MULTI-PHOSPHONATE TREATED DENTAL IMPLANTS: COMPARISON OF CLINICAL OUTCOME IN MAXILLA, MANDIBLE, SMOKERS AND NON-SMOKERS

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SurfLink® Dental implant surface treatment produces a monolayer of permanently bound multi-phosphonate molecules on the surface of an implant[1]. This novel phosphorous-rich surface mimics one of the main constituents of bone, hydroxyapatite, providing a favourable environment for cell colonisation.

BACKGROUND AND AIM

Pre-clinical in vitro and animal studies have shown that SurfLink®, a novel surface treatment, increases implant wettability, resulting in faster bone cell adhesion and colonisation[2]. Once on the implant surface, bone cells quickly spread improving osseointegration in the short and long term[3] (Figure 1).

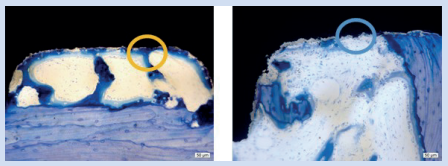

FIGURE 1. Pre-clinical study in sheep: results after 2 weeks healing

SurfLink® has been clinically validated in a randomised controlled trial. Preliminary 1 year data showed excellent clinical outcome for all implants[4].

In this poster we further analyse the effect of SurfLink® surface treatment of dental implants at 1 year post-loading in respect to implant surface (SurfLink® treated vs control implants), implant position (maxilla vs mandible), patient characteristics (smoker vs non-smokers, gender, age).

MATERIALS AND METHODS

The clinical study was conducted in a private Swiss clinic according to GCP and ISO 14155. Prior to the study, no clinical data was available on SurfLink® treated implants and sample size calculation was therefore not conducted.

Twenty three patients were enrolled in the study (Ethics Committee Lausanne, approval n° 214/07 and SwissMedic, approval n° 2008-MD-0024) with broad inclusion criteria.

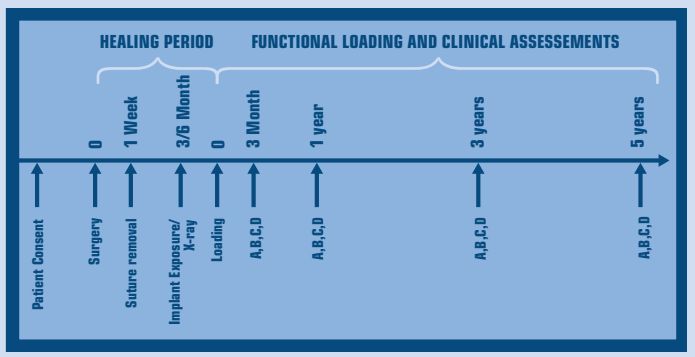

FIGURE 2.
Outcome measures,
A) Failure,
B) Marginal Bone,
C) Marginal Bleeding,
D) Complications

Patients requiring at least 2 single implant-supported crowns were randomised according to a split-mouth design to receive one SurfLink® treated implant and one non-treated control implant. Cylindrical titanium grade IV roughened implants with internal connection (SPI® Element, Thommen Medical) were used. If more than 2 implants were needed, additional SurfLink® treated implants were placed and restored with single crowns. Study plan and outcome measures are presented in Figure 2.

Mesial and distal bone heights were evaluated using x-rays (Figure 3) and the changes in bone level were analysed by a Two-Paired-Samples, two-sided, Student t-test with $p<0.05$ for significance (RealStatistics plugin for MS Excel 2013).

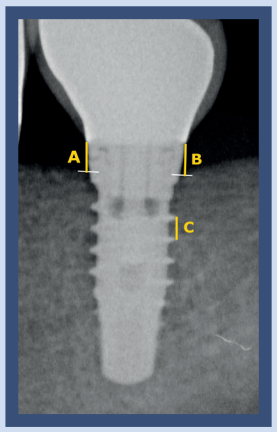

FIGURE 3.
Measurements of mesial and distal marginal bone levels (A and B) using ImageJ software after length calibration (C) before each measurement.

