

Bone Level Changes At CONELOG® Implants Associated With Augmentation Procedures

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Objectives

- This private practice study examines bone level changes concerning the implant-bone-interface of CONELOG® implants in the months after implant placement and exposure in 2011 and 2012.
- A correlation between CONELOG®s integrated platform switching and the bone level is established and physiological bone level changes associated with the conical connection are investigated.
- The influence of various augmentation procedures on the bone level is also investigated.
- According to the given anatomical conditions, a recommendation regarding augmentation techniques should be developed.

Patients and Methods

- Study products were CONELOG® Screw-Line implants with diameters of 3.3 mm, 3.8 mm, 4.3 mm, 5.0 mm; and length of 9, 11 and 13 mm.
- Selected healing technique was submerged in most of the cases (n= 32) because of the performed augmentative procedures.
- In this instance efficacy is evaluated as implant survival and success rate as well as a stable bone level.
- Using Orthopantomograms of 38 implants in 22 patients from a private practice, bone level was graphically analyzed (using the program ImageJ®) at the time of insertion and at the time of exposure based on the radiological diagnosis (figure 1).

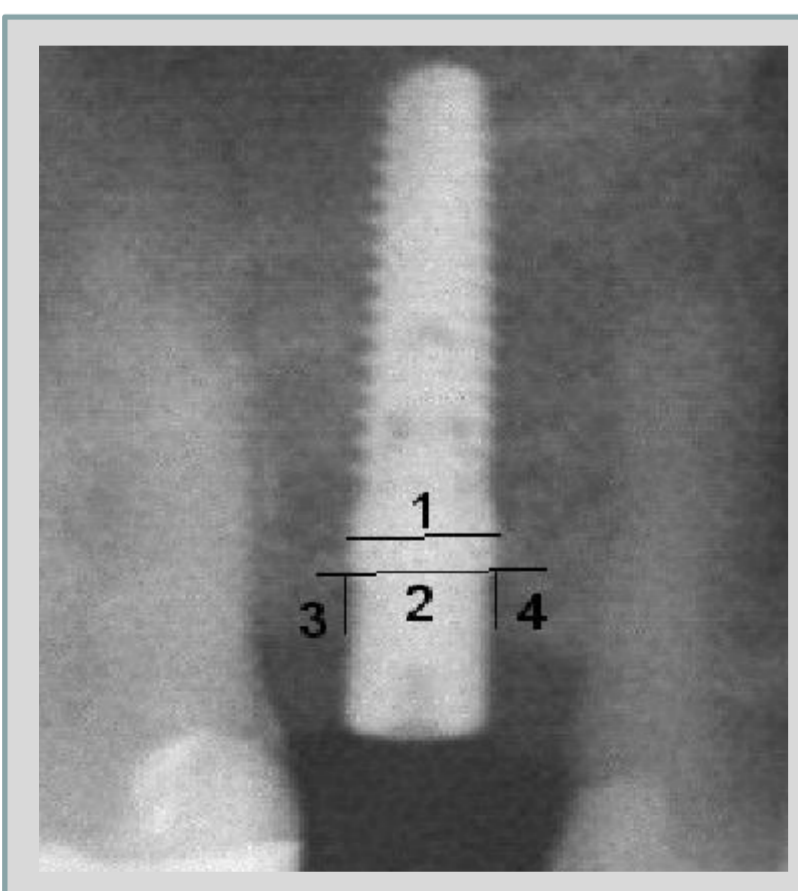


Figure 1: Presentation of the measurement with ImageJ®.

Line 1 marks the radiological diameter of the implant, line 2 is a parallel in the area of the screw plug. 3 and 4 are the measurement lines from the upper edge of the implant to the upper bone level

- Statistical analyses compared the change of bone level at the time of establishing the implants and after exposure.
- Furthermore, bone level changes were analyzed in regard to sex (male / female), to implant diameter (3,8 / 4,3), and to implant length (11/13).
- Because of abnormal distribution (p-values of Shapiro-Wilk-tests < 0,05) group differences were analyzed by non-parametric methods (Mann-Whintey-U-test and Kruskal-Wallis-test, resp.). The level of significance was generally set to $\alpha=0,05$, and tests were performed two-sided. All statistical analyses were performed using SPSS, Version 17.02.

