

A randomized clinical pilot study on the use of deproteinized bovine bone for the treatment of alveolar bone critical size defect secondary to cyst removal. Preliminary results

INTERNATIONAL SYMPOSIUM
OSTEOLOGY
MONACO
MAY 2-4, 2013

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INTRODUCTION

The healing of extensive alveolar bone defects secondary to cysts removal is not predictable. Usually residual voids of various entity persist.

Some Authors have proposed the use of grafting materials to reconstitute the loss of hard tissue.

OBJECTIVES

The aim of this study was to evaluate the effect of the use of deproteinized bovine bone as a filler material of bony defects derived from the excision of maxillary and mandibular cysts having a diameter ≥ 20 mm.

Deproteinized bovine bone was considered effective if subjects treated with the graft material (group 1) showed a lower recurrence and a better healing in terms of volume of bone regrowth at 12 months after surgery, when compared to no treatment (group 2).

Clinical and radiological control (computerized tomography) were considered at baseline (pre-operative) and after 12 months post-operative for both groups.

METHODS

The study was approved by the local ethics committee (protocol 2187P, Azienda Ospedaliera di Padova Ethics Committee, Padova (I) 05th January 2011).

19 patients (10 male and 9 female) requiring the removal of maxillary cyst ≥ 20 mm and showing tolerance to conventional surgical procedure were considered.

Patients were randomly divided into 2 groups according to the type of treatment: the bone defect was filled with granules of deproteinized bovine bone (Group 1); no filling material (Group 2).

Clinical and radiological follow up was performed for every patient. Clinical follow up was scheduled as follows: 7 days, 1, 6 and 12 months after surgery. Radiological follow up consisted of an orthopantomography and a CT scan taken at the baseline (pre-operative) and 12 months after surgery.

A computerized method was adopted to compare the pre-op and the 1 year post-op CT scan: images were acquired in DICOM format and then converted into NIFTI format using the stand-alone program DCM2NII. Using an in-house software, cysts outline in the pre-op CT, and residual radiotransparent areas in the 1 year post-op CT, were manually outlined on single axial layers.

The final volume of each cyst was computed as the sum of the voxel included in the manual segmentation.

In order to evaluate the volume in cm^3 , the result was multiplied by the actual dimension of each voxel: this information was adopted to compare the pre-op and 1 year post-op CT scans, in order to evaluate the degree of bone regeneration in the area where the cyst was removed.

