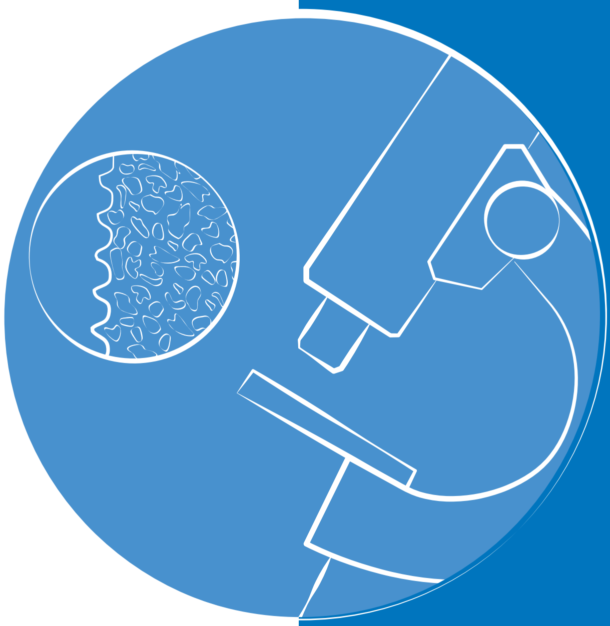


Clinical Case Studies

The MIS Research Department is honored to share the clinical research posters which were presented at the 2019 EAO Congress in Lisbon.

Eight research works have been submitted and accepted at the EAO 2019 that was held this year in Lisbon, Portugal. 3 out the 8 have been accepted as an Oral presentation during the research session, the 5 others were received as posters.

We are proud to announce that Dr. Gian Ragucci from UIC Barcelona won the first prize of the research Oral presentation session with his research on 220 C1 and V3 implants placed by inexperienced students.

Click on a title to see the clinical case

Early loading after 4 weeks of C1 implants with a B+ treated surface: effect on marginal bone level

Miguel Padial-Molina, Lourdes Gutierrez-Garrido, Lucia Lopez-Chaichio, Roque Rodriguez-Alvarez, Claudia Guerra-Lorenzo, Floriana Lauritano, Pablo Galindo-Moreno

Department of Oral Surgery and Implant Dentistry, University of Granada, Spain

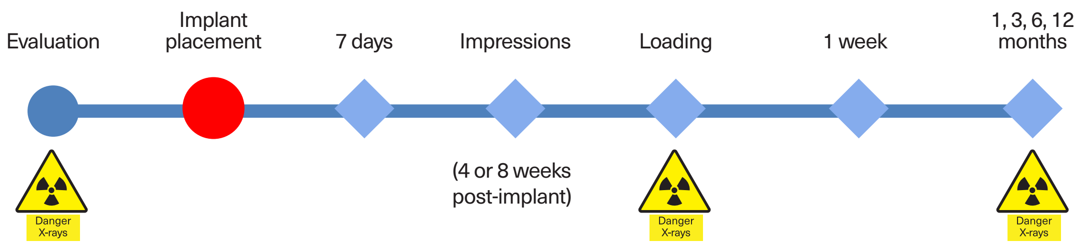
Abstract

Background: Implant surface is a key-factor to achieve osseointegration. Surface modifications have been proposed to accelerate the integration process and shorten loading times below 3 mo. in the mandible and maxilla. Some authors suggested that part of MBL (marginal bone loss) might result from disuse atrophy; others reported reduced MBL after implementing shorter healing periods rather than longer ones. The effects of early loading, especially of implants with a B+ surface, on MBL is poorly documented.
Aim/Hypothesis: To evaluate peri-implant marginal bone loss around implants with a B+ modified surface loaded 4 weeks (4w) or 8 weeks (8w) after implant placement in the mandible and in the maxilla. Marginal bone loss was compared between both groups at the milestone of 1-year after delivery of the final prosthesis.
Material and Methods: A randomized controlled clinical trial (NCT03059108) was set-up in which single implants were placed according to a 1-stage protocol and randomly assigned to two distinct loading groups: test (4w after placement) or control (8w). Implants were followed until the 1-year post-loading milestone. Variables that might affect the MBL were: age, gender, smoking, alcohol consumption, bone type, width of bone crest, soft tissue thickness, width of keratinized mucosa, mesio-distal distance to adjacent teeth and prosthetic abutment height. The distance between the implant to the adjacent teeth, the MBL on the mesial and distal sides and the bone levels of the adjacent teeth were recorded on periapicals X-rays with the Image J software. Each image was internally calibrated with the known implant diameter. The R software was used for the statistical analyses. The Wilcoxon rank sum test and the general linear model with pair-wise comparisons of means further evaluated by Tukey contrasts were used.
Results: 29 patients (mean age 42, 25-58) received one implant each, 27 in the maxilla, 14 were loaded after 4w. Change in MBL between placement and loading measured on the mesial (M) and distal (D) sides was statistically significant within each group (S, p<0.001). No difference was observed between the groups. From loading to the 1-year milestone, bone loss for the 4w group was 0.17±0.38mm and 0.18±0.22mm on the M and D sides, respectively. For the 8w group, M marginal bone increased by 0.09±0.44mm; on the D side marginal bone decreased by 0.13±0.45mm. Differences between 4w and 8w were not statistically significant (NS, p=0.24, p=0.68, M and D, respectively). Differences between groups at each time point were NS (p>0.20) either. MBL after 1 year of loading was -0.23±0.41mm and -0.20±0.32mm on the M and D sides, respectively for the 4w group; it was 0.00±0.54mm and -0.18±0.43mm for the 8w group. None of the variables affected the MBL in a significant way, for any groups at any time point.
Conclusion and Clinical implications: Early loading after 4 weeks of C1 implants with a B+ modified surface did not affect the MBL when compared to loading after 8 weeks, for any milestone until 1 year after prosthesis delivery. Within the limitations of the study, no variable under investigation affected the MBL in a significant way, not the soft tissue thickness, not the width of the keratinized mucosa and not the prosthetic abutment height.

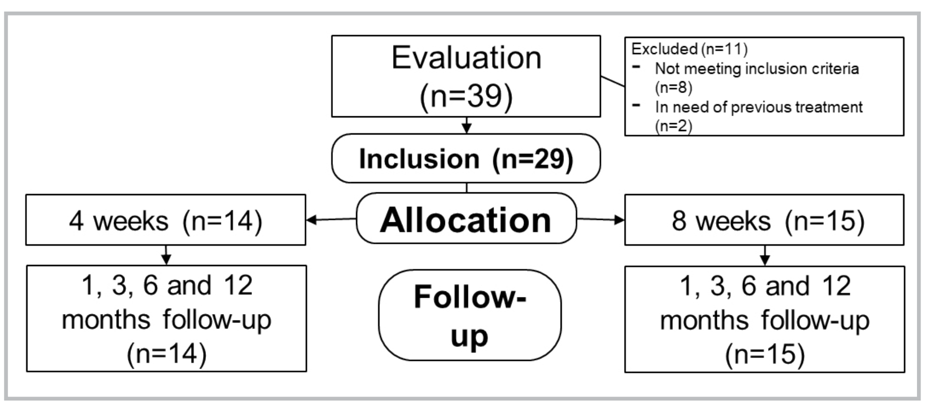
Background and Aim

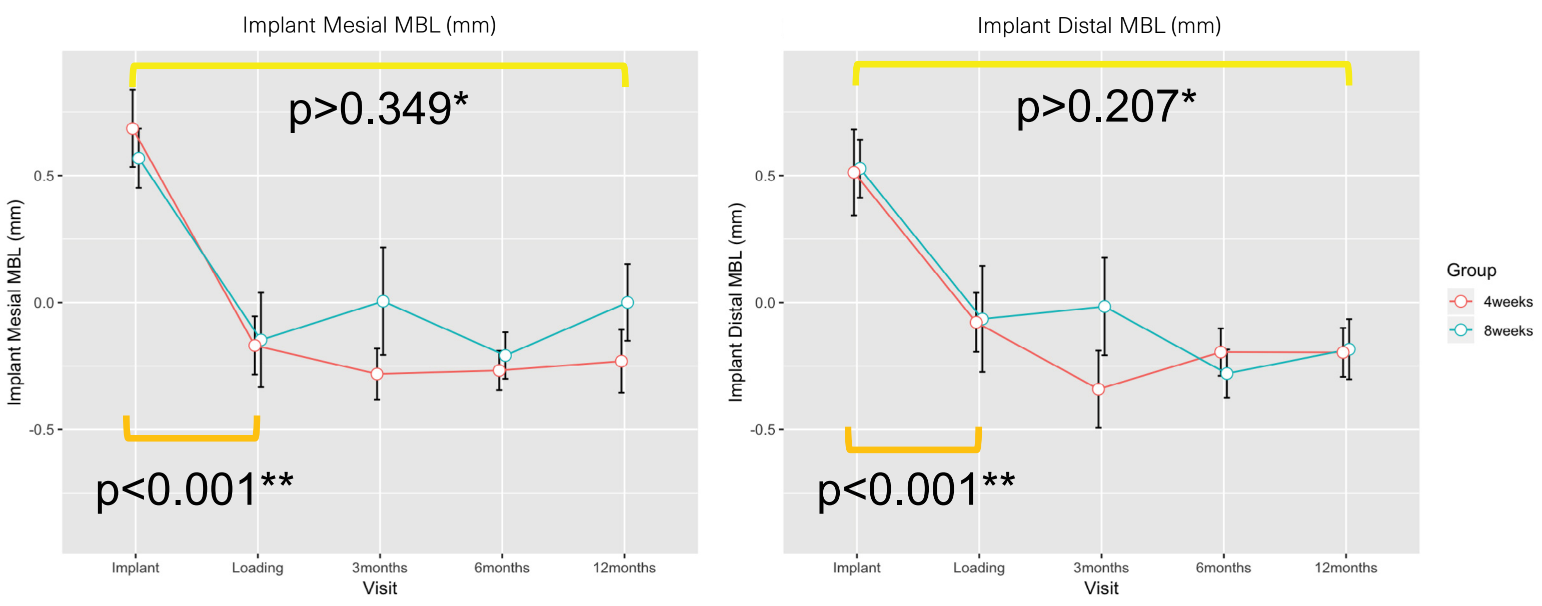
To evaluate peri-implant marginal bone loss around implants with a B+ modified SLA surface loaded 4 (4w) or 8 weeks (8w) after implant placement in the mandible and in the maxilla. Marginal bone loss was compared between both groups at the milestone of 1-year after delivery of the final prosthesis.

