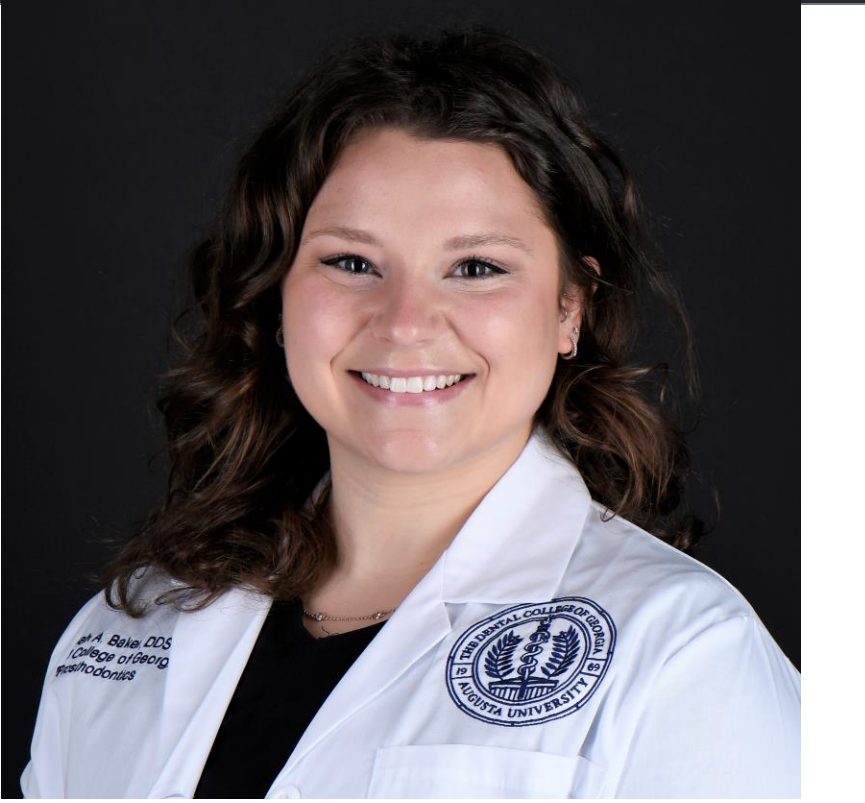


Utilizing Radiographic Properties of Dental Materials for Accurate Planning of Full-Arch Rehabilitation of Natural Dentition and Dental Implants

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Introduction

- Guided implant surgery planned using superimposed scans of a diagnostic wax-up and CBCT imaging allows for the most accurate placement of dental implants as compared to free-hand placement or placement with a conventionally made guide. (1,5, 11)
- Hard tissues represented on the diagnostic cast and in the CBCT are used to superimpose the images together to properly plan implant placement. (6, 15)

Materials & Methods

Prior to starting this technique, proper diagnosis and treatment planning procedures were completed including a diagnostic wax up and intraoral mockup.

- 1) A clear matrix was made on a duplicate cast of the wax-up.
- 2) Separator was placed on the teeth.
- 3) Radiopaque composite was placed in areas of planned implant crowns and pick up intraorally.
- 4) Excess holes placed in matrix on lingual surfaces of natural teeth.
- 5) Radiolucent provisional material was placed in matrix in areas planned for natural tooth crowns and picked up intraorally.
- 6) Photo of patient wearing matrix representing the wax up.
- 7) CBCT was taken of patient while wearing matrix with composite material.
- 8) 3D planning for fully guided implant placement was completed while being able to visualize both the available bone and planned crown location.
- 9) A guide was printed that can be supported on patients' current dentition.
- 10) The guided implant placement was completed.

• When a full-arch rehabilitation is diagnostically waxed, there are no available hard tissue markers to use to be able to superimpose the diagnostic model and CBCT scan together. (6, 15) Using soft tissue dramatically decreases the accuracy of planning. (2, 8, 10, 12, 14)

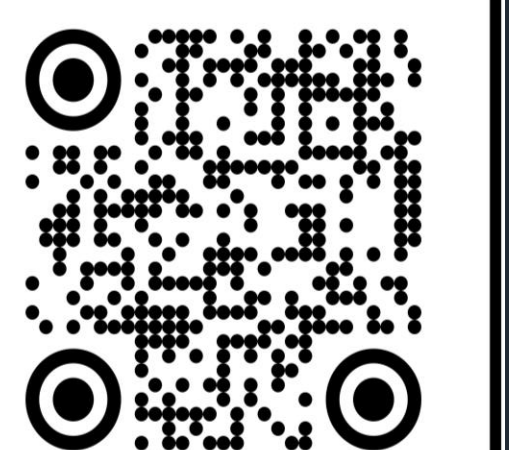
• To re-establish hard tissue markers, the natural teeth in the arch could be prepped and provisionalized but would then be in long-term provisional restorations while the implants heal. This long term provisionalization could increase patient sensitivity, risk of developing open margins, fractures, and chair time for repairs. (7, 9) Esthetically driven patients will require frequent remakes due to color instability of provisional materials. (3)

• Another option would be to make a guide conventionally and depend on soft tissue support from the palate and the unilateral edentulous ridge, in this case, to guide implant placement. Studies have shown that mucosa-based guides decrease fit and stability of the guide and therefore accuracy of implant placement. (4, 13)

• Differing radiographic properties of composite materials were used to visualize both the current state of the patients' teeth and intended restorative position of implants on CBCT imaging. After planning the surgery in CBCT software, a stable, tooth-supported implant guide was printed and utilized for accurate placement of prosthetically driven implants.

Results & Conclusion

Accurate, prosthetically-driven implant placement was achieved via a printed, stable, tooth-supported implant guide. This was accomplished without prematurely prepping the natural teeth in the arch or relying on an inaccurate mucosa-supported or conventionally made implant surgical guide.



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