

INTRODUCTION

Background

- The restoration of dental implants presents a unique challenge due to the intrinsic biomechanical differences between osseointegrated implants and natural teeth
- Dental implants and teeth respond differently to occlusal loading due to lack of PDL around implants
- Controversy exists regarding the role that occlusion plays in the physiology of the peri-implant complex

Purpose

- The aim of this review is to provide an overview of the scientific literature regarding occlusion as it relates to implant dentistry and peri-implant disease

Materials and methods

- This review presents occlusal loading and its potential effects on the peri-implant complex
- Summarizes generally accepted guidelines for occlusion in implant dentistry

OCCLUSAL FORCE, MAGNITUDE, AND DISTRIBUTION AND IMPLANT COMPLICATIONS

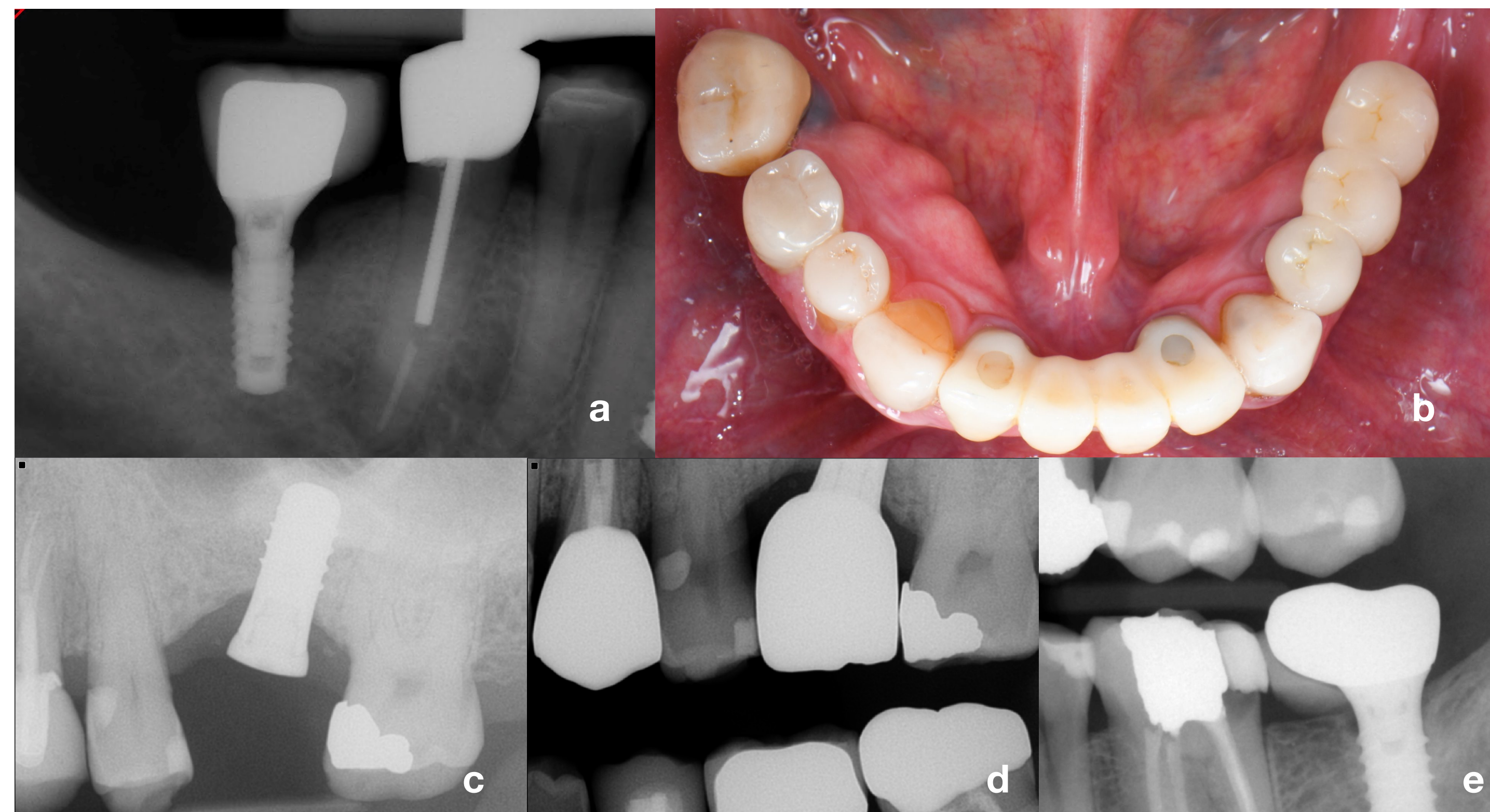


Figure 1. (a) fractured implant i30 with radiographic bone loss. Implant failure possibly caused by nonaxial force from mesial cantilever and bruxism; (b) occlusal view of the fractured implant in the previous radiograph; (c-d) PA radiograph showing implant placed at a non-ideal angle, and subsequently restored with a prosthesis that transfers non-axial forces to the implant; (e) Implant placed distally of the ideal position and result in a mesial cantilever of the final crown.

