



# Comparative Accuracy of Static and Dynamic Computer-Assisted Implant Surgery in Anterior versus Posterior Regions

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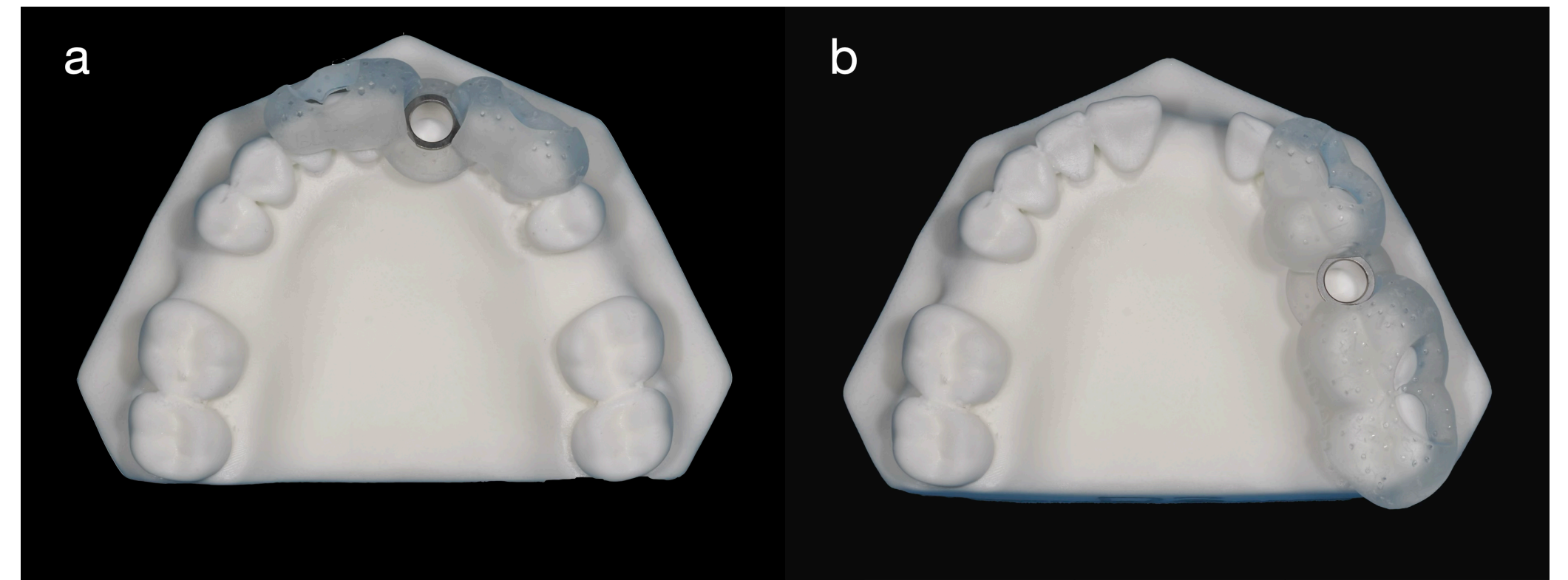


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## BACKGROUND

Implants are the treatment of choice for missing teeth, with well-documented evidence of long-term success and survival rates. With the increased prevalence of implant placement, one of the biggest challenges is placing the implant in the correct position utilizing a prosthetically driven approach.. With the advancements in technology, there has been a noticeable increase in the use of computer-assisted implant surgery (CAIS). Two commonly used CAIS systems include static and dynamic. Both static CAIS (s-CAIS) and dynamic CAIS (d-CAIS) have proven to improve the accuracy and achieve more predictable surgical outcomes. Few studies have a standardized, well-controlled protocol to study the accuracy of static and dynamic CAIS approach for replacement of anterior teeth compared to posterior teeth.

**The primary goal of this study was to evaluate whether any deviations exist between dynamic and static CAIS in anterior versus posterior implants.**







