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**Title of Thesis:** A Three Dimensional Comparative Study of Two Rapid Maxillary

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**Abstract :**

Maxillary constriction is considered one of the common orthodontic problems that could be accompanied by unilateral or bilateral posterior cross-bite narrow nasal cavity, and dental crowding. **Aim:** The purpose of this study was to evaluate and to compare three dimensionally the dento-skeletal changes concurrent with tooth-borne and bone-borne rapid maxillary expanders. **Material and methods:** The study was conducted on 20 growing female patients with a mean age of  $12 \pm 2$  years old. They were divided into two equal groups; the first group was treated by tooth borne (Hyrax) expander supported by four stainless steel bands, whereas the second group received bone borne (Hyrax) expanders anchored directly to the palatal bone through four mini-screws. Orthodontic study models, intra- and extra-oral photographs, and cone beam computed tomography (CBCT) images were taken before and immediately after treatment were taken. Cone beam computed tomography scans was the tool of assessment in this comparative study. **Results:** On comparing both groups, subjects in tooth borne expander group showed a significant increase in nasal widths ( $P = 0.018$ ). There was a higher significant increase in intercuspal widths of first premolars ( $P = 0.046$ ) and first permanent molars ( $P = 0.015$ ) noticed in the tooth borne group. The tooth borne group resulted in a higher significant increase in the buccolingual inclination ( buccal rolling ) of the upper first premolars compared to the bone borne group. Superimposition of three dimensional images revealed skeletal expansion in canine, first premolar and first molar regions in both groups. **Conclusion:** The greatest skeletal and dental changes occurred in the transverse dimension in both expanders whereas, the vertical and anteroposterior changes were minute. Both groups produced basal bone expansion at the level of the hard palate. Regarding the dental expansion, the tooth borne expander produced more dental expansion than bone borne expander resulting in a buccal rolling effect in the upper first premolar teeth. As for the nasal width changes, there was a greater increase noticed in the tooth borne expander group. **Keywords:** Rapid maxillary expansion; Miniscrews; Cone Beam Computed Tomography.