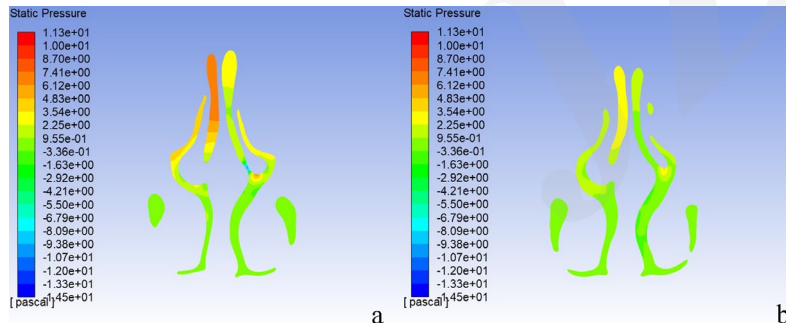
Key words: Rapid maxillary expansion; Upper airway;
Computational fluid dynamics

Research Summary



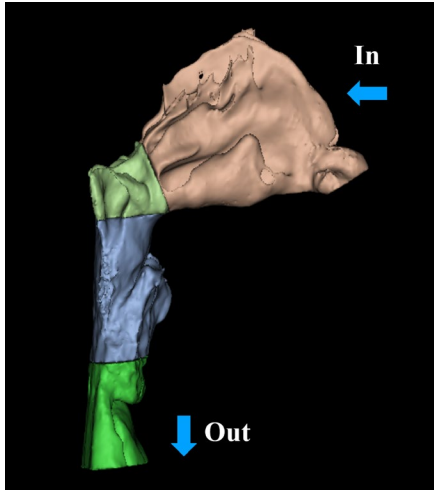
Twenty young adults had cone-beam computed tomography (CBCT) images taken before and after midpalatal corticotomy assisted rapid maxillary expansion (MCRME).

The upper airway model were constructed by CBCT data and the flow characteristics were simulated using computational fluid dynamics (CFD).



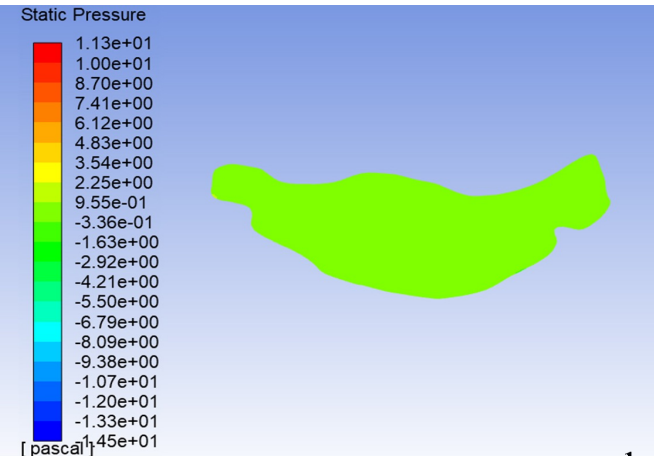
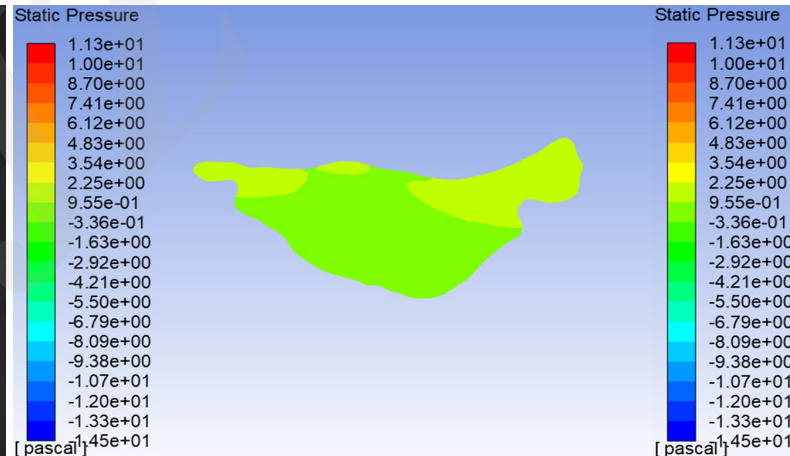
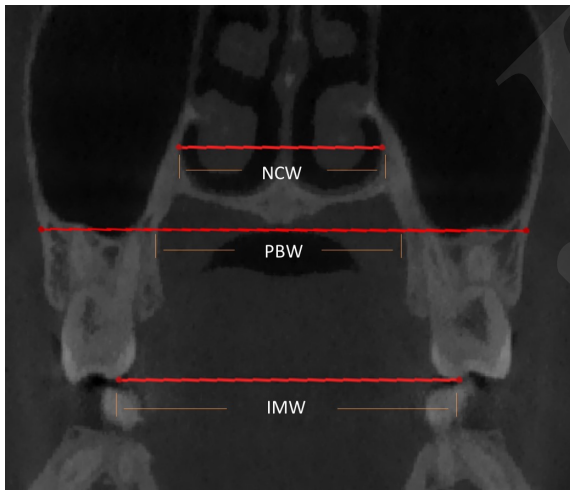
The results suggest that both the maxillary width and upper airway volume increased significantly and the upper airway pressure drop and velocity decreased significantly after MCRME.

Innovation points



- **Computational fluid dynamics (CFD)** may be an accurate method for the complicated evaluation of the upper airway in young adults.

- **Evaluated the changes in maxillary morphology and the upper airway following MCRME using CFD.**



Innovation points

A series of comprehensive tables were generated to investigate changes in the maxillary width and upper airway ventilation .

Table 1 | The four parts of the upper airway in the sagittal plan .

Table 2 | Skeletal and dental changes.

Table 3 | Upper airway volume changes .

Table 4 | Upper airway pressure drop.

Table 5 | Upper airway velocity .

