Clinical application of a new systematic implant planning concept: A Clinical Report

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Statement of Problem. Commonly used classification systems do not inform fo dentists the dimension of the available bone at a potential implant site although regarding a variety of morphologic and pathophysiologic aspects using schematic graphs. However, for the implantologist the availability of bone substance is most important independent whether it concerns the jaw basis or the alveolus.

Purpose of Study. The present article refers to a new evaluation form, to analyze the available bone with regard to optional immediate loading site by site. According to a new systematic implant planning concept will be presented in two case reports.

Results. The feasibility of the classification for planning and documentation of immediately loaded implants is presented in two case reports.

Conclusion. The factor of bone support for immediate functional stability is important in dental implantology. The new systematic implant planning helps to systematically estimate the dimension (ASCIi classification) of the alveolus site by site to evaluate the possibility of immediate loading. The Göttingen classification thus aids to determine the degree of stability that can be expected for the planned solution.

Key Words :
Available bone, systematic implant planning, ASCIi-classification

The treatment with endossleous implants requires an accurate preoperative planning. It must contain substantial information about the findings concerned, in order to permit a meaningful documentation and communication between the dentists participating in the treatment.

Commonly used classification systems do not in form the user about the dimension of the available bone at a potential implant site although regarding a variety of morphologic and pathophysiologic aspects using schematic graphs. However, for the implantologist the availability of bone substance is most important independent whether it concerns the jaw basis or the alveolus.

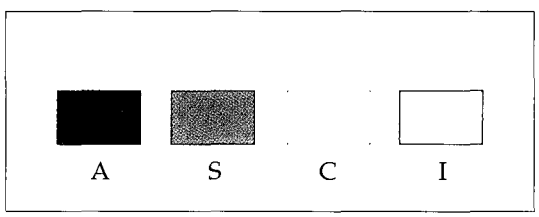
The distinction between basal bones and resting alveolus is of limited interest for individual case treatment and plays a minor role for the positioning of implant. More recently Misch published a 4 lev-

el classification of the bone dimension of the alveolus.[1] Generally some problems results for the classification after Misch because different aspects are summarized in individual categories, which make an application more difficult in practice.[2] The available classifications of alveolar atrophy due to their vagueness on one hand and due to unnecessary and differentiation between alveolus and basal bone do not meet sufficiently the needs of the daily clinical application for treatment planning.

The present article refers to a new evaluation form, to analyze the available bone with regard to optional immediate loading site by site. According to a new systematic implant planning concept will be presented in two case reports.

ANATOMICAL SITE EVALUATION FOR OPTIONAL IMMEDIATE LOADING

The available classifications of alveolar atrophy due to their vagueness on the hand and due to differentiation between alveolus and basal bone on the other hand do not meet sufficiently the needs of the daily clinical application for treatment planning. The new systematic implant planning concept developed a classification to differentiate the alveolar bone at the implant site based on the assumption that only cortical aspect of alveolar bone serve as stabilizing element for immediate loading: The bone site for a normal screw-type implant (diameter 3.75 mm) is represented as a column with a base of 5 by 5mm according to Misch,1 and with variable height.



A = abundant, >20 mm
S = sufficient, >15 mm
C = critical, >10 mm
I = insufficient, <10 mm

Fig. 1. Color Code of ASCIi-system.

Using the ASCIi classification system according to Engelke, 3 the bone height is divided site by site into four classes (Fig. 1).

The subcrestal width is judged to be insufficient i if it is smaller than 5 mm at a 5 mm subcrestal level. The i is added to each of the classes when detected.

The classification can be used at the time of implant planning, during surgery or during postoperative CT-scan controls. With the bone structure score as guideline we can determine it a foreseen implant site may be adequate for immediate loading from surgical point of view and how to achieve sufficient stability.

