

Improving Troop Readiness with Virtual Implant Planning, Guided Surgery, and Modern Restorative Options

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Introduction: Advances in digital dentistry allow virtual restorative-driven planning and guided implant placement, creating a predictable outcome that improves troop readiness and wellness. The availability of angled screw channel restorative options helps maintain screw access, and improve retrievability when implant position would otherwise preclude in-line screw channels.

Methods: Virtual implant planning utilizes Cone Beam Computed Tomography (CBCT) images and Standard Tessellation Language (STL) files of proposed restorations. CBCT allows clinicians to visualize the alveolar ridge in 3-dimensions (3D), assess bone quality, and evaluate distance to vital structures. Proposed restorations are designed based on the patient's esthetics, phonetics, and occlusion through analog or digital workflows, then converted to the STL format. Implant position, angulation, and depth are idealized in an implant planning software based on location of the proposed restoration. Static surgical guides are designed utilizing Computer Aided Design (CAD), then made using 3D-printing/Stereolithography (SLA). Implants are placed utilizing fully guided surgical protocol. When implant location is located in the anterior maxilla or deviates away from the planned position, angled screw channel restorations can be used to maintain screw retrievability utilizing a screwdriver with rounded flutes and complementary abutment screws.

Results: The use of fully guided surgical placement minimizes deviation from planned implant position, reducing the risk of mechanical, technical, and biological complications. Well-aligned implants allow the final restoration to be screw retained, which maintains retrievability and eliminates peri-implant complications associated with residual cement. Although angled screw channels can be used to correct screw access up to a certain degree, higher angle correction is associated with greater insertion torque loss.

Conclusion: Virtual implant planning and guided implant placement help achieve mechanically sound and esthetically pleasing results. Modern implant restorative options help maintain screw access and ease of restoration retrievability.

Keywords: Dental Implants, Digital Dentistry, Guided Surgery, CAD/CAM, Readiness, Angled Screw Channel