REFERENCES

1. C. Viornery et al. Langmuir 2002, 18, 2582-2589
2. C. Viornery et al. J. Biomed. Mater. Res. 2002, 62, 149–155
3. von Salis-Soglio et al. Journal of Functional Biomaterials 2014, 5, 135-157
4. Esposito et al. European Journal of Oral Implantology 2013, 6 (3), 227-236

RESULTS

Twenty three patients were recruited. At 1 year post-loading, there was one drop-out and one patient missed the baseline time point. No implant failures or other complications related to the implants occurred. No marginal bleeding was observed.

Marginal bone levels were analysed up to 1 year post-loading. Results are summarised in Table 1, for the 21 patients.

When the additional SurfLink® treated implants are included in the analysis, (Figure 4) a statistically significant difference in marginal bone level changes between the 2 groups is observed ($p=0.033$).

Furthermore, SurfLink® treated implants placed in the maxilla vs mandible or smokers vs non-smokers (Figure 5) showed a strong tendency for maintenance of bone levels. However, the differences are not significant.

TABLE 1. Comparison of mean changes in peri-implant marginal bone levels at 1 year post-loading between implant types, position and patient characteristics.

	# Patients	Implant Type	Mean±SD
Surface	21	SurfLink®	-1.09±0.76
		SurfLink®(a)	-1.04±0.72
		Control	-1.36±0.87
		p / p(a)	0.057 / **0.033**
Maxilla	9(b)	SurfLink®	-1.32±0.79
		Control	-1.70±0.59
		p	0.070
Mandible	9(b)	SurfLink®	-0.92±0.83
		Control	-0.95±1.08
		p	0.914
Smokers	6	SurfLink®	-0.77±0.82
		Control	-1.24±0.82
		p	0.062
Non smokers	15	SurfLink®	-1.22±0.72
		Control	-1.41±0.90
		p	0.285

(a) Three patients had one additional SurfLink® implant each. For these three patients, the value for the two SurfLink® implants was meaned for use in the statistics.
(b) Three patients had 1 implant placed in the mandible and 1 implant placed in the maxilla. These patients were excluded from the analysis.

CONCLUSIONS

SurfLink® treated dental implants showed statistically significant (p=0.033) improvement in maintaining marginal bone levels when compared to untreated control implants. This seems to particularly benefit patients with compromised (i.e. smokers) or poor (ia.e. maxilla) bone quality.

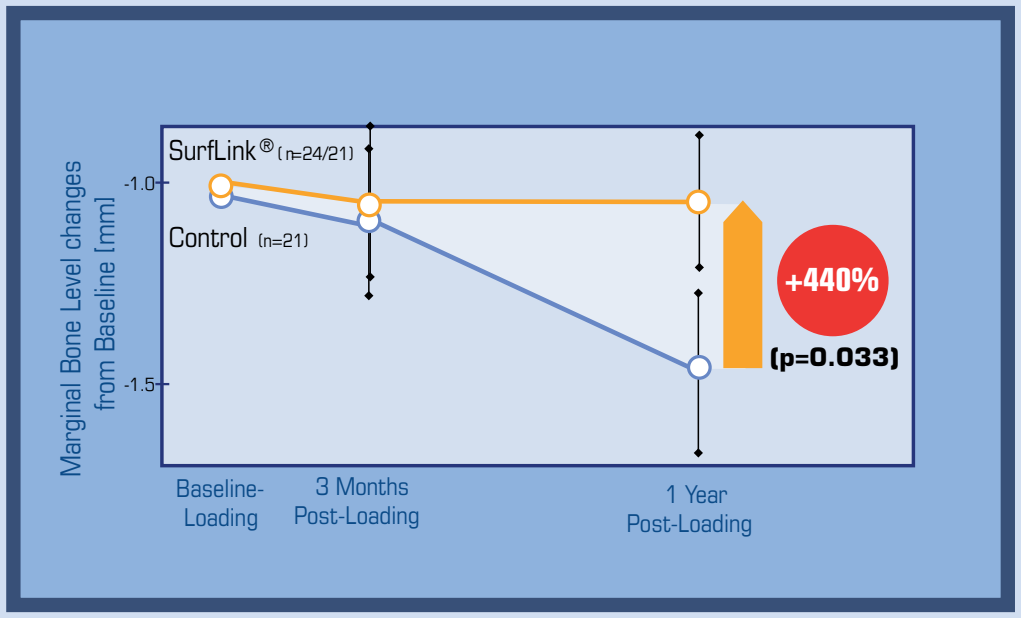

FIGURE 4. Peri-implant marginal bone levels at 1 year post-loading for Control and SurfLink® implants (n=21).