Materials and Methods

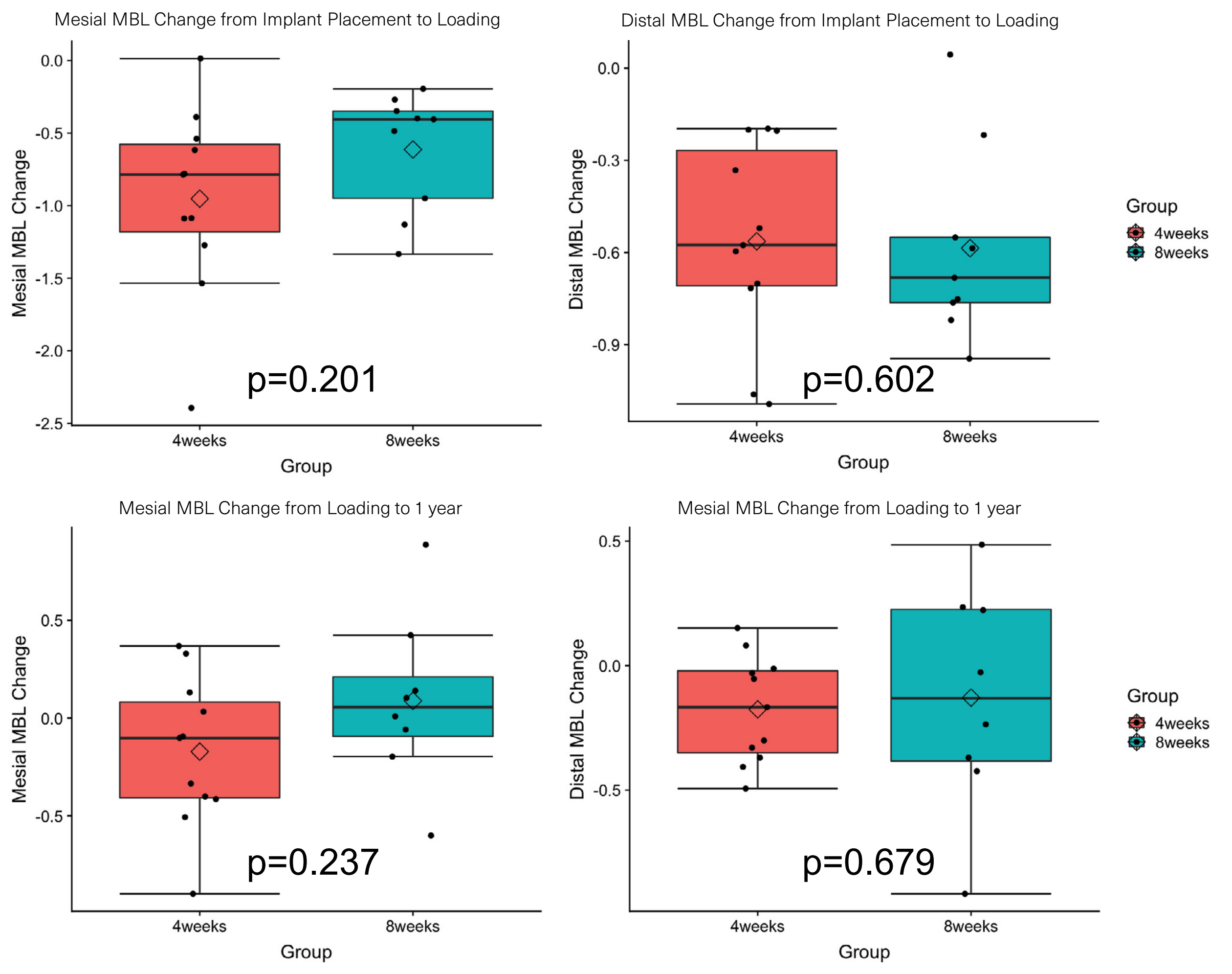


Results





*: Comparison between groups within each visit
**: Comparison between visits within each group



Conclusion

Early loading after 4 weeks of C1 implants with a B+ modified SLA surface did not affect the MBL when compared to loading after 8 weeks, for any milestone until 1 year after prosthesis delivery. Within the limitations of the study, no variable under investigation (soft tissue thickness, width of the keratinized mucosa and prosthetic abutment height) affected the MBL in a significant way.

References

Benic, G.I., Mir-Mari, J. & Hämmerle, C.H. (2014) Loading protocols for single-implant crowns: a systematic review and meta-analysis. International Journal of Oral & Maxillofacial Implants 29 Suppl: 222-238.
Bilhan, H., Mumcu, E. & Arat, S. (2010) The role of timing of loading on later marginal bone loss around dental implants: A retrospective clinical study. Journal of Oral Implantology 36: 363–376.
von Salis-Soglio, M., Stübinger, S., Sidler, M., Klein, K., Ferguson, S.J., Kämpf, K., Zlinszky, K., Buchini, S., Curno, R., Péchy, P., Aronsson, B.-O. & von Rechenberg, B. (2014) A novel multi-phosphonate surface treatment of titanium dental implants: a study in sheep. Journal of Functional Biomaterials 5: 135–57.

Presented at: EAO Congress, European Association for Osseointegration, Lisbon 2019

Bone changes above implant neck of subcrestally placed implants. Early report from RCT of implant and abutment level treatment

Rokas Linkevicius [1], MD, Jonas Alkimavicius [2], DDS, Algirdas Puisys [3], DDS,PhD, Valda Valantiejiene [4], DDS, Tomas Linkevicius [5], DDS, PhD

[1]Lithuanian University of Health Sciences, Department of Maxillofacial surgery, Kaunas, Lithuania
[2]Lithuanian University of Health Sciences, Department of Oral and Dental Pathology, Kaunas, Lithuania
[3]Vilnius implantology center, Vilnius, Lithuania
[4]Vilnius research group,Vilnius, Lithuania
[5]Institute of Odontology, Faculty of Medicine, Vilnius University, Vilnius, Lithuania

Abstract

In this prospective randomized clinical study, a specific situation was achieved at bone level implants with platform switching (V3, MIS) placed subcrestally about 1.5 mm. In the test group, after randomization, a 3 mm height intermediate abutment (CONNECT) was torqued to implant (at 30 Ncm) during surgery, while implant of the control group received regular healing abutment. The bone level above the implant/abutment junction after final crown delivery was measured between, 1) implants with crowns mounted on a Ti-base affixed to the implant neck that underwent 4 abutment disconnections (AD), 2) implants with crowns affixed to a 1-time abutment torqued to the implant during surgery that underwent no AD after 1 month post-delivery. According to clinical data the use of intermediate abutment (CONNECT) significantly reduced crestal bone remodeling around subcrestally positioned implants.

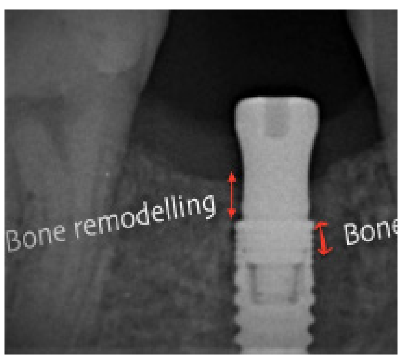
Background and Aim

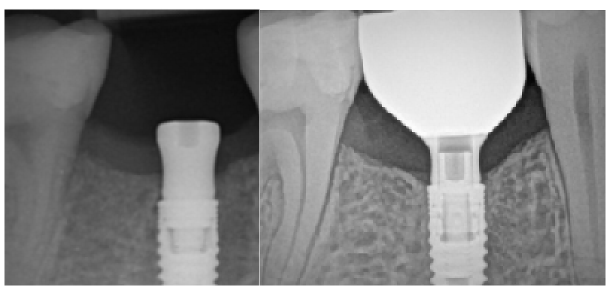
Implants placed subcrestally lead to the specific feature of crestal bone being situated above the implant neck. One need therefore to distinguish between the crestal bone changes above and below the implant neck. It is proposed to characterize any bone change above the implant neck as 'bone remodelling' and any bone change below the implant neck as 'bone loss'.

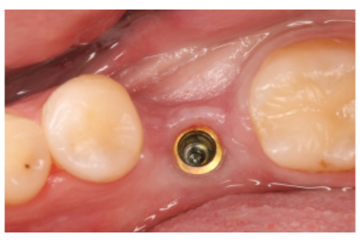
It is suggested that moving the restorative steps from the implant level to the abutment, reduces abutment disconnection (AD) and decreases remodeling of the bone situated above the implant neck. This prospective study compares the changes of the bone above the implant/abutment junction after final crown delivery between the following 2 groups: 1) implants with crowns mounted on a Ti-base affixed to the implant neck that underwent 4 abutment disconnections, 2) implants with crowns affixed to a 1-time abutment (CONNECT) torqued to the implant during surgery that underwent no abutment disconnection.

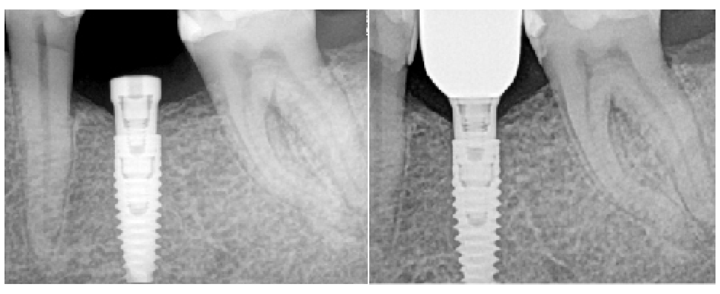
Material and Methods

Bone level implant with platform switching (V3, MIS) were placed 1.5-2.0 mm subcrestally in 73 patients enrolled in the study after application of inclusion criteria. After randomization, in the test group a 3 mm height intermediate abutment (CONNECT) was torqued to implant during the surgery (at 30 Ncm), while other implants received regular healing abutment and served as a control. After 2 months of healing and 1 month of provisionalisation, final Zr-based screw-retained restorations were delivered to both groups. One month after prosthesis delivery, post-delivery bone levels above the implant neck were calculated and compared. Bone remodeling was defined as the first bone contact to the Ti-base abutment in the control group and the first bone contact to the CONNECT abutment in the test group.. The Mann-Whitney U test was used, statistical significance was a=0.05



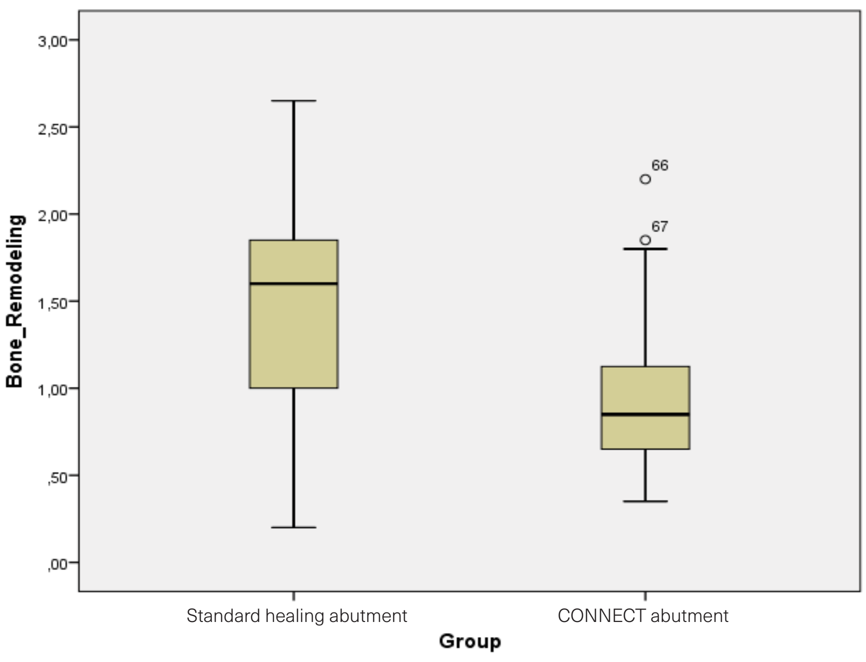






Results

Bone level implants with platform switching (V3, MIS) were placed 1.5-2.0 mm subcrestally in 73 patients enrolled in the study after application of inclusion criteria. After randomization, in the test group a 3 mm height intermediate abutment (CONNECT) was torqued (at 30 Ncm) to the implant neck during surgery, while in the control group implants received regular healing abutment. After 2 months of healing and 1 month of provisionalisation, final Zr-based screw-retained restorations were delivered to both groups. After 1 month, post-delivery bone levels above the implant neck were calculated and compared. Bone remodeling was measured as a first bone-to-Ti base or abutment contact above the implant neck. The Mann-Whitney U test was used, statistical significance was a=0.05



Conclusion

Within the limitations of this evaluation performed 1 month after prosthesis delivery, it can be concluded that the use of an intermediate one-time abutment (CONNECT) significantly reduced the crestal bone remodeling around subcrestally positioned implants.

References

1. Clin Oral Implants Res. 2018 Sep;29(9):907-914. doi: 10.1111/clr.13343. Influence of the abutment height and connection timing in early peri-implant marginal bone changes: A prospective randomized clinical trial. Borges [T1], Leitão [B1], Pereira [M2], Carvalho Á3, Galindo-Moreno [P4].

2. Clin Implant Dent Relat Res. 2018 Dec;20(6):976-982. doi: 10.1111/cid.12683. Epub 2018 Oct 11. Marginal soft tissue stability around conical abutments inserted with the one abutment-one time protocol after 5 years of prosthetic loading. Canullo [L1], Pesce [P2], Tronchi [M3], Fiorellini [J4], Amari [Y5], Penarrocha [D6].

