Three-Dimensional Condylar changes in the Surgery First Approach: a comparison of Fixed Orthodontics vs. Invisalign Therapy

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BACKGROUND

During the 1960s, traditional Orthognathic Surgery was almost exclusively done with out prior orthodontic treatment. This was known as the "**Surgery First Approach**". This approach led to realizations that mandibular set back was limited by overjet between the maxillary and mandibular incisors. Later in the 1970s the "**Orthodontic Approach**" became the standard for orthognathic surgeries which encompassed orthodontic treatment before surgery. This helped to improve **alignment of dental occlusion, incisor decompensation, tooth rotation, and arch coordination.** More recently a "**Face First**" approach has been adopted where the chief complaint is taken care of immediately by improving the facial soft tissue. This approach is a modernized "Surgery First Approach" . It allows for the elimination of the presurgical orthodontic phase. It allows for all dental movements, including incisor decompensation, alignment, and surgical relapse, to be corrected in the post-surgical phase with orthodontics.
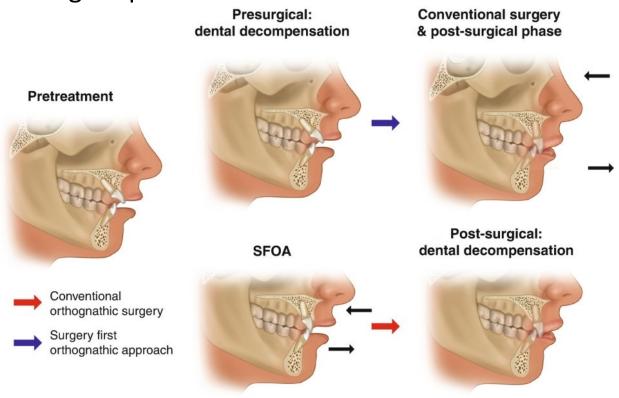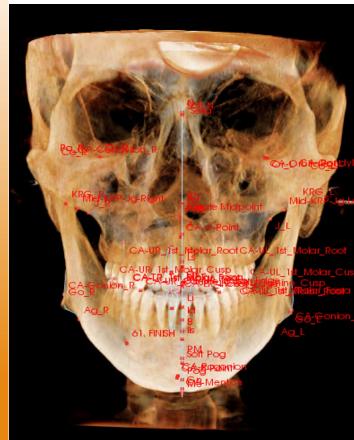

Figure A. Showing difference between Surgery first approach and traditional approach.

OBJECTIVES

To analyze condylar resorption, remodeling, and positional changes in Surgery First Approach (SFA) patients and assess correlations with cephalometric changes. The null hypothesis is that there are no significant differences in condylar changes between fixed orthodontics and Invisalign therapy post-SFA.

METHODS

Figure 1- 3D auto-tracing

This retrospective observationa longitudinal study (IRB2021-70) involves two groups. Group Fixed includes 28 patients (20 males, 8 females, ages 17-25; males average age 22Y 4M, females 26Y 6M). Group Invisalign consists of 18 patients (11 males, 7 females, ages 18-48; males average age 10Y 10M, females 22Y 3M). All underwent mandibular setback and maxillary advancement, evaluated at three points: T1 (pre-surgery), T2 (post-surgery), T3 (after orthodontic treatment). Imaging used InVivo and 3D Slicer with AI auto-tracing and specialized configuration, checking data against three planes: Frontal, Frankfort Horizontal, and Midsagittal. Inclusion criteria: adult Class III dental patients post-orthognathic surgery. Exclusion criteria: patients with condylar disorders or resorption.

Table 1- Results of T1 Vs T2 (Initial to Surgery) – Student`s t-test

Table 2- Results T2 vs T3 (Post Surgery to Final) - Student`s t-test

RESULTS AND DISCUSSION

Table 3- Showing results of T1 Vs T2 Differences between Fixed and Invisalign. Significant differences were seen in the SNB between the two.

