

# Chapter 24

## Periodontal and Implant Treatment Maintenance Assisted With Computerized Occlusal Analysis

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### ABSTRACT

*The role of occlusion in the progression of periodontal disease remains a controversial subject. Occlusal force, which is a mechanical stress applied to tissues, has always been considered to not initiate, nor accelerate periodontal attachment loss resultant from inflammatory periodontal disease. This chapter outlines this controversy in great detail, from the perspective that the absence of a validated occlusal force and timing measuring device that can quantify the occlusion has contributed to the confusion and questions that exist in the scientific community about the relationship between both periodontal disease and peri-implantitis, and the occlusion. The development of the T-Scan occlusal measurement technology that records and analyzes precise and reproducible relative occlusal contact force levels in real-time, independent of a clinician's subjectivity, is helping to change the scientific opinion regarding occlusion's role in periodontal and peri-implant supporting tissue loss. The T-Scan 10 system is particularly adapted for treating patients who demonstrate tissue loss combined with occlusal issues. Indeed, after having controlled the major etiologic and risk factors of periodontal disease and peri-implantitis, adjusting the occlusion after active tissue and implant therapy favors healing. This chapter discusses how the outcome of periodontal treatment aimed at compromised teeth and dental implants becomes highly predictable, when combined with occlusal force excess control from T-Scan-guided targeted occlusal adjustments, with posttreatment tissue health being characterized by less inflammation, decreased probing depths, and bone level stability around teeth and dental implants. This chapter will also detail that 3-Dimensionally printed maintenance nightguards require post fabrication T-Scan occlusal adjustments to measurably balance the nightguard's occlusion and increase the nightguard's effectiveness.*

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## INTRODUCTION

The Periodontium is characterized by several tissues:

- Soft tissues, such as the keratinized gingiva
- The free gingiva
- The periodontal ligament (PDL)
- The hard tissues around the teeth such as bone and cementum.

Periodontal diseases are multifactorial and considered to be of bacterial origin, which are characterized by the presence of gingival pockets and progressive loss of attachment with bone resorption occurring around teeth. It is possible to ensure the periodontal health of the patient by keeping these pockets shallow. Clinicians are therefore perpetually faced with the need for probing pocket depths of any detected periodontal pockets.

Clinicians also check for two groups of potential Periodontal disease risk factors, which include:

- Innate human factors (age, sex, ethnicity, genetic predisposition)
- Acquired factors (microbiological factors, smoking, and other systemic disease states)

The link between occlusion and impaired periodontal health has always been a matter of great debate (Green & Levine, 1996). However, occlusion is not generally considered to be a risk factor for periodontal disease, but is rather viewed as an aggravating factor in the same way as is tobacco use. Despite that in everyday practice, clinicians observe obvious links between occlusion and periodontal parameters, the absence of an “evidence based” occlusal force analysis makes difficult the demonstration of these interrelations. The T-Scan III, could help to address unanswered questions. The aim of this chapter is to review how occlusal analysis can be integrated in periodontal treatment and how a computerized occlusal analysis can help the clinician in his practice.

## BACKGROUND

Interrelations between periodontal disease and occlusal forces have been usually defined by the term occlusal trauma. Stillman was the first to define occlusal trauma, as “a traumatic state of the tissues supporting the teeth resulting from the movement of the jaws towards the closed position” (Stillman, 1917). In 1978, the World Health Organization (WHO) defined occlusal trauma as a “periodontal traumatism caused by stress on the teeth induced directly or indirectly by the teeth present in the other arch” (Lindhe, Karring, & Lang, 2008). The American Academy of Periodontology (AAP) defined reduced tissue support, the tooth’s center of rotation translates more apically, which creates a major lever-arm resultant from the occlusal loading (Figure 2). Occlusal trauma as “damage to the dental support tissues caused by an excessive occlusal load” (Gher, 1996). There are 2 classifications of periodontal damage resultant from occlusal trauma:

- **Primary** - Primary trauma affects teeth with normal periodontal tissue height (Figure 1)
- **Secondary** - Secondary trauma affects teeth with reduced periodontal tissue height (Figure 2)

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