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Editorial

Biomechanical Aspects of Oral Implants

Report on the 15th Annual Scientific Meeting of the European Association for Osseointegration, Part II

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In the introduction of the previous report (Part I), which was published in Issue 2006/11 of the **camlog foundation QUARTERLY**, it was underlined that the 15th Annual Scientific Meeting of the EAO was a special forum in the series of regular EAO Congresses. The reason for its exceptional importance was that the EAO Meeting 2006 in Zürich was not only a forum for presenting results of outstanding scientific efforts but its main objective was to summarize the up-to-date knowledge of implant dentistry in some specified scientific fields. The main goal of the present paper is to find and formulate scientifically-based evidence – where this is possible – in these fields:

- » Biomechanical aspects of oral implants
- » Soft-tissue integration of oral implants
- » Local and systemic conditions potentially influencing osseointegration.

In the previous issue of the **camlog foundation QUARTERLY**, the topic of soft-tissue integration of oral implants was dealt with. In the present issue, the findings of analyses of the biomechanical aspects of oral implants are summarized. The topic is presented using the same methods as for the topic «Soft-tissue integration of

oral implants». The results of the analytic activity of the Consensus Report Working Group I, presented in the article «Biomechanical Aspects of Oral Implants» published by J.A. Hobkirk and H.W.A. Wiskott on behalf of the Working Group I, were summarized together with the abstracts of the following works:

1. Aparicio C., Lang N. P., Rangert B., «Validity and clinical significance of biomechanical testing of implant/bone interface», *Clinical Oral Implants Research*, vol. 17 (Suppl. 2.), 2006; 2-7
2. Isidor F., «Influence of forces on periimplant bone», *Clinical Oral Implants Research*, vol. 17 (Suppl. 2.), 2006; 8-18
3. Nkenke E, Fenner M., «Indications for immediate loading of implants and implant success», *Clinical Oral Implants Research*, vol. 17 (Suppl. 2.), 2006; 19-34
4. Renouard F, Nisand D., «Impact of implant length and diameter on survival rates», *Clinical Oral Implants Research*, vol. 17 (Suppl. 2.), 2006; 35-51.

In the 4th plenary session, chaired by H. Spiekermann, Germany, and C. Aparicio, Spain, the following lectures were given:

1. Nisand, D. (France): Long versus short implants: theoretical considerations.
2. Steveling, H. (Germany): The scientific long-term basis of implant

The first seven months of the camlog foundation have to be judged as the building phase. To bring this valuable initiative of the CAMLOG group to life, the most important task was to establish a communication infrastructure. The tools available today are the website with its intranet, reserved for the growing group of specially registered users. For the time being, the scientific content of the website mainly consists of original studies, which have been published before in print or have been presented at congresses. A newsletter and an infoMail have been created in addition. The newsletter called **camlog foundation QUARTERLY** will be sent out by e-mail four times a year to all our almost 600 members, informing them about organisational and scientific topics. The newsletter can also be downloaded from www.camlogfoundation.org. The infoMail draws the attention of the reader to specific topics, e.g. a local congress, a new project of the camlog foundation, etc.

To become more service-oriented, many projects are in the pipeline:

- » an electronic bibliography of publications interesting for CAMLOG users
- » the invitation and coaching of a first camlog foundation guest
- » educational offers.

Have we so far fulfilled your expectations? Every feedback helping us to better live up to your expectations and interests is highly welcome! I wish you interesting reading.

Rolf Ewers, MD, DMD, PhD
Chairman of the Board of Directors
of the camlog foundation

length and number.

3. Fugazotto, P. (USA): Long versus short implants: new horizons.
4. Renouard, F. (France): Optimal number and distribution of implants.
5. Sennerby, L. (Sweden): Scientific basis and clinical value of stability measurements of dental implants.