3. Canullo, L; Bignozzi, I; Cocchetto, R; Cristalli, MP; Iannello, G. Immediate positioning of a definitive abutment versus repeated abutment replacements in post-extractive implants: 3-year follow-up of a randomised multicentre clinical trial. Eur J Oral Implantol 2010;3:285-296.

4. Braz Dent J. 2018 Jan-Feb;29(1):7-13. doi: 10.1590/0103-6440201801686. One Abutment at One Time Concept for Platform-Switched Morse Implants: Systematic Review and Meta-Analysis. Santos JS1, Santos TS2, Martins-Filho PR[S2], Krockow [NV1], Weigl [P3], Pablo [H1].

5. Biomed Res Int. 2018 Dec 30;2018:2958982. doi: 10.1155/2018/2958982. eCollection 2018. Mechanical Outcomes, Microleakage, and Marginal Accuracy at the Implant-Abutment Interface of Original versus Non-original Implant Abutments: A Systematic Review of In Vitro Studies. Tallarico [M1], Fiorellini [J2], Nakajima [Y3],4, Omori [Y3],4, Takahisa [I3],4, Canullo [L1].

Presented at: EAO Congress Lisbon 2019

Implant neck or 1 time abutment level treatment? Early outcome of bone and soft tissue from a RCT

Rokas Linkevicius[1], MD, Jonas Alkimavicius[2], DDS, Algirdas Puisys[3], DDS,PhD,Valda Valantiejiene[4], DDS, Tomas Linkevicius[5], DDS, PhD

[1]Lithuanian University of Health Sciences, Department of Maxillofacial surgery, Kaunas, Lithuania
[2]Lithuanian University of Health Sciences, Department of Oral and Dental Pathology, Kaunas, Lithuania
[3]Vilnius implantology center, Vilnius, Lithuania
[4]Vilnius research group,Vilnius, Lithuania
[5]Institute of Odontology, Faculty of Medicine, Vilnius University, Vilnius, Lithuania

Abstract

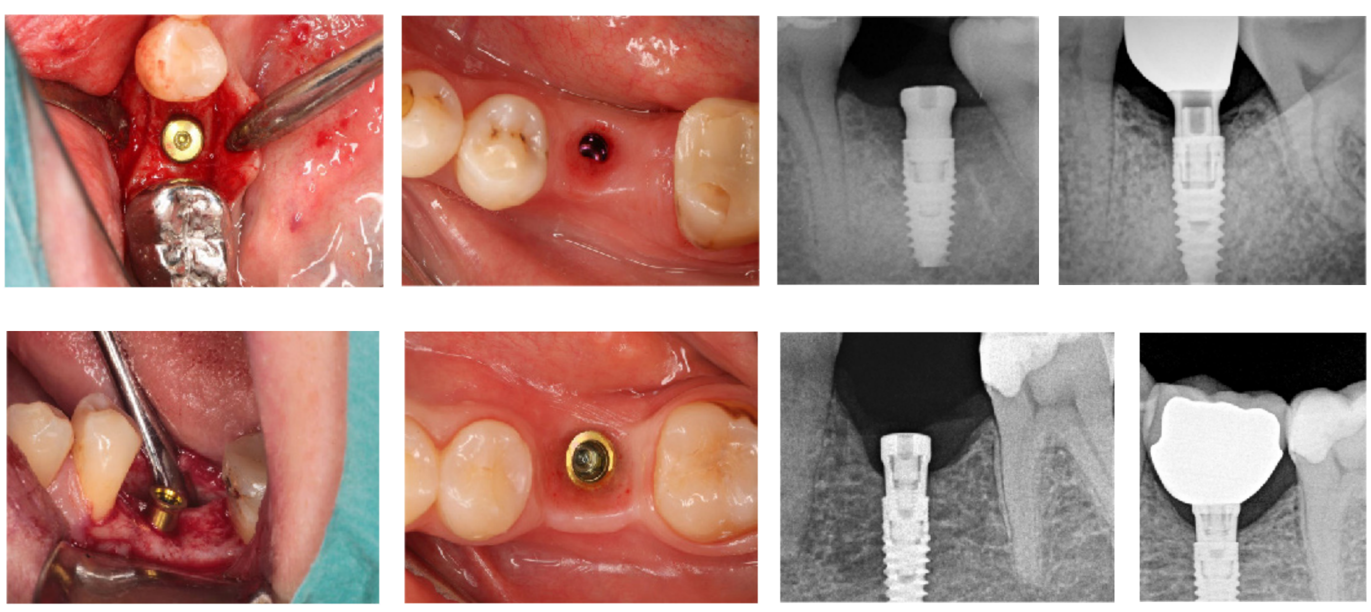
Novelty of this research is the 2 different most widely used prosthetic concepts were directly compared in the same clinical trial. In the test group, the platform of 1-time Connect abutment underwent no abutment disconnections and the peri- implant seal was not disturbed by the impression steps, while the control group had 4 abutment disconnections (AD). However, according to the recent data of the performed study it can be concluded that the 1-time Connect abutment can significantly reduce the bone volume loss around subcrestally placed conical connection implants.

Background and Aim

The '1 abutment-1 time' concept has been around for a long time. It suggests that moving the restorative steps from the neck level to the abutment should avoid abutment disconnection and disturbance of the peri-implant seal; this should decrease the marginal bone loss observed around implants. It makes sense to anticipate a positive outcome from the early treatment stages. There is no study directly comparing this approach to multiple ADs. Strong evidence of the benefit of this concept is lacking. Aim of the prospective randomized clinical trial was to compare peri-implant tissues parameters measured 1 month after final crown delivery between, 1) implants with crowns mounted on a Ti-base affixed to the implant neck that underwent 4 ADs, 2) implants with crowns affixed to a 1-time abutment torqued to the implant during surgery that underwent no AD.

Material and Methods

A randomized prospective clinical trial was set up with 73 patients receiving a 'bone level' implant with platform-switching (V3, MIS) in mono-edentulous sites in the posterior mandible and maxilla. All implants were placed about 1.5 mm subcrestally. In the test group, a 3 mm 1-time abutment (CONNECT) was torqued during surgery at 30 Ncm. In the control group, implants received a regular healing abutment. After 2 months of healing, a temporary crown was prepared. In the test group, the impression steps did not disturb the peri-implant seal; in the control group, the peri-implant seal was disturbed. After 1 month of loading, a final Zr-based screw-retained crown mounted on a titanium base was delivered to both groups. One month after crown delivery, bone levels and peri- implant probing depths were measured and compared with the Mann-Whitney U test (α=0.05). Bone loss was measured at the first bone-to-implant contact below the implant neck.



Results

19 men and 54 women (mean age 48.3 ± 3.4 years) had 47 mandibular and 26 maxillary sites rehabilitated. All 73 implants integrated and were available for evaluation 1 month after delivery of the final prosthesis. For the test group (n=35) with the ceramic crowns mounted on the platform of the 1-time CONNECT abutment that underwent no abutment disconnection, bone loss was 0.19 ± 0.25 mm (range, 0-0.75 mm). For the control group (n=38) with the ceramic crowns mounted on Ti-base abutments directly affixed to the implant neck that underwent 4 abutment disconnections, bone loss was 0.82 ± 0.58 mm (range, 0-2.5 mm); the difference was statistically significant ($p < 0.0001$). Peri-implant probing depth was 2.51 ± 0.94 mm for the test group with the 1-time CONNECT abutment; it was 2.58 ± 0.75 mm for the control group with the prosthetic abutment directly affixed to the implant neck. The difference was not statistically significant (p=0.414).

Conclusion

Within the limitations of this early evaluation 1 month after final crown delivery, it can be concluded that using the 1-time CONNECT abutment that turns 'bone level' implants into 'tissue level' implants significantly reduced the bone loss around implants with a conical connection placed 1.5 mm subcrestally.

References

1. Clin Oral Implants Res. 2018 Sep;29(9):907-914. doi: 10.1111/clr.13343. Influence of the abutment height and connection timing in early peri-implant marginal bone changes: A prospective randomized clinical trial. Borges T1, Leitão B1, Pereira M2, Carvalho Á3, Galindo-Moreno P4.

2. Clin Implant Dent Relat Res. 2018 Dec;20(6):976-982. doi: 10.1111/cid.12683. Epub 2018 Oct 11. Marginal soft tissue stability around conical abutments inserted with the one abutment-one time protocol after 5 years of prosthetic loading. Canullo L1, Pesce P2, Tronchi M3, Fiorellini J4, Amari Y5, Penarrocha D6.

3. Canullo, L; Bignozzi, I; Cocchetto, R; Cristalli, MP; Iannello, G. Immediate positioning of a definitive abutment versus repeated abutment replacements in post-extractive implants: 3-year follow-up of a randomised-multicentre clinical trial. Eur J Oral Implantol 2010;3:285-296.

4. Braz Dent J. 2018 Jan-Feb;29(1):7-13. doi: 10.1590/0103-6440201801686. One Abutment at One Time Concept for Platform-Switched Morse Implants: Systematic Review and Meta-Analysis. Santos JS1, Santos TS2, Martins-Filho PRS2, Krockow NV1, Weigl P3, Pablo H1.

5. Biomed Res Int. 2018 Dec 30;2018:2958982. doi: 10.1155/2018/2958982. eCollection 2018. Mechanical Outcomes, Microleakage, and Marginal Accuracy at the Implant-Abutment Interface of Original versus Nonoriginal Implant Abutments: A Systematic Review of In Vitro Studies. Tallarico M1, Fiorellini J2, Nakajima Y3,4, Omori Y3,4, Takahisa I3,4, Canullo L1.

Presented at:

EAO CONGRESS
EUROPEAN ASSOCIATION FOR OSSEOINTEGRATION
Lisbon
2019

IMPLANT THERAPY OUTCOMES; SURGICAL ASPECTS

Success rate and bone loss of immediately loaded tilted long implants: an up to 1.5 y follow-up

Rodrigues Pedro[1], Cardoso Jorge André[2], Pimenta Joao[3], Veksler Ruth[4]

[1.] Private practice, Braga, Portugal,
[2.] Private practice, Espinho, Portugal,
[3.] Private practice, Barcelos, Portugal,
[4.] R&D Dpt , MIS, Israel

Abstract

Background

The All-on-4 protocol to rehabilitate edentulous jaws is a procedure in which 4 implants are placed in the anterior jaw. The two medial implants are straight and the 2 distal ones are tilted; tilted implants can be as long as 18-20 mm. Beyond the scope of pterygoidic and zygomatic implants, the fate of ≥ 18 mm long tilted implants (LTI) has been scarcely addressed with regard to implant failure due to bone overheating and specific features of marginal bone loss related to the crestal position.

Aim

Objective was to document the success rate and radiographic outcomes of long tilted implants used in an All-on-4 protocol in private practice. Specific bone loss features of long tilted implants were compared to tilted and straight 10-16 mm long (STD) implants when placed crestally and subcrestally.

Material and Methods

In a single private practice, 234 SEVEN (MIS) implants were placed in 36 maxillae and 22 mandibles of 36 edentulous patients (21 women, 15 men, mean 57.1y) using the All-on-4 MULTIFIX protocol; 146 were inserted in the maxilla. Implants were 70 LTIs (66 in max, 4 in mand), 46 tilted and 113 straight STD implants. All received a per-operative multi-unit abutment (MUA); bone profiling was done at 174 sites. 36 straight implants and the distal side of 112 angulated MUAs were placed subcrestally. Implants were loaded within 3-5h with a screw-retained full-arch prosthesis. Radiographic data were recorded post-op (baseline) and at the 1y and 1.5y follow-up. Crestal bone loss (CBL) was measured on both sides from panoramic radiographs using the Image J software with internal calibration. Success rate and CBL were compared for LTIs vs. angulated STDs vs. straight STDs. Bone features specific to the distal side of angulated MUAs in subcrestal position vs. the mesial side were also recorded.

