

Accuracy of Intraoral Scan Based Versus Cast Scan Based Surgical Guides

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Introduction:

The osseointegration of dental implant is predictable and it is related to the surgical technique and implant handling. Surgical guide templates facilitate proper positioning and angulation of implants in the bone and decrease postoperative complications. Fabrication of a surgical guide templates is based on one of three design concepts: Non-limiting design, Partially limiting design or Completely limiting design.

The optical impression of the surgical guide can be taken directly to the patient in a chair side procedure or indirectly by making conventional impressions, pouring them and then scanning the casts.

Aim of the study:

This study was made to compare the accuracy of Intraoral scan based and Cast scan based completely limiting CAD/CAM surgical guide for locating dental implants in implant supported mandibular partial overdenture.

Method:

Ten mandibular partially edentulous patients were randomly divided into two groups in which each patient received two implants:

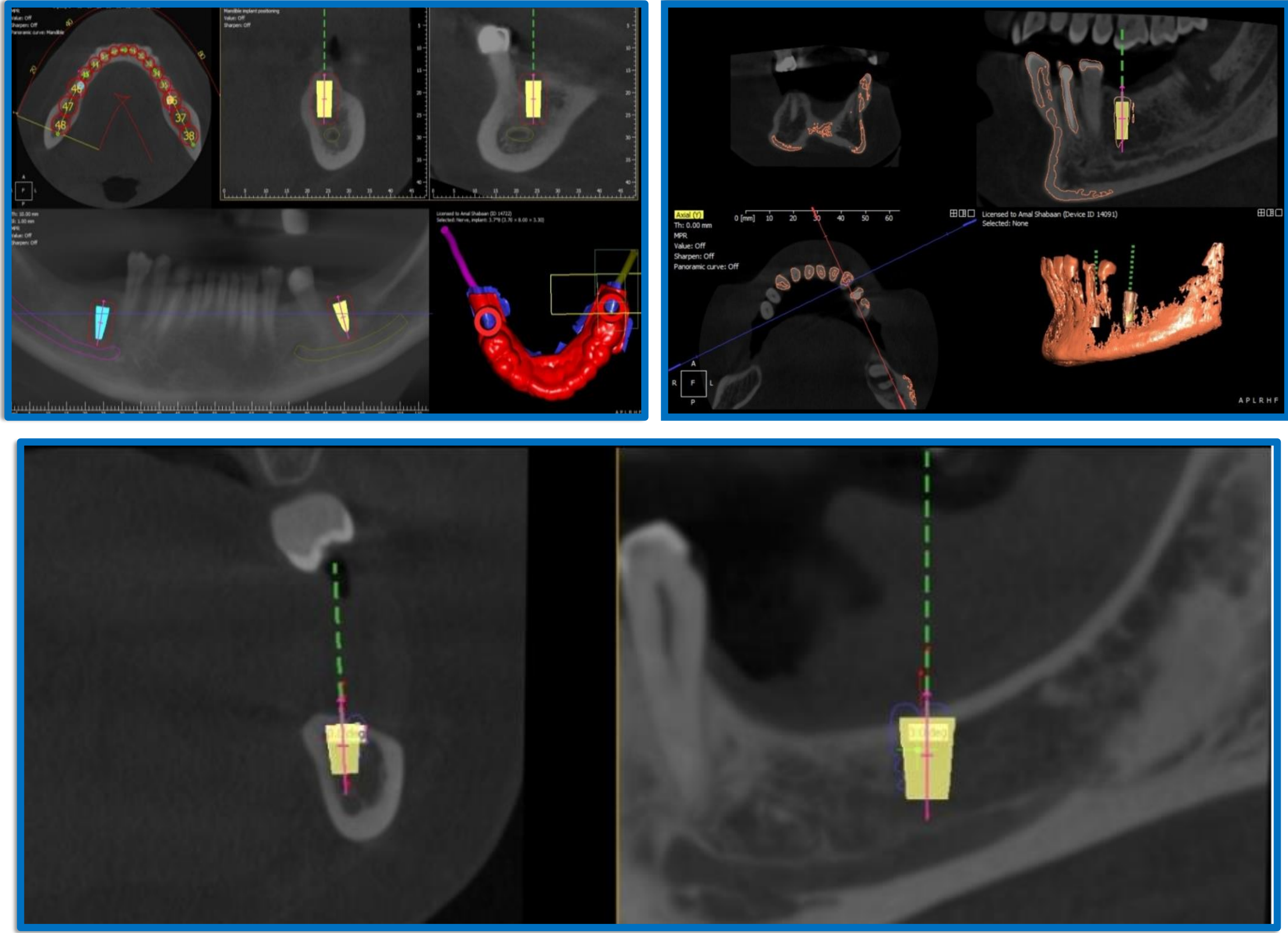
Group (A) Included ten implants inserted to support mandibular partial overdentures using completely limiting intraoral scan based surgical guide. An open system intraoral scanner (TRIOS 3shape) was used to scan the teeth and soft tissues of the lower dental arch. Then, the STL file was created and sent to the lab to start the implant planning. While **Group (B)** Included ten implants inserted using completely limiting cast based surgical guide. An impression was made for lower arch and poured into cast, then the cast was sent to the lab for scanning using Planmeca ProMax imaging unit.