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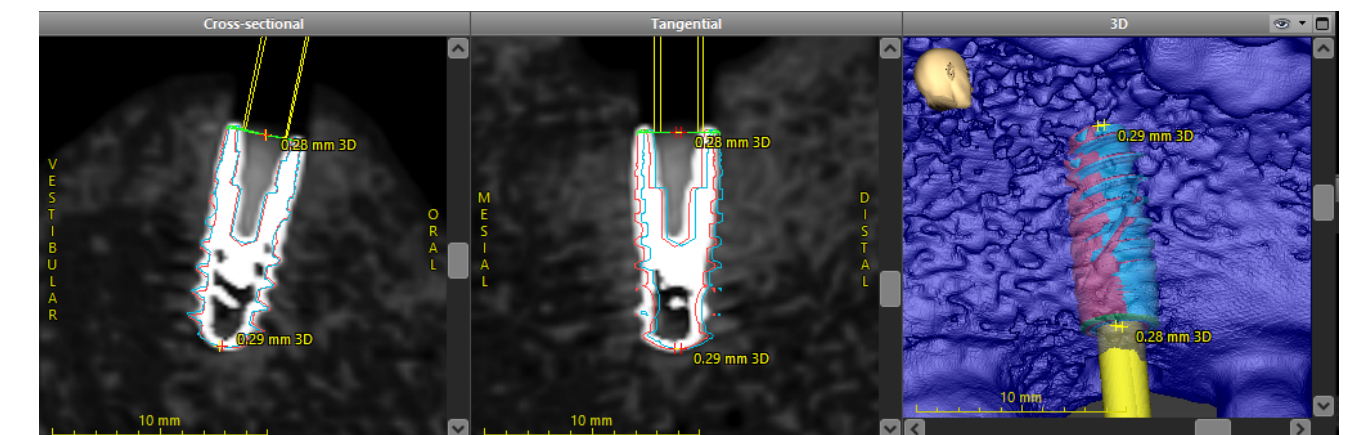
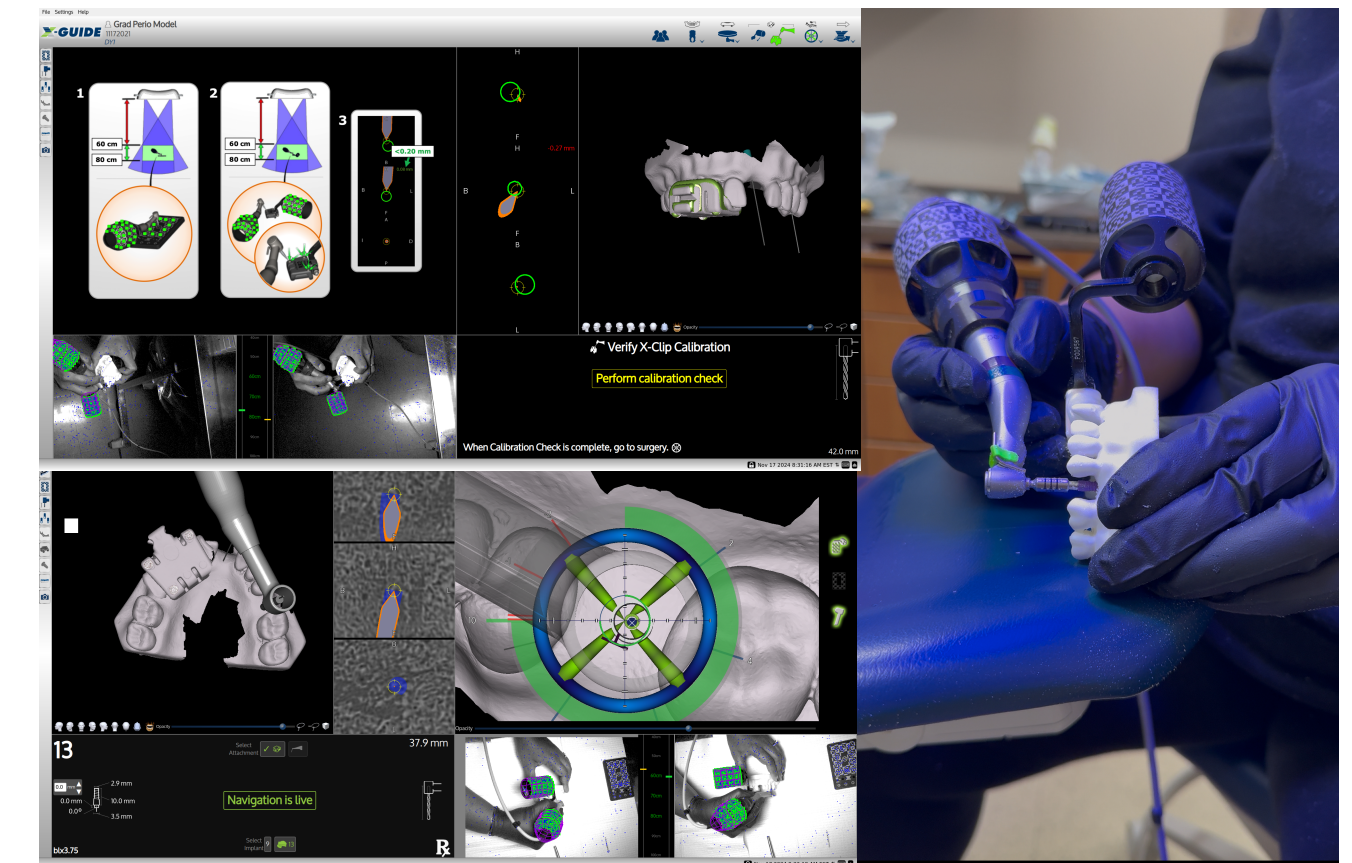
