Section 6
T-Scan 10 Applications with Dental Implants

Chapter 16
Digital Occlusion Technology's Capacity to Prevent Implant Complications Within Contemporary Digital Workflows

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ABSTRACT

The relationship between occlusion and biological and technical complications in dental implant rehabilitations has been well established. Many clinicians are wary of occlusal issues, yet fail to properly diagnose and manage ongoing occlusal concerns that may mitigate dental implant complications. Peri-implantitis, implant failure, abutment screw loosening, and prosthetic breakage are among a few of these concerns. While protocols for an implant-protected occlusion and proper implant prostheses occlusal force distribution are routinely recommended, rarely is the importance of the T-Scan 10 digital occlusal technology mentioned as a force control standard. Instead, only traditional marking papers are used, which measure no occlusal forces in any quantifiable way. New guidelines should include digital occlusal analysis technology in the dental implant workflow because of the inaccuracy and subjectivity of traditional marking papers. This chapter will address occlusion's role in prosthetic and biologic implant complications, and detail strategies for complication prevention using specific occlusal schemes that incorporate the T-Scan 10 technology as an integral part of the dental implant digital workflow. These recommended occlusal schemes accommodate the prosthetic differences when implant prostheses oppose solely implants, or oppose natural teeth, or soft tissue with an opposing complete denture, or when implants lie between natural teeth, with the occlusal goals to minimize the potential for post-insertion prosthetic complications. Three very detailed implant prosthetic case examples illustrate how navigated surgery and restoratively-driven implant placements are guided by merging CBCT images with intraoral anatomic dental scans. Then at insert, these differing implant prostheses were installed with T-Scan 10 occlusal force level and occlusal contact time-sequence control, which markedly improved the preciseness of the installed prosthetic occlusion. This computer-guided case insert directly

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promotes implant prosthesis survivability, as damaging occlusal force levels and problematic occlusal contact surface friction are first isolated, and then measurably removed from the implant patient's daily functional movements. Unfortunately, these same occlusal force and timing aberrations that T-Scan isolates for the clinician cannot be detected by traditional, non-digital occlusal indicators, and are often unknowingly left in place after articulating paper/shim stock-only case insert by the clinician. They then go unchecked during the implant patient's functional movements, frequently resulting in mechanical and biologic implant complications.

INTRODUCTION

Digital technology has benefited dental implant treatment significantly for both provider and patient, allowing for fewer treatment appointments, lowering costs, and improving patient perception (Joda, Zarone, & Ferrari, 2017). Contemporary Digital Workflows incorporate dental technologies that collect patient anatomic morphology and through software programming, create a planned template for surgical and prosthetic solutions. For patient analysis and treatment planning, the Digital Workflow combines intra oral and extra oral standard tessellation language (.STL) scanning, facial photography, and cone-beam computed tomography (CBCT) (Figures 1a - 3c) (Papaspyridakos, Bedrossian, De Souza, Bokhary, Gonzaga, & Chochlidakis, 2022; Bedrossian, 2022). Surgical implant placement is performed with 3D-printed surgical guides and sterolithic models, 3-Dimensional dynamic surgical navigation (Chen, & Nikoyan, 2021), or surgical robotics (Racal, 2022).

Figure 1. An intraoral standard tellessian language (.STL) scan of a verified complete denture that will be used in the planning of a maxillary implant rehabilitation. Note the opaque software identification fiduciary markers that are attached to the denture for the merging of this .STL scan with a cone-beam computed tomography (CBCT) scan.