RESULTS

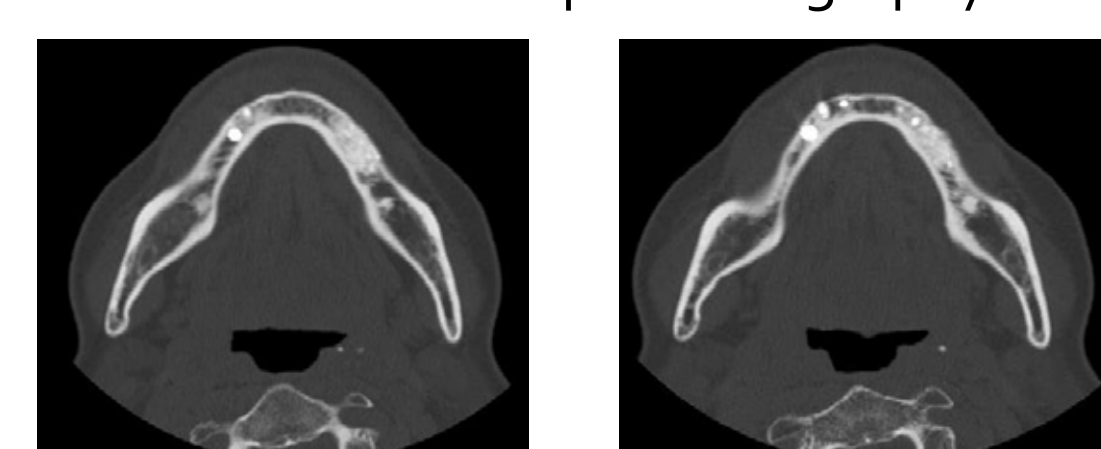
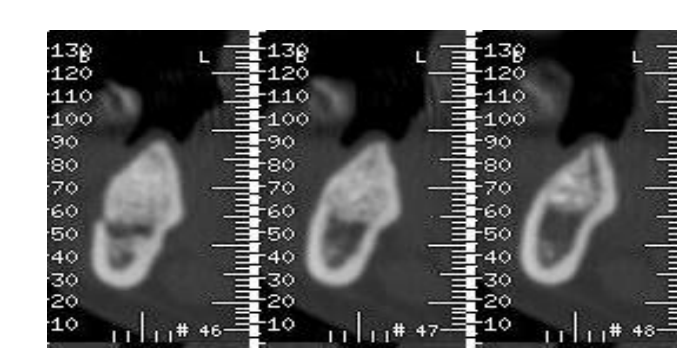
