



Future Trends in Implantology

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**Program &
Abstracts**

Bone Density and Implant Stability in Treatment Planning

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Objectives: The data of bone density and recordings of implant stability could increase the clinical success modifying the time needed for osseointegration specially using narrower and/or shorter implants or placing them in bone of lower density.

Methods: The 42 times one-stage and 20 times two-stage protocol for implant placement was followed. For the static method, the system SimPlant was used for placing 29 dental implants in maxilla and 21 in mandible (PIH) in 12 females and 15 males, mean age 58 ± 11 years. 11 times in maxilla and 3 times in mandible 3D surgical planning software without stereolithographic surgical templates were used. Clinical stabilities in Ncm and bone densities in Hounsfield Unites (HU) were determined at implant placement and only insertion torque at suprastructure fixation. The correlation coefficient between CT bone density values, and maximum force during implant or suprastructure placement was assessed.

Results: Implant success rate after 1,7 years (\bar{x}) was 96,87%. The correlation coefficients between HU values outside the implant and insertion force during implant or suprastructure screwings are 0,48 and 0,13 respectively. The torsional forces for 60 implants at suprastructure fixation were ≥ 35 Ncm and 2 times in the group of 15-30 Nm. Student's t-test demonstrated that there is the statistical significant difference between torsional forces for implants placement and screwings forces at suprastructure fixations.

Conclusion : Computer-guided surgical approach yielded predictable results even in cases where primary stabilities at implant placement were under the level of 35 Ncm and bone density reached less than 400 HU.

Topic: Implant and guided surgery

Objectives

The purpose of this study is to analyse the success of implant treatment of patients having poor bone density and lower primary stability through principles of computer-aided implantology (CAI). The clinical results concerning implant stability of technique using a scan prosthesis and computed tomography, three-dimensional surgical planning software, and mostly stereolithographic surgical template to guide the implant placement are shown. The recordings of implant stability and bone densities in Hounsfield Units (HU) could increase the clinical success (2,3) modifying the time needed for osseointegration specially using shorter lengths of implants or placing them in bone of lower density. Planning and placing implants through principles of CAI allow to determine more precisely which protocol has to be followed to reach reliable implant loading with success of longer duration.

Methods and Materials

The 42 times one-stage and 20 times two-stage protocol for implant placement with computer assisted fabricated surgical template as the static method for transfer of three-dimensional pre-operative planning to the patients was followed (4). For the static method, the system SimPlant was used for placing 29 dental implants in maxilla and 21 in mandible (Plan 1 Health External Hexagon Connection) in 12 females and 15 males, mean age 58 ± 11 years. 11 times in maxilla and 3 times in mandible 3D surgical planning software without stereolithographic surgical templates were used. Clinical stabilities in Ncm and bone densities in Hounsfield units were determined at implant placement and only insertion torque at suprastructure fixation in maxilla-6 months and in mandible-3 months after surgery (Fig.1., 2. and 3.). The Hounsfield units of alveolar bone outside the implants were acquired for all placed implants. The correlation coefficient between CT bone density values, and maximum force during implant or suprastructure placement was assessed. The maximum torsional force (35 Ncm) during implant tightening has been recorded, by dynamometric wrench (Fig. 1). All the patients were non-smokers and had no systemic diseases with potential influence on periodontal conditions.

Results

Implant success rate after 1,7 years (\bar{x}) was 96,87% (Fig.4.). Bone densities at baseline outside the implants were distributed between 118-1661 Hounsfield units (HU), mean value 614 ± 342 HU (Fig.5.). The correlation coefficients between HU values outside the implant and insertion force during implant or suprastructure screwing are 0,48 and 0,13 respectively. The primary stabilities at implant placement were 24 times under the level of 35 Ncm while 38 times the applied torsional force reached the desired value of 35 Ncm. The torsional forces for 61 implants at suprastructure fixation were ≥ 35 Ncm and only once in the whole group of 15-30 Ncm. Student's t-test demonstrated that there was the statistically significant difference between torsional forces for implants placement and screwing forces at suprastructure fixations.

Fig. 1. Flapless approach and tightening by wrench



Fig. 2. Misch C.E. bone density classification defined in HU (1,3)

Density	Hounsfield range
D1	> 1250
D2	851-1250
D3	351-850
D4	150-350

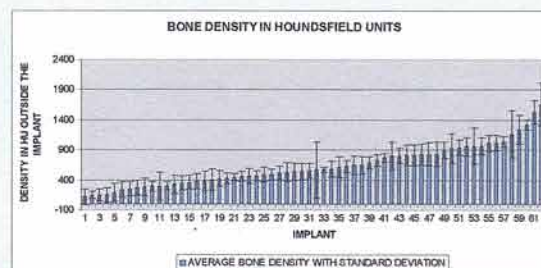
Fig. 3. Colour bone density



Fig. 4. Radiographic control 1 year after implant placement



Fig. 5. Bone density from CBCT in HU



Conclusions

Computer-guided surgical approach yielded predictable results even in cases where primary stabilities at implant placement were under the level of 35 Ncm and bone density reached less than advised value of 400 HU. Both failed implants exceeded approximately two times 400 HU and had excellent primary stability at implant placement. In the limits of this study the result shows that clinical stability of implant could not be only dependent on bone quality but also on other factors like surgical technique, time of healing, loading characteristics, etc.

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