Results

All patients passed the 1y control, 13 pat / 20 prosth / 80 imp passed the 1.5 year control. No implant failed; overall success rate was 97.9% (5 imp. with CBL ≥ 1.2 mm on both sides). Success rate of straight and tilted implants was 96.6% and 99.1%. At bone profiled sites bone remained slightly away from the machined MUA surface; it migrated apically down to the neck level; the same applied to the distal side of angulated MUAs. A bone densification (BD) feature was observed at straight and tilted implants; at tilted implants BD happened only on the distal side. In the mandible, BD frequency was 25.0% (11/44) for tilted and 2.3% (1/44) for straight; in the maxilla, it was 38.9% (28/72) for the tilted and 6.8% (5/74) for the straight. Mean CBL of straight vs. tilted implants was 0.28±0.51 mm vs. 0.28±0.54 mm. Mean CBL of LTI vs. tilted STD was 0.25±0.5 3mm vs. 0.32±0.56 mm. At tilted implants, mean CBL mesial side vs. distal was 0.39±0.60 vs. 0.17±0.46 mm. 75.4% of implant sides had a 0-0.5 mm CBL.

Conclusion and Clinical implications

The All-on-4 MULTIFIX protocol with SEVEN implants in the maxilla was as predictable as in the mandible. Overall success rate was 97.9%; it was 96.6% for the straight implants and 99.1% for the tilted ones. Overheating during placement of long tilted implants was not a concern. Bone densification at the distal sides of the tilted implants was more frequent (38.9%) in the maxilla than in the mandible (25.0%). CBL was similar for straight and tilted implants, and for long tilted and standard tilted implants.

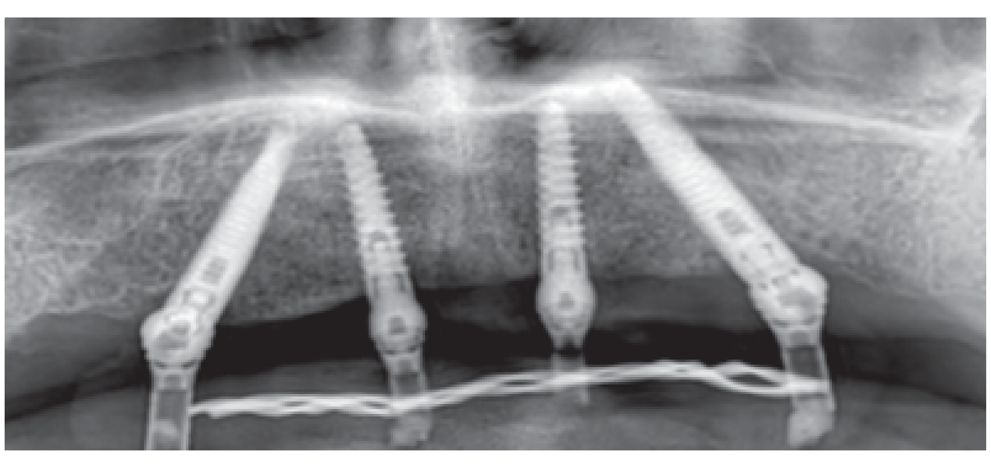
Background and Aim

The All-on-4 protocol to rehabilitate edentulous jaws is a procedure in which 4 implants are placed in the anterior jaw. The two medial implants are straight and the 2 distal ones are tilted; tilted implants can be as long as 18-20 mm. Beyond the scope of pterygoidic and zygomatic implants, the fate of ≥ 18 mm long tilted implants (LTI) has been scarcely addressed with regard to implant failure due to bone overheating and specific features of marginal bone loss related to the crestal position.

Objective was to document the success rate and radiographic outcomes of long tilted implants used in an All-on-4 protocol in private practice. Specific bone loss features of long tilted implants were compared to tilted and straight 10-16 mm long (STD) implants when placed crestally and subcrestally.

Materials and Methods

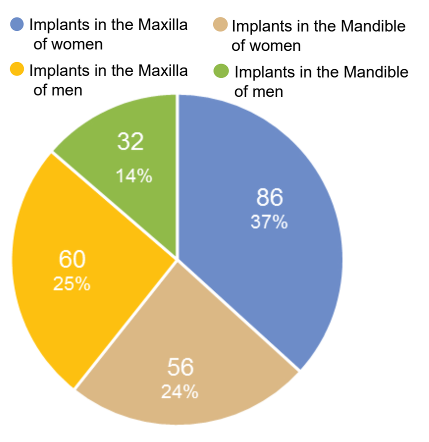
In a single private practice, 234 SEVEN (MIS) implants were placed in 36 maxillae and 22 mandibles of 36 edentulous patients (21 women, 15 men, mean 57.1 years) using the All-on-4 MULTIFIX protocol; 146 were inserted in the maxilla. Implants were 70 LTIs (66 in Max, 4 in Mand), 46 tilted and 113 straight STD implants. All received a per-operative multi-unit abutment (MUA); bone profiling was done at 174 sites. 36 straight implants and the distal side of 112 angulated MUAs were placed subcrestally. Implants were loaded within 3-5h with a screw-retained full-arch prosthesis. Radiographic data were recorded post-op (baseline) and at the 1 year and 1.5 year follow-up. Crestal bone loss (CBL) was measured on both sides from panoramic radiographs using the Image J software with internal calibration. Success rate and CBL were compared for Long Tilted vs. angulated Standard vs. straight Standard. Bone features specific to the distal side of angulated MUAs in subcrestal position vs. the mesial side were also recorded.



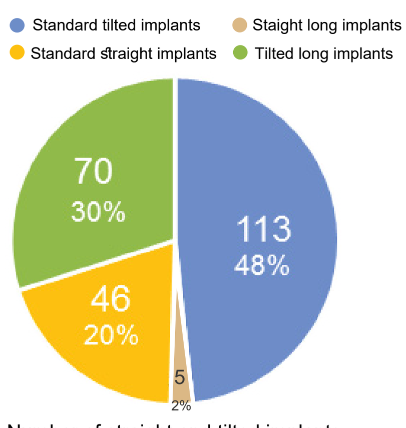
Radiography of an All-on-Four case in the maxilla with its temporary prosthesis. Note the straight and the tilted implants, the standard and the long implants.

SEVEN implants

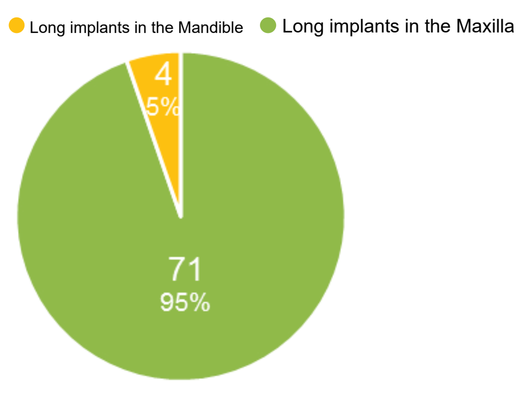
Standard implants: Ø 4.20-3.75 x 11.5-16mm
Long implants: Ø 4.20-3.75 x 18-20mm



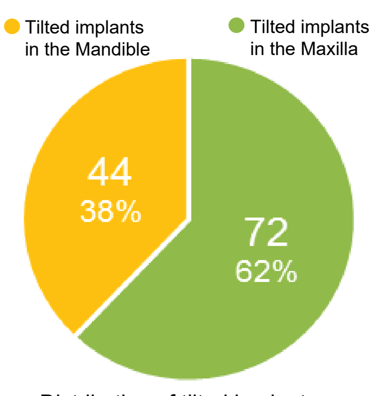
Implant distribution according to jaw and gender.



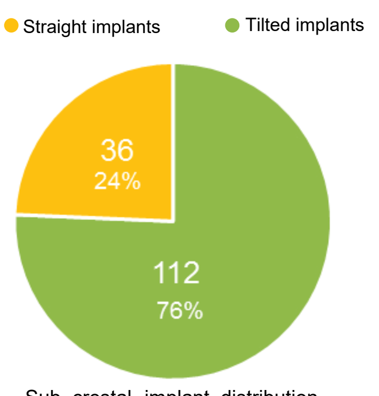
Number of straight and tilted implants distributed according to standard and long.



Long implant distribution according to jaw.

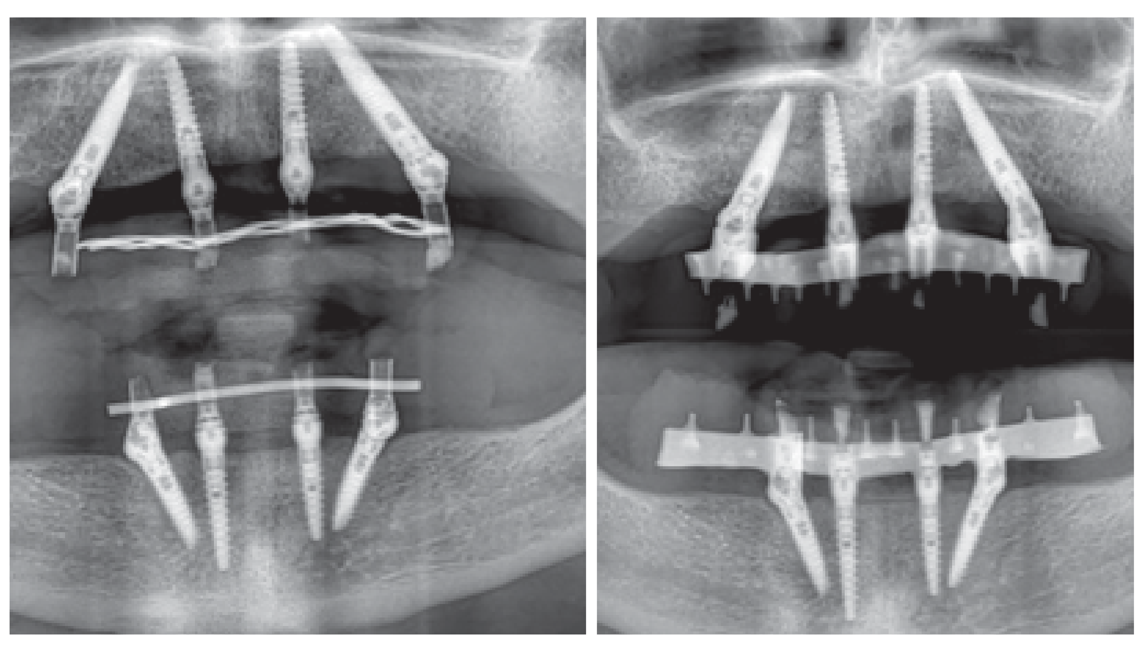


Distribution of tilted implants according to jaw.



Sub -crestal implant distribution according to implant angulation.

Results



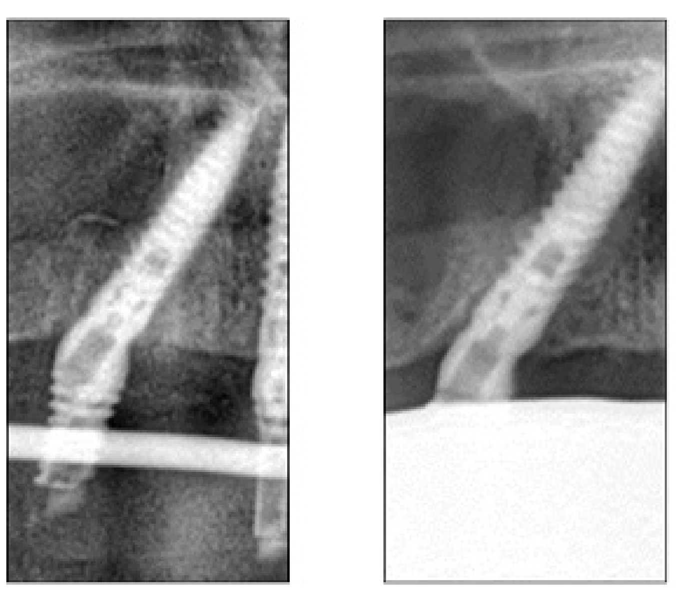
All-on-Four protocol in the mandible and the maxilla. Left at implant placement, Right at the 1-year control with the final prosthesis.