Based on these lectures and the subsequent discussions, the following statements can be formulated:

1. The clinical use of short/wide implants led to a higher failure rate than placing standard-length implants functioning as abutments for dentures. In this context, «short implant» means a device with a designed intraosseous length of 8 mm or less; «wide implant» can be defined as an implant with a diameter of 4.5 mm or more, «narrow implant» as one of 3.5 mm or less. For ensuring the correct biological requirements for long-term success in the case of a «standard-length/width» implant, advanced surgical protocols should be followed. [Comment by Prof Fazekas: The results of 'Akca et al.: Biomechanical aspects of initial intraosseous stability and implant design: a quantitative morphometric analysis. Clin. Oral Impl Res. 17, 2006, 465-472', suggest that the micro morphology of bone around differently designed implants has a larger impact than the implant design itself, especially on the insertion torque value, but to some extent also on the implant stability quotient. This means that according to scientifically-based statements, the available bone quality and quantity are the significant
2. Under the subtitle of the report «Indication for immediate loading of implants and clinical success», immediate loading was defined as «implants placed in occlusion within 72 hours after insertion and functioning as abutments for dentures. Success assessment was only carried out in cases with a follow-up of denture-wearing of one year or longer. The vast majority of scientifically-based systemic reviews of conventionally loaded implants show that immediate loading has not reached the same degree of predictability. There is a lack of evidence for specific risk factors in immediate loading.
3. Under the subtitle «Influence of forces on periimplant bone», it was emphasized that, in scientifically-based clinical studies, it is difficult to discover a possible correlation between occlusal forces and marginal bone loss [Comment by Prof Fazekas: similarly to natural teeth) or implant failures. In the scientific literature, no data can be found proving that in any clinical case the occlusal forces were associated with loss of an oral implant; a causal connection between occlusal overloading and implant loss has never been convincingly presented. Only one animal experimental study shows that excessive occlusal load can cause complete loss of osseointegration. According to animal experiments, the «mild overload»
4. Subtitle «Validity and clinical significance of biomechanical testing of the implant/bone interface»; Biomechanical testing of the implant/bone interface is extensively used in clinical trials and is often recommended for clinical use. Two widely suggested methods, RFA (Resonance Frequency Analysis) and PTV (Periotest Values), have been looked into only in a limited number of studies comprising accurate details in terms of reproducibility and prognostic value. RFA, PTV and insertion torque measurements have been recommended to assess implant stability. While insertion torque measurements only assess conditions at the time of implant placement, RFA and PTV may be used for monitoring implants over time. Insertion torque measurements are considered destructive tests intended for research purposes. RFA and PTV measurements are proposed to reflect the nature of the implant/bone interface. The biological variables that are assessed in connection with these methods have not yet been defined, however.

range of 100 to 300 microstrain – microstrain means the procentual bone deformation when loading; 0.1 to 0.2 kg/mm² correspond to 50 to 100 microstrain – may lead to a physiologically positive response of bone around the implant, while in case of an overload of more than 3,000 microstrain (12 kg/mm²), fatigue fracture and bone resorption will result.

«Implantology – Revolution or Evolution?»

19th Annual Congress of the German Association for Implantology (DGI), Dresden, Nov 30th through Dec 2nd, 2006

DR MED. HABIL. LUTZ TISCHENDORF

Under Prof Dhom, who presided over the Congress, a new structure was introduced. The Practice and Science Forum was held in the large hall and the forums on science, ceramics, dental technology, assistance and care took place in adjoining rooms. Over 2,100 persons participated in the Congress, among them 100 dental technicians and 100 dental nurses. The DGI Congress was opened by honouring Prof Donath with the DGI merit medal and by making Prof Tetsch an honorary member of the DGI. At the general meeting, the members confirmed the leadership of the management team by electing Prof Dhom as President and Prof Terheyden as Vice President of the DGI.