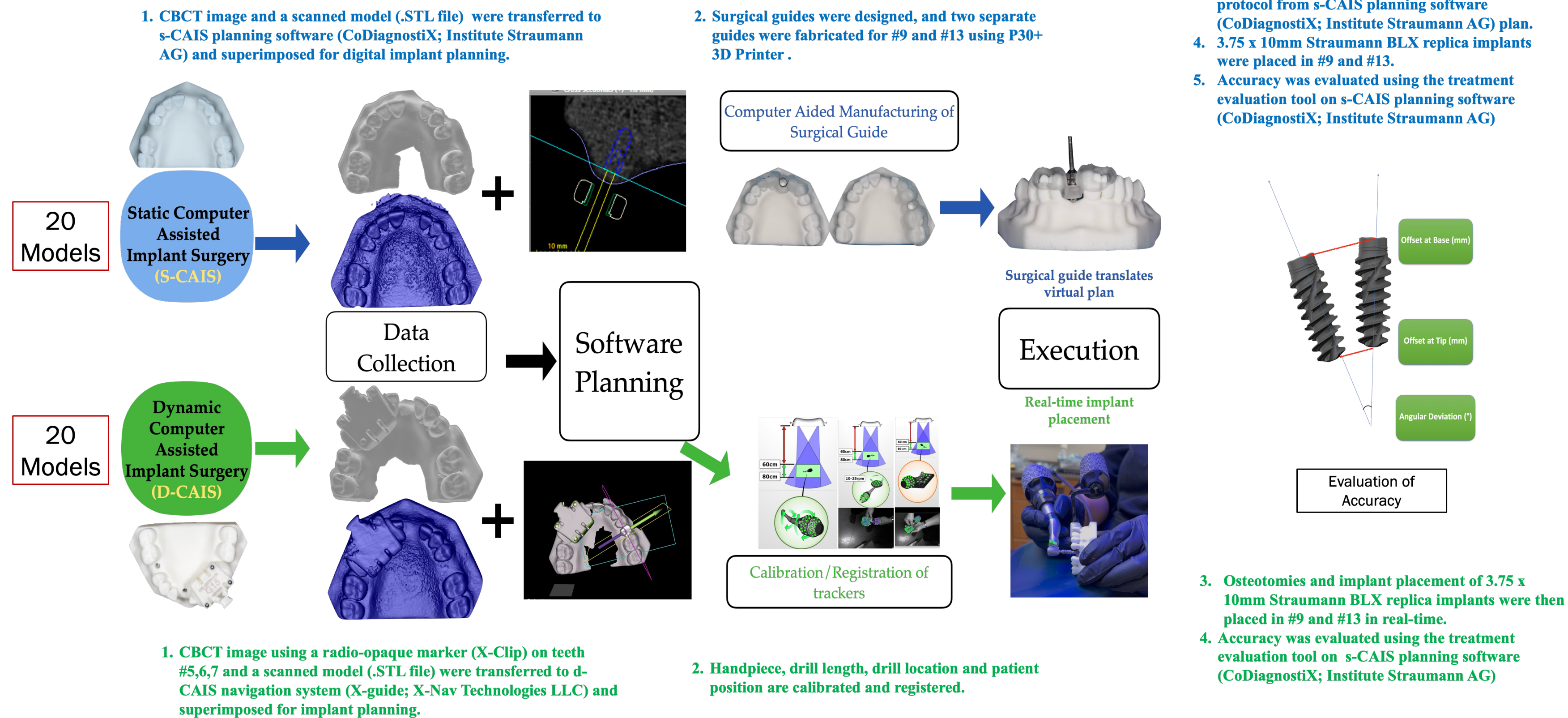
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## MATERIAL & METHODS







