HARD AND SOFT TISSUE DIMENSION CHANGES FOLLOWING RIDGE PRESERVATION WITH DIFFERENT MEMBRANES- A PILOT STUDY

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Introduction

Following tooth extraction, bone resorption can be expected, especially on the buccal wall. To maintain ridge volume for future implant placement, ridge preservation procedures (RP) are commonly performed. Various materials and methods can be utilized during RP, however, there is no consensus on the membrane selection when the intact buccal plate is present after tooth extraction. The objective of this study is to investigate the impact of different types of membranes used on ridge preservation, as evaluated by hard and soft tissue dimension changes.

Materials and Methods

This prospective randomized clinical trial aims to enroll 50 subjects divided into 5 groups of 10. Each group underwent RP with mixing allograft and xenograft, using a 1:1 ratio and received 1 of 5 different types of membranes: absorbable collagen dressing (ACD), non-resorbable d-PTFE (d-PTFE), cross-linked collagen membrane (CLCM), non-cross linked ECM membrane (N-CLCM), or dehydrated human deepithelialized amnion-chorion membrane (DHDA-C).
Prior to extraction intraoral scan was obtained and immediately following extraction, a Cone Beam Computed Tomography (CBCT) was taken to evaluate the extraction socket (Pre-CBCT). Four months after extraction and ridge preservation, a second CBCT (Post-CBCT) and an intraoral scan were obtained. Measurements were performed using implant planning software (Bluesky Bio®). Intraoral scan files were also superimposed on pre-CBCT and post-CBCT. A region of interest (ROI) guide was placed on pre-CBCT image at the extraction socket to provide accurate slice for measurement and the horizontal reference line at 1 mm interval from the bone crest. The exported ROI guide and segmented jaw which shared the same 3D co-ordinate in STL format are superimposed onto post-CBCT image to identify the same slice that was measured on pre-CBCT image Following the ROI guide, horizontal measurements were taken at 0-9 mm level for hard tissue (Fig 2). At 5 months after the extraction and RP, a histological specimen was obtained using a trephine bur for histological assessment.

Results

A total of 35 patients were enrolled in the randomized clinical trial when the report was written. After removing insufficient data, only 32 patients' data were included in bone measurement (Fig 3) and 25 for soft tissue measurements (Fig 4). ANOVA test was used for analyzing the results. The results showed that there were no statistically significant differences in hard tissue (p=0.4) and soft tissue (p=0.5) among different kinds of membranes that were used in the intact defect.

Fig 1. Study Workflow

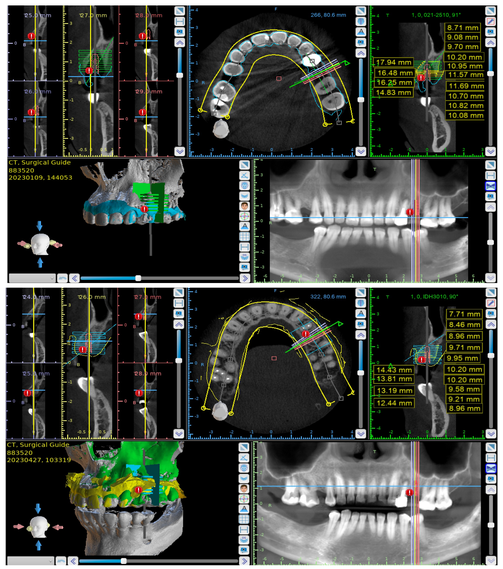
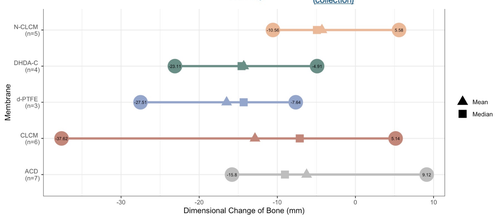
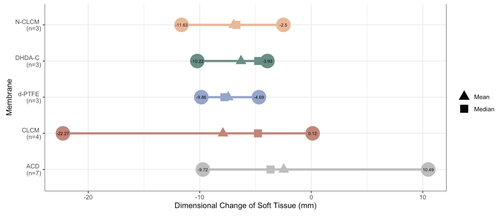


Fig 2. Pre-CBCT and Post-CBCT Measurements



Membrane	Minimum	Maximum	Mean	Median
ACD	-15.80	9.12	-6.25	-9.02
CLCM	-37.62	5.14	-12.86	-7.13
d-PTFE	-27.51	-7.64	-16.49	-14.31
DHDA-C	-23.11	-4.91	-14.30	-14.58
N-CLCM	-10.56	5.58	-4.29	-4.93

Fig 3. Bone dimensional changes



Membrane	Minimum	Maximum	Mean	Median
ACD	-9.72	10.49	-2.47	-3.65
CLCM	-22.27	0.12	-7.92	-4.78
d-PTFE	-9.86	-4.69	-7.45	-7.79
DHDA-C	-10.22	-3.93	-6.30	-4.76
N-CLCM	-11.63	-2.50	-6.95	-6.71

Fig 4. Soft tissue dimensional changes

Conclusion

In conclusion, there were no significant differences in the dimensional changes of hard and soft tissue between the membrane groups, suggesting that the membranes are equally effective in intact sockets. The rationale of the material selection is not the most important factor in maintaining the ridge volume. A larger sample size is needed to confirm these findings.

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