In summarizing lectures, renowned implantologists from dental practices and universities informed the large audience about solutions of problems at the bony implant bed and about aesthetic and periodontal aspects. In a new approach, a team of dentists and dental technicians jointly introduced problem solutions. For example, Prof Wichmann and Dental Technician Bergler on immediate care with high-quality demands in Germany, Dr Cacaci and Dental Technician Lotz on future-oriented solutions in geriatrics with conversion possibilities from fixed to removable dentures, that are easier to care for, Dr Dieterich and Dental Technician Dieterich on temporary solutions. Dr Schlee moderated a discus-

sion on alternative therapy-planning in individual cases.

Eleven lecturers from dental practices competed for the Congress's award. The subjects ranged from immediate loading in the edentulous maxilla to the analysis of patient expectations. Contributions by Dr Kreusser and Dr Jacobs on socket preservation and on implants with an extended platform in sinus floor elevations were outstanding. Dr Luckey from Hanover received the award. He reported on 304 navigated implant insertions.

There was a greater number of presentations competing for the Congress award from universities. Work groups from Freiburg and Kiel reported on osteoprogenitor cells, mesenchymal stem cells and cultivated osteoblasts with bone replacement materials in sinus floor elevations. Lectures on implant surfaces came from Göttingen and Dresden. Several studies were dedicated to immediate implant loading. Associate Prof Nkenke demonstrated that no reliable criteria for immediate loading indications are yet available. Prof Niedermeier presented new possible reasons for early implant losses, e.g., the fact that allergic reactions to nickel parts could play a role. According to Prof Richter, two implants are not sufficient to stabilize upper palate-free dental prostheses. The overall presentation was completed by studies on implant systems and based on dif-

ferent augmentation procedures. Prof Graf from Leipzig found in implants with identical healing behaviour two completely different bone cell proliferation patterns, which might indicate potentially different osseointegration processes. The Congress award was given to a work group from Mainz led by Dr Klein. This group presented in the micro CT three-dimensional position relationships of particles from bone replacement materials, allowing the conclusion of an optimized vessel intrusion.

Prof Becker gave an overview of controlled bone regeneration. Long durability of collagen membranes seems less likely to be reached through chemical modifications but rather through multi-layer technology application. Presently, Prof Watzek is investigating into a paste-like compound in internal sinus floor elevation. Prof Haßfeld, Associate Prof Nkenke, and Associate Prof Luthart lectured on CT- and CAD/CAM-supported care. This could reduce implant insertion invasivity. However, cost/benefit analyses are not available. Prof Kohal described ceramic implants available on the market as «banana products» with (presumably) high failure rates. Prof Mericske-Stern and Prof Haas discussed immediate loading in the toothless maxilla and in patients with periodontal diseases. According to Prof Mombelli, the peri-implantitis therapy usually presents many problems. 24 posters participated in the competition. Of

interest were posters from Bonn for the determination of oxygen supply to peri-implantary tissues. A poster from Prof Bourauel on the course of the bone load of immediately loaded implants with clinical findings and with finite element calculations received the Congress award.

In a separate forum and in workshops, the Congress sponsors presented their developments. It was possible to contact almost 90 exhibitors.

Reporting through assessments on forums for dental nurses, dental tech-

nicians, and the forum on ceramics should be supplemented. The most important scientific lectures will be published in journals, and the principle lectures will be available on DVDs to be ordered via the DGI homepage (www.dgi-ev.de). The emphasis of the principle lectures on contributions from dental practices was interesting for the majority of the Congress participants. Referring to the Congress topic «Implantology: Revolution or Evolution?», William Becker (USA) stated that scientifically proven developments by Brånemark and Schroeder had indeed been revolutionary for implant

dentistry. Variations based on these findings can rather be attributed to an evolution, which is (too) often dictated by the market and is too rarely scientifically founded.

The selected Congress structure proved its worth. The next practical test will be joint meetings with the Landesverband Bayern from May 3rd through May 5th, 2007 in Munich and with the other German-speaking scientific expert associations from Nov 29th through Dec 1st, 2007 in Vienna.

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