Time interval (months)	Implants at interval start	Drop-out during interval	Failures during interval	Implants with CBL ≥ 1.2mm on both sides	Survival rate on interval (%)	Success rate on interval (%)	Cumulative Success rate (%)
0-12	234	0	0	0	100	100.00	100.00
12-24	234	0	0	5	100	97.86	97.86

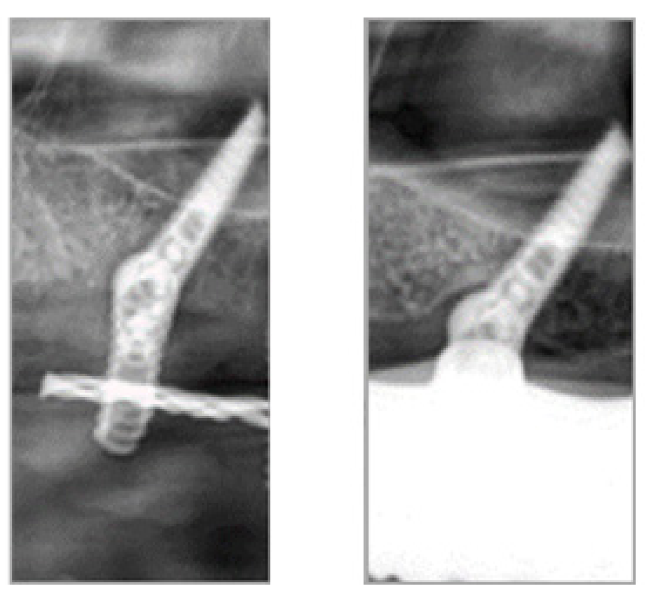
2-year Life time analysis (LTA) of all implants.

	Standard	Long	Axial	Tilted
Number of implants with CBL ≥ 1.2mm on both sides	4	1	4	1
Success rate (%)	97.48	98.67	96.61	99.14

Success rate of straight and tilted implants, standard and long ones.



Bone densification pattern at the distal side of the tilted implants. Left at placement, right at the 1-year control.



Bone loss pattern at submerged distal sides of the tilted implants. Left at placement, right at the 1-year control.

	straight (n=118)	tilted (n=116)
	mean	mean
Mesial	0.29 ± 0.50 (-0.25; 2.10)	0.39 ± 0.60 (-0.46; 3.15)
Distal	0.27 ± 0.53 (-0.35; 2.63)	0.17 ± 0.46 (0; 2.98)
Mean	0.28 ± 0.51 (-0.35; 2.63)	0.28 ± 0.54 (-0.46; 3.15)

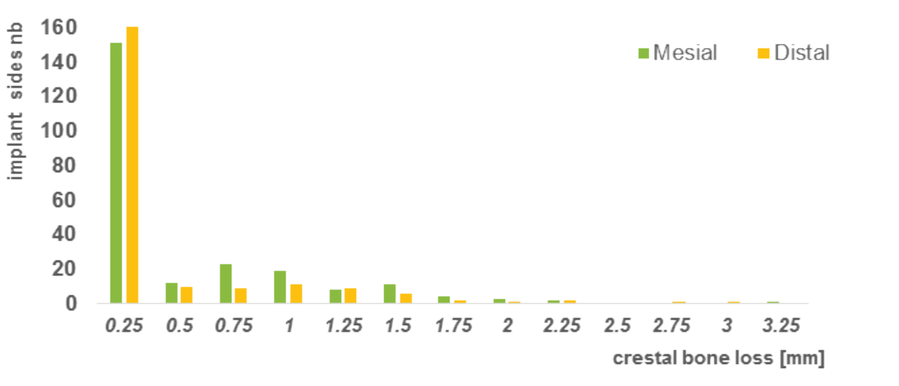
Crestal bone loss (mm) measured at straight and tilted implants.

	standard (n=46)	long (n=70)
	mean	mean
Mesial	0.44 ± 0.63 (-0.18; 3.15)	0.35 ± 0.59 (-0.46; 2.08)
Distal	0.21 ± 0.46 (0; 1.80)	0.15 ± 0.45 (0; 2.98)
Mean	0.32 ± 0.56 (-0.18; 3.15)	0.25 ± 0.53 (-0.46; 2.98)

Crestal bone loss (mm) measured at tilted implants, standard and long ones.

Interval (mm)	mesial	distal	percentage (%)
0-0.5 mm	161	192	75.4
0.5-1.2 mm	50	26	16.2
> 1.2 mm	23	16	8.3
			100%

Frequency of bone loss on mesial and distal sides.



Conclusion

The All-on-4 MULTIFIX protocol with SEVEN implants in the maxilla was as predictable as in the mandible. Overall success rate was 97.9%; it was 96.6% for the straight implants and 99.1% for the tilted ones. Overheating during placement of long (18-20mm) tilted implants was not a concern. Bone densification at the distal sides of the tilted implants was more frequent (38.9%) in the maxilla than in the mandible (25.0%). CBL was similar for straight and tilted implants, and for LTIs and tilted STDs.

References

-Bruschi E, Manicone PF, De Angelis P, Papetti L, Pastorino R, d'Addona. Comparison of marginal bone loss around axial and tilted implants: a retrospective CBCT analysis of up to 24 months. Int J Periodontics Resto ative Dent. 2019;39:675-684.
-Krekmanov L, Kahn M, Rangert B, Lindstrom H. Tilting of posterior mandibular and maxillary implants for improved prosthesis support. Int J Oral Maxillofac Implants. 2000;15:405–414.
-Lin WS, Eckert SE. Clinical performance of intentionally tilted implants versus axially positioned implants: A systematic review. Clin Oral Implants Res. 2018;29 Suppl 16:78-105.
-Maló P, de Araújo Nobre M, Lopes A, Ferro A, Nunes M. The All-on-4 con-cept for full-arch rehabilitation of the edentulous maxillae: a longitudinal study with 5-13 years of follow-up. Clin Implant Dent Relat Res. 2019;21:538-549.

Presented at: EAO CONGRESS EUROPEAN ASSOCIATION FOR OSSEOINTEGRATION Lisbon 2019

Immediate loading of the edentulous multi-risk patient jaw: an up to 3-year cohortstudy

Davarpanah Mithridade[1,2,3], Rajzbaum Philippe[1,2,3],
Davarpanah Keyvan[1,2,3], Zyman Pascal[1,2,3] , Sater Sarah[1,2,3]

[1.]Oral Rehabilitation Center, American Hospital of Paris [2.]Excellence in Dentistry (EID), Paris, [3.]Private practice

Abstract

Background

The issue of how to realize the transition from a failing dentition to an implant- supported prosthesis has been insufficiently addressed in the multi-risk patient. In this case, implants are simultaneously placed in healed (H) and post-extraction (PE) sites to support an immediately loaded temporary full prosthesis. Distribution between H and PE sites in the mandible and the maxilla can vary. Information about respective failure rates and contributing factors to failure are needed.

Aim/Hypothesis

Objective of this cohort study was to record the failure rates of C1 and V3 implants (MIS) placed in H and PE sites in the mandible and the maxilla of the multi-risk patient following a 36h immediate loading protocol. Aim was to check the predictability of implants placed in PE than H sites.

Material and Methods

Patients with several health risks attended implant therapy because of a failing bridge relying on teeth in the mandible or maxilla or had an edentulous jaw. They required an immediate fixed solution. Patients were affected by at least 2 of the following risks: advanced perio. disease, poor hygiene, bruxism, diabetes, smoking, cholesterol, cardiovasc. issues and blood pressure. Implants were placed in either H and/or PE sites, 4-7 implants in the mandible and 6-9 implants in the maxilla; some implants were also left unloaded. When insertion torque was ≥40Ncm, multi-unit abutments (MUA) of various heights were affixed. Following impression, the lab prepared a temporary acrylic prosthesis. After 36h, the prosthesis was delivered. After 3m in the mandible and 6m in the maxilla, the final prosthetic steps were undertaken and included the unloaded implants. Variables contributing to failure rates were investigated using the Kaplan-Meier survival estimate method and the Chi-square test.

Results

16 lower and 16 upper jaws in 9 men and 17 women, median age 68.5y, were treated with 215 implants of Ø 3.3-5x8-16 mm. H/PE sites were 47/49 in the mandible and 57/62 in the maxilla. C1/V3 implants were 101/114. MUAs of 1, 2, 3 and 4-5mm were 26, 56, 94 and 39. NP/SP/WP platform MUAs were 25/183/7. 25 prostheses relied on implants placed in mixed H and PE sites, 13 in the maxilla; 2 relied on PE sites only, 1 in the maxilla and 5 relied on H sites only, 3 in the mandible. Of the 215 implants 19/57/121 implants passed the 3/2/1 year control. Overall failure rate was 2.3% (5/215) in 4 patients during the healing time only; no temporization was interrupted. Failures were 1 in the mandible in a PE site and 4 in the maxilla, 3 in H sites and 1 in a PE. No variable was a significant contributor to implant failure. Failures occurred in mixed situations only, none when placed in H or PE sites only. In the maxilla, failure rate of H/PE sites was 5.3%/1.6% (p=0.26); in the mandible, failure rate of PE sites was 0%/2.0% (p=0.57). Most failures happened in the maxilla, in H sites but not in PE sites.

Conclusion and Clinical implications

Immediately loaded prostheses relying on C1 and V3 implants placed in the multi- risk patient were highly predictable when 4-7 and 6-9 implants were placed in the mandible and the maxilla. More implants failed in the maxilla but not in PE sites, because of the low number of failures no variable could be identified as a contributor to failure. Our experience showed that the multi-risk patient is willing to cope with implant failure as far as prosthetic temporization is not interrupted during the healing phase.

Background and Aim

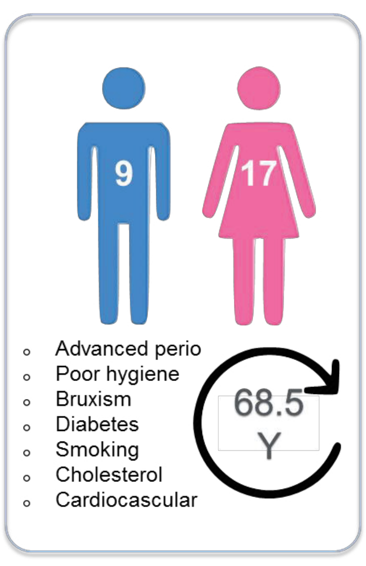
The issue of how to realize the transition from a failing dentition to an implant-supported prosthesis has been insufficiently addressed in the multi-risk patient. In this case, implants are simultaneously placed in healed (H) and post- extraction (PE) sites to support an immediately loaded temporary full prosthesis. Distribution between H and PE sites in the Mand, and the Max. can vary. Information about respective failure rates and contributing factors to failure are needed.

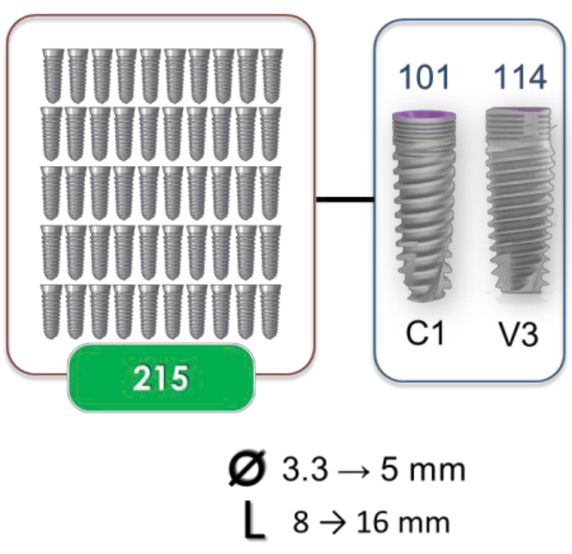
Objective of this cohort study was to record the failure rates of C1 and V3 implants (MIS) placed in H and PE sites in the mandible and the maxilla of the multi-risk patient following a 36 hours immediate loading protocol. Aim was to check the predictability of implants placed in PE than H sites.

