PLATFORM-SWITCHING

Marques H *, Carracho J **, Reis A *, Vaz I *

* Student of post-gratuated program in Prosthodontics – Faculdade de Medicina Dentária da Universidade de Lisboa (FMDUL)
** Clinical assistant Professor in FMDUL, Coordinator of the post-gratuated program in Prosthodontics FMDUL

Introduction

Bone remodeling around implants may occur due to the need to establish a biological space (1), location of inflammatory cell (2), implant/abutment interface distance to the bone crest, gingival biotype (3), occlusal load (4), and repeated removal of prosthetic abutments (1). This remodeling takes place through a vertical and horizontal resorption of the marginal bone. In the first year in function, the mean bone resorption is 1,5mm and in subsequent years is up to 0,2mm. (5). The aim of this literature review is to confirm if the marginal bone resorption decreases when an implant is rehabilitated with a prosthetic abutment of narrower diameter than the implant platform, known as platform switching.

Materials and methods

An internet source (PubMed/Medline) was used to search for eligible articles in english. The time period was from 2005 to 2018. The search strategy included the following keyword combinations: “platform switched”, “platform switching”, “dental implant abutment design”, “alveolar bone loss” and “dental implants”.

Results

The first article addressing platform switching was published in 2005.(6) This article described a 1-year follow-up of a 5.0mm diameter implant placed with immediate load in the position of an upper central incisor and restored with a 4.1mm diameter prosthetic abutment. The height of the bone crest was maintained in the first year of function. (6)

The concept of platform switching (PS) emerged accidentally through a radiographic finding in 1991, with implants of BIOMET 3i ®, whose 5 and 6mm diameter implants had to be rehabilitated with 4.1mm diameter abutments. In this study, the authors analyzed radiographs with 5 to 13 years of follow-up and in the implants rehabilitated with narrower diameter prosthetic components the marginal bone resorption expected after restoration placement did not occur or was much lower than when the abutment and implant had the same width (2),

Marginal bone resorption is clinically relevant because it can reduce biomechanical support. Futhermore, it can affect the height of the buccal bone and the proximal bone crest, comprimising the position of the gingival margin and interimplantar papilla (7). Bone remodeling occurs only after exposure of the implant to the oral médium: in the second surgical phase, when a two-piece implant is placed in a single surgical phase or after premature exposure of the implant to the oral médium (2).

There are several theories underlying the concept of platform switching (PS): biomechanical theory - placing an abutment of narrower diameter than the implant can limit bone resorption by shifting the area with higher stress levels to the implant axis (8); biological space theory - the peri-implant biological space needs about 3mm of thickness, allowing a biological sealing against external harmful agents. The displacement of the implant / abutment interface to a deeper position will allow a certain area of the implant platform to serve as a perimplant insertion into the soft tissue and thereby decrease bone resorption (2).
Quirynen et al. (9) evaluated in vitro implants of the branemark system that showed a microbiological contamination of the implant/abutment interface. The displacement of this interface to a more medial position on the implant platform would allow the creation of an extra zone to accommodate the peri-implant soft tissue and to move away from the marginal bone inflammatory cell infiltrate, which would be confined to an area of exposure angle less than 90 ° instead of 180 ° in conventional abutments(2).

Farronato et al. (10) found that implants with abutments with a circumferential discrepancy of 0.25 mm in relation to implant diameter lost, on average, 0.5 mm less marginal bone than conventional abutments without platform switching (NPS). Wang YC et al. (11) observed that in 15 PS implants and 15 implants with NPS after one year, the marginal bone level change was similar and reported that more studies were needed, with a larger sample and longer periods of observation.

Sesma et al. (12) performed a study where they placed implants with NPS or PS in 40 patients who needed implants in the mandible. The radiographic evaluation was done on the day of placement (T0), on the first day of load (T1) and one year after the first load(T2). The results showed significant diferences between NPS e SP at all stages of evaluation.

	Marginal bone resorption		Bone loss area
	Horizontal	Vertical	
NPS	1.04 mm*	0.99 mm*	0.77 mm²*
PS	0.84 mm*	0.82 mm*	63.m²*

Table 1: Values of resorption of T0 – T2 *p <0,05

Liu et al. (13) investigated the effect of PS on the distribution of stress between implant and bone, using vertical and horizontal loads that reached 150 N and agreed on the benefits of PS that showed less stress.

Conclusion

The marginal bone resorption found around PS rehabilitated implants is lower than the implants with NPS, resulting in a biomechanical and aesthetic improvement. However, studies with larger follow-ups are needed to observe the behavior of long-term PS rehabilitated implants.

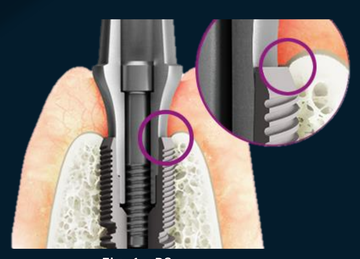
Fig. 1 - PS


Fig. 2 - PS


Fig. 3 - PS


Fig. 4 - PS


Fig. 4 - PS


Fig. 3 - Guidance of the inflammation flow in PS

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