Table 4- Showing results of T2 vs T3 differences between Fixed and Invisalign. FMA increased in fixed group and decreased in the Invisalign group

Table 5- Shows there was no significant diferences between the 2 groups for condylar changes between T2 and T3

Figure 2- Summary of results for the skeletal bone bases between groups and time points.
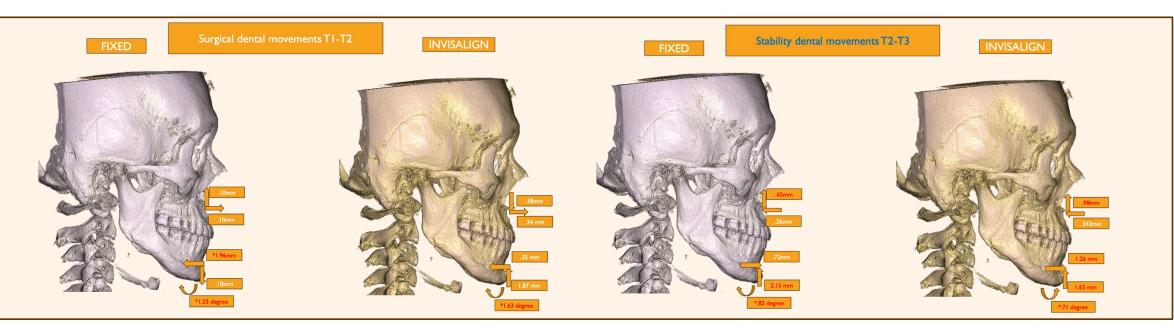

Figure 3- Summary of results for the dental movements between groups and time points.
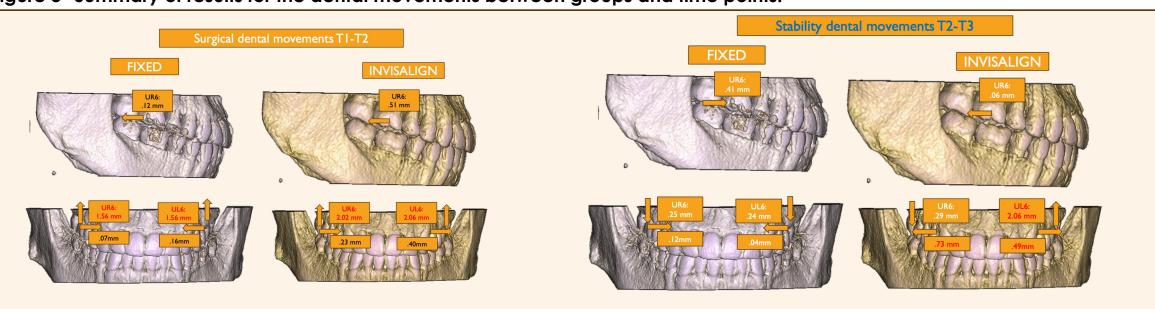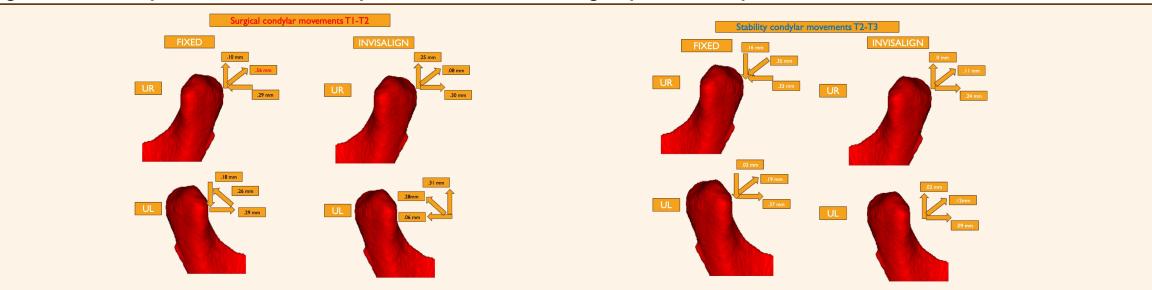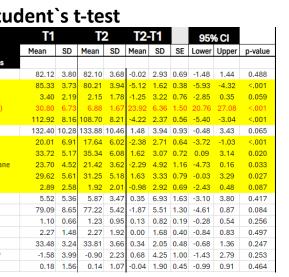

Figure 4- Summary of results for the condyle movements between groups and time points.

CONCLUSION

Most skeletal variables showed no statistically significant differences between the groups post-surgery and after treatment completion. No condylar changes were observed in the SFA between the fixed and Invisalign groups. The null hypothesis is accepted, indicating no significant differences in condylar changes between the two treatment modalities.

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