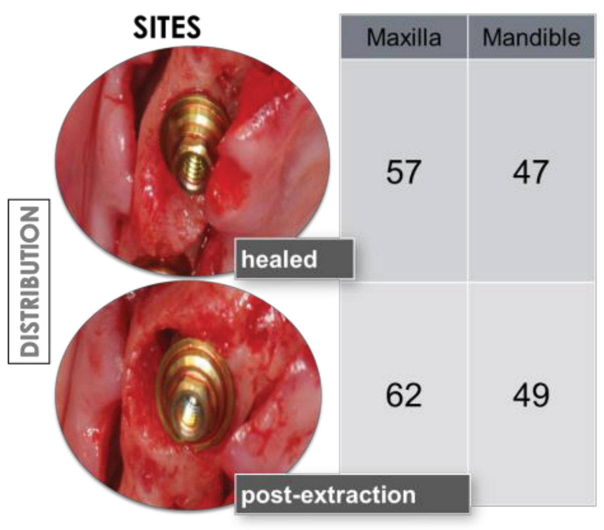
Materials and Methods

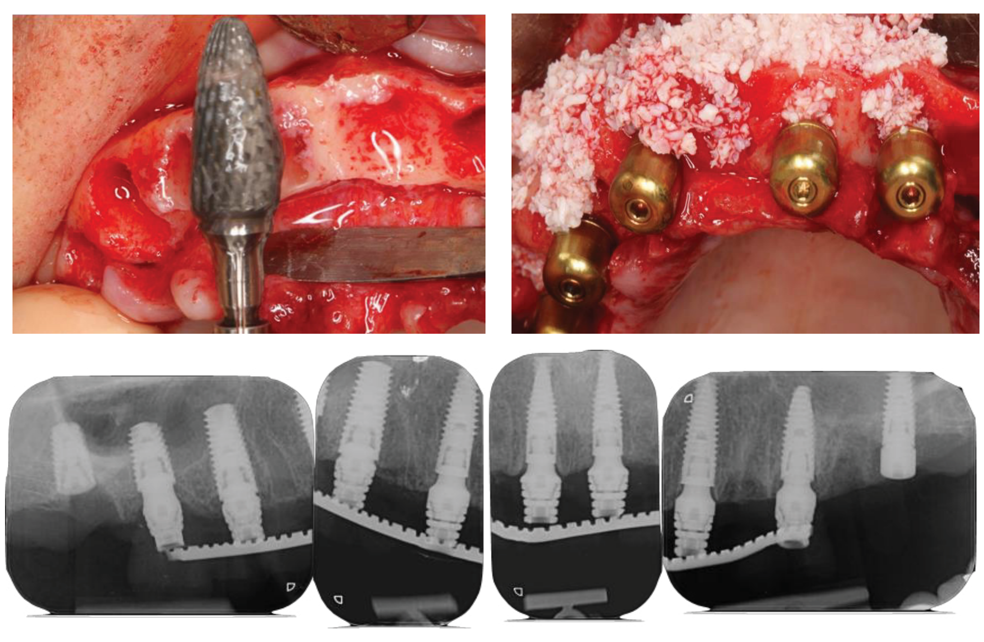
Inclusion criteria:
1) Several health risks patient with failing bridge / edentulous jaw.
2) At least 2 of the following: advanced perio disease, poor hygiene, bruxism, diabetes, smoking, cholesterol, cardiovasc. issues and blood pressure.
3) Implants were placed with ≥ 40 Ncm in either healed and/or post extraction sites.
4) 4-7 implants in the Mandible and 6-9 implants in the Maxilla loaded.
5) Multi-unit abutments (MUA) of various height.
6) Temporary acrylic prosthesis delivered within 36h.
7) Final prosthetic steps started after 3m in the Mandible, 6m in the Maxilla.

Variables contributing to failure rates were investigated using the Kaplan-Meier survival estimate method and the Chi-square test.

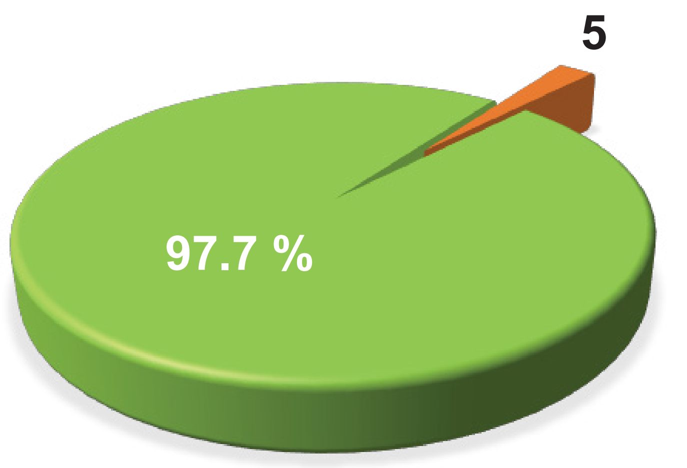




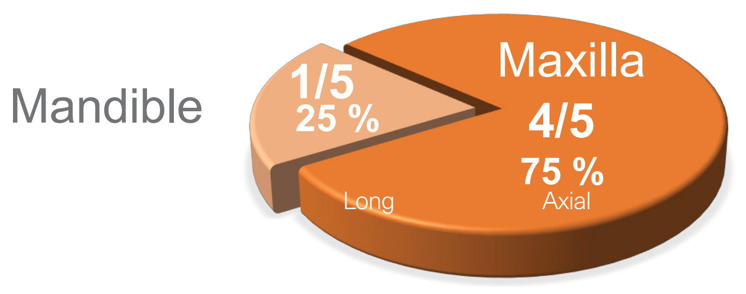




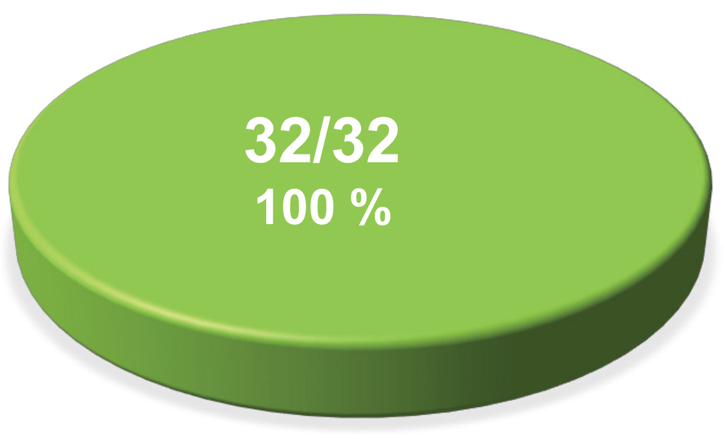
Results



Failure rate of 2.3 %, all during the healing phase



Distribution of the failures according to the mandible and the maxilla.



no temporization failure despite implant failure

	healed	post-ex
Maxilla	0 %	2.0 %
Mandible	5.3 %	1.6 %

Failure rates vs. healed and post-extractive sites in the mandible and the maxilla.

Conclusion

Immediately loaded prostheses relying on C1 and V3 implants placed in the multi-risk patient were highly predictable when 4-7 and 6-9 implants were placed in the Mandible and the Maxilla. More implants failed in the maxilla but not in post-extractions sites. Because of the low number of failures no variable could be identified as a contributor to failure. The multi-risk patient is willing to cope with implant failure as far as prosthetic temporization is not interrupted during the healing phase.

References

-Davarpanah M, Rajzbaum P, Szmukler-Moncler S, Davarpanah K, Bichacho N, van Dooren E. ImplantoLOGIC. Treatment planning and Decision making. Editions Espace ID, Paris, France, 2017.
-Demurashvili G, Davarpanah K, Szmukler-Moncler S, Davarpanah M, Raux D, Capelle-Ouadah N, Rajzbaum P. Technique to obtain a predictable aesthetic result through appropriate placement of the prosthesis/soft tissue junction in the edentulous patient with a gingival smile. Clin Implant Dent Relat Res. 2015;17:923-931.
-Davarpanah M, Caraman M, Jakubowicz-Kohen B, Kebir-Quelin M, Szmukler-Moncler S. Prosthetic success with a maxillary immediate- loading protocol in the multiple-risk patient. Int J Periodontics Restorative Dent. 2007;27:161-169.

Presented at: EAO Congress European Association for Osseointegration Lisbon 2019

BASIC RESEARCH

Physical characterization and Osseointegration of 3 implants with distinct materials and surfaces

Pimenta Joaõ[1], Aramburù Jaime Jr[2], Dedavid Anina B[3], Gehrke Sergio A[2],
Szmukler-Moncler Serge[4]

[1]Private practice, Barcelos, PT, [2]Biotechnos Research Center, Sta Maria, BR,
[3]Dpt Material Engineering, PUC, RS, BR, [4]R&D Dpt, MIS, Israel

Abstract

Background & Aim

Dental implants are manufactured from various titanium grades and titanium alloys; diverse surface treatments are implemented. Subsequently, implants display distinct surface texture characteristics and composition. It has been claimed that 'because of the biphasic nature of the TiAlV alloy, sandblasting and acid-etching is typically not an appropriate treatment for α-β-alloys'. This issue needs to be addressed by comparing well physically characterized surfaces to osseointegration data. Aim was to compare in a rabbit model the osseointegration rates of well physically characterized surfaces of 3 distinct implant systems. Investigated implants were made of cp titanium and titanium alloy Gr. 23. Surface treatments were sandblasting-and-acid-etching and anodic oxidation.

Material and Methods

Implants belonged to the following groups: G1, Ti cp Grade 4, anodic oxidation (Replace, TiUnite, NobelBiocare, Switzerland); G2, Ti Gr. 23 (TiAl6V4 ELI) sandblasted-and-etched (V3, SLA, MIS, Israel), G3, Ti cp Grade 4, sandblasted-and-etched (BL, SLA, Straumann, Switzerland). Implant dimensions were: G1, Ø 3.3 x 8 mm; G2, Ø 3.9 x 8 mm with a triangular neck and gap of 0.2 x 3.7 mm; G3, Ø 3.5 x 8 mm. Roughness (S_a) was determined between the threads with an optical profilometer (filter 50 µm). Surface topography and element composition were observed under SEM/EDS (x 20-4000). Surface composition was determined by XRD (2Θ: 30-80°), presence and size of Ti hydride needles (TiH-n) was determined on etched metallographic sections, segregation of Al and V at the alloy surface was determined by SIMS, concentration profile was gained using O- and Cs+ ions at 500 eV. Implants of each group (n = 8x3) were implanted in the tibia of 6 rabbits for 45 days. Histological sections were prepared and BIC was measured.

Results

Under SEM, all surfaces looked differently: G1 showed Ø 3-12 µm canyon-like structures allowing bone ingrowth. G2 and G3 displayed a macro and micro-texture allowing bone ingrowth; G2's macrotexture was rounder. Sa roughness of G1/G2/G3 implants was 0.80/1.22/1.59 µm. XRD/EDS led to distinct surface compositions: on G1, anatase Titanium oxide rich in P; on G2, Ti α and ßphases; on G1, a rough porous 3-16 µm thick Titanium oxide layer sitting on a lower density base, no TiH-n; on G2, ß-Ti phase grains distributed among a α-Ti phase matrix, no TiH-n; on G3, α-Ti phase and Ti hydride. The metallographic sections revealed: on G3, presence of 3-18 µm long TiH needles, TiH needles concentration was higher at the thread level Concentration profile by SIMS on G2's surface showed an increased amount of O and depleted amounts of Al and V. After 45 days of implantation, the BICs of the G1/G2/G3 groups were similar: 58.7±1.8%/59±2%/58.1±1.6% (p=0.94, NS); G2's gap was filled with bone.

Conclusion and Clinical implications

Surface topography and composition of G1, G2, G3 were all different. Surface treatment of G1 and G3 generated new compounds at the implant surface, anatase rich in P on G1, TiH on G3. TiH-n were found on G3 only. On G2, Al and V were depleted at the implant surface. Despite distinct surface characteristics and composition, osseointegration was similar for the 3 implant systems; G2's gap was filled with bone. Sandblasting-and-etching was an appropriate treatment for the TAV α-ß alloy implant.

Background and Aim

Dental implants are manufactured from various titanium grades and titanium alloys; diverse surface treatments are implemented. Subsequently, implants display distinct surface texture characteristics and composition. It has been claimed that 'because of the biphasic nature of the TiAlV alloy, sandblasting and acid-etching is typically not an appropriate treatment for α-β Ti alloys' (Saulacic et al. 2012). This issue needs to be addressed by comparing well physically characterized surfaces to osseointegration data.

