

HISTOLOGIC AND RADIOGRAPHIC BONE DENSITY CHANGES IN ALVEOLAR SOCKET PRESERVATION USING AUTOGENOUS BONE GRAFT AND HYALURONIC ACID

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Background & Aim

- Tooth extraction is one of the most widely performed procedures in dentistry, and it has been historically well documented that it can induce significant dimensional changes of the alveolar ridge.
- Today's concept in tooth extraction shall routinely consider maintenance of the existing extraction socket dimensions with some sort of bone-replacement material. (1) This procedure has been called ridge preservation. (2)
- Hyaluronic acid (HA) is one of the major components of the extracellular matrix (ECM) and is found in all connective tissues of the body. It is a naturally derived, linear, high molecular weight polymer with visco-elastic properties. (3)
- The aim of this study was to evaluate the histological and radiographic efficiency of hyaluronic acid "HA" when combined with autogenous bone graft in filling post-extraction sockets.

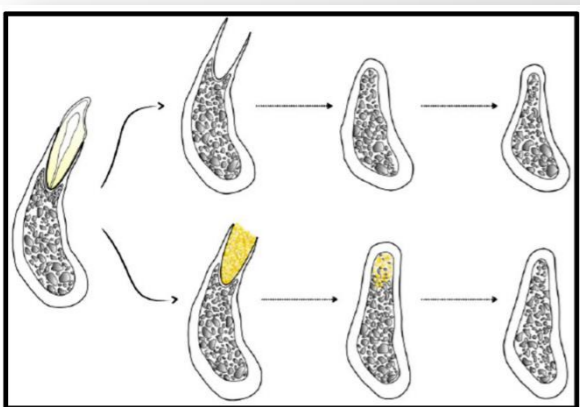


Illustration comparing expected alveolar bone changes after natural healing (upper row) as compared with alveolar ridge preservation via socket grafting (lower row) after tooth extraction. (4)

Patients & Methods

- The ethical approval was obtained by the ethical committee before the study began, and the selected patients were informed about the nature of the study and the informed consent was obtained.

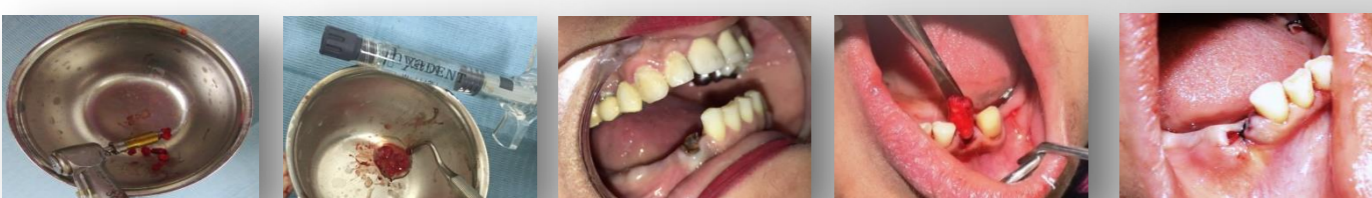
PATIENTS

- A split mouth randomized clinical trial was conducted on ten patients who were indicated for mandibular bilateral single rooted teeth extraction. Ten sockets were grafted with autogenous bone graft only collected using Auto-Max™ bone harvester from the external oblique ridge area (Control Group) and the other ten sockets were grafted with autogenous bone graft mixed with hyaluronic acid (Hyadent™) (Study Group).

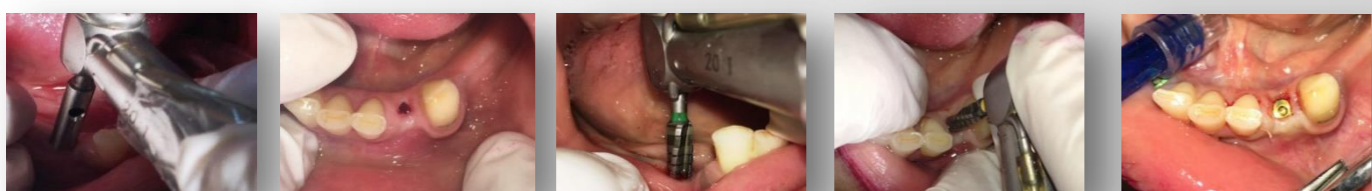
MATERIALS

- Twenty Biohorizons Mount-free Tapered Internal dental implants (Birmingham, USA).
- Two Auto-max bone harvesters (MEGAGEN, Seoul, Korea) of diameters 3.5 mm and 4 mm length.
- Ten single use syringes of HA. Hyadent gel (BioScience GmbH, 19073 Dummer, Germany).

