Immediate, Rapid and In-office Tooth Osteoplant(TOP) Method; Clinical Evaluation

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Introduction: Demineralized dentin matrix(DDM) had better performance for bone induction than calcified dentin after implantation. Dentin after the decalcification are composed of predominantly type I collagen (95%) and the remaining as noncollagenous proteins(NCPs) including small amount of growth factors such as endogenous BMPs, dentin matrix protein(DMP) and dentin phosphophoryn(DPP). The bone inducing activity of rhBMP-2 is enhanced by DPP as a co-factor of rhBMP-2 in vivo. So, the demineralized treatment for dentin increased their osteoinductivity, and decreased their antigenesity.

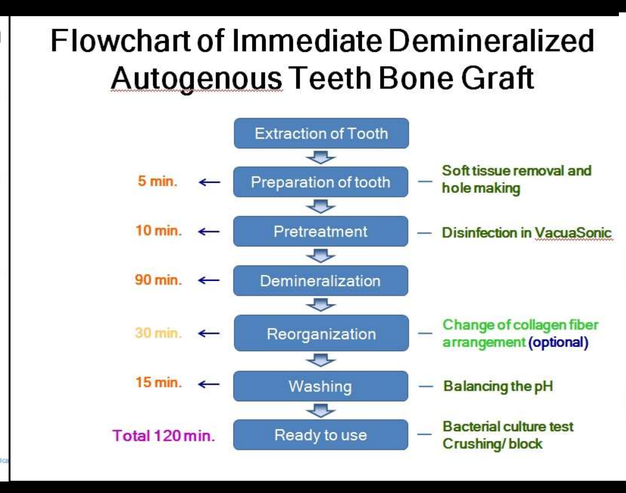
The ability of demineralized dentin to induce bone formation is well established, but a conventional decalcification method takes time and long treatment period may induce negative effects to various osteogenic proteins in dentin.

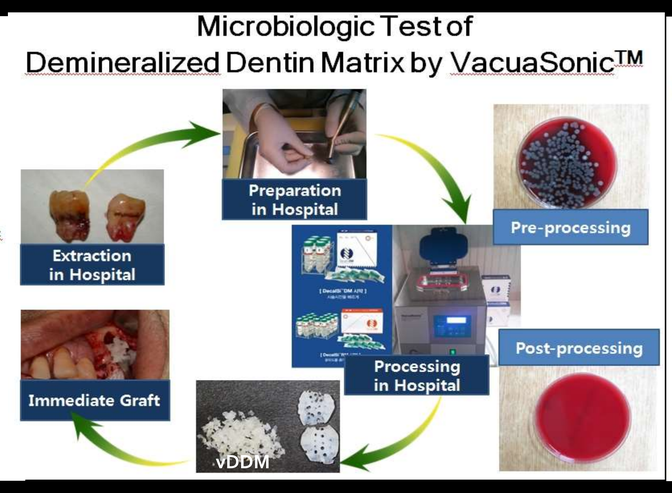
- *Higher temperatures, higher concentration, and most organic acids extract variable quantities of the organic components of bone matrix and destroy BMPs.*
- *Implantation of bone demineralized by nitrous or nitric acid(HNO_2, HNO_3) produced no bone.*
- *The decrease in the capacity of demineralized dentin to induce bone formation with increasing dosed of irradiation, etc.*

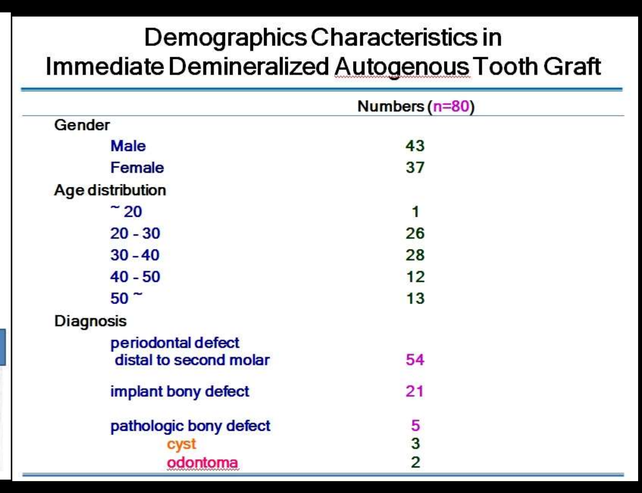
Purpose: Based on previous studies, we focused on the **short processing time** with vacuum-ultrasonic machine **in dental clinic** only for single day surgery. Authors observed the characteristics of newly processed dentin material, which could be grafted into the removal defects immediately after extraction. The aim of this study was to develop immediate, rapid and in-office tooth osteoplant method.