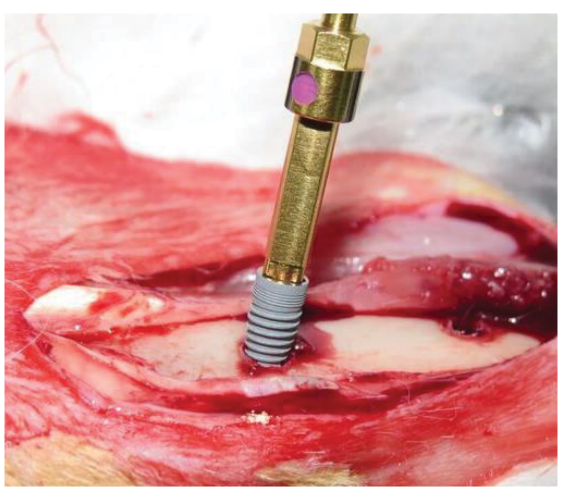
Aim was to compare in a rabbit model the osseointegration rates of well physically characterized surfaces of 3 distinct implant systems. Investigated implants were made of cp titanium and titanium alloy Gr. 23. Surface treatments were sandblasting-and-acid-etching and anodic oxidation.

Materials and Methods

3 well–known implant brands were characterized and tested in vivo:

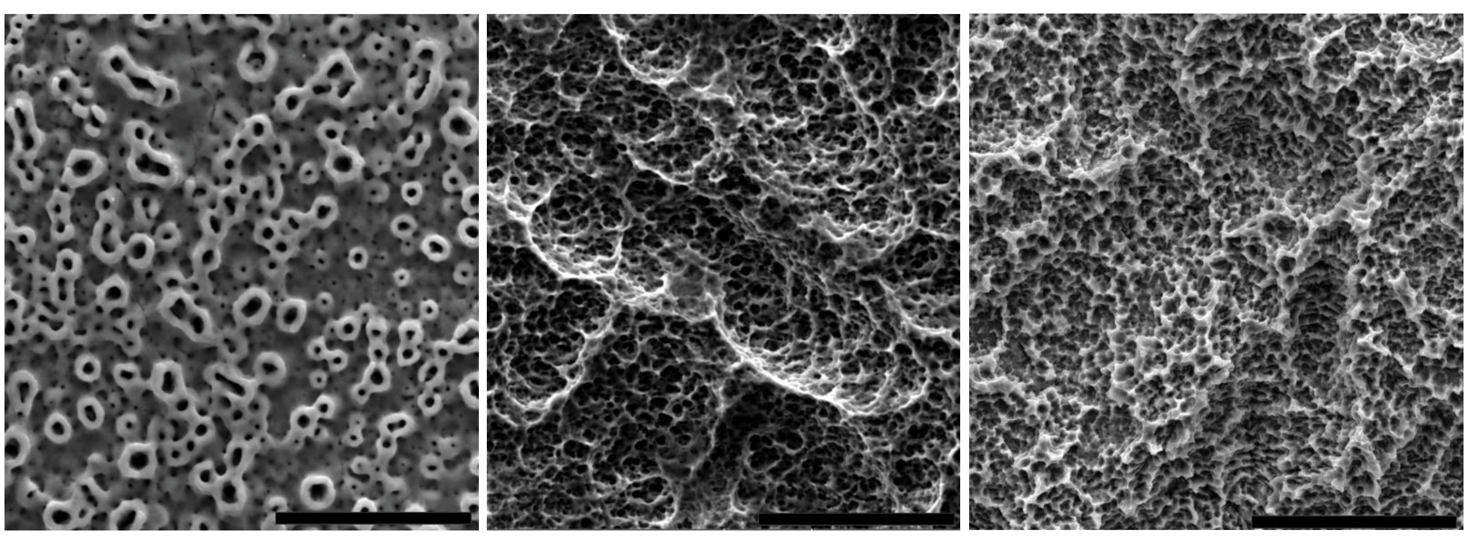
- G1: Ti Gr. 4, anodic oxidation (Replace, NobelBiocare, CH),
- G2: Ti Gr. 23 (TiAlV ELI), sandblasted & etched (V3, MIS, IL),
- G3: Ti Gr. 4, sandblasted-and-etched (BL, Straumann, CH). The following was recorded:

(1) Surface roughness (Sa, Sq, Ssk, Sku, Sdr), (2) Surface topography (SEM), (3) Element and surface composition (EDS/XRD),
(4) Presence, size of Ti hydride needles (metallographic sections),
(5) Depth profiling (ToF-SIMS) to check for segregation of Al & V.



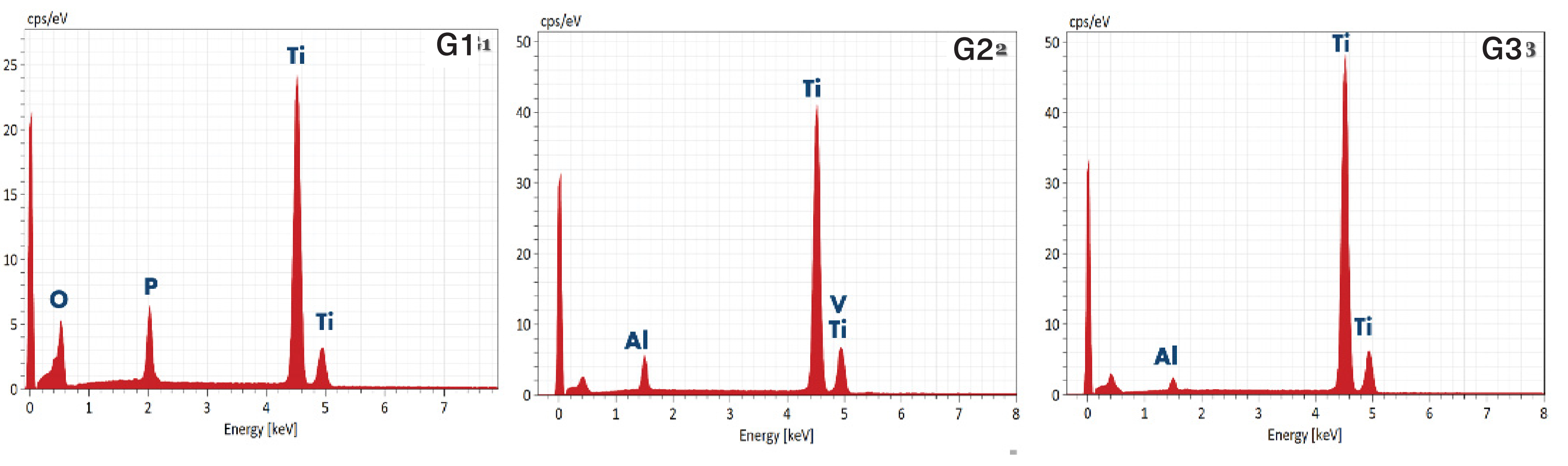
Implants of each group (n= 8x3) were implanted in the tibia of 6 rabbits for 45 days. Histological sections were prepared to record the bone-implant contact of each group; their means were statistically evalu- ated by the Kruskall-Wallis H test by ranks, α = 0.05

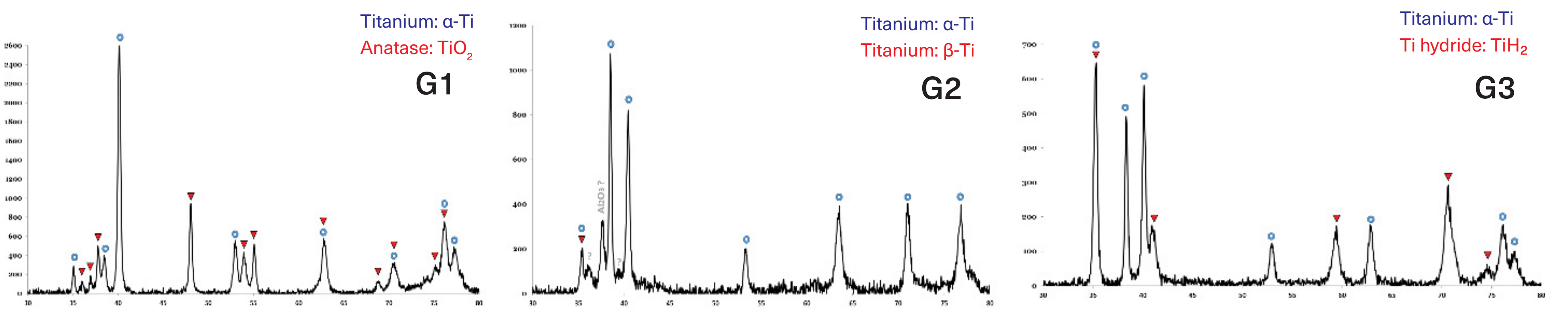
Results



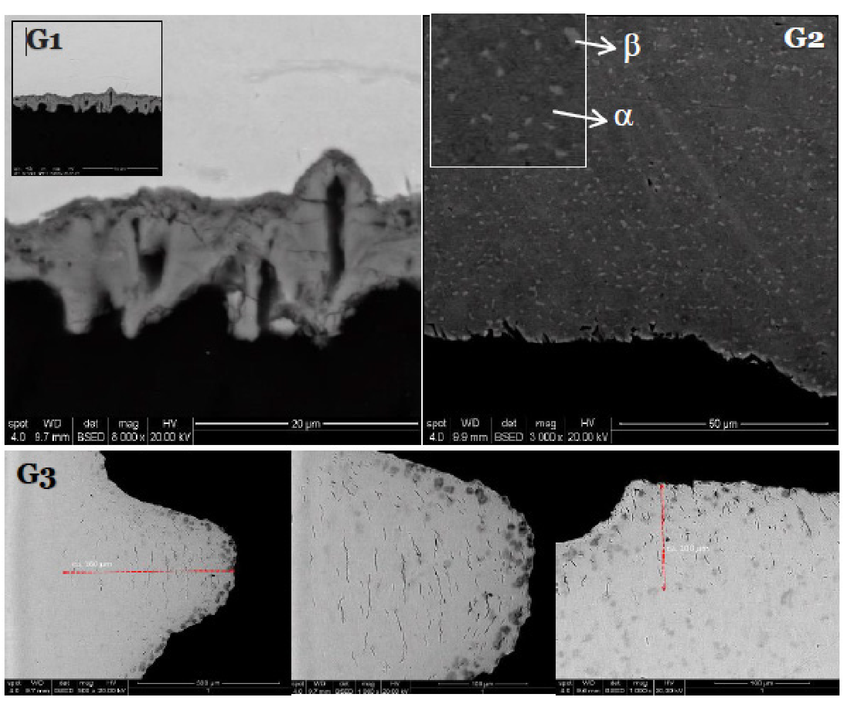
G1 G2 G3

G1 G2 G3
Sa: 0.80 µm 1.22 µm 1.59 µm

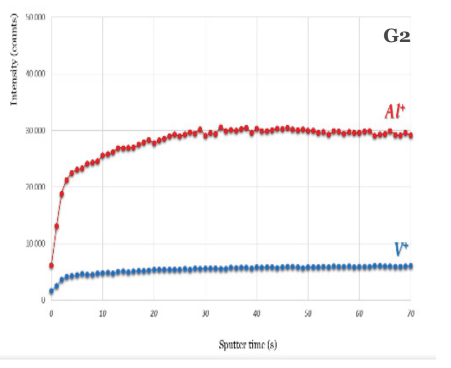


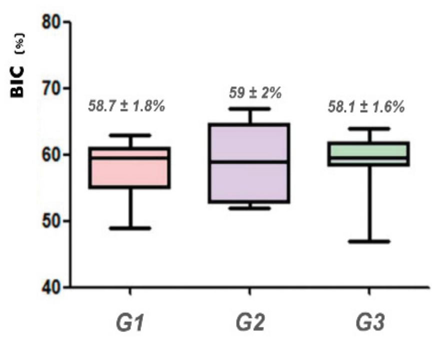


EDS and XRD led to distinct surface compositions:
-on G1, anatase titanium oxide (TiO2) rich in P from the anodization bath;
-on G2, α-Ti and β-Ti phases; - on G3, α-Ti phase and Ti hydride (δ-TiH_2).