CASE REPORT 1

A 47 year-old female patient asked for an immediately loaded prosthesis after a series of unsuccessful conventional treatments with removable full dentures. The case history showed a central motoneuronal disorder after methanol-intoxication at the age of 24. The coordination of her perioral and lingual muscles was disabled and could not stabilize the denture sufficiently during mastication. The initial clinical situation is shown in Fig. 2, 3. The G ttingen implant dental examination form is shown in Fig. 4, the bone classification according to the ASCIi scheme showed class Si throughout the right interforaminal region. We planned a total of 4 implants (Frialoc titanium screw implants) in the interforaminal region. The structural evaluation of the sites 44, 42, 32 and 34 with the help of multiplanar CT reconstructions showed a sufficient cortical layers at the crestal and apicobasal aspects of all sites. The implants positions were chosen to allow the placement of

three connecting bars with equal distances between the implants. 4 Frialocs (4.0 × 15 mm) were inserted (Fig. 5) and impression copings were inserted and wound closure was performed (Fig. 6). In the prothetic department (led by Prof. Dr. Dr. A.H ls), an impression with polyether (Impregum) impression material was taken with help of an individual tray made before surgery. The patient received only analgetic medication (paracetamol, 500mg every 6 hours) and was advised of continuous external cooling of the region operated. The following day she received

Fig. 2. Pretreatment of intraoral view.

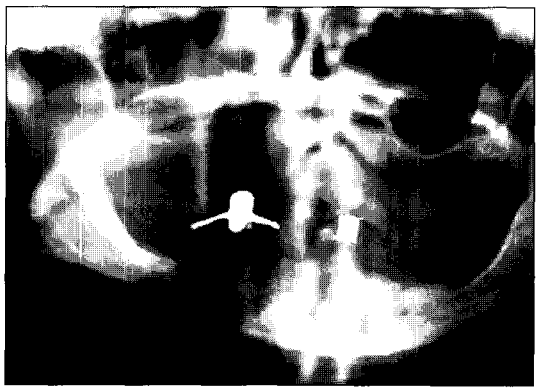


Fig. 3. Pretreatment panoramic radiograph of edentulous arches.

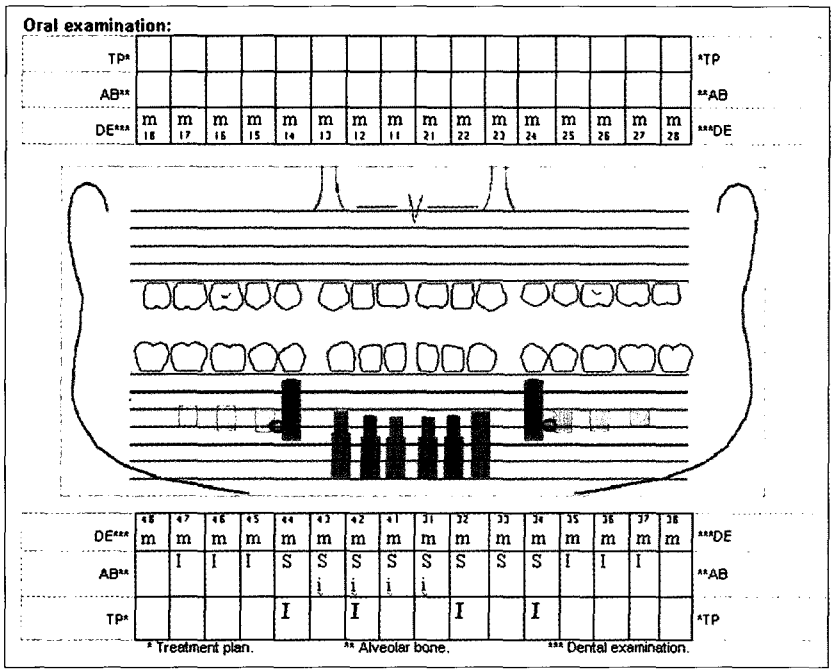


Fig. 4. Preimplantologic diagnostics summarized Implant Consultation Form: Sufficient bone height and insufficient width (Si) in the interforaminal region, insufficient sites in the posteror regions. In the dental schema, every column represents an anatomic site examined for implantation. Green columns represent sufficient bone height.