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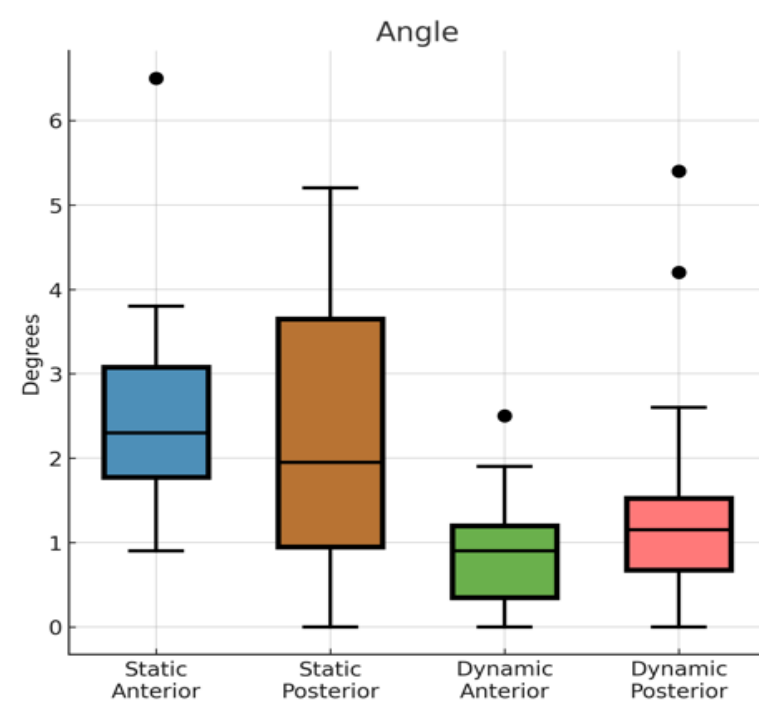
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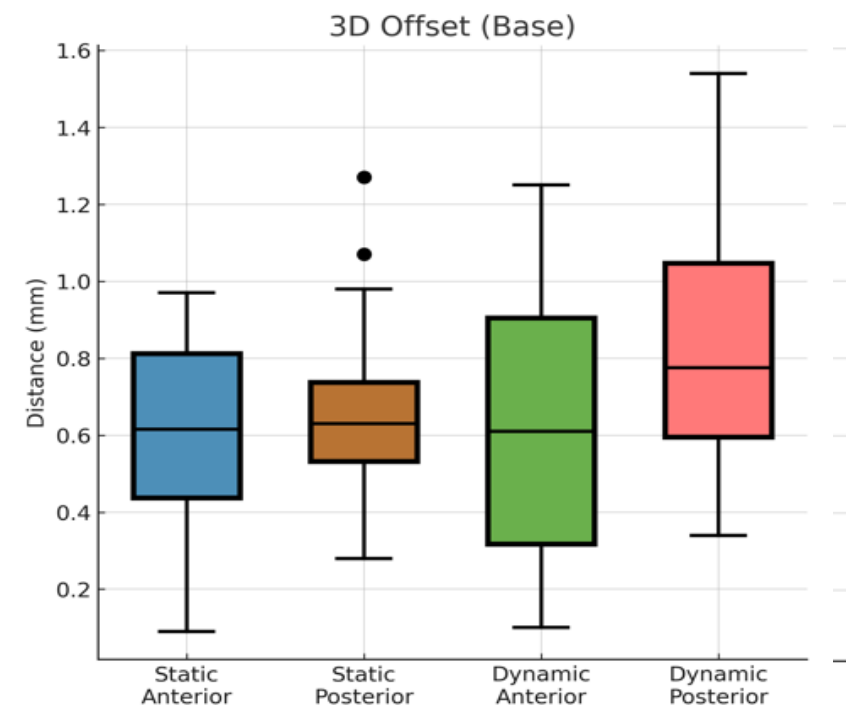
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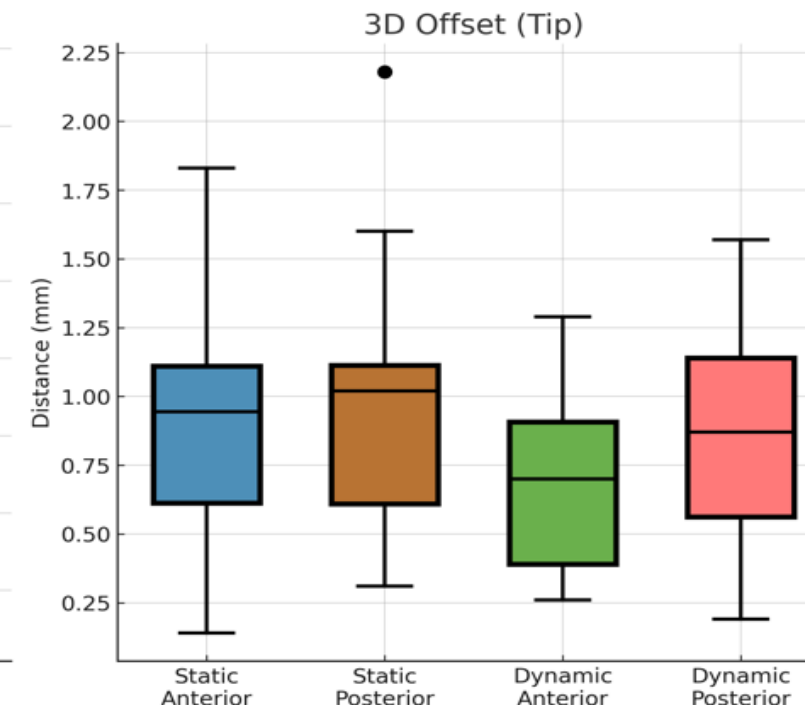
## RESULTS



