



Pickup Impression Technique to Facilitate Digital Merge of Patient Provisional Restorations with Cone Beam Computed Tomography Scan

STATEMENT OF PROBLEM

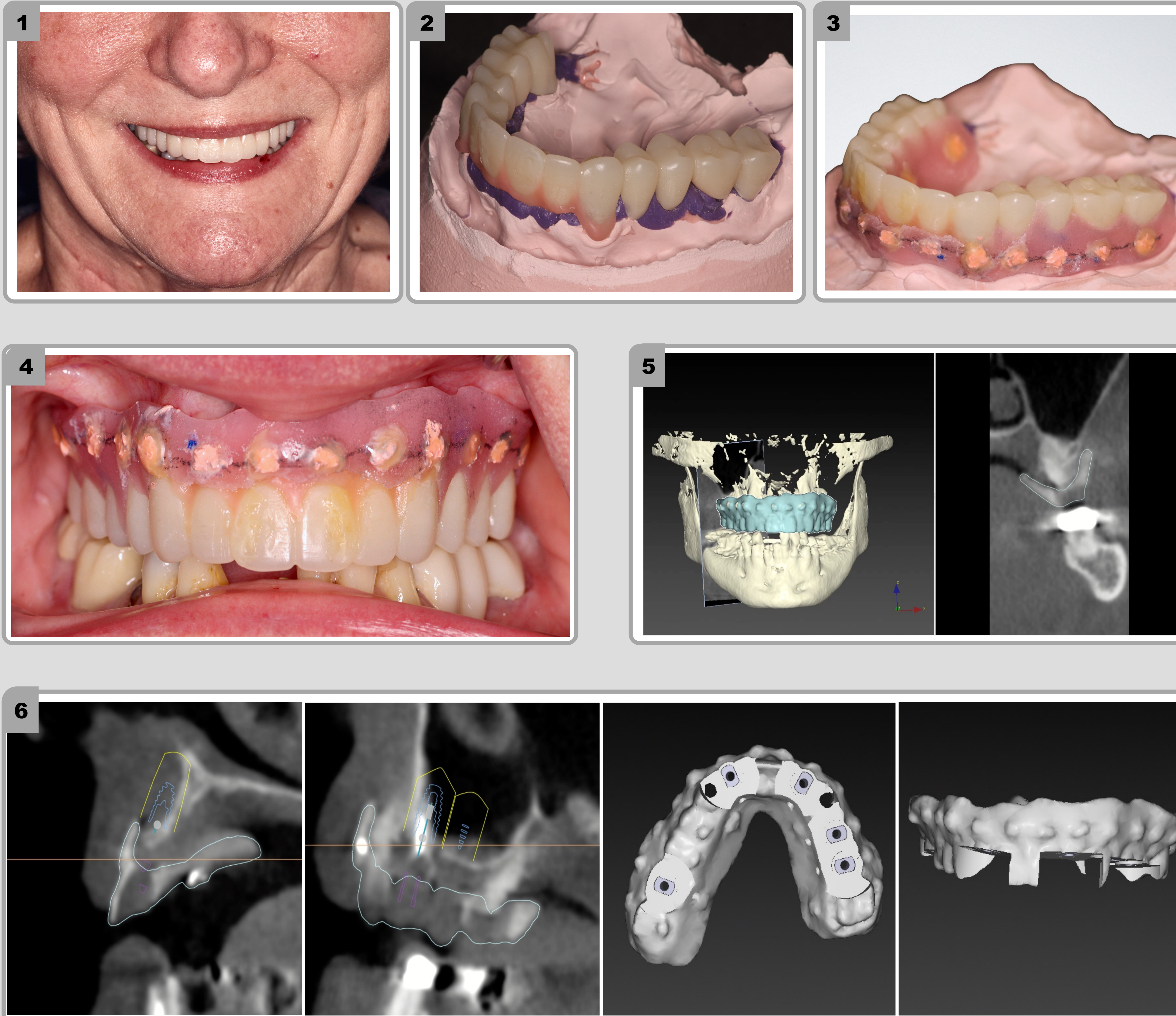
This poster presents a novel technique that merges a patient's radiolucent full arch fixed provisional restoration onto cone beam computed tomography (CBCT) scans, thereby enabling a prosthetically driven digital implant planning approach. The primary focus is on cases involving partial edentulism necessitating fixed full arch rehabilitation with implant-supported and tooth-supported restorations with implants placed after tooth preparation and provisionalization.

OBJECTIVES

The technique addresses the challenges posed by the lack of radiopacity in the patient's full arch fixed provisional dental restoration which cannot be easily correlated between STL and DICOM files.

MATERIALS & METHODS

- This technique is suitable for a patient with an existing full arch provisional prosthesis supported by few natural abutments and satisfying functional and esthetic requirements.
- Clinical verification ensures restoration fit, occlusion, incisal edge position, and esthetics (Figure 1).
- A pickup Impression of the provisional prosthesis with an elastomeric impression material, polyvinylsiloxane in this case, is poured using a non-compatible elastomeric impression material, polyether in this case, for the prepared teeth and surrounding soft tissue and type IV dental stone for the rest of the model.
- This results in a model that accommodates provisional seating and removal without damaging the model (Figure 2).
- The creation of a radiographic guide involves the use of light-cured composite tray material (Triad) to add flanges to the provisional prosthesis and the strategic placement of radiopaque markers (gutta percha) (Figure 3).
- Key steps include identifying the smile line and marking it with a pencil intraorally, as well as positioning the radiopaque markers along the smile line (Figure 4).
- Dual CBCT scans are conducted: one with the patient wearing the radiographic guide and another focusing solely on the guide (Figure 5).



RESULTS

The merging of the two CBCT DICOM files occurs within implant planning software (DTX Studio Implant) using radiopaque markers, which then serve as the foundation for implant planning guided by the provisional teeth position. The results underscore the successful alignment of radiographic data with the patient's provisional teeth position, culminating in the precise fabrication of a prosthetically driven surgical guide (Figure 6).

CONCLUSIONS

This technique offers a solution to the challenge of merging a patient's radiolucent provisional fixed restoration with CBCT scans. By fostering accurate registration and minimizing chair time, radiation exposure, and costs, this noninvasive method holds immense promise in achieving meticulous implant planning and surgical guide fabrication, thereby advancing the realm of implant dentistry.

REFERENCES

1. Yuan C, Wei L, Li X, Wang P. A technique for registering digital dental casts onto cone beam computed tomography scans with excessive metallic artifacts. J Prosthet Dent. 2021 Jan;125(1):29-33. doi: 10.1016/j.prosdent.2019.12.018. Epub 2020 Feb 19. PMID: 32085869.
2. Joda T, Brägger U, Gallucci G. Systematic literature review of digital three-dimensional superimposition techniques to create virtual dental patients. Int J Oral Maxillofac Implants 2015;30:330-7.
3. Jamjoom FZ, Kim DG, Lee DJ, McGlumphy EA, Yilmaz B. Effect of length and location of edentulous area on the accuracy of prosthetic treatment plan incorporation into cone-beam computed tomography scans. Clin Implant Dent Relat Res 2018;20:300-7.
4. Widmann G, Berggren JP, Fischer B, Pichler-Dennhardt AR, Schullian P, Bale R, et al. Accuracy of image-fusion stereolithographic guides: mapping CT data with three-dimensional optical surface scanning. Clin Implant Dent Relat Res 2015;17 Suppl 2:e736-44.
5. Behneke A, Burwinkel M, Behneke N. Factors influencing transfer accuracy of cone beam CT-derived template-based implant placement. Clin Oral Implants Res 2012;23:416-23.