BIOLOGICAL PROCESS OF PERI-IMPLANT DISEASES

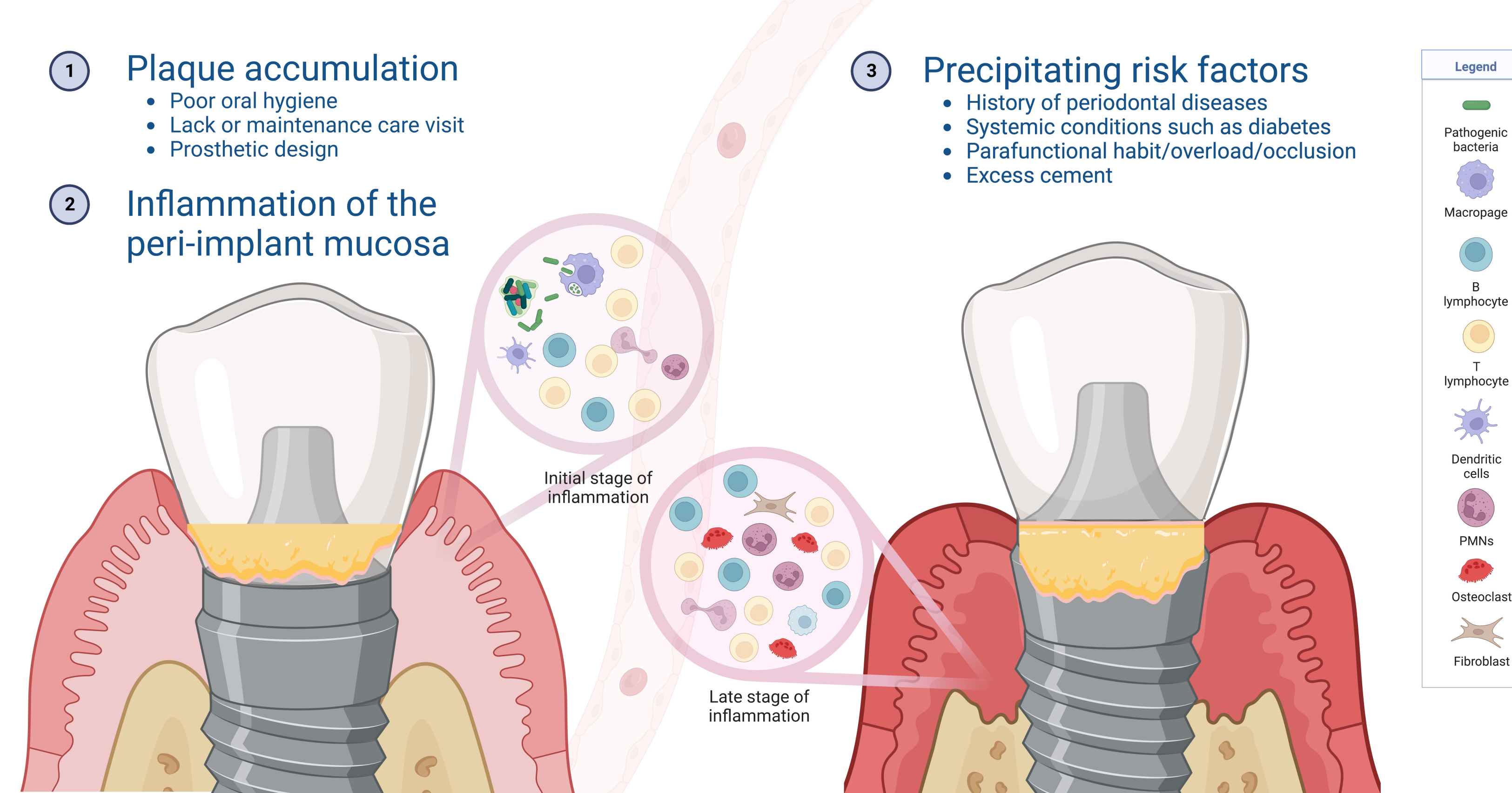


Figure 2. Biologic process of peri-implant mucositis and peri-implantitis. Peri-implant diseases are first initiated with biofilm accumulation. Inflammatory cells infiltrate the peri-implant tissues which could ultimately result in attachment loss and bone loss.