Metallographic sections:
on G1, a rough porous 3-16 µm thick TiO2 layer sitting on a lower density base, no TiH-n; on G2,β-Ti phase grains distributed among an α-Ti matrix, no TiH-n; on G3, Ti and 3-18 µm long Ti Hydride needles, the TiH needles con- centration was higher at the thread level. Concentration profile by SIMS on G2's surface showed an increased amount of O and depleted amounts of Al and V. After 45 days of implantation, the BICs were similar: G1 (58.7±1.8%), G2 (59±2%), G3 (58.1±1.6%),
(p=0.94, NS); the coronal gap of G2 was filled with bone.





Conclusion

Surface topography and composition of G1, G2, G3 were all different. Surface treatment of G1 and G3 generated new compounds at the implant surface: anatase rich in P on G1, TiH on G3. TiH-n were found on G3 only. On G2, Al and V were depleted at the implant surface. G2's gap was filled with bone. Despite distinct surface characteristics and composition, osseointegration was similar for the 3 implant systems. Sandblasting-and-etching was found to be very appropriate for the TiAlV α-β alloy implant.

References

-Szmukler-Moncler S, Bischof M, Nedir R, Ermrich M. Titanium hydride and hydrogen concentration in acid-etched commercially pure titanium and titanium alloy implants: a comparative analysis of five implant systems. Clin Oral Implants Res. 2010;21:944-950.
-Saulacic N, Bosshardt DD, Bornstein MM, Berner S, Buser D. Bone apposition to Ti-Zr alloy implant as compared to 2 other Ti containing implants. Eur Cell Mater. 2012;23:273-286.
-Shah FA, Trobos M, Thomsen P, Palmquist A. Commercially pure titanium (cp-Ti) versus titanium alloy (Ti6Al4V) materials as bone anchored implants - Is one truly better than the other? Mater Sci Eng C Mater Biol Appl. 2016;62:960-696.

Presented at: EAO Congress European Association for Osseointegration Lisbon 2019

Factors affecting implant failure and crestal bone loss. A study of 220 implants placed by students

Ragucci Gian Maria; Giralt-Hernando Maria; Garcia Susana; Hernández -Alfaro Federico

Department of Oral and Maxillofacial Surgery, Universitat Internacional de Catalunya (UIC), Barcelona, Spain

Abstract

Scientific literature demonstrated that implant therapy is highly reliable. Contributing factors to failures and marginal bone loss (MBL) have been documented. However, most of our knowledge stems from implants placed by experienced teams in university settings with strict selection criteria or in private offices. 130 C1 and 90 V3 implants were placed in 99 patients. All surgeries were performed by inexperienced postgraduate students under supervisor attention. 8 early failures were recorded, no implant failed after loading; survival rate was 96.4%. No variable significantly affected implant failure. Overall mean MBL was 0.53mm, Several variables affected MBL: gender, implant diameter, depth of implant placement, keratinized mucosa height, and probing depth.

Background and Aim

Studies on implants placed by inexperienced clinicians like students in non-selected patients are scarce; they should be more representative of the daily reality of implant therapy. Objective of this study was to identify contributing factors to implant failure and MBL of C1 and V3 implants (MIS) placed by inexperienced post-graduate students. Contributing variables were related to the patient, the local site, surgical and prosthetic protocols.

Materials and Methods

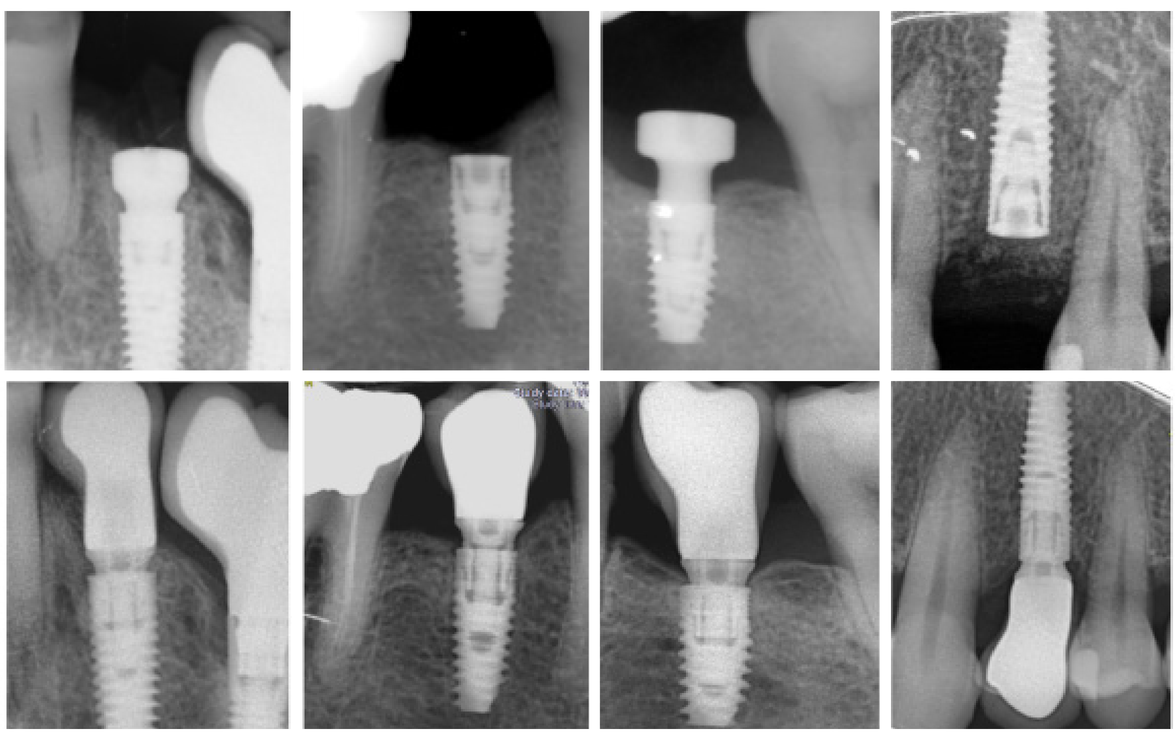
130 C1 and 90 V3 implants Ø 3.3-5 x 8-16 mm long were placed in 99 patients. All surgeries were performed by inexperienced postgraduate students (T0). After 3 months of healing, the prosthetic steps were carried out. Failures and MBL were investigated at the 1 year recall after prosthesis delivery (T1). A generalized linear model and generalized estimating equations were used to identify contributing factors to implant failure and MBL.

	Site variables	Surgical variables	Prosthetic variables
Age	Diameter	Implant placement depth	Screw- retained
Gender	Length	Bone/sinus grafting	Cemented
Smoking	Local site	Healing protocol	Crown- implant ratio
Periodontal disease	Jaw		
Diabetes	Abutment height		
Oral hygiene	Soft tissue thickness		
Bone quality	Biotype		
	Pocket depth		
	Keratinized mucosa		
	Bleeding on probing		
	Insertion torque		

Variables measured

T0

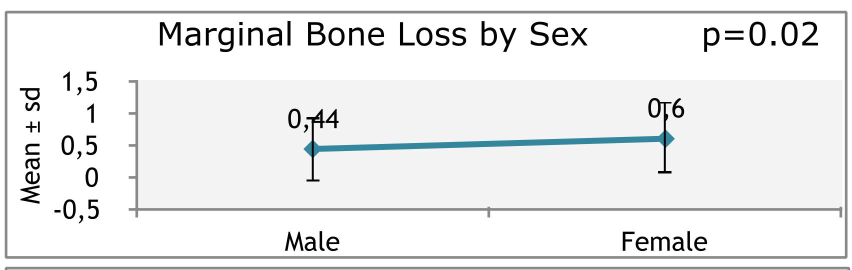
T1

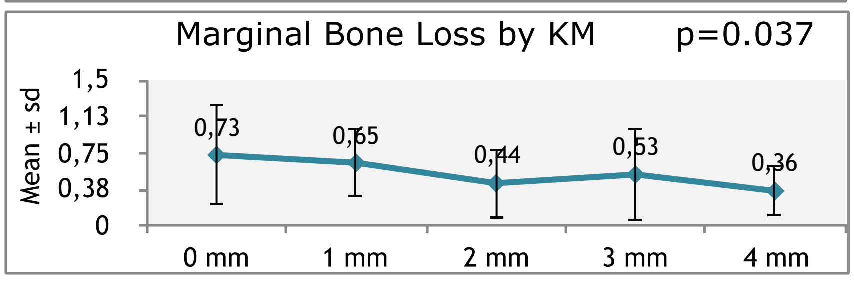


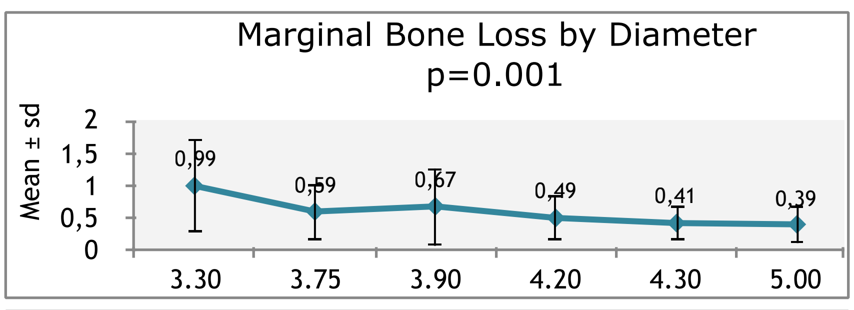
Results

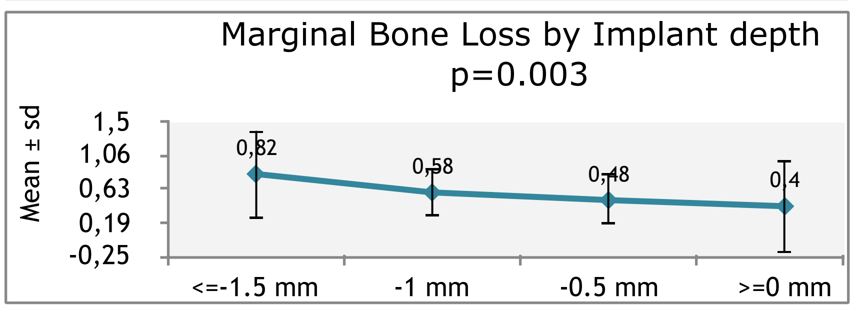
8 early failures were recorded, no implant failed after loading; survival rate was 96.4%. No variable significantly affected implant failure. Implants placed in periodontal patients were at higher risk (OR=5.6) but the difference was not statistically significant (NS, p=0.11). Overall mean MBL was 0.53mm, difference between C1 and V3 implants was non significant (p=0.11); difference between Maxilla (0.60mm) and Mandible (0.46mm) was non significant (p=0.05)

Several variables affected MBL:









Conclusion

The failure rate of C1 and V3 implants placed by inexperienced students was as low as 3.6%, similar to published data from experienced practitioners. No contributing factor was identified for implant failure.

Several factors have been shown to contribute to MBL; they were: 1) gender (female) 2) implant diameter 3) depth of implant placement 4) presence of KM 5) PD depth. In contrast thickness of gingiva and prosthetic abutment height were not found to affect MBL.

References

-Roccuzzo M, Bonino L, Dalmasso P, Aglietta M. Long-term results of a three arms prospective cohort study on implants in periodontally compromised patients: 10 year data around sandblasted and acidetched surface. Clin Oral Implants Res 2014;25(2):1105–12.

-Simonis, P. , Dufour, T.,Tenenbaum, H. Long-term implant survival and success: a 10–16- year follow-up of non-submerged dental implants. Clinical Oral Implants Research,2010,21: 772-77.

-Francetti, L, Cavalli, N, Taschieri, S, Corbella, S. Ten years follow-up retrospective study on implant survival rates and prevalence of peri-implantitis in implant-supported full-arch rehabilitations. Clin Oral Impl Res. 2019; 30: 252– 260.

Presented at: EAO Congress, European Association for Osseointegration, Lisbon 2019