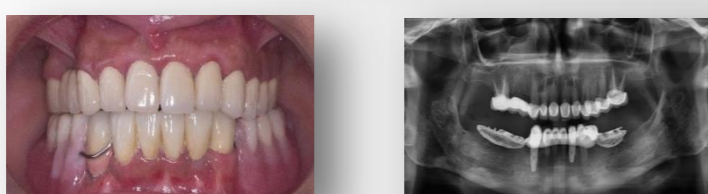
BONE HARVESTING AND BILATERAL SOCKET AUGMENTATION



CORE BIOPSIES TAKING AND IMPLANT PLACEMENT AFTER 2 MONTHS OF HEALING

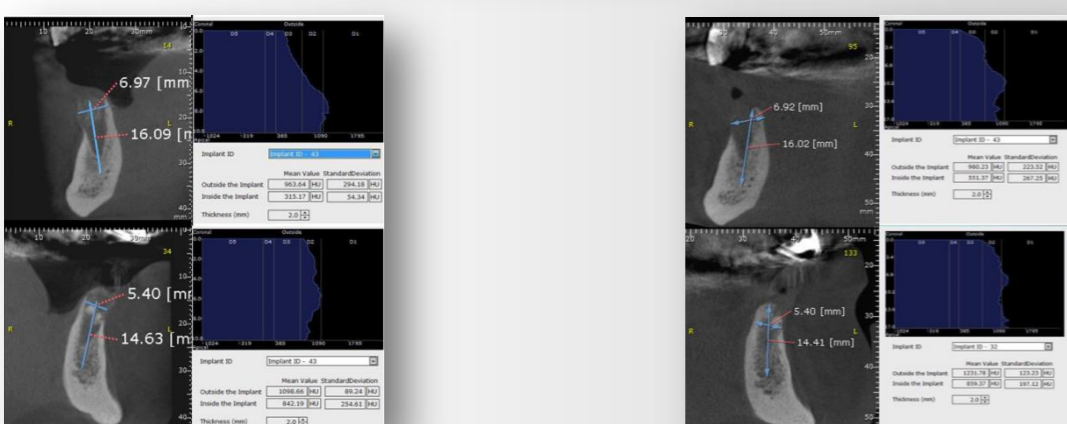


LOADING AFTER 3 MONTHS OF IMPLANT PLACEMENT



Results

RADIOGRAPHIC RESULTS FOR BONE DENSITY CHANGES IN HU



CBCT immediately after bone graft application

CBCT after 2 months and before implant placement

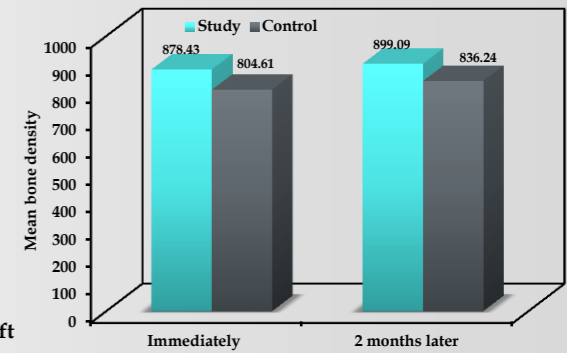
COMPARISON BETWEEN THE TWO STUDIED GROUPS ACCORDING TO BONE DENSITIES IN (HU) USING CBCT

CBCT	Study (n= 10)		Control (n= 10)	
	Immediate Bone density	2 months later	Immediate Bone density	2 months later
Min. - Max.	699.29 - 998.86	709.42 - 1037.69	315.17 - 989.39	551.37 - 1009.30
Mean ± SD.	878.43 ±116.10	899.09 ±117.88	804.61 ±198.43	836.24 ±142.81
Median	864.81	901.21	861.15	871.27
P ₁	0.001*		0.198	
P ₂			0.323	0.297

p₁: p value for Paired t-test for comparing between immediately after bone graft placement and 2 months later in each group

p₂: p value for Student t-test for comparing between the two studied groups in each period

*: Statistically significant at p ≤ 0.05



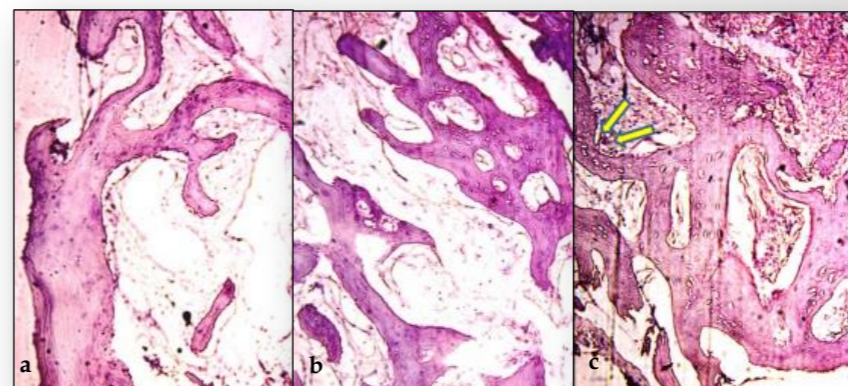
HISTOLOGICAL AND HISTOMORPHOMETRIC RESULTS

HISTOLOGICAL EXAMINATION (5)

- All specimens were stained after fixation using H&E stain to evaluate histologically the type, quality and quantity of formed bone.