THE EFFECT OF OCCLUSAL LOAD AND OVERLOAD ON THE PERI-IMPLANT HARD AND SOFT TISSUE COMPLEX

Bone remodeling and occlusal load

- Factors affecting occlusal forces are age, gender, dentate status, location in the mouth
- There is a constant interaction between implant and the surrounding bone when implant undergoes loading forces
- Wolff's law describes the phenomenon when bone adapts to applied loads through remodeling in terms of size and structural configuration through mechano-transductive processes and signaling

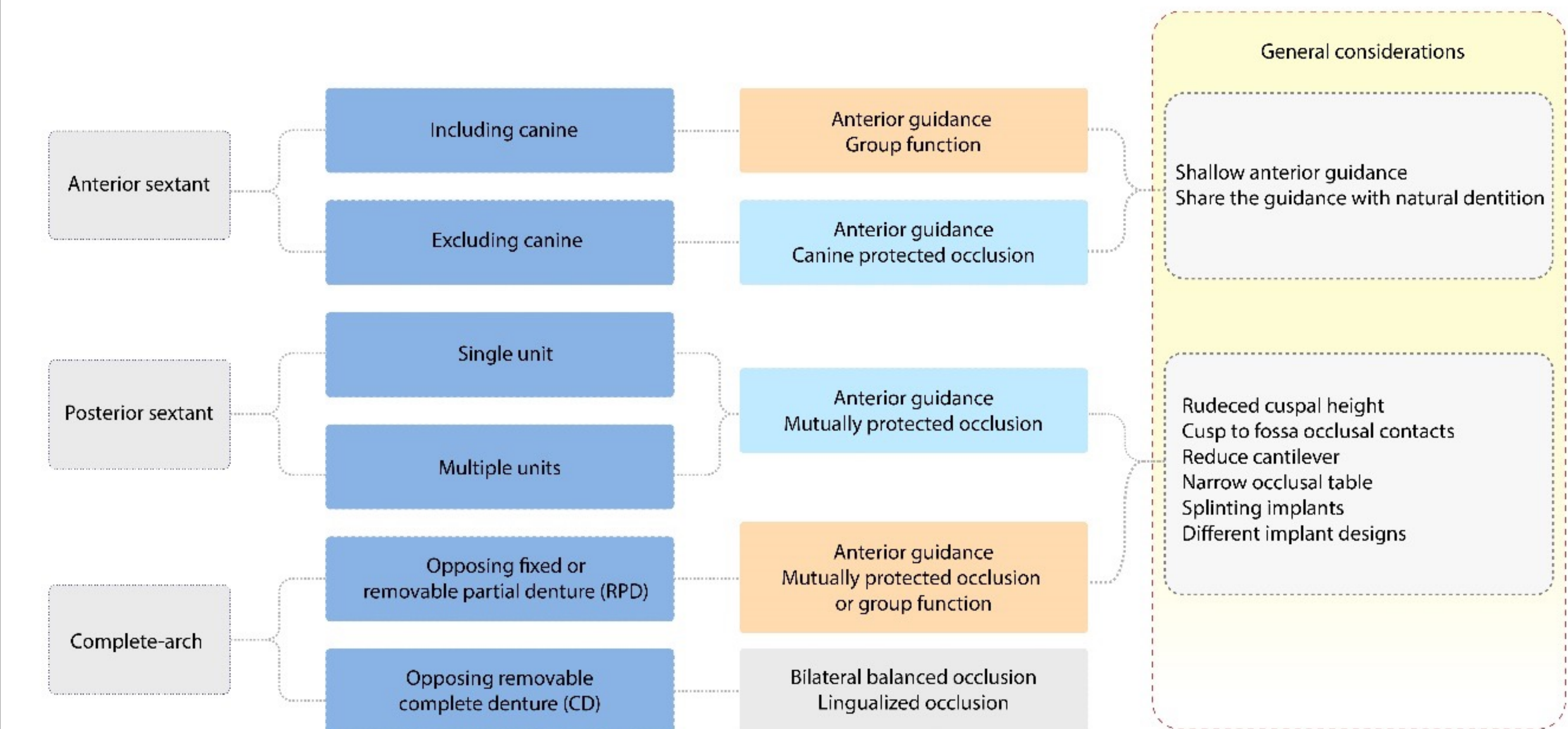
Bruxism and overload

- Overload is defined as a force that exceeds the capacity of the prosthesis, restorative components, implant fixture, or the supporting bone, to withstand without damage
- Systematic reviews suggested association between bruxism and higher risk for technical and biological complications in dental implants
- Some animal studies reported marginal bone loss or implant failure associated with excessive occlusal loading in the absence of peri-implant inflammation; other concluded that occlusal overloading only contribute to peri-implant bone loss in the presence of inflammation

- Mechanisms determining an anabolic or catabolic response to load may be related to
 - surrounding bone quality
 - magnitude and direction of forces
 - macro and micro-geometry of the implant fixture

- Occlusal splints are routinely used to reduce potential damage caused by bruxism on natural dentition and implant restorations from attritive wear

OCCLUSAL CONSIDERATIONS IN IMPLANT DENTISTRY



CONCLUSIONS

- There is no clear scientific evidence showing a direct causative relationship between occlusal overload and peri-implant disease. However, occlusal overload may be a contributing factor to peri-implant disease in the presence of inflammation
- The functional mechanisms of occlusion in dental implants differ from that of occlusion in the natural dentition due to the unique biomechanical properties of dental implants
- Optimization of implant occlusion in terms of occlusal scheme as well as prosthetic design is suggested to minimize unfavorable overload on implant restorations in order to reduce the associated complications
- Occlusion related complications in implant dentistry can happen, even with meticulous planning of treatment. Understanding how to diagnose and treat these complications is an essential skill for the prosthodontist

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