References

1.Gomez-Roman G et al.; Area-dependent enlargement ratios of panoramic tomography on orthograde patient positioning and its significance for implant dentistry; Int J Oral Maxillofac Implants;1999 Mar-Apr; 14(2): 248-57 .

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Results

1. Bone level changes: insertion vs. exposure

- The results of the mesial and distal measured changes of bone level were shown in table 1. P-values of all comparisons are > 0.05, thus there is neither mesially nor distally a statistically significant difference in bone level between exposure and insertion.
- To be descriptive, a slight bone formation was measured mean for both regions; mesial and distal.

Parameter	Mean	Std.	Median	1.Quart.	3. Quart.	p-Value
Exposure mesial	1,4910	1,2090	1,3284	0,5512	2,1660	0,232
Insertion mesial	1,2347	1,2030	0,8486	0,3981	1,7419	
Exposure distal	1,2292	1,1645	0,9512	0,1935	1,8646	0,604
Insertion distal	1,0252	0,8532	0,8070	0,4469	1,2813	

Table 1: Comparative measurements exposure vs. insertion

2. Bone level changes: technique of augmentation

- Due to the different frequencies of the applied augmentation technique combinations (four of them only used in one patient), a comparison between the nine procedures was not possible.
- Alternatively, for both the mesial and the distal difference values, a comparison between group B (n=14, advanced flap with periosteal incision, guided tissue regeneration (GTR), partial vestibuloplasty, autogenous bone chips, removal of alveolar flabby ridge) and C (n=9, GTR, autogenous bone chips, advanced flap with periosteal incision) and the combined group D (n=6, GTR, partial vestibuloplasty, autogenous bone chips, removal of alveolar flabby ridge, sinusfloor elevation) and E (n=3, GTR, autogenous bone chips, advanced flap, sinusfloor elevation) was performed.
- Bone level changes do not differ noticeably in these three groups (p = 0.219 mesial, p = 0.747 distal).

3. Bone level changes: Sex, implant diameter, implant length

- Bone level changes compared between male (n=16) and female (n=22) were not statistically significant (mesial p = 0.636 and distal p = 0.790, resp.).
- Also the results of comparing bone level changes for different implant diameter - diameter 3;8 (n=20) vs. diameter 4;3 (n=14) - showed no statistical difference (mesial p = 0,545 and distal p = 0.986, resp.).
- The implant length was generally 11 or 13 mm (except for one tooth with 9 mm). The comparison of the changes in bone level between these groups showed a non-significant result for mesial measurement (p = 0.170) and a statistically significant result (p = 0.044) for distal measurement.

4. Bone level changes: tooth comparison

- Especially in the lower jaw, bone level remained stable distal as well as mesial of the implant.
- Clustered distribution of bone level changes mesial (A) and distal (B) is shown in table 2 and figure 2.

Measurement of Bone level Changes	Mesial [% (n)]	Distal [% (n)]
< 0	21,1 (8)	18,4 (7)
0 - 0,5	52,6 (20)	44,7 (17)
> 0,5 - 1	10,5 (4)	28,9 (11)
> 1	15,8 (6)	7,9 (3)

Table 2: Values, Clustered distribution of bone level change (n=38) in percent (%)