Fig. 5. Frialoc implants in situ after augmentantion with autogeneous bone graft obtained from the crestal aspect of the anterior mandible.

Fig. 6. Implants with impression copings immediately after wound closure.

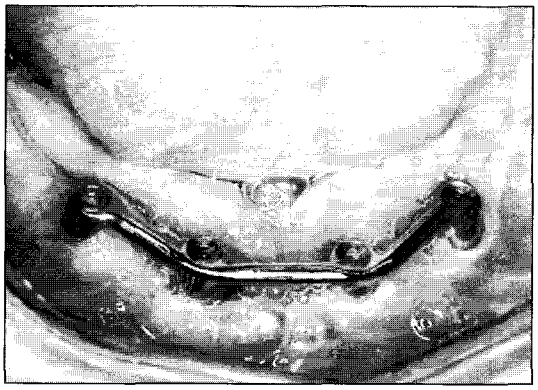


Fig. 7. Clinical situation 2 weeks after surgery with three rounded bars in situ, normal mucosal attachment.

Fig. 8. Immediate loaded bar-retained mandibular denture, base with three clip retentions.

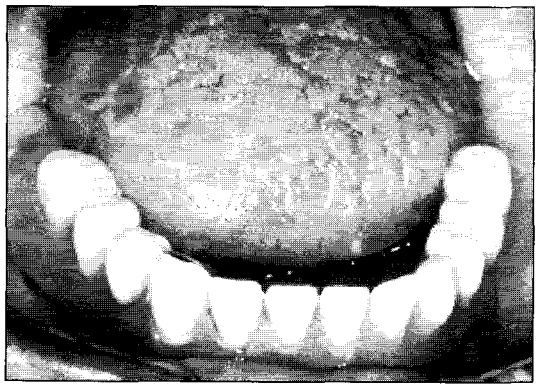


Fig. 9. Intraoral view of the overdenture in situ.

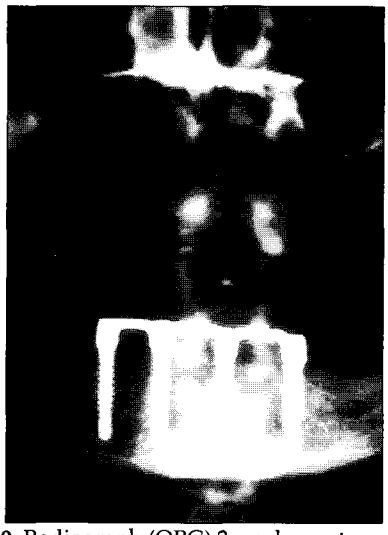


Fig. 10. Radiograph (OPG) 2 weeks post-operatively.

her mandibular prosthesis retained with 3 clips on prefabricated rounded bars attached by screws to the four implants (Fig. 7~10). Healing was uneventful. The sutures were removed one week postoperatively. Controls of occlusion and were carried out every 4 weeks.

CASE REPORT 2

Patient 2, male, aged 54, without general diseases asked for complete fixed upper archs reconstruction due to professional reason.

The dental examination revealed an edentulous maxillary arch with moderate atrophy and a partielly edentulous mandibular alveolar with

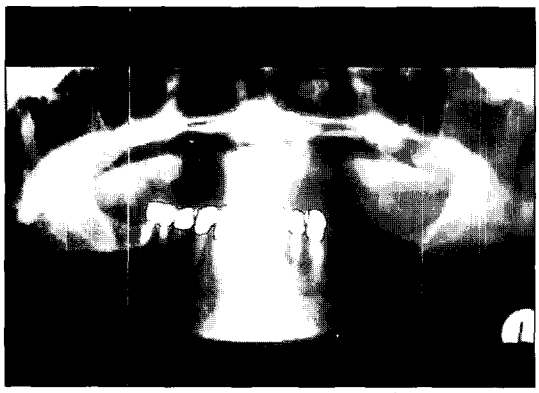


Fig. 11. Pretreatment panoramic radiograph of edentulous arches of upper.