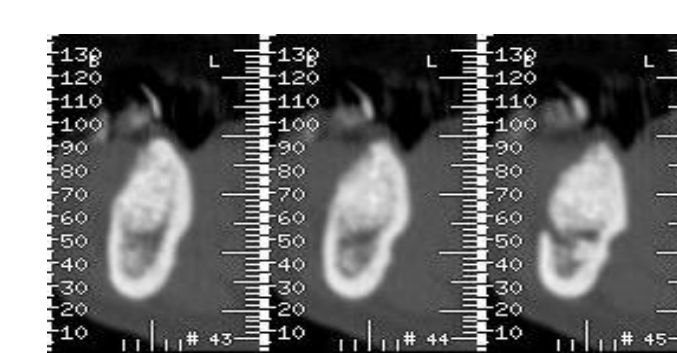
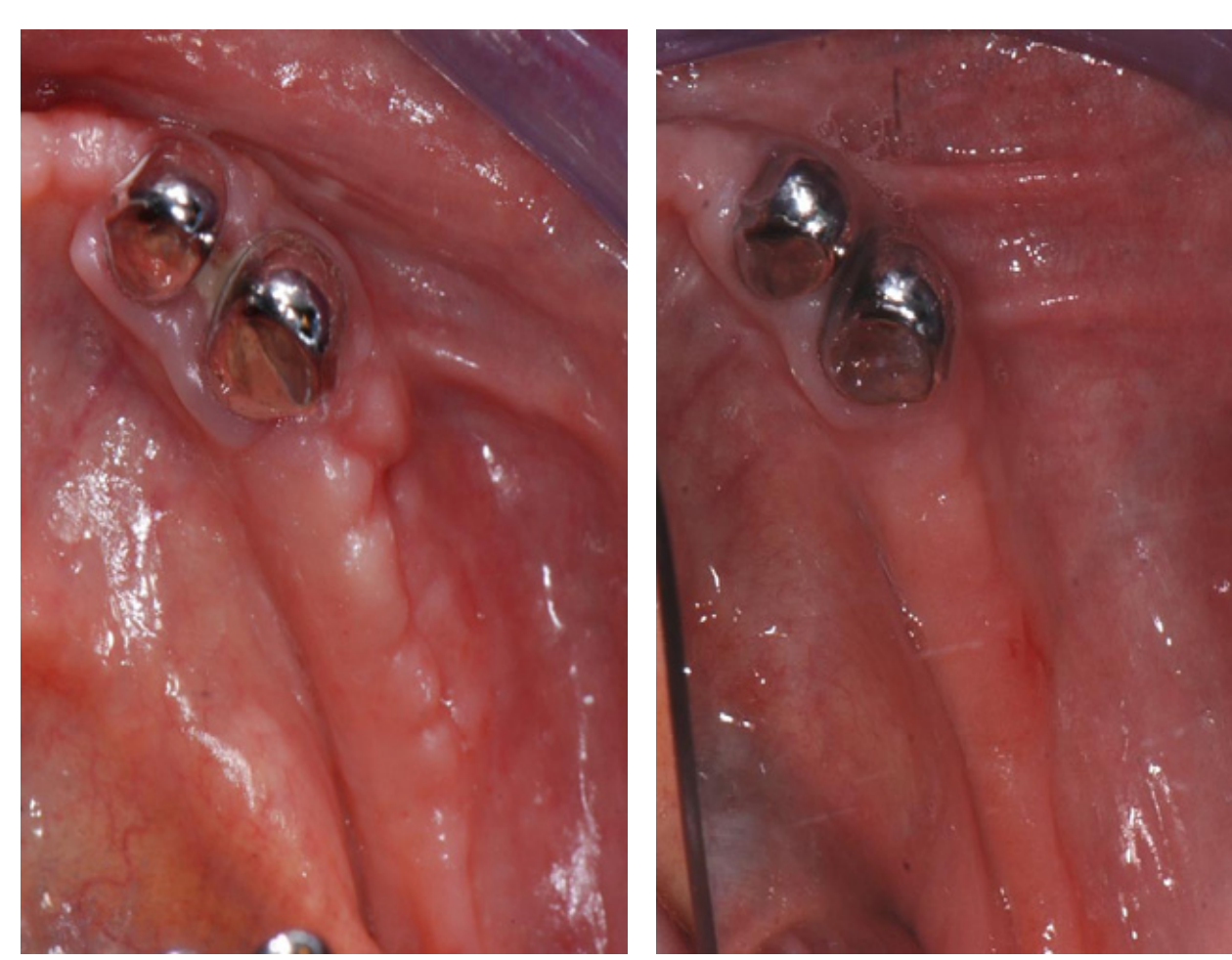
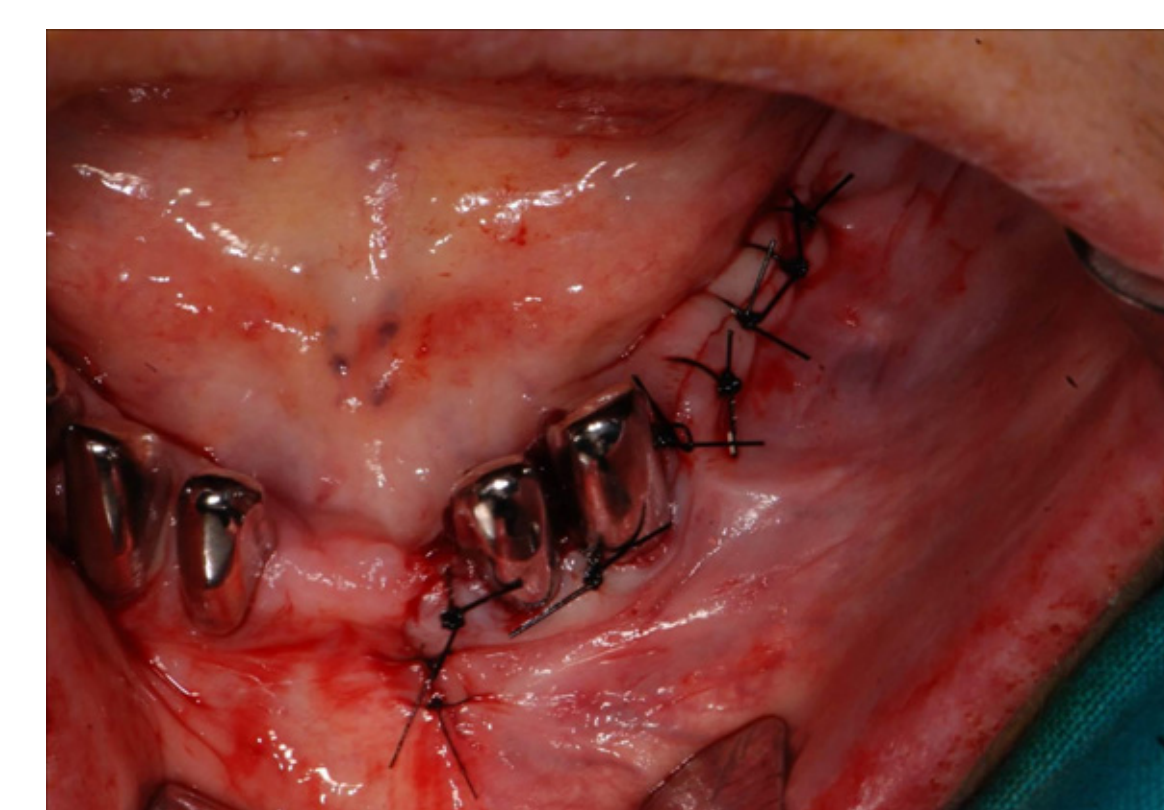
