A CRITICAL REVIEW INTO PROSTHODONTIC FACTORS FOR BONE LOSS ASSOCIATED WITH DENTAL IMPLANTS

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INTRODUCTION

- Literature - high survival and success rates with long standing predictability. However, susceptible to technical and biological complications
- Reason for crestal bone loss controversial with infection or overload and more recently compromised healing/adaptation.

**AIM:** Critically review literature to describe prosthodontic factors that might be associated with crestal bone loss around osseointegrated dental implants
**BACKGROUND**

- Bone loss: focus of concern due to increasing prevalence, as well as the deleterious consequences

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**BIOMECHANICS**

- Crown:implant ratio
- Splinting of implants
- Tilting and use of angulated abutments
- Cantilever
- Antero-posterior spread

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**PROSTHETIC PROCEDURAL / DESIGN FACTORS**

- Screw vs. cement retention
- Abutment height
- Design of prostheses (access)
- Abutment connection/reconnection
MATERIALS AND METHODS

- Medline (OVID)
- Cochrane Library
- Combination of MeSH terms and keywords searched January 2006 - April 2016

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DISCUSSION: CROWN:IMPLANT RATIO

- Class I lever - non-axial loading, creating bending moment - bone stress/loss
- Position of fulcrum differentiates between an anatomical crown:implant and clinical crown:implant ratio
- Majority of studies - anatomical
DISCUSSION: CROWN:IMPLANT RATIO

- Results suggest crown:implant ratios do not play a role in bone loss

- Limitations
  - Analysis: anatomical compared with a clinical ratio
  - Studies compared splinted and non-splinted restorations
  - Antagonist type

2 prospective studies, 6 retrospective studies

- Tawil et al. 2006
- Blanes et al. 2007
- Birdi et al 2010
- Gomez-Polo et al 2010
- Urdaneta et al 2010
- Lee et al 2012
- Schneider et al 2012
- Anitua et al 2014
DISCUSSION: SPLINTING

- Splinting implant restorations thought to favourably distribute the non-axial loads, and to increase total load area.

- 10-year RCT between splinted and non-splinted prostheses (Vigolo et al 2015)
  - statistically significant difference - 0.1mm not clinically significant

Vigolo et al 2015
Mendonca et al 2014
1 RCT, 1 retrospective study
DISCUSSION: TILTING

- Good evidence implant inclination does not have a detrimental effect on peri-implant bone loss.

- 7 prospective studies,
- 2 retrospective studies

Agliardi et al, 2014
Malo et al, 2013
Testori et al, 2013
Penarrocha Diago et al, 2013
Francetti et al, 2012
Hinze et al, 2010
Agliardi et al, 2010
Capelli et al, 2007
Koutouzis & Wennstrom,
DISCUSSION: SCREW V.S. CEMENT

- From the limited evidence available there is no evidence to support differences in the marginal bone loss between cement and screw-retained restorations.

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DISCUSSION: PROSTHETIC ABUTMENT HEIGHT

- Prosthetic height of the abutment may play a role in crestal bone loss with shorter abutments exhibiting more bone loss.
- Soft tissue thickness may be more important?

Galindo-Moreno et al 2014
Vervaeke et al 2014

1 RCT, 1 retrospective study
DISCUSSION: CANTILEVER

- Cantilever extensions did not lead to higher implant failure rate or more bone loss.

- Postulated that level of stress may be below the threshold for bone loss and within an individual’s capacity for bone remodelling.

Romanos et al 2014
Dhima et al 2014
Aglietta et al 2012
Mumcu et al 2011
Semper et al 2010
Halg et al 2007
Romeo et al 2009

7 retrospective studies
1 prospective study
DISCUSSION: PROSTHESIS DESIGN
(HYGIENE ACCESSIBILITY)

- Limited evidence design of prostheses (hygiene accessibility) may be related to the marginal bone loss around dental implants

- The clinician must design implant restorations to carefully ensure implant components and restorations are designed to minimise plaque accumulation and maximise access for oral hygiene

Lehmann et al 2013
Serino and Strom 2009
2 retrospective studies
the “one abutment-one time” concept has shown that there is no benefit in vertical bone healing with statistically insignificant differences in bone loss.

Grandi et al 2012

Degidi et al 2011

1 RCT
1 prospective study
CONCLUSION

- Need for the development of consensus based standardised criteria for assessment of bone levels
- Radiographic limitations

**EVIDENCE**

- Not Factors Associated With Bone Loss
  - Crown:Implant Ratio
  - Cantilevers
  - Tilting Of Implants

**LIMITED EVIDENCE**

- Increased Bone Loss
  - Reduced Prosthetic Height Of Abutments
  - Prostheses Design Precluding Adequate Oral Hygiene

**LIMITED EVIDENCE**

- No Differences In Marginal Bone Loss
  - Cement And Screw-Retained Splinting
  - Abutment Connection/Reconnection

- Further well-designed prospective and randomised controlled studies with large sample sizes and long-term follow-up required