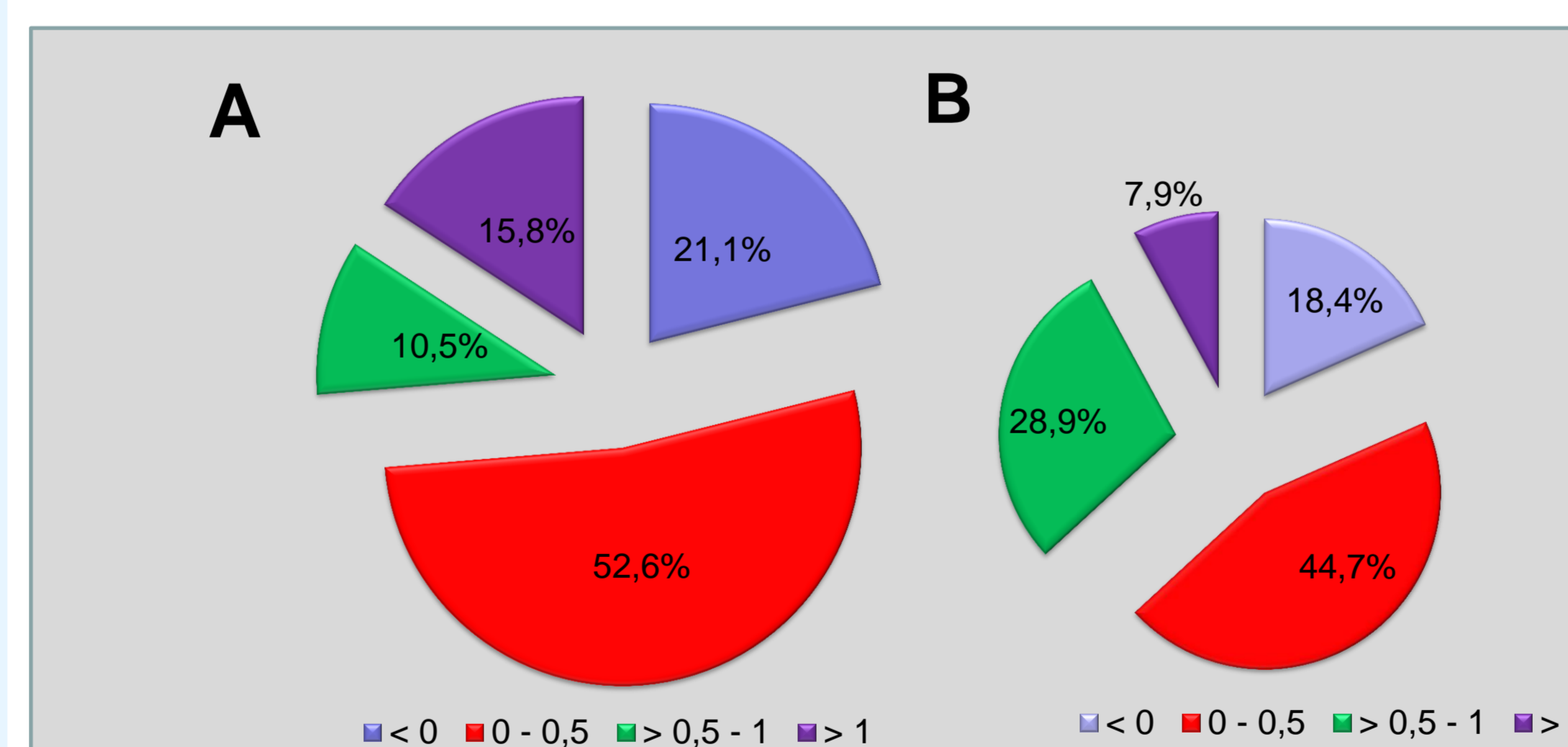


Figure 2: Clustered distribution (%) of bone level change (n=38)

(A) Bone level changes mesial: Only 21,10 % showed an obvious bone loss. In 78,9 % of our measurements bone level remained stable or we found bone growth.

(B) Bone level changes distal: In 81,5 % of the cases we measured a stable or growing bone level.

Discussion

- Examination time is short; long-term results are necessary for a valid statement to bone level changes. Larger study numbers would improve statistical results.
- The limitations of the radiological diagnosis are well – known and well –documented.
- Bone stability in this period of treatment may be a result of the more deeply positioned coronal implant shoulder, the acid-etched tapered implant shoulder (45°) or machined implant shoulder surface. The CONELOG® cover screw or healing abutment do not cover the implant shoulder. This integrated platform switching concept may be another reason for keeping bone level stable.

Conclusion

- CONELOG® implants in combination with augmentative processes showed no bone loss during healing period and seemed to initiate slight bone growth. Descriptively, in most of the cases there was bone growth, according to our clinical impressions.
- No differences in bone level due to the diverse augmentation techniques could be found related to CONELOG®.
- Further investigations after one and five years of prosthetic loading are planned as part of clinical follow-up.