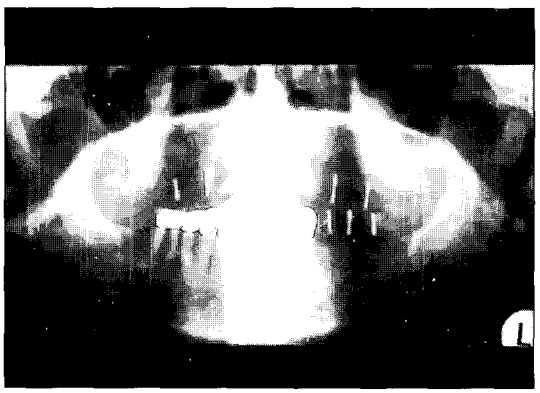


Fig. 12. Preoperative panoramic radiograph with surgical guides.

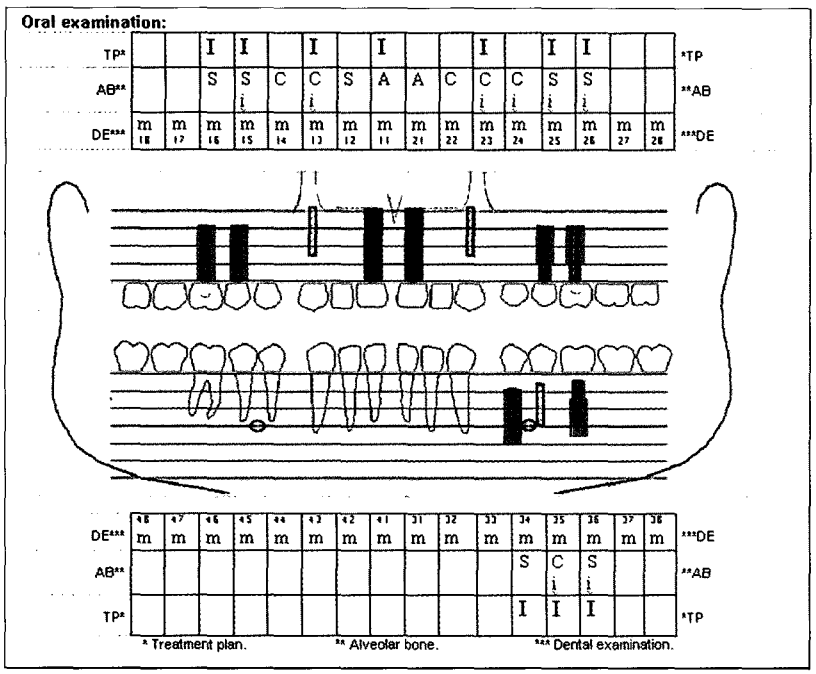


Fig. 13. Preimplantologic diagnostics summarized Implant Consultation Form: Abundant bone height and width (A) in the region 11 and 21, sufficient height and insufficient width (Si) site in the maxilla posterior region, sufficient sites in the mandibular left posterior region.

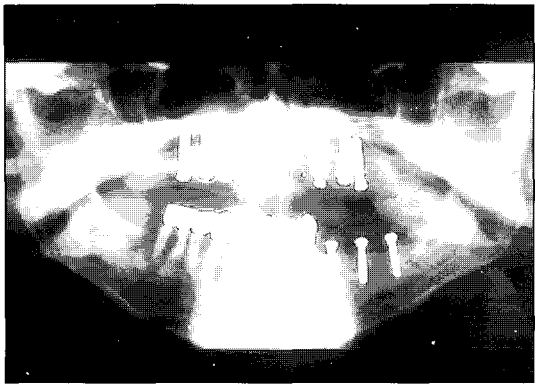


Fig. 14. Panoramic radiograph following placement of ITI implants in the maxilla and the mandible.

