Platform switching in dental implants

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Prof. Liviu Steier and Gabriela Steier look at the benefits of this concept, how best to carry it out and which manufacturers offer the equipment.

Introduction

The crestal area is the region to suffer initial breakdown when it comes to the implant tissue interface. Adell et al. (1981) first communicated 1.2mm of marginal bone loss from the first thread during healing time, with a continuation of 0.1 mm annually.

As a consequence, Smith and Zarb (1989) established the following as criteria for implant success: vertical bone loss of <0.2mm annually following the first year. This of course is a major issue in the anterior esthetic zone. Since then, clinicians and manufacturers have worked hard to try to improve this condition.

Factors affecting loss

The following factors are among the most discussed to cause crestal bone loss:

1. Surgical trauma
2. Biologic width/seal
3. Microgap
4. Occlusal overload
5. Crest module.

Causes of trauma

Overheating the bone during the drill procedure; extended full-flap raise, Screw-in forces higher than 35 N/cm² are optional causes for crestal breakdown. As such, these factors may only be responsible for bone loss prior to prosthetic load.

Biologic width/seal

This seal starts the day the abutment is mounted and continues for the next six weeks into treatment. Today’s surgical protocols control this fact by adequate three-dimensional implant positioning.

Microgap development

Two-stage implants seem to be prone to microgap development. Even with implant engineering work, it’s hard to control via different improved connections, glue, etc.

Occlusal overload

Crestal bone is mostly cortical bone. Forces occurring at the crestal level are described as shear forces. Cortical bone is highly susceptible to shear forces. Occlusal concepts have been developed specially for implant-supported restorations to address this issue.

Crest module

Implant professionals as well as implant manufacturers have introduced different remedies to address this issue: polished collar, Connective Contour (Astra), Laser-Lok Technology (Biohorizons), for example.
The peri-implant histology
Ericsson et al (1995) reported the following findings:

a. Plaque associated inflammatory cell infiltrate;
b. Implant associated inflammatory cell infiltrate.

As such implantologists addressed more attention to the area.

Serendipity

• In the late 1980s, NobelPharma introduced a Branemark 5mm-diameter implant. The prosthetic components used a “standard” diameter.
• In 1991, Implant Innovations introduced wide diameter implants. Of course not all prosthetic abutments were available. As a result, prosthetic parts from a regular platform have been used.

Long-term observations of this demonstrated a reduced loss vertical change in crestal bone height compared to the available standards.

The platform switching treatment concept
The platform is the crestal area of an implant. Let us say as an example that the crestal diameter of the implant is 5.8mm and the abutment used measures 5.2mm. The difference of the diameter between the implant and the abutment is the so called “platform switching”.

Manufacturers offering the concept
The concept of platform switching is only offered exclusively by a restricted number of implant manufacturers.

1. Wieland
2. ITI
3. 3I
4. Astra
5. Dentply – Ankylos
6. Zimmer

Scientific evidence

Conclusion: The findings of the current trial indicate that the use of implants with an enlarged platform can result in better preservation of crestal bone as compared with conventional cylindrical implants when a reduced abutment is mounted.


Conclusion: This study suggests that, in a limited time period of two years, immediately placed implants with subsequent platform switching can provide peri-implant tissue stability.


Conclusion: Results from this study showed the reduction of abutment diameter (for example, platform switching) resulted in a measurable, but minimal effect on Von-Mises stress in the crestal region of cortical bone.


Conclusion: The concept of platform switching appears to limit crestal resorption and seems to preserve peri-implant bone levels. A certain amount of bone remodelling, one year after final reconstruction occurs, but significant differences concerning the peri-implant bone height compared with the nonplatform-switched abutments are still evident 1 year after final restoration. The reduction of the abutment of 0.45mm on each side (5mm implant/4.1mm abutment) seems sufficient to avoid peri-implant bone loss.


Conclusion: Platform switching seems to reduce peri-implant crestal bone resorption and in-
improve the long-term predictability of implant therapy.


Conclusion: This proof-of-concept study suggests that immediate loading with platform switching can provide peri-implant hard tissue stability with soft tissue and papilla preservation.


Conclusion: Within the limits of the present study, it was concluded that both CAM and CPS implants revealed crestal bone-level changes after 28 days of healing.

The ITI Consensus Statements on aesthetic considerations in implant dentistry (ITI Treatment Guide Volume 1 – Quintessence) have to be mentioned here as the authors wish to avoid raising false expectations that only platform switching (a group of prosthetic and restorative procedures) can lead to predictable results. The author’s statements in the articles are based on:

1. Long-term results (from evidence to newer surgical approaches)
2. Surgical considerations (from extraction planning to soft tissue stability)
3. Prosthetic and restorative procedures (from standard for esthetic fixed-implant restorations to location of the implant shoulder)
4. Well-executed aesthetic risk analysis performed prior to any treatment planning.

Conclusion: The authors would like to end with questions raised by DM Gardner in an article in NYSDJ, from APRIL 2005:

• Can implants be placed closer than 5mm from an adjacent implant, while still maintaining interproximal height of bone?
• Can implants be placed less than 1.5mm from a adjacent tooth and still maintain interproximal bone?

About the author
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