

Radiographic Evaluation of Single Implant Retained Mandibular Overdenture Using Two Types of Matrices

Wesam E Badr^{1*}, Baraka O² and O A Helalay³

¹Assistant Lecturer, Removable Prosthodontic Department, Faculty of Dental Medicine, Al-Azhar University, Cairo, Egypt

²Professor, Removable Prosthodontic Department, Faculty of Dental Medicine, Al-Azhar University, Cairo, Egypt

³Lecturer, Removable Prosthodontic Department, Faculty of Dental Medicine, Al-Azhar University, Cairo, Egypt

***Corresponding Author:** Wesam E Badr, Assistant Lecturer, Removable Prosthodontic Department, Faculty of Dental Medicine, Al-Azhar University, Cairo, Egypt.

Received: December 31, 2020; **Published:** February 26, 2021

Abstract

Aim: The purpose of this study was to radiographically assess silicone-based soft-liner attachment and ball for mandibular single implant-retained overdenture.

Subjects and Methods: From the removable prosthodontics department clinic, Faculty of Dental Medicine, (Boys, Cairo), Al-Azhar University, 10 completely edentulous patients were randomly chosen. The patients divided into groups, group I contained a single implant-retained overdenture with ball and socket while group II contained a single implant-retained overdenture with silicone-based attachment. Radiographic measurement using the extension cone parallel technique was performed with a periapical radiograph.

Results: Group I registered greater bone loss than group II after one year of insertion and the difference was significant.

Conclusion: Silicone-based soft-liner attachments preserve bone than ball and socket attachment around implant fixture or implant-retained overdenture.

Keywords: Radiographic Evaluation; Single Implant Retained Mandibular Overdenture; Silicone-Based Soft-Liner

Introduction

The loss of teeth is one of the main drawbacks in elderly patients, which endangers their chewing capacity and thus their nutritional status. The prevalence of complete edentulism is declining worldwide particularly in developing countries due to recent preventive approaches and increased awareness. Statics showed that 19.2 percent of 62 percent of edentulous people suffer from mandibular denture failure, and 12.2 percent from maxillary denture failure. The denture is the source upon which to depend on these men [1,2].

Implant-supported overdentures increase comfort and stability. It improved survival rates and oral health. The big problem with overdentures, however, was its high cost [3].

Many experiments were performed using a new implant-retained overdenture model using one single implant implanted in the mandible midline. It was also reported that patient satisfaction and chewing ability were greater than conventional dentures [4].

As contrasted with implant-supported overdenture wearers the implants have been identified with edentulous modern denture wearers give significant changes in oral function and quality of life; In particular for the mandible [5].

Selection of an implant-retained overdenture attachment device depends on cost-effectiveness, an appropriate amount of retention, anticipated degree of oral hygiene, bone availability, patient social position, patient perception, maxillomandibular relation, inter-implant distance, and adversarial jaw status [6].

Several researches compared the efficacy of various types of attachment systems and found that single implants with dome-type magnets or ball attachments retained overdentures have comparable effects with the two implant-supported overdentures. Attachment systems with Larger dimensions provide higher retention and (ball attachment) distribute stress well [7,8].

Several studies reported the use of resilient liners as a matrix over a bar [9,10] and ball [11] attachments for implant overdentures. These liners obturate the spaces around the bar when used as a retention tool for implant-retained overdentures, absorb energy, disperse chewing forces to the implants and edentulous ridge and provide the patient with a greater latitude of movement and comfort [9,10].

Patients and Methods

From the removable prosthodontics department clinic, Faculty of Dental Medicine, (Boys, Cairo), Al-Azhar University, 10 completely edentulous patients were randomly chosen, with the average age of 45 - 55 years free from any systemic diseases that might affect implant placement. After a clarification of the technique before study enrolment, informed consent was obtained from all participants.