Fig. 15. Healing cap in place.

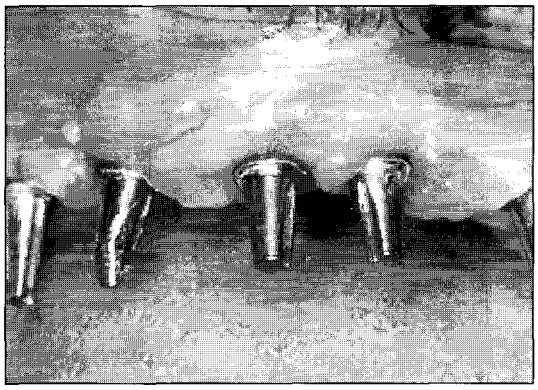


Fig. 16. Status after abutment placement.

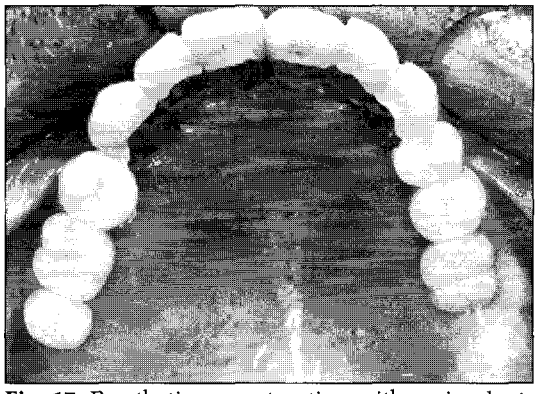


Fig. 17. Prosthetic reconstruction with an implant-supported fixed complete arch pros.

Fig. 18. Frontal view of metal-ceramic bridges.

sufficient transverse dimension of the potential impflant sites (Fig. 11, 12). The results of dental and the radiographic examination to the ASCIi-System as well as primary implant treatment plan are shown in Fig. 13.

A total of 8 maxillary and 3 mandibular implants (ITI, Straumann, Switzerland), diameter 4.0 mm, length 12~14 mm are inserted (Fig. 14). After 4 months healing time, all implants are exposed (Fig. 15, 16) and a fixed metal-ceramic bridges was interpreted by the prosthetic department (led by Prof. Dr. Dr. A.H ls). After surgical and prosthodontic immediate treatment, healing was uneventful. Results are shown in Fig. 17. During monthly controls we observed good retention and functional

stability of the prosthesis (Fig. 18).

DISCUSSION

The ASCIi-classification does not regard the difference between the jaw basis and the alveolus, which might be of interest under etiologic criteria of the alveolar reabsorption, but however of minor importance for treatment planning.[4] However, for the implantologist the availability of bone substance is most important independent whether it concerns the jaw basis or the alveolus. Regarding the ASCI classification suggested by Engelke due to geometrical considerations on the one hand and more critical indication on the other hand,[5] modifications in the case of the categories insufficient (I) and critical (C) were necessary. The indication limites exclude now from the beginning extreme cases of high-grade atrophy due to the vertical dimension, even if in an individual case an experienced surgeon could perform an implant insertion in bone sites of this category if necessary with help of extensive surgical means, perfect navigation technique or special implants.

It is necessary that the classification of implant planning contain further radiological-epidemiolo gical investigations, in order to evaluate the specificity and sensitivity of the classification for the needs of implant treatment.

CONCLUSION

The factor of bone support for immediate functional stability is important in dental implantology. The new systematic implant planning helps to systematically estimate the dimension (ASCIi classification) of the alveolus site by site to evaluate the possibility of immediate loading. The G ttingen classification thus aids to determine the degree of stability that can be expected for the planned solution.

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