Chapter 12
Tooth Wear:
Prevention, Treatment, and Monitoring Using the T-Scan/ BioEMG Synchronization Module

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ABSTRACT

Tooth wear is considered a normal, age-dependent, physiological process that leads to the loss of enamel and dentine. However, in some cases the process is so progressive that it may be regarded as severe or pathological. The focus of this chapter is to present the consequences of tooth wear resultant from mechanical reasons, such as parafunction, excessive masticatory forces, imbalanced occlusal contacts, and hyperactive masticatory muscles. This chapter will also outline preventative strategies that can predictably reduce the progression of pathologic wear, which employ the T-Scan 8/BioEMG synchronization module. These two objective companion technologies assess the occlusion before, during, and after dental treatment, as well as predictably control the long-term stability of newly-installed fixed, implant-supported, or removable prostheses. Their synchronization correlates muscle activity level information directly to occlusal contact force and time-sequencing information, which when applied together in the wear patient, can be instrumental in tempering and eliminating pathologic occlusal wear.

INTRODUCTION

The masticatory system may be considered a morphological-functional unit that is subject to dynamic transformations that occur throughout a patient's life (Ash & Nelson, 2003). As in every dynamic system, key elements may become damaged over time. In the case of the masticatory system, tooth wear (occlusal wear) has been thought of a basic physiological adjustment mechanism whereby the patient's central nervous system detects unwanted opposing occlusal surface frictional events and attempts to remove them. These premature occlusal surface contacts (which are often undetectable via traditional means) are systemically "self-removed", often without the appearance of clinical symptoms (Bartlett,

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2003; Bartlett, Anggiansah, Owen, Evans, & Smith, 1994). To some degree, limited tooth wear appears to be a universal finding.

In adults, the distinction between physiological, severe, or pathological tooth wear is by no means easy to define, but extreme tooth wear is considered to be an abnormality (Smith & Knight, 1984). The term "severe tooth wear" means there is a substantial loss of tooth structure, with dentin exposure and significant loss (> 1/3) of the clinical crown. Pathological tooth wear is atypical regardless of the age of patient, causing pain and discomfort, functional problems, that can deteriorate the patient's esthetic appearance, which, if progresses, may give rise to undesirable complications of increasing complexity (Loomans, Optam, Attin, Bartlett, Edelhoff & et al., 2017).

It has been frequently suggested that the clinical presentation of occlusal wear depends upon (Bartlett, 2003):

- The degree of wear
- The localization of tooth structure damage
- The progression of wear over time
- The contributory etiological factors

The clinical examination of occlusal wear often reveals the flattening of occlusal surfaces, the presence of enamel discoloration, the presence of enamel cracks and fractures, dentine exposure, and in extreme cases, pulp denudation. Wear damage to the clinical crowns of teeth often results in teeth short teeth and flattened occlusal surfaces. This often leads to the clinical loss of occlusal vertical dimension (OVD) (Davies, 2002).

Pathologic or severe tooth wear may be very destructive to the masticatory system. Presently, there are no strict guidelines to instruct clinicians as when to commence intervention, and how to best manage any needed reconstructive treatment (Johansson, Johansson, Omar, & Carlsson, 2008). Most often, the decision to intervene in ongoing occlusal wear depends upon the clinician's experience and the patient's needs.

Today, there are many methods and materials available to use in the restoration of worn teeth. However, there exists controversy with Dental Medicine, concerning the most appropriate and effective approaches that a clinician could follow to treat wear. It has been suggested that definitive restorative procedures should not be performed without first identifying the etiological factors contributing to excessive occlusal wear (Bartlett, 2003). Moreover, the treating of these etiologic factors should combine preventive procedures that can limit further tooth structure degradation with clinician-recommended, patient lifestyle alteration advice (Bartlett, 2003).

Costly, conventional fixed and removable prosthetic treatment tends to be the rehabilitation mainstay in the treatment of advanced tooth wear, especially in cases where the occlusal vertical dimension has been decreased. Such treatment is complex and may be highly invasive, requiring that optimal occlusal post treatment function be obtained with the newly installed restorations, to limit the failure potential from parafunction of the new restoration, long-term. Therefore, desirable treatment goals when restoring the worn dentition should be to install well-fitting, high quality restorations, which function under favorable (low muscle activating) occlusal conditions (Kerstein & Radke, 2012):

- Short Disclusion Time (DT) in excursions (< 0.5 seconds per excursion)
- Short Occlusion Time (OT)in closure (< 0.2 seconds from 1st contact to last)

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