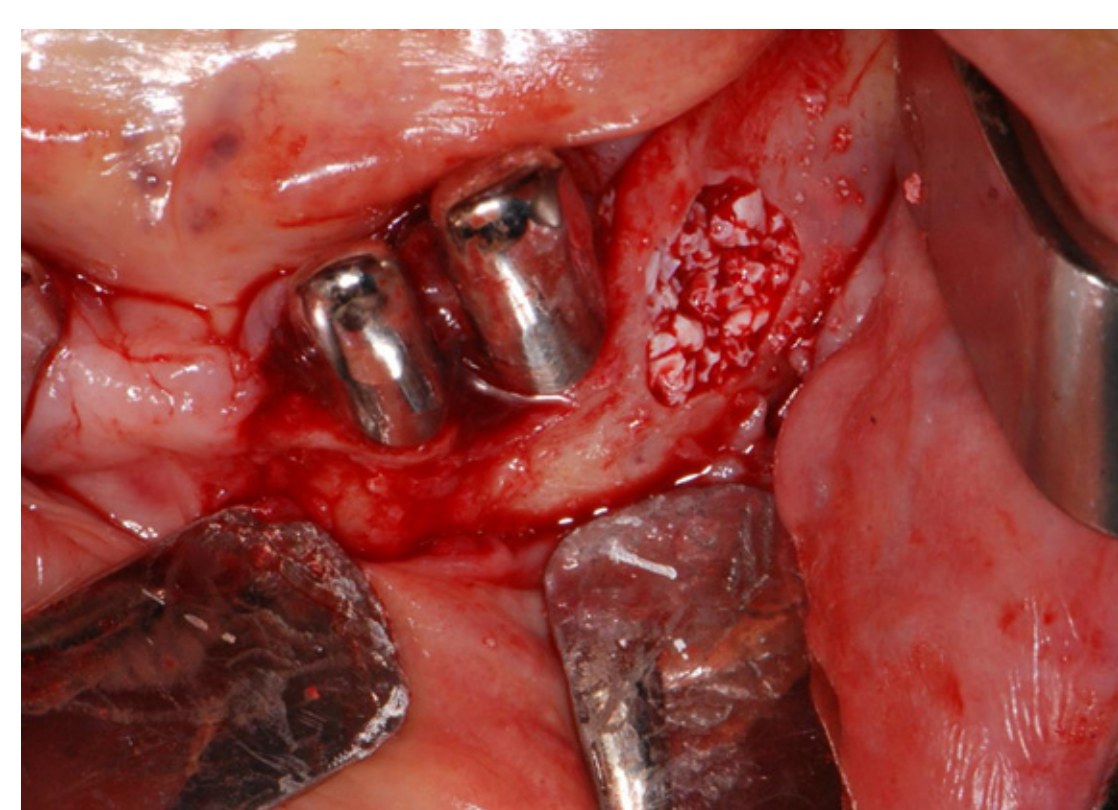
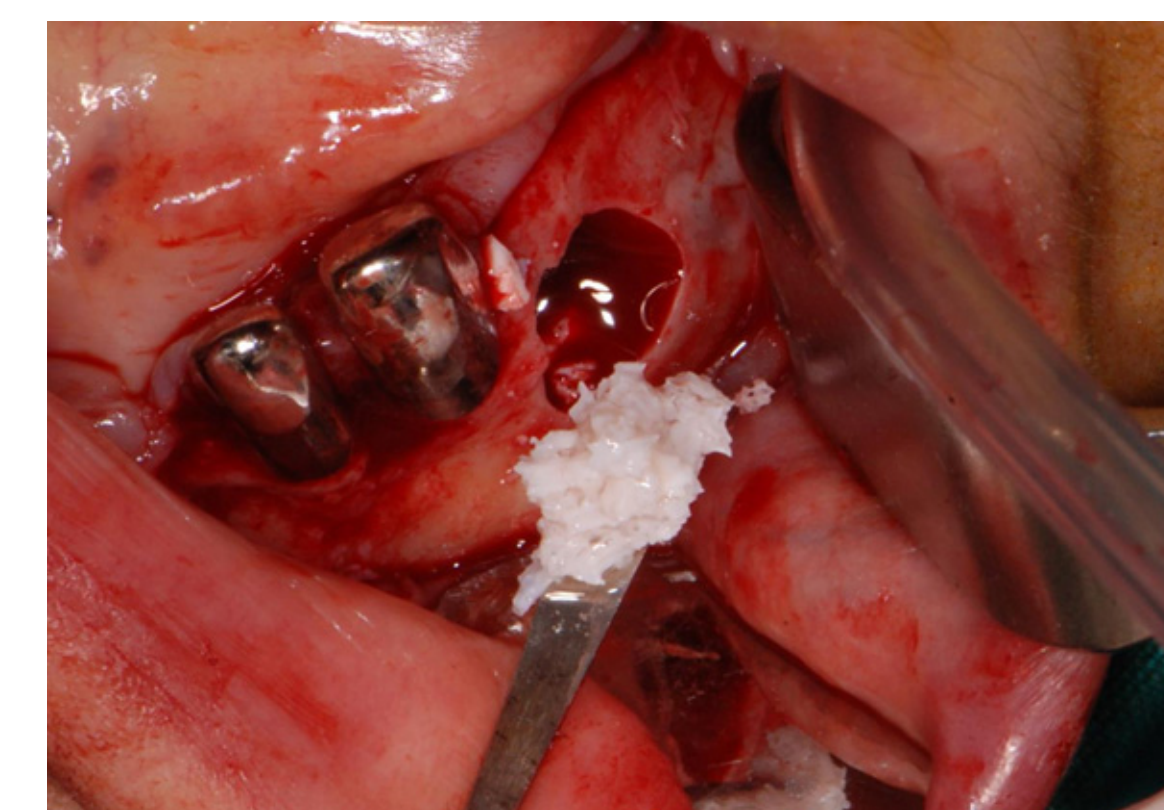