Virtual Implant planning procedures:

Planmeca ProMax 3D Mid imaging unit was used to take the CBCT image for the patient. The CBCT image and the scanned image were superimposed together and the ideal position of the implant was chosen using the DDS-Pro software in DICOM (Digital Imaging and Communications in Medicine) format. Two virtual implants of the required length & diameter were placed into their proposed sites and parallelism between them was considered. A virtual surgical guide was designed with two holes to receive prefabricated metallic sleeves. The plan was saved as a “STL” file format and sent to the printing center for fabrication of the surgical guide, using stereolithographic technique.

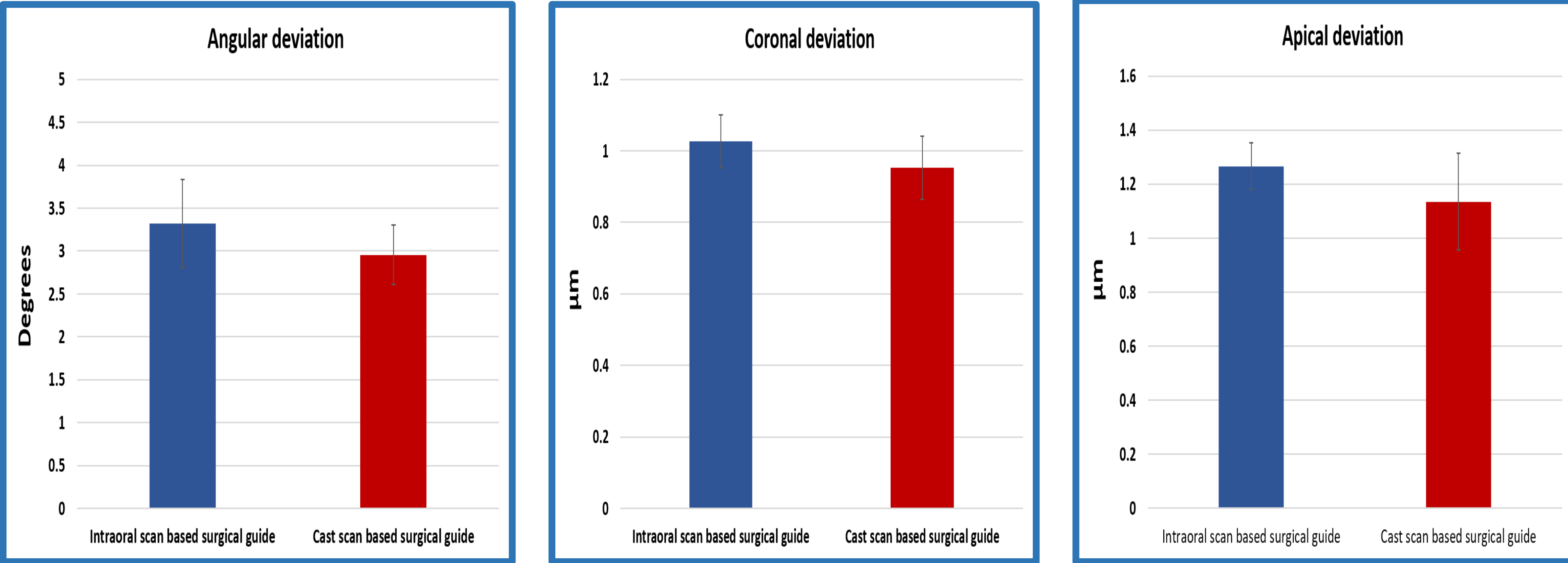
The implant system used:

The guide was inserted in the patient mouth and supported by the remaining anterior teeth. Tapered self-tapping threaded implants were used, then patients were recalled three days after implant insertion for another CBCT scan.



Evaluation of accuracy of intraoral based & cast scan based Guides (Measurement of Implants Deviation):

Three deviation parameters were used to evaluate the amount of deviation between the pre-operative plan and the actual position: Coronal Deviation in x, y and z axis, Apical Deviation in x, y and z axis and the Angular Deviation. The Coronal and Apical deviations were measured in mm and the angular deviation in degrees.



Results:

Results showed a higher apical ,coronal and angular deviation for intraoral scan based surgical guide than cast scan based surgical guide however, by using independent student t-test this differences waere statistically insignificant.

Conclusions:

Within the limitation of this study, it could be concluded that:

- 1) The use of Intraoral scan based or Cast scan based surgical guides for flapless dental implant placement may result in a deviation of implants between virtual & actual implants positions.
- 2) The accuracy of implant placement in both groups was within the safety margin of previous studies.
- 3)Cast scan based surgical guide gave better results over intraoral scan based; however, both methods can be used in manufacturing surgical guides as difference in accuracy is statistically insignificant.

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