Prosthodontics phase of the treatment

For each patient, an acrylic complete denture was designed according to the conventional steps for complete denture construction with bilateral balanced occlusion principle. The denture was inserted into the patient's mouth after polishing, and verification of esthetics, stability, retention, occlusion, high spots, and any sharpness or overextension that could cause pain were checked. Patients were advised to wear the dentures before adaptation was achieved and post-insertion instructions were done.

Implant placement

Following single-stage surgical protocol, a Single dental implant fixture (Nucleoss, Menderes, Izmir, Turkiye) with a length of 10 mm, a diameter of 3.7 mm was inserted at the midline of the mandibular alveolar ridge. Depending on the attachment used, patients were randomly divided into two groups. Group I: contained ball and socket attachment. Group II: contained silicone-based soft liner attachment. Housings were produced to accept the matrix portion and this was done in the fitting surface of the denture.

Observations

The film sensor (RVG 5200, Carestream Dental/Kodak. USA software) was used to conduct a radiographic evaluation of crystal bone loss around the implant. using the aiming device and following the extension cone parallel technique the exposure was done (Figure 1 and 2).



Figure 1

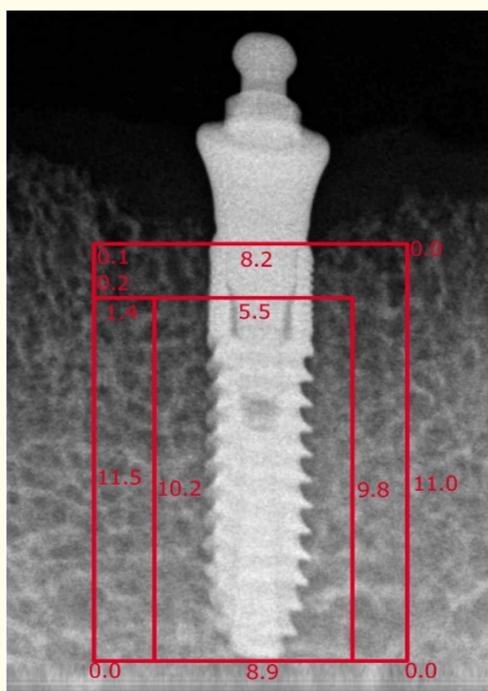


Figure 2

Results

The data was obtained, tabulated, and statistically analyzed for windows using SPSS©. The data normality distribution was performed using the Kolmogorov-Smirnov test. The test illustrated normal data distribution and the Student t-test was used to evaluate statistics. The level of significance was at $P \leq 0.05$. With SPSS Statistics Version 20 for Windows, statistical analysis was done.

Six months after loading

Group I (Metal housing) had a higher mean value for bone loss (0.578 mm) than group II (soft liner) (0.367 mm). The difference was statistically significant between the two groups, as shown by the t-test as ($p < 0.05$).

	Mean	SD	P-value	Significance
Metal housing	0.578	0.09090	0.001038741	Significant
Soft liner	0.367	0.0788		

Table 1: Mean bone loss for different groups 6 months after loading.

t: Student t-test.

•: Statistically significant at $p \leq 0.05$.