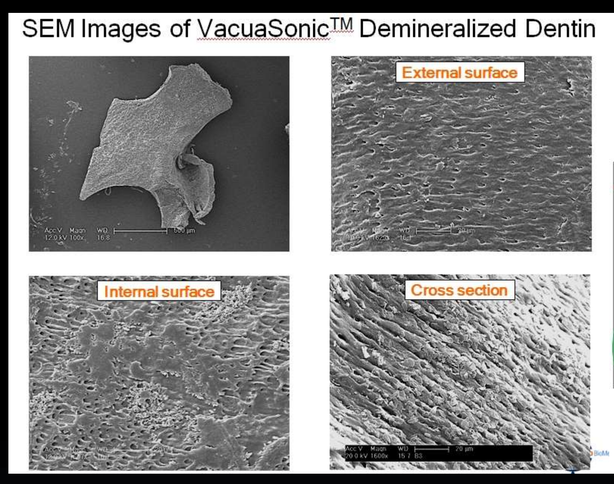
Methods: The present new methods are two types that the extracted teeth with soft tissue trimming and hole formation were demineralized in 0.6 N HCl for 70-90minutes by vacuum-ultrasonic accelerator with heat controlled(**vDDM**) and the processed DDM(vDDM) was treated with several solvents(RM) using same machine(Reorganized Dentin matrix, **RDM**). We also tried other various teeth processing methods such as change of HCl concentration and conventional method for expression of NCPs in western blot. The characteristics of the vDDM were evaluated by the scanning electron microscope features(SEM) and energy dispersive x-ray spectroscopy(EDS). Eighty patients of odontoma, dentigerous cyst, impacted third molar, and apical periodontitis were selected for clinical evaluation. Vacuum-ultrasonic accelerator (VacuaSonic™) was used to prepare the hard tissue and demineralized dentins(vDDM) were grafted the defect immediately.

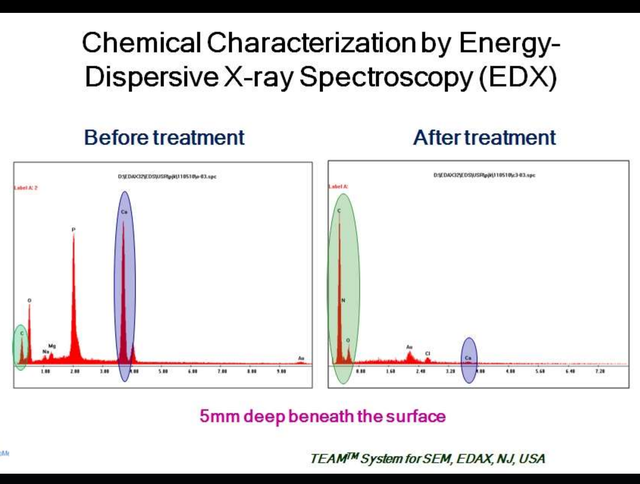
Results: We observed uniform decalicification in rapidly processed teeth(vDDM) in SEM and EDS. Analysis of the processed materials(RDM) by SDS-PAGE revealed a general increased in proteins. Following dialysis of RDM, it was considered that NCPs are preserved in vDDM of new method. Histological findings of immediate processed dentin matrix(vDDM) after implantation were observed a new bone formation in the clinical cases. Active bone formation occurred between vDDM. Clinical cases did not show any adverse response and the healing was favorable at lease over 3 months.