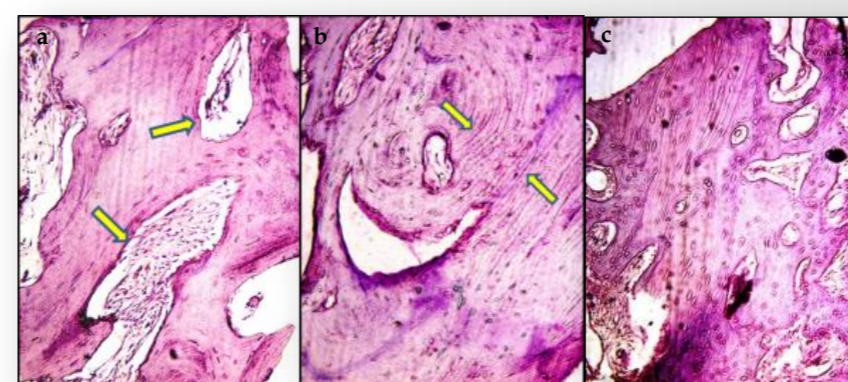
• Histological results

- **Control group:** (sockets grafted with autogenous bone graft only)



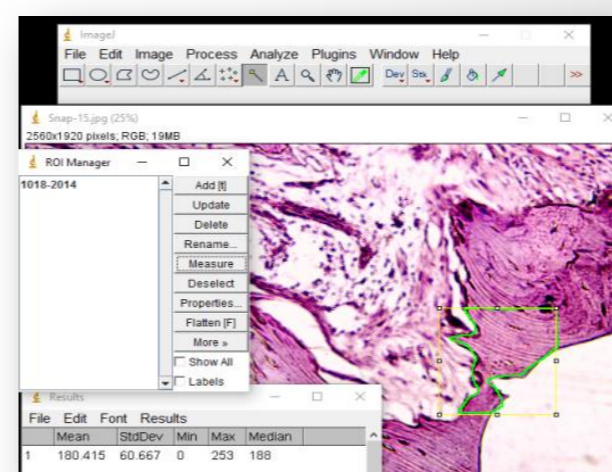
A PhM showing: a) large marrow spaces surrounded with thin bone trabeculae. b) well connection between the newly formed bone trabeculae with large areas in between filled with fine fibers, cells and BLVs. c) the osteoblasts bordering the surfaces of the connected bone trabeculae (arrows) and osteocytes within the trabeculae in the remaining areas filled with C.T (PhM) (H&E stain x100).

- **Study group:** (sockets grafted with autogenous bone graft & Hyaluronic acid gel)

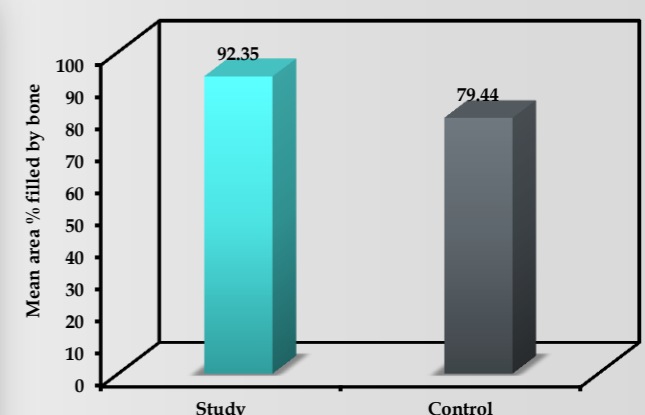


A PhM showing: a) thick formed bone trabeculae connected together reducing the spaced areas (arrows). b) numerous resting lines parallel to each other's (arrows) within thick formed bone. c) extra deposition of bone with many osteocytes within the connected trabeculae. (H&E stain x100).

• Histomorphometric results



Measuring percent of bone surface area from histological sections using imageJ software



Value of area % filled by bone trabeculae among the studied groups

Conclusion

- From radiographic and histologic evaluation, acceleration of bone deposition and bone remodeling due to the presence of hyaluronic acid, can reduce the time required for bone regeneration when associated with autologous cortical bone.

References

1. Henkel KO, Gerber T, Lenz S, Gundlach KK, Bienengraber V. Macroscopical, histological, and morphometric studies of porous bone-replacement materials in minipigs 8 months after implantation. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006; 102:606-13.
2. Ashman A. Postextraction ridge preservation using synthetic alloplast. Implant Dent. 2000; 9:168-76.
3. Laurent TC, Laurent UB, Fraser JR. Functions of hyaluronan. Ann Rheum Dis 1995;54(5):429-32.
4. Avila-Ortiz G, Elangovan S, Kramer KW, Blanchette D, Dawson DV. Effect of alveolar ridge preservation after tooth extraction: a systematic review and meta-analysis. J Dent Res 2014; 93: 950-8.
5. Orban B, Bhaskar S. Oral histology and embryology. 13th ed. St. Louis: Mosby Company; 2011. pp 410-6.

The authors declare no conflict of interest.