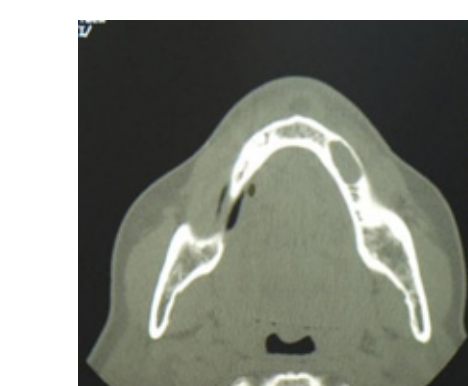
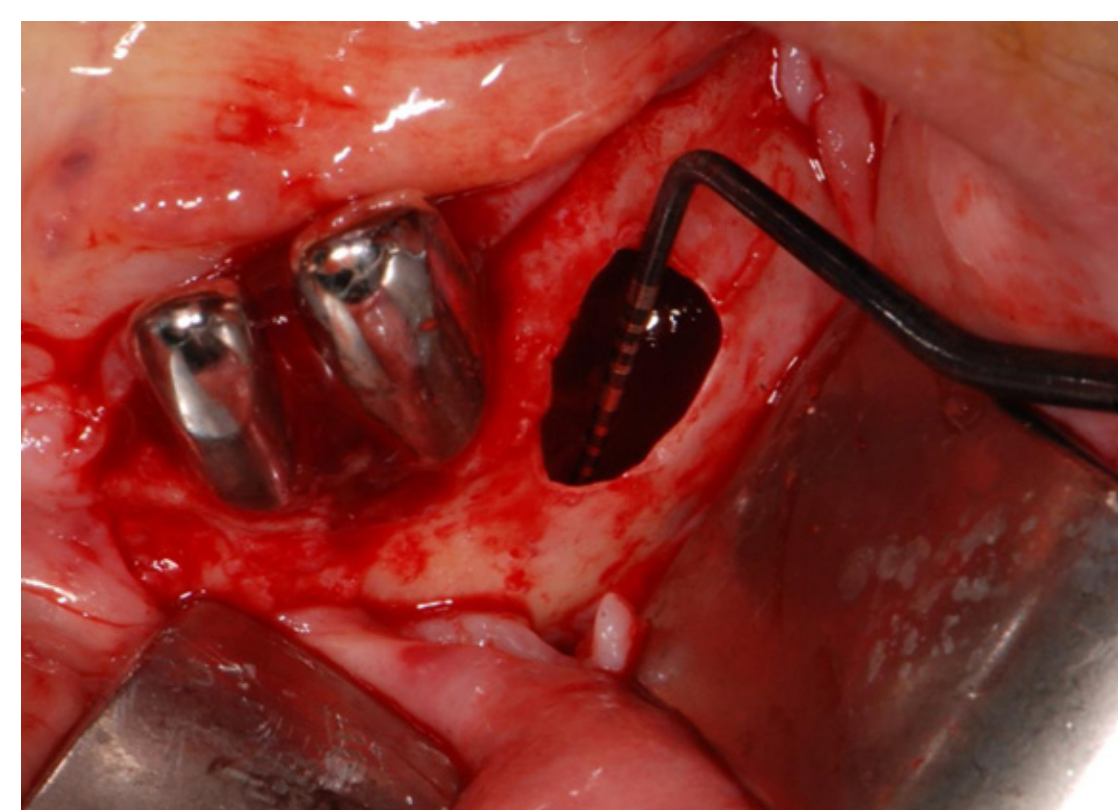
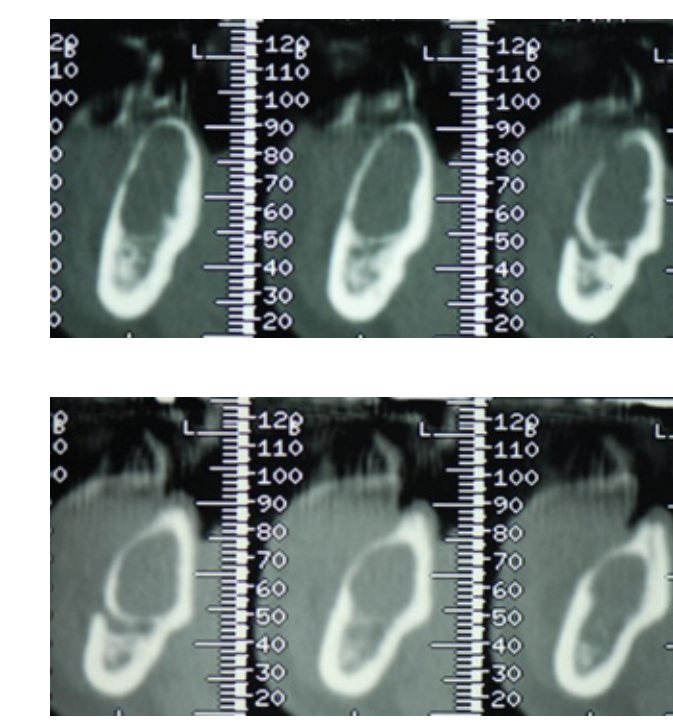
