



Histological and Histomorphometric Evaluation of Human-retrieved Successfully Loaded Implants: A Cadaveric Study

Lan-Lin Chiou, DDS¹, Yoshiatsu Tanaka², DDS, Joe Iwanaga, DDS³, PhD, R. Shane Tubbs, PhD, MS, PA-C³, Yusuke Hamada, DDS, MSD¹

¹Graduate Periodontics, ²Graduate Prosthodontics, Indiana University School of Dentistry; ³Department of Neurosurgery, Tulane University School of Medicine

INTRODUCTION

Bone-to-implant contact (BIC) is the gold standard to represent the degree of osseointegration. However, histological evaluations of fully osseointegrated dental implants in human are barely published in the literature. Therefore, this study aimed to analyze the BIC and bone area (BA) with functionally loaded implants from a human cadaver and to compare those differences between mandibular and maxillary arches.

MATERIALS AND METHODS

Following the institutional board approval, a fresh-frozen cadaver from a 88-year-old at death Caucasian female with 9 root form dental implants (5 in the maxillary and 4 in the mandibular arch) was obtained. Each block was sectioned parallel to the long axis of the dental implants in the buccal-lingual (palatal) dimension. All specimens were stained with toluidine blue followed by basic fuchsin staining. The BIC was measured by dividing the total surface length of the implant surface in bone by the length with actual direct bone-to-implant contact. The BA was calculated as the percentage of occupying bone area within each thread. Mean values of BIC and BA were recorded with the standard deviations for each implant in the maxillary and mandibular arches. The two-sample t-test was used to compare the maxillary and mandibular arches in BIC and BA.

RESULTS

- Peri-implant marginal bone loss was found in all specimens. Intrabony defects were present in 4 maxillary implants while horizontal bone loss was noted in 5 mandibular implants and 1 maxillary implant.
- Higher bone turnover was noted within the intrabony bone loss around dental implants compared to the area with horizontal bone loss.

Arch	BIC		BA		Bone loss	
	Mean (%)	Range	Mean (%)	Range	Mean (mm)	Range
Maxillary	83.2 ± 4.3	76.5 – 87.7	84.3 ± 6.2	77.0 – 93.9	2.97 ± 1.45	0.76 – 3.13
Mandibular	74.4 ± 7.1	69.4 – 84.9	74.5 ± 6.9	69.8 – 84.7	1.82 ± 0.99	1.25 – 5.13
P-value	.053		.061			