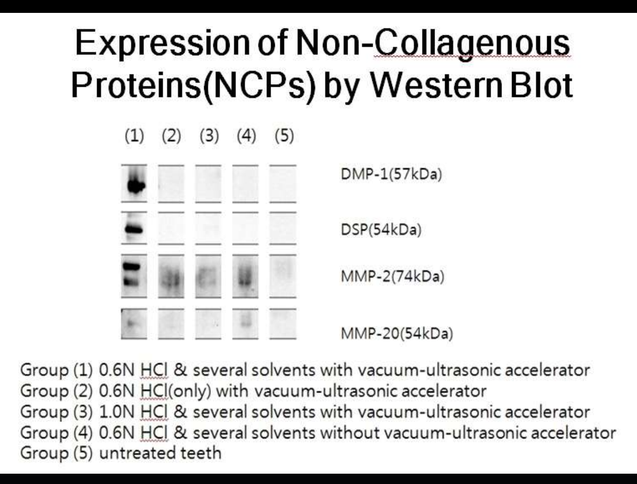


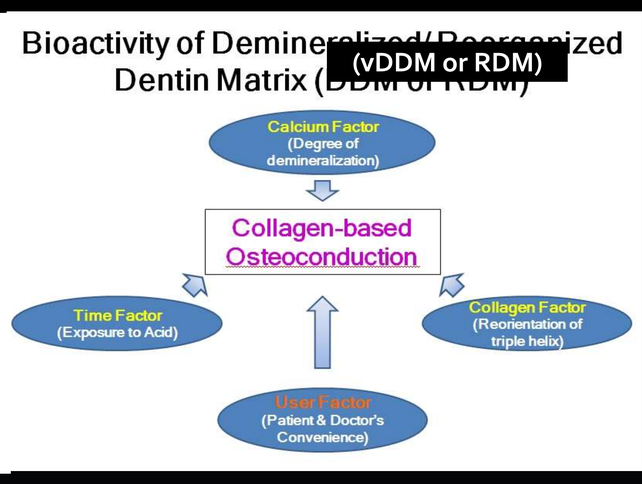






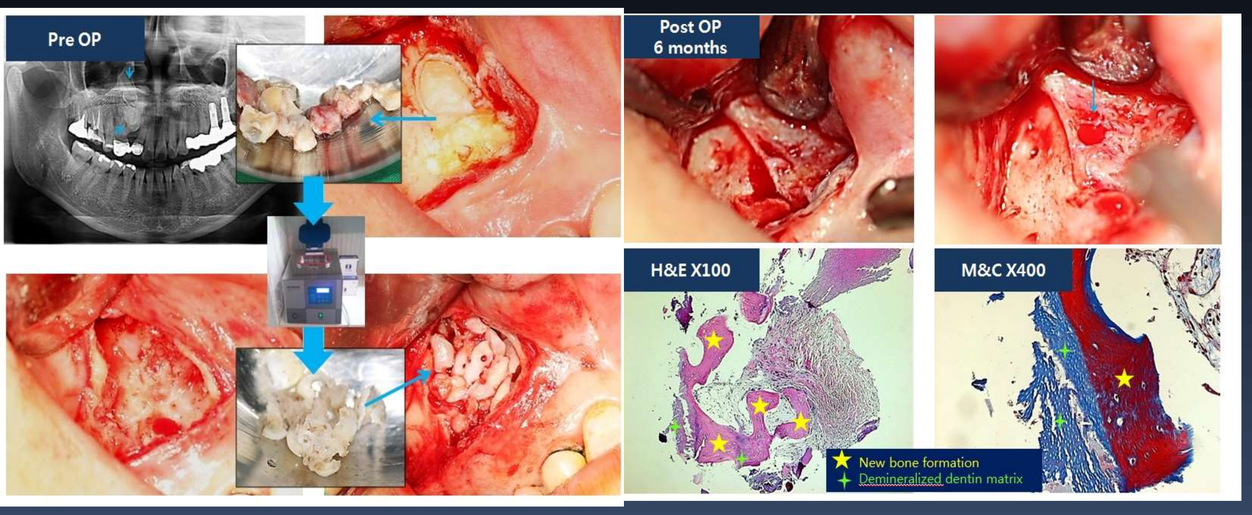




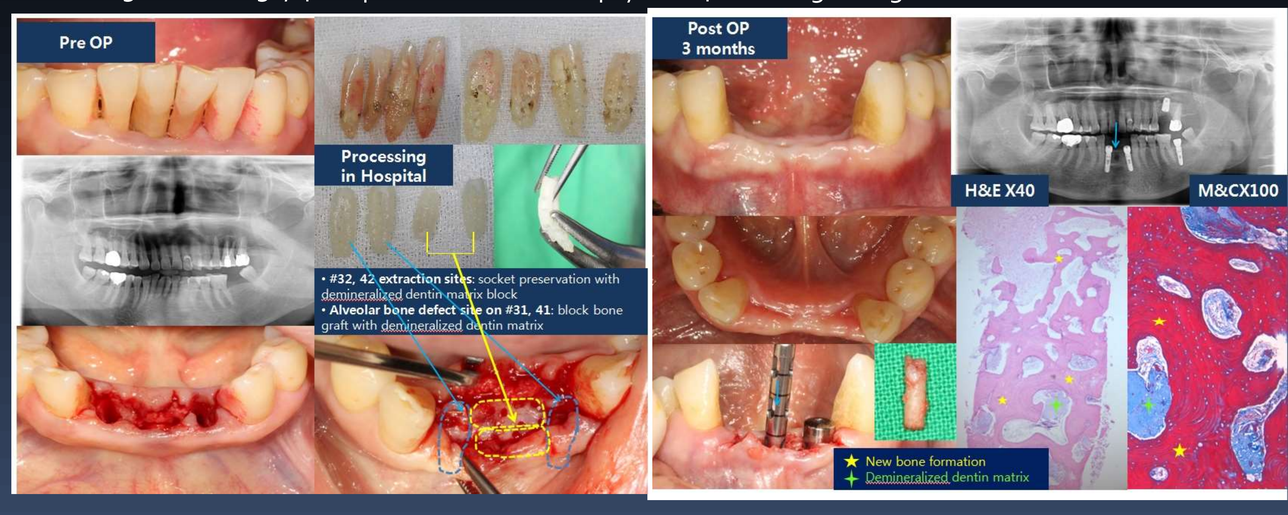


Case Reports

Case 1. F/26
: Odontoma in Maxilla
Odontoma enucleation – processing with Vacuasonic for 2hr(vDDM) – Grafting



Case 2. F/88
: Periodontal problem on #32-42
#32-42 extraction – Immediate processing with Vacuasonic for 2hr(vDDM) – Grafting –
Post OP 3months: #32, 42 implant insertion & biopsy on #41 vDDM grafting site



Conclusions: Rapid preparation of teeth with the vacuum-ultrasonic accelerator could make immediate one-day graft possible.

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