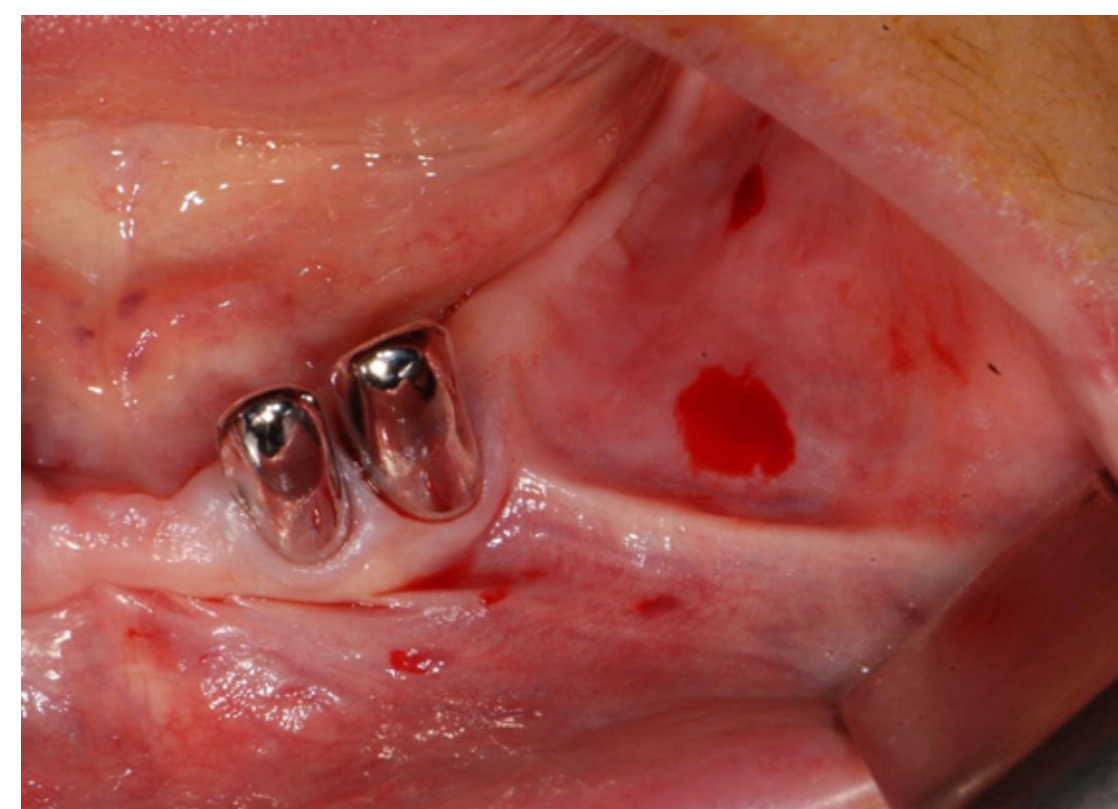
Results are preliminary, since not all the 19 patients enrolled for this study completed the 1-year follow up. 8 patients were considered (5 in Group 1 and 3 in Group 2).