HISTOLOGY

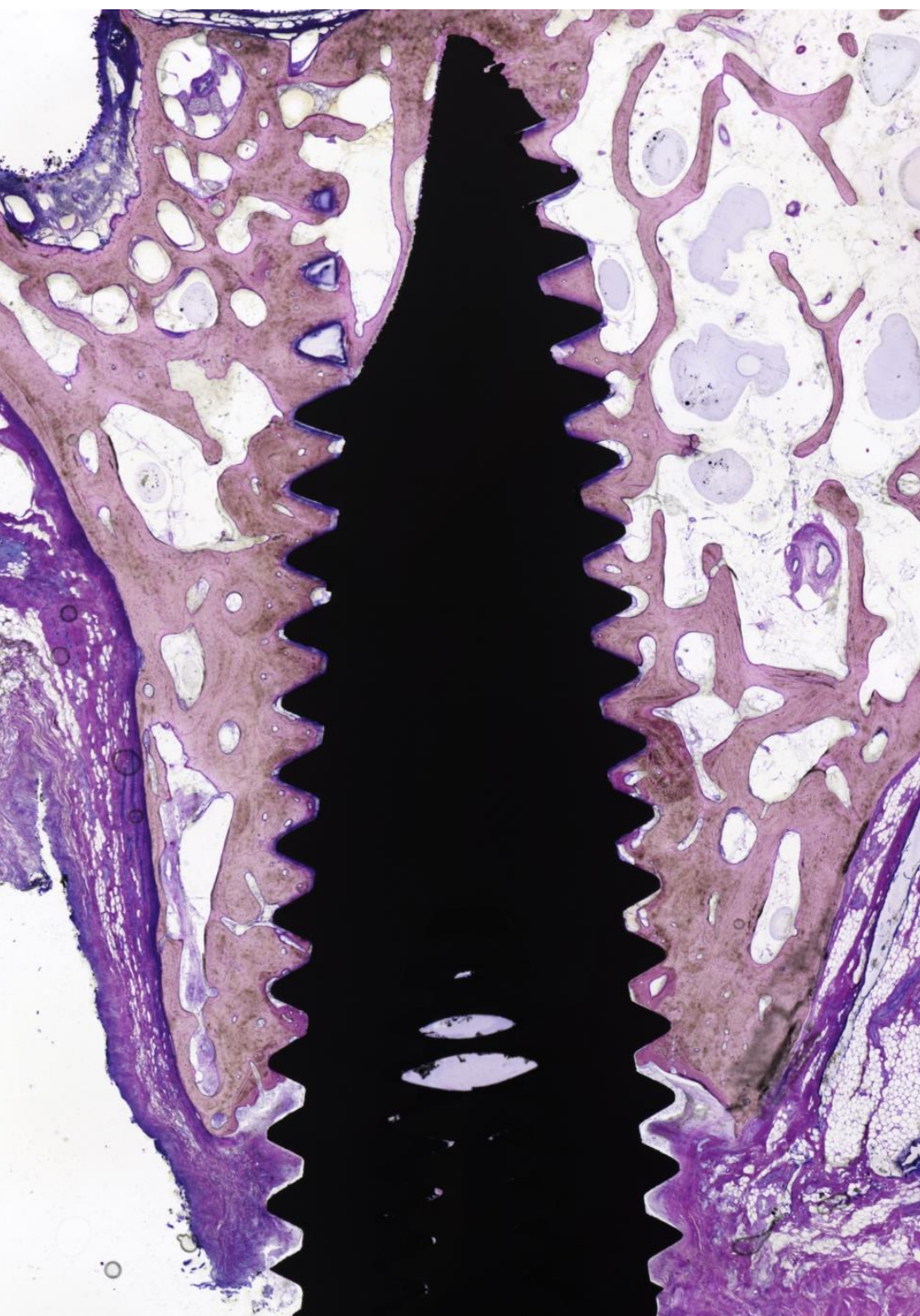


Figure 1

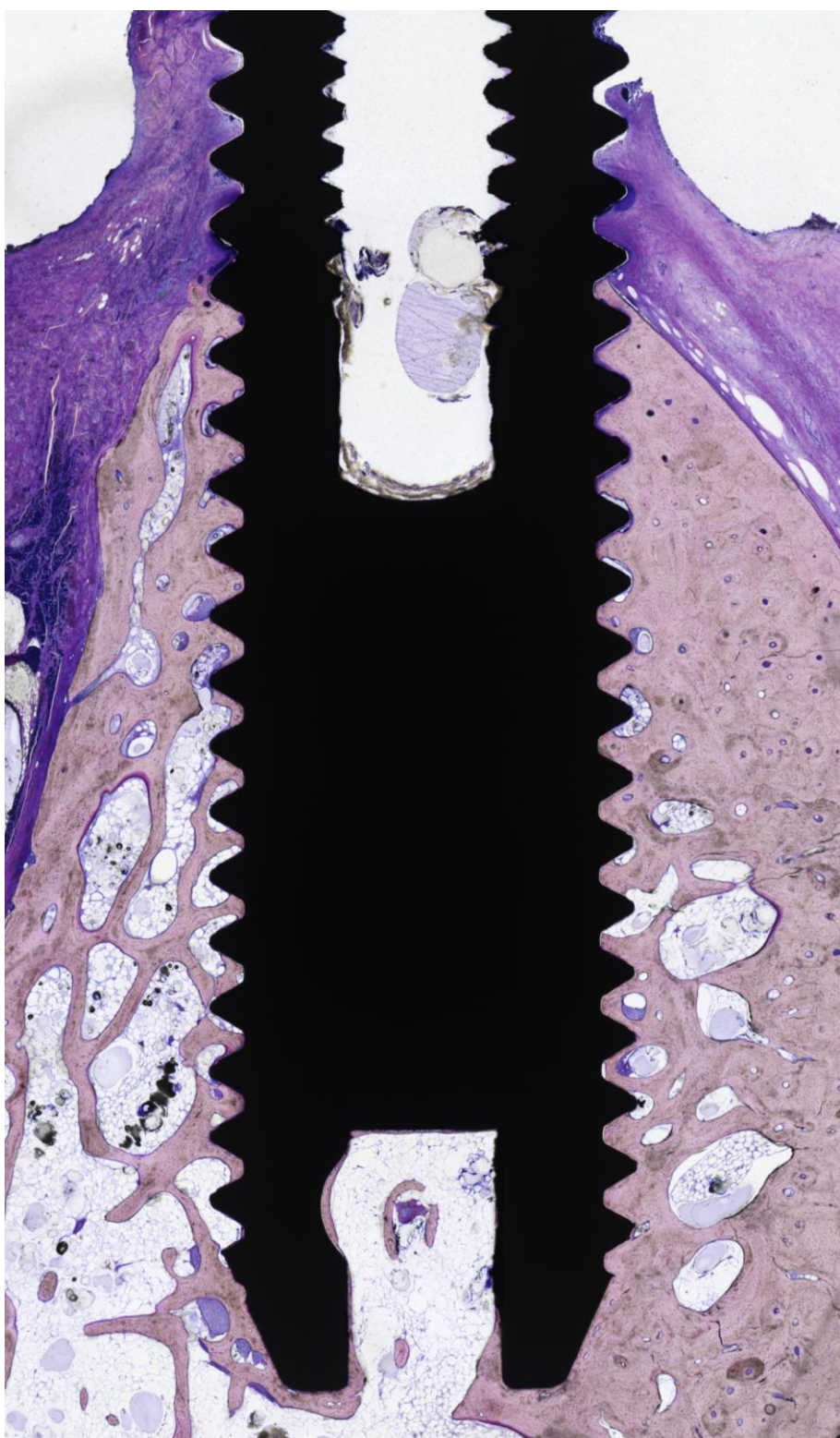


Figure 2

- Intrabony defects were present in the #14 site (Figure 1) whereas horizontal bone loss was found in the #22 site (Figure 2).
- High bone-to-implant contact (BIC) was observed on both implants (mean BIC: 81.69% for #14 site; 71.79% for #22 site).
- Prominent bone remodeling, represented by the relatively dark-staining, was seen within the intrabony defect (Figure 1). In contrast, bone surface where no intrabony component was present was stained homogenously (Figure 2).

CONCLUSION

This study demonstrated that the BIC and the BA from functionally loaded implants were relatively high. In the same individual, no statistically significant differences were found between implants placed in the maxillary and mandibular arches.

REFERENCES

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