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Analysis of implant longevity in four types of alveolar augmentation

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Abstract

Purpose Loss of implants is a clinic problem especially in alveoli that have been edentulous for long periods. The combination of various augmentation procedures, with primary or secondary implantations, will improve survival rate. This study intended to correlate the survival rate with individual patients' parameters.

Methods A total of 194 patients who underwent reconstruction of deficient dental alveolar ridges and insertion of endosseous implants were evaluated retrospectively. In addition, 134 patients, who are in a multi-disciplinary clinical recall system, were examined on a clinical and anamnestic level. The correlations between an individual patient's bone situation, the surgical technique and the implant survival, were evaluated statistically.

Results & Discussion We found an overall implant survival rate of 96,8 % in our patients. The best results were obtained in partially edentulous patients by autologous bone grafts in combination with primary implantation. Total alveolar ridge augmentation resulted in the highest implant loss rates, both with primary and secondary implantations. And these were associated with the occurance of a Periimplantitis. Lack of preservation of the soft tissue integrity seems to be the main underlying cause for implant loss.

Introduction

Loss of implants is a clinical problem especially in alveoli that have been edentulous for long periods or bone defects caused by a trauma or as a result of a cancer resection 6. The problem in those cases is a lack of bone in one or even all three dimensions (vertical, horizontal, sagittal).

Due to continuously development in medical knowledge as well as in investigation of new surgical techniques the classical indications for inserting dental implants could be enlarged 2,3,5,7. The combination of various augmentation procedures i. e. sinus lift, total alveolar augmentation, Guided Bone Regeneration (GBR) and local augmentative techniques, with primary or secondary implantation, will improve survival rate 1.

This study intended to correlate the implant survival rate with individual patients' parameters.

Material and Methods

A total of 194 patients who underwent reconstruction of deficient dental alveolar ridges and insertion of endosseous implants were evaluated retrospectively. Out of these 6 patients got in both jaws augmentation, so that there were altogether 200 cases. Moreover, 134 were examined on a clinical and anamnestic level.

Grafts

Transplant donor site was on the one hand autogenous bone from iliac crest bone, chin, retromolar area, implant bed and on the other hand alloplastic material as a non-resrbable barrier membrane and in some cases Hydroxyapatite (HA).

Surgeries

Of the 200 cases, 47 were treated with a total alveolar augmentation and 45 with a sinus lift. The GBR was used in 56 cases and 52 patients were treated with a localized augmentation.

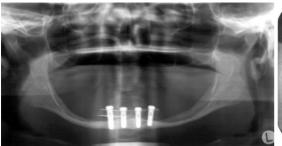




fig. 1: X-ray taken after a total alveolar augmentation

fig. 2: X-ray taken after occurance of a perimplantitis

Implants

A total of 574 implants were placed in the 194 patients. Implants were inserted either simultaneously (primary) with aug- mentation or delayed (secondary) after a healing period of 6 months. In the study we used different implant-systems.

Prosthodontics

After allowing an osseointegration time (6 months maxilla, either 3 or 6 months mandibula) to the implants prosthetic rehabilitation begun. Fixed denture (crown, bridge) was integrated each in 29 %. In 27 % a removable bar-worn total prosthesis and in 15 % a partielly fixed prosthesis was the therapy.

Clinical parameters

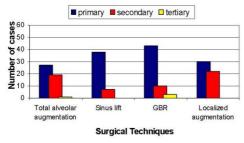
134 patients were clinically examined. Investigations included implant mobility, gingival index, attachment level, inflammation of the mucosa and bone loss. Moreover each patient answered a questionnaire about comfort, function, esthetics and phonation after treatment.

Statistics

The correlation between an individual patient's bone situation, the surgical technique and the implant survival, were evaluated by the Wilcoxon-Test. Additionally, survival analysis according to Kaplan-Meier was examined⁴.

Results

We found an overall implant survival rate of 96,8 % in our patients. The best results were obtained in patients treated with a sinus lift or localized augmenation in combination with an autologous bone graft and primary implantation (fig.1-3).



Number of cases Periimplantitis Implant loss

Number of cases Periimplantitis Implant loss

Total alveolar Sinus lift GBR Localizd augmentation

Surgical Techniques

fig. 3: distribution of implant insertion according to surgeries

fig. 4: correlation between implant-loss and Periimplantitis

Total alveolar ridge augmentation resulted in the highest implant loss rates, both with primary and secondary implantation. And these were associated with the occurance of a Periimplantitis (fig.2+4).

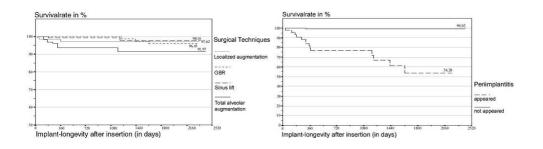


fig. 5: survivalrate according to surgery techniques

fig. 6: survivalrate with occurance of periimplantitis

Within the clinical examination patients with total alveolar augmentation showed slightly worse results for the gingival index, attachment level and mucosal inflammation. Of these cases treat- ment was necessary in two cases. The questionnaire illustrated that this group of patients showed most discomfort with the therapy. Thereby most of all it is not the oral situation for dissatisfaction but the transplant donor site, which is in all cases the anterior iliac crest.