No differences in clinical conditions were observed between the two groups.

The comparison between the pre-operative and post-operative CT revealed that the average volume of residual radiolucency in Group 1 was reduced with respect to Group 2 (2,26% vs 27,87%) showing a difference of 25,61%.

Pre-op CT scan	1 year post-op CT scan	Bone defect reduction	Use of filler material
2334,60 cm^3	1033,78 cm^3	55,72%	NO
2931,50 cm^3	80,109 cm^3	97,27%	NO
1011,28 cm^3	41,472 cm^3	95,9%	NO
964,14 cm^3	39,32 cm^3	95,92%	YES
4117,10 cm^3	2484,55 cm^3	39,65%	NO
2020,35 cm^3	31,203 cm^3	98,46%	YES
1258,10 cm^3	14,4 cm^3	98,86%	YES
1230,94 cm^3	364,274 cm^3	70,41%	NO

1° Case

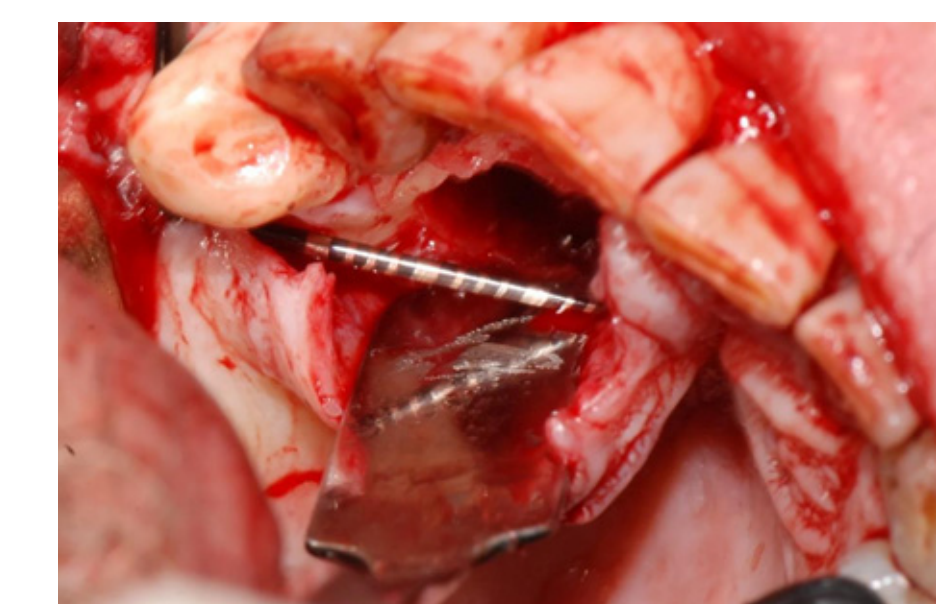
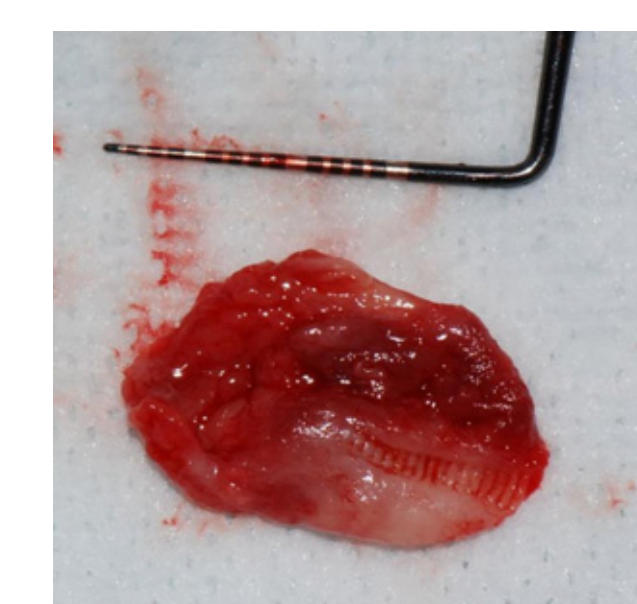
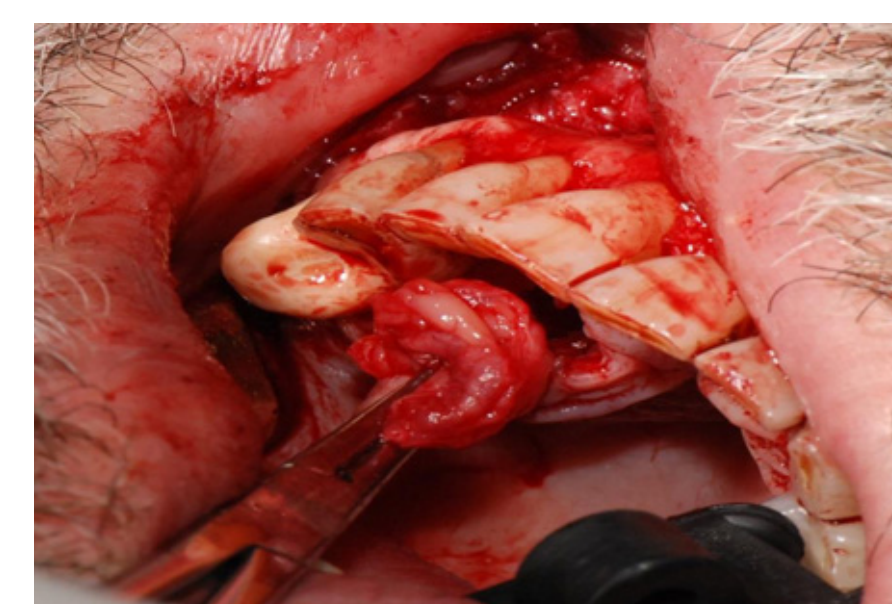


12 months CT axial view

2° Case



12 months CT axial view



CONCLUSIONS

Preliminary results show that the use of deproteinized bovine bone seems to influence positively the healing of alveolar bone critical size defects in humans.

The method used to compare the pre-op and the 1 year post-op CT scans, may be considered as a repeatable one to evaluate the healing of bony defects.

The results of this pilot study may justify future researches with a larger number of patients.

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