

Platform Switching in Dental Implantology: A Literature Review

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ABSTRACT

Background: The platform switching involves diminution of diameter of implant abutment with respect to the dental implant, rather than placing abutments of analogous diameters. This concept helps to maintain soft tissue aesthetics and preserves the crestal bone loss. Conventionally placed implants have higher stresses around the neck of the implants and along the lateral surface whereas in platform switched implants the stress areas are located to the centre of the implant. The position of the crestal bone influences the position of soft tissue in turn dictates the entire aesthetic outcome.

Keywords: Platform switching, Crestal bone remodelling, crestal bone loss, biologic width, dental implant.

INTRODUCTION

The clinical success of dental implants is highly dependent on integration between implant components and oral tissues. A successful prosthesis must also include an esthetic and functional restoration surrounded by stable peri-implant bone and tissue levels.^{1, 2} After the placing of the dental implant and its prosthetic connection, remodelling and resorption process starts at the level of crestal bone.³

According to Lazzara, during the first year of loading vertical and horizontal bone loss was approximately 1.5 and 2 mm down to the first thread which is considered a normal loss between the implant components.⁴

Many researchers have stated the factors affecting early bone loss after implant placement which include,

1. Surgical trauma
2. Crest module
3. Micro gap
4. Alteration in biologic width^{5, 6, 7}

1. Surgical trauma:

Surgical trauma happens due to the application of excessive force using reflection of mucoperiosteal flap at crestal region. The bone loss was restricted around the site of the implant.⁷

2. Crest module:

The crest module of an implant body receives the crestal stresses to the implant after loading. Surface texture and Angled crest module resist the compressive and tensile stresses resulting in less amount of bone loss when compared to smooth crest module.⁵

3. Micro gap:

Bacterial colonization around dental implant surface was resultant of micro gap present between implant abutment interfaces. After the second stage surgery the penetration of bacteria and their product takes place which leads to subsequent inflammatory process resulting in bone loss around implant abutment interface. It is one of the possible

Received: Mar. 3, 2018; Accepted: Apr. 23, 2018

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etiologic factor which results in early crestal bone loss.^{8,9}

4. Alteration in biologic width

The dimensions of peri-implant biologic width are similar to that of teeth and are stable even after loading. Early crestal bone loss is from the processes of establishing the biologic width and it basically depend upon the thickness of soft tissue around the dental implant. Altered biologic width has major effect on final esthetic outcome of restoration and crestal bone loss around implant abutment interface.^{10, 11, 12, 13}

Foundation to platform switching

The platform switching involves diminution of diameter of implant abutment with respect to the dental implant, rather than placing abutments of analogous diameters. This type of connection moves the outer limits of implant abutment junction to the center of implant axis i.e. away from bone crest thus reducing the bone resorption.¹⁴ several studies observed that implants restored with platform-switching concept showed significantly less marginal bone loss and marginal bone levels were better maintained with implant abutment mismatching.⁴

Maeda et al stated that platform switching shifts the forces away from the bone-implant interface which provides biomechanical advantage to the implant. The disadvantage of this concept is the stress concentration are increased in the abutment or the abutment screw in later stages.¹⁵ Hsu et al conducted a 3 D finite elements study by reducing the platforms of a restoration and it showed a 10% decrease in forces transmitted to the bone-implant interface.¹⁶

Atieh et al observed the inverse relation of degree of marginal bone resorption to the extent of the implant-abutment mismatch.¹⁷

Trammell et al measured the biological space and bone loss in conventional platform abutments and in reduced platform in the same individual. They found that bone loss was significantly smaller with the expanded platform with no significant difference in biological space.¹⁸

Degidi et al. studied the histology and histomorphology of three morse cone connection implants and stated that in platform switching, there will be no resorption of bone when there is zero micro gap and micro-movement. This method provides better esthetic results when prosthetic space is jeopardised.¹⁹

Clinical implication platform switching

1. Cases with inadequate prosthetic space

The platform switching technique can be effectively used in situation where a wider implant is desirable but prosthetic space is inadequate as a sufficient tissue depth (approximately 3 mm or more) is essential to accommodate an sufficient biologic width.²⁰

2. Less inter-implant distance (3 mm or less)

When two implants are placed with inter-implant distance less than 3 mm, the bone present between implants tends to resorb below inter-implant junction leading to lateral food impaction. Platform switching of components will reduce this type physiologic resorption by moving micro gap away from inter-implant junction.¹³

3. Limitation of anatomical structures

Platform switching approach will minimize the amount of bone loss and provide the biomechanical support to the implant when the anatomical limitations like sinus floor, presence of alveolar nerve etc.¹³

4. Use of morse taper implant-Abutment connection

Use of morse taper type of implant abutment connection will reduce micro pumping effect and eliminate the micro gap thus it preserves the crestal bone loss around the implant.²⁰

CONCLUSION

Platform switching is capable of reducing the crestal bone loss. It improves bone crest preservation and leads to controlled biological space reposition. Platform switching is applicable in anterior zone and where prosthetic space is limited. Moreover, the implant design modifications in platform

switching will offer many advantages and probable applications.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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