More **angle deviation** noted in the static anterior and posterior implants when compared to the dynamic anterior and posterior implants.



The dynamic posterior implants showed the most **offset at base deviation** and static anterior group showed the least deviation.



Both anterior and posterior static implants groups showed more **offset at tip deviation** than the dynamic groups. The dynamic anterior group showed the least deviation.

| Angle                         |        |        |         |        | Offset at Base                |        |        |         |        | Offset at Tip                 |        |        |         |        |
|-------------------------------|--------|--------|---------|--------|-------------------------------|--------|--------|---------|--------|-------------------------------|--------|--------|---------|--------|
| Type 3 Tests of Fixed Effects |        |        |         |        | Type 3 Tests of Fixed Effects |        |        |         |        | Type 3 Tests of Fixed Effects |        |        |         |        |
| Effect                        | Num DF | Den DF | F Value | Pr > F | Effect                        | Num DF | Den DF | F Value | Pr > F | Effect                        | Num DF | Den DF | F Value | Pr > F |
| Location                      | 1      | 76     | 0.03    | 0.8603 | Location                      | 1      | 38     | 4.99    | 0.0314 | Location                      | 1      | 38     | 2.02    | 0.1637 |
| Type                          | 1      | 76     | 20.12   | <.0001 | Type                          | 1      | 38     | 1.62    | 0.2110 | Type                          | 1      | 38     | 2.81    | 0.1017 |
| Location*Type                 | 1      | 76     | 2.2     | 0.1421 | Location*Type                 | 1      | 38     | 1.18    | 0.2839 | Location*Type                 | 1      | 38     | 0.62    | 0.4350 |

| Precision (Equality of Variances) |                |          |
|-----------------------------------|----------------|----------|
| Factor                            | Measure        | p-values |
| Location across Type              | Angle          | 0.3279   |
|                                   | Offset at Base | 0.8644   |
|                                   | Offset at Tip  | 0.7447   |
| Type across Location              | Angle          | 0.1322   |
|                                   | Offset at Base | 0.0732   |
|                                   | Offset at Tip  | 0.1520   |

Neither the **location** nor the **type** exhibited a statistically significant difference with the angle, offset at base, or offset at tip



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## CONCLUSION

- A statistically significant main effect of **Type was noted**, indicating that **angles were significantly higher in the Static group** compared to the Dynamic group.
- A statistically significant effect on **Location**, indicating that the measurement is **significantly higher from Posterior group** compared to the Anterior group ( $0.62 \pm 0.14$ ).
- The Location (Anterior vs. Posterior), Type (Static vs. Dynamic) and the interaction between Location and Type **did not significantly impact offset at tip**.
- Regarding precision, neither the location nor the type of surgery exhibited a statistically significant difference with the angle, offset at base, or offset at tip

## DISCUSSION

### Strength of Study

- ✓ Well controlled variables and study design
- ✓ Limited studies showing the difference between accuracy of anterior and posterior implants for single tooth gap

### Limitation

- \* In-vitro design can't 100% duplicate clinical settings
- \* Limited numbers of models

## REFERENCE

