META® ADVANCED MEDICAL TECHNOLOGY

Meta Poster

4 th World Congress of Osseointegration, Venice - Italy 14-16 October 2004

CORTICAL BONE HARVESTING FROM JAW BY SURGICAL TUNNEL TECNIQUE: PRELIMINARY RESULTS

Ferdinando D'Avenia, Davide Zaffe*

Private practice, Parma – Italy

**** Department of Anatomy and Histology University of Modena and Reggio Emilia***

BACKGROUND

Autologous bone is still considered the best grafting material for GBR and Sinus Grafting. The main drawback connected to its usage is the need of opening a second surgical site and the consequent post-operative morbidity. This ends up limitating its usage, most of all in minor bone augmentation cases, where the use of bone harvesting sometimes appears unjustified.

PURPOSE

Aim of the present work is to study the morbidity and frequency of complications occurring on the jaws after a minimally invasive tunnel harvesting technique and to analyze the collected cortical bone.

Initial radiography. The advanced periodontal destruction grade requires to postpone the peri-implant augmentation stage with respect to root extraction.

The case two months after extraction. The existence of a horizontal and vertical bone deficit is evident.

The bone convexity is completely absent. The horizontal component of the peri-implant defect is evident.

Tunnel harvesting from external oblique line with Micross (Meta, Reggio Emilia - Italy)

The Micross internal chamber capacity is 0,25 cc. of cortical bone curls mixed with 20% of venous blood.

The implant is placed in the correct vertical position with respect to the periodontal attachment of adjacent teeth.

The bone tissue collected with Micross is placed to fill the defect.

At the second surgery stage, after 6 months, the newly formed bone tissue has completely filled the defect. Note the periodontal tissue coronal migration of teeths 21 and 23, on which no other treatment was performed.

MATERIAL AND METHODS

Ten patients, 4 male and 6 female (aged 22.3 to 68.6 years, average age 46.4 years) received 12 implants in combination with the treatment of a single peri-implant bone defect. Five osteotome sinus elevations, and seven horizontal GBR, with a non resorbable e-PTFE membrane where subsequently performed, using a 100% autogenous cortical bone graft.
A specifically designed bone scraper (Micross – Meta – Reggio Emilia, Italy), provided with an internal chamber, and a suitable surgical tunnel technique was utilized to harvest autologous bone from surgically convenient intraoral sites: external oblique line, palatine cortical plate and maxillary zygomatic process. The donor site was selected with the intention of minimizing the patient's post-operative discomfort. In all cases the amount of cortical bone chips obtained was measured and recorded, as well as the time needed to perform the harvesting phase. In 8 of 10 patients, the graft material (4 maxillary and 4 mandibular) was histologically processed to evaluate the size of bone particles, presence of living osteocytes and calcified/not calcified tissue rate. A 12 months period of follow-up was observed in attempt to evaluate the healing process of the donor sites, the perioperatory temporary complications and the permanent lesions.

Section of bone, harvested by Micross with tunnel technique and embededed in PMMA, stained by Trypan Blue. The analysis of fragments returns a mean length of 800 µm (black arrows) and a mean thickness of 75 µm (red arrows). Field width = 7mm

SEM microradiographs of a section of fragments harvested by Micross and embededed in PMMA. Cortical curl fragments increase the volume of the graft. Field width = 3.37 mm

SEM microradiographs of a cortical fragment harvested from external oblique line of the mandible with tunnel technique. Field width = 5mm

SEM microradiographs of a section of a cortical fragment harvested by Micross . Note the several osteocyte lacunae (red arrows) and the thickness of the fragment. Field width = 480 µm

SEM microradiographs of superficial osteocyte residues of a bone fragment, inside their lacuna. (white arrows) Field width = 60 µm.

Section of bone, harvested by Micross with tunnel technique and embededed in PMMA, stained by toluidine blue. Note as the osteocytes of the fragment display a living, well-preserved morphology (black arrows). Field width = 397 µm.

RESULTS

The collected bone fragments had a mean size of 800 µm (length) and 75 µm (thickness). All samples showed bone fragments surrounded by little soft tissue: the calcified fraction exceeds 80%. Almost all bone fragments displayed well-preserved living osteocytes inside.
All the patients showed very few post-operative symptoms, limited to a slight swelling comparable to a tooth extraction and completely solved within one week. No hematoma or infection were detected in the post-operative period nor permanent lesions where present at the 12-months recall visit. In all cases it was possible to harvest the necessary amount of cortical bone for the ideal grafting of the implant site. All grafted sites perfectly healed and the implant treatment was successfully completed according to the Albrektsson criteria.

TUNNEL HARVESTING TIME

Donor site	Range
External oblique line*	11-13 min
Palatine cortical plate**	
Zygomatic process**	5-7 min

(*) Secondary site for tunnel harvesting different from the grafting site
(**) Sites for tunnel harvesting, performed extending the periosteal elevation of the donor site access flap

CONCLUSIONS

The results of this study seem to highlight that, in minor bone augmentation procedures, such as horizontal GBR, osteotome sinus lift and extraction sockets grafting, our tunnel harvesting technique may provide vital autogenous bone grafts in optimal quantity and with a minimal post-operative discomfort for the patient. This is probably due to the absence of flap elevation and the consequent limited operating time to complete the harvesting procedure.

META® ADVANCED MEDICAL TECHNOLOGY

C.G.M. S.p.A.
DIVISIONE MEDICALE META
Via E. Villa, 7 -42100 Reggio Emilia - ITALY - Tel.: +39 0522.50.23.11 - Fax: +39 0522.50.23.33
www.metahosp.com