Retrospective radiological study of survival and success rate of implants placed in sinus graft performed with particulate DFDBA and platelet concentrates

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Introduction

For implantation in the posterior maxilla area, a sinus lift may be performed using particulate allograft DFDBA and platelet concentrates. Interesting is limited height loss of bone graft with time, in order to maintain a good bone height around implants.

The success and survival rate of implants are defined by several criteria. Among them is peri-implant crestal bone loss with time, which must remain under 1.5 mm after the first year and 0.2 mm per year thereafter to consider success.

Objectives

The aim of our study was to evaluate radiologically the variations in bone heights of maxillary sinus grafts performed using particulate DFDBA and platelet concentrates, as well as success of implants placed in the graft considering peri-implant crestal bone loss and survival rate of the implants placed in the area of the sinus graft.

Material and methods

A radiological retrospective clinical study was conducted. Taking into account the exclusion criteria, we selected 13 patients with a total of 21 sinus-lifts. 37 implants were placed after a period of graft healing between 6 to 9 months.

Protocol of measurements:

- Measures on dental scanner**
For our measurements, we used a dental scan preoperative and another in postoperative at 6 ± 1.35 months, which allowed us to know the residual ridge heights and postoperative height. The measurements were taken every millimeter between the mesial and distal boundaries and an average was made.
- Measures on panoramic radiograph**
On the panoramic radiographs, we measured the bone gain obtained with DFDBA and platelet concentrates and also the bone height loss at 12 and 18 months after the graft. We based our protocol on fixed anatomical landmarks. An orthonorma landmark was created on each radiograph: a straight line corresponding to the x-axis has been drawn between the apex of the two condyles and another corresponding to the y-axis passing through the septum and stopping at the lower part of the mandible. These lines were measured for each radiograph. The upper limit of the graft was highlighted to make it more visible for the measurements. We then divided the upper part of the graft in spaced segments of 2 mm and reported each point on the x-axis represented by the condyles axis. Then we postponed their details on the y-axis on the postoperative panoramic radiograph as a reference. It was therefore possible with a rule of three to replace each point on the following panoramic (12 months, 18 months) in order to measure the bone loss at each point. Because of the deformation due to the panoramic radiographs, calibration was done using fixed anatomic landmarks taken from the available scanners. Thus the actual distance could be calculated by a rule of three. From these data, the average percentage of bone loss at the total height (native bone + graft) has been calculated at a period of 12 months, 18 months.
- Measures of the peri-implant bone loss at implants placed in sinus lift**
Peri-implant bone loss was measured in mesial and distal of each

implant at a period of 6 months after the setting function of the implant and also after a period of 12 months for all patients who presented to their appointment control. The peri-implant bone loss was defined as the distance between the neck of the implant and the bone level in contact with the implant. We were able to determine the distance between two threads and thus to calibrate each radiography with a rule of three.

All the measurements were carried out by two independent operators.

Results

The mean preoperative bone height was 5.89 ± 1.81 mm and the mean postoperative bone height was 14.09 ± 2.72 mm. The mean bone gain was 8.16 ± 2.81 mm (57.26 ± 13.24 %). At 12 months, the mean total bone height was 12.36 ± 2.40 mm and at 18 months, the mean total bone height was 10.49 ± 2.39 mm.

The mean total bone loss of the sinus graft at 12 months was 1.78 ± 1.21 mm ($P < 0.001$) and 2.63 ± 1.11 mm at 18 months ($P < 0.001$). This corresponds to an average percentage of bone resorption at 12 months of 12.74 ± 8.99 % and 20.51 ± 8.82 % at 18 months relative to the total bone height.

The mean peri-implant crestal bone loss at 6 months was 0.78 ± 0.39 mm mesial and 0.91 ± 0.67 mm distal. The mean peri-implant crestal bone loss at 12 months was 1.10 ± 0.31 mm in mesial and 1.28 ± 0.57 mm in distal.

The implant success rate, from a peri-implant crestal bone loss perspective, was 94.44% at 12 months and the survival rate was 97.30% at 12 months.

12 Months	
Survival rate	97,30%
Succes rate from a peri-implant crestal bone loss perspective	94,44%

Conclusions and clinical implications

Although comparison of our results with results gained from other techniques is difficult because of the great variability of surgical protocols and methods of measurements between studies, our results show that the surgical technique using particulate DFDBA and platelet concentrates for sinus lift seems to give good results in terms of bone gain and limited bone loss of the graft over time. In addition, the limited peri-implant crestal bone loss of the implants placed in sinus graft allows us to consider a good success for the implants in sinus graft performed with DFDBA and platelet concentrates.