Discussion and Conclusions

The present study shows that augmentation in alveolar defects is a predictable procedure for all kinds of rehabilitation. Nevertheless with regards to the survivalrates when ever possible sinus lift should be preferred to total alveolar augmentation when treating an edentulous maxilla. Localized deficiencies should be augmented without a barrier membrane, or at least not like in our study with a non-resorbable memebrane, because transplant loss or sequestro- tomy occurred mainly in combination with GBR.

The main underlying cause for implant loss seems to be lack of preservation of the soft tissue integrity. But by means of a recall system inflammation can be avoided or treated.

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Analysis of implant longevity in four types of alveolar augmentation

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Loss of implants is a clinical problem especially in alveolar crost positions that have been edentulous for long periods or bone defects caused by a trauma or as a result of a cancer resection. The problem in those cases is a lack of bone in the vertical or horizontal dimension. Due to a continuous development in medical knowledge with improved surgical techniques the classical indications for inserting dental implants could be enlarged ^{25,57}. The combination of various augmentation procedures L. e. sinus lift, total alvolar augmentation, Guided Bone Regeneration (GBR) and local augmentative techniques, with primary or secondary implantation, has shown to improve survival rate. This study intended to correlate the implant survival rate with individual patients' parameters.

Material and Methods

A total of 194 patients who underwent reconstruction of deficient dento-alveolar ridges and insertion of endosseous implants were evaluated etrospeciévely. Out of these, 134 patients were examined and documented well anamnestically and clinically.

Grafts Transplant donor site was autogenous bone from the iliac crest bone, chin, retromolar area and implant bed. Alloplastic material (non-resorbable barrier membranes and Hydroxyapatite (PA)) was also

Surgerlee Of the 194 cases, 42 were treated with a total alvoclar augmentation (fig.1) and 45 with a sinus lift. The GBR was used in 55 cases and 52 patients were rehabilitated with a localized augmentation (lateral alvoclar extension, bone splitting, localized vertical augmenta-



fig. I:X-ray taken after a total alveo-

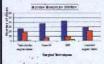


fig.2:X-ray taken after occura

lar sugmentation a perimplantitis implants. A total of 574 implants were piaced in the 194 patients. Implants were inserted either simultaneously (primary) with the augmentation or delayed (secondary) after a healing period of 6 months. A third group (tertiary) included patients with transplant loss who needed a second augmentation and implantation tollowed delayed. Different implant-systems were used in this study. Prosthodorities After allowing an ossistintegration time (6 months maxilla, either 3 or 6 months mandbula) prosthetic rehabilitation was started. Fixed dentures (crowns, bridges) were integrated in 58 % of the patients, in 27 % of the cases a removable bar-worn total prosthesis and in 15 % a partially fixed prosthesis was the therapy. Clinical parameters investigations comprised implant mobility, ginglyal index, attachment level, inflammation of the mucosa (6g.2) and bone loss. Moreover, each patient answered a questionnaire about satisfaction, control, function, esthetics and phonetion after treatment. Statistics The correlation between an individual patient's bone situation, the surgical schenique and the implant survival, was evaluated by the Chil[®] -Test. Additionally, survival analysis was calculated according to Kaplan-Meier 4.

Results

We found an overall implant survival rate of 96,8 % in our patients. The best results were obtained in patients treated with a sinus lift or localized augmentation in combination with an autologous bone graft and primary implantation (fig.3-5).



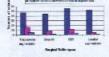


fig.3: Distribution of implant insertion according to surgeries

fig./:Correlation-between implantloss and periimplantiti

Total alveolar ridge augmentation resulted in the highest implant loss rates, both with primary and secondary implantation. This loss rate was associated with a high incidence of a periimplantitis (fig.4+6).



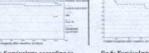


fig 5: Survivalrate according to surgical techniques



fig.6: Survivalrate with occurance of a periimplantitis

Within the clinical examination patients with total alveolar augmentation had the worst results. The evaluation of the questionnaire illustrated that this patient group showed also most disassistation aftereatment. But this referred mostly to the transplant donor site, which was in all cases the iliac crest bone, and not to the oral situation.

The present study demonstrates that augmentation in alveolar defects is a predictable procedure for all lands of rehabilitation. With regards to the survival rate when ever possible sinus lift should be preferred to total alveolar augmentation when treating an edentulous maxilla 19. Localized deliciencies should be augmented without a barrier membrane, or at least not like in our study with a non-resorbation membrane 27, because transplant loss and sequestrotomy occurred mainly in combination with a GBR. The main underlying cause for implant loss seems to be tack of preservation of the soft tissue integrity. But by means of a sufficient recall system inflammation can be avoided or treated 5,

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