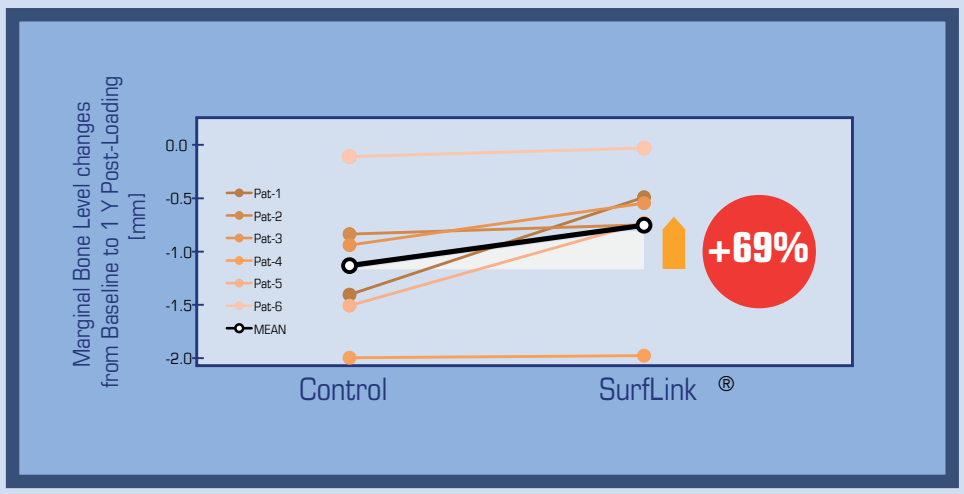

FIGURE 5. Peri-implant marginal bone levels at 1 year post-loading for Control and SurfLink® implants (n=6).

FOR FURTHER INFORMATION PLEASE CONTACT:
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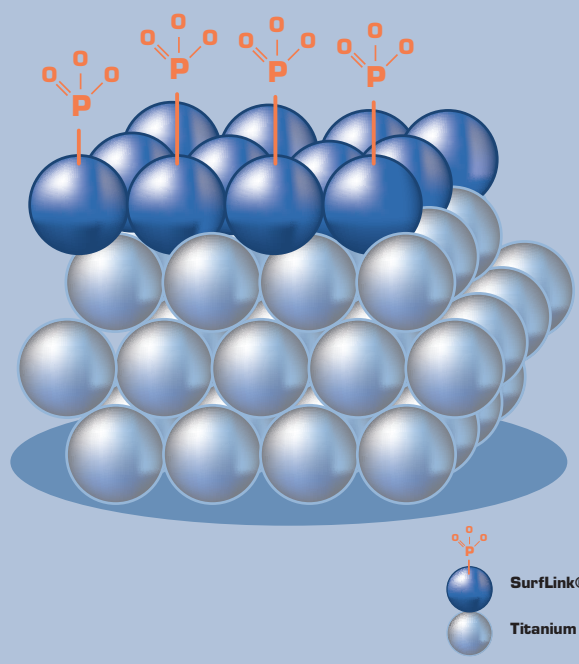
SurfLink® CONCEPT

The SurfLink® surface treatment consists of a layer of phosphorous-rich molecules, which is applied to the dental implant surface. The treated surface mimics the natural, biological environment, thus promoting cell and bone adhesion. This results in faster bone formation and ingrowth immediately after implantation as well as over the long term.



SurfLink® monolayer

Titanium implant

- **Assure successful aesthetics**
- **Promise predictable marginal bone levels**
- **Improve patient satisfaction**
- **Enable early bone formation directly on the implant surface**
- **Enhance early and long-term biomechanical fixation**
- **Promise long-term implant stability and true osseointegration, even in patients with compromised bone quality**