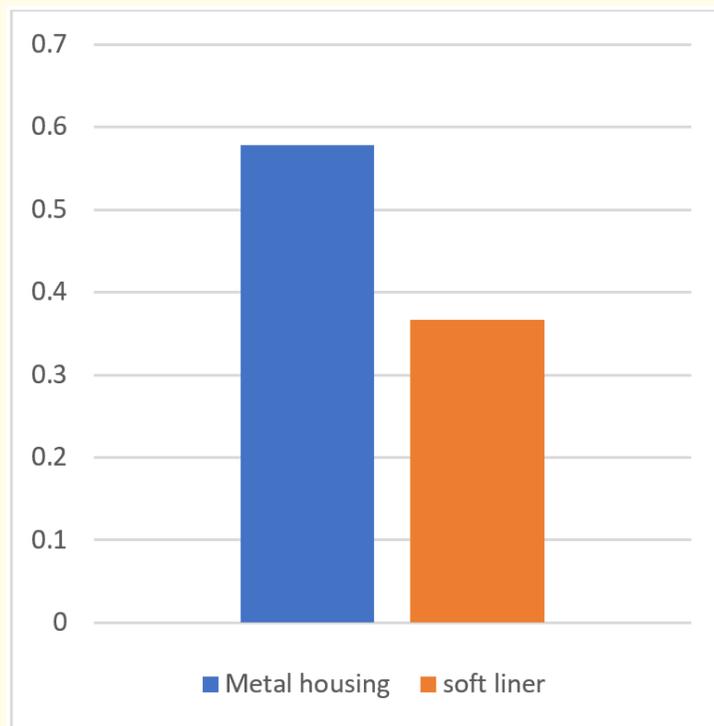


Figure 3: Mean bone loss for different groups 6 months after loading.

12 months after loading

Group 1 (Metal housing) had a higher mean value for bone loss (0.651 mm) than group 2 (soft liner) (0.5761 mm). The difference was statistically significant between the two groups, as shown by the t-test as ($p < 0.05$).

	Mean	SD	P-value	Significance
Group 1	0.651	0.0256	0.021468	Significant
Group 2	0.5716	0.069		

Table 2: Mean bone loss for different groups 12 months after loading.

t: Student t-test.

*: Statistically significant at $p \leq 0.05$.

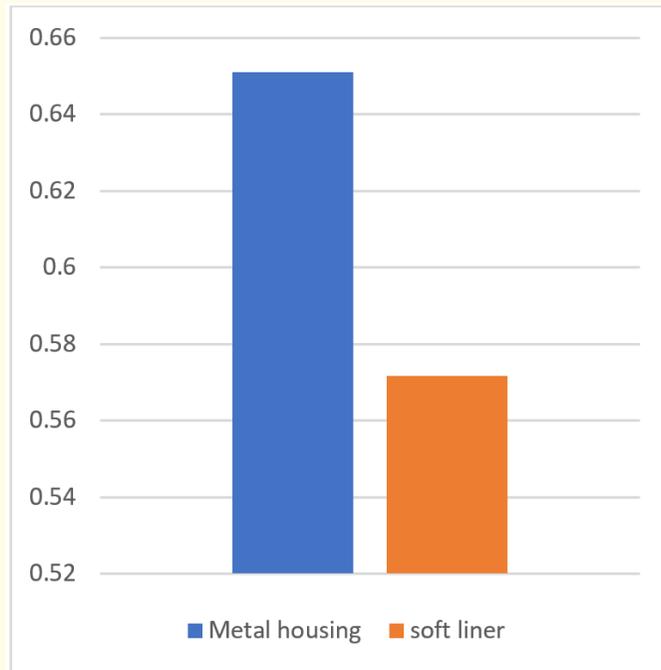


Figure 4: Mean bone loss for different groups 12 months after loading gingival index results.

Discussion

Descriptive statistics of the results regarding crystal bone loss for both types of matrices concluded that the female metal housing recorded bone loss higher than silicone based soft liner with differences considered as statistically significant.

These results agree with Elsyad MA and EL Shoukouki AH. Who evaluate resilient liner vs. clip attachment effects on tissues around the implant and found that the resilient liner attachment had substantially decreased bone loss [10].

These results agree with Heckmann SM., *et al.* who evaluate overdenture attachment selection and the loading of implant and denture bearing area and found that (non-rigid telescopic attachment, magnetic connectors, and single spherical attachment) slight loading of the implant seems to be exerted, which could be partially explained by the denture forward shift induced by load application in the chewing region [12].

These results also agree with Iman AW Radi who evaluate patient satisfaction and marginal bone loss in rigidly and resiliency retained mandibular implant overdenture and concluded that A significant difference was detected between the two groups at the different follow-up intervals [13].

Conclusion

Silicone-based soft-liner attachments preserve bone than ball and socket attachment around implant fixture or implant-retained overdenture.

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Volume 20 Issue 3 March 2021

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