Research Article

JRAD Journal of Research and Advancement in Dentistry

J Res Adv Dent 2021;11:2:45-48.

Evaluation of Change in Bite Force of Conventional Lower Denture and Implant Supported Denture

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ABSTRACT

Background: Compared to the conventional complete denture, two or more implant-retained mandibular overdentures can promote function and enhance success rates. However, economic constraints especially among the emerging elderly population in developing countries make this treatment strategy financially challenging. In order to reduce the cost and time of treatment, the concept of single implant-supported denture provides another option for elderly populations with increased retention stability and support.

Material and Method: Ten complete edentulous patient with resorbed mandibular ridge were selected. Bite force was measured in conventional denture after 1 month of delivery and similarly after placement of implant with denture after 6 months.

Results: A significant difference in bite force was found between conventional complete denture and implant supported denture.

Conclusion: Single implant supported denture can be effective option for edentulous mandible.

Keywords: Complete Denture Hygiene, bite force, implant supported denture.

INTRODUCTION

Treatment concepts for edentulous adults using oral implants have progressed to encompass simplicity and cost-effectiveness. Long-term studies have indicated that two splinted or unsplinted implants supporting mandibular overdentures (opposing complete maxillary dentures) are a globally accepted treatment option. Future directions with case reports and prospective studies point towards a more conservative approach; the use of only a single implant to support a mandibular overdenture. Implant outcome and patient satisfaction has shown to be comparable whether one or two implants are used for support of mandibular overdentures.[1]

Rehabilitation using complete dentures on edentulous patients who suffer from a compromised alveolar bone often results in denture soreness, poor retention and instability unclear pronunciation, and low chewing efficiency. Implant-retained overdentures are widely applied for the rehabilitation of edentulous jaws as it is able to increase retention rates of prosthesis, enhance the masticatory function and reduce the absorption of

Received: Oct. 21, 2020**: Accepted**: Dec. 1, 2020
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pISSN 2278-0076
eISSN 2321-9270

alveolar bone by regulating neuromuscular adaptation[2,3,4].

In previous studies and practice, using a single implant in the mandibular midline area with ball or locator attachments to support overdenture produced favorable outcomes [5,6]. An in vitro model study demonstrated that the single implant-supported overdenture increased retention and stability as compared with the conventional complete overdenture; furthermore, the biomechanical effects were comparable to those observed in a mandibular two-implant retained overdenture [7]. In comparison with two-implant overdenture, the single implant presented other advantages such as lower component costs and shorter treatment time while maintaining comparable patient satisfaction [8]. The York consensus statement recommends at least two implants to support a mandibular overdenture for edentulous patients [9].

MATERIAL AND METHOD

Conventional complete denture for 10 selected patients with resorbed mandibular ridge were fabricated. Bite force of conventional complete denture was measured after 1 month. After 1 month a single midline endosseous implant was placed in the mandibular mid-symphyseal region following the recommended surgical protocol. Using the customized abutment, a bar prosthesis was fabricated over which conventional denture was adjusted. After 6-month bite force was measured and compared with conventional denture. The strain gauge sensor was used to evaluate bite force.

RESULTS

Mean values of bite force (in N) was derived for both right and left sides. It was observed that, the bite force was more in Implant supported denture group as compared with conventional complete dentures (35.80±3.42) on right side as well as on left side (33.60±3.64). (table-1)

Thus, on right side, biting force was more than on left side; and as compared to conventional complete dentures. One-way ANOVA test (table-2) was done for intergroup comparison between conventional dentures group and implant supportd denture group for bite force. It was found that a statistically significant difference (p-value<0.05) was observed between experimental and control group. Post HOC tukey test was done to analyse the intergroup comparisons between individual groups. It was observed that statistically significant difference (p-value<0.05) was observed for bite force between conventional complete dentures and implant supported denture.

Table 1: Mean values of bite force (in N).

Side	Conventional complete denture	Implant supported denture At 6mths
Right	35.80±3.42	58.60±1.51
Left	33.60±3.64	57.00±2.24

Table 2: One-way ANOVA for intergroup comparison between SISBOD at different time intervals with conventional dentures for bite force.

source	sum of squares SS	degrees of freedom df	mean square MS	F statistic	p-value
treatment	6,724.3375	3	2,241.4458	195.4338	1.1102 e-16*
error	871.6500	76	11.4691		
total	7,595.9875	79			

*p-value<0.05 is significant.

DISCUSSION

Life expectancy among the population is increasing and so are the edentulous patients. In India, an epidemiological survey conducted in 2012, revealed that 30% of population is edentulous [10] . The traditional treatment of edentulous patients is the rehabilitation with the pair of removable maxillary and mandibular complete denture. Conventional maxillary and mandibular denture rely upon the available residual alveolar ridge surface area for support and retention [11]. Many patients have problems adapting to their complete dentures, especially to the mandibular prosthesis. Mandibular denture rests over the movable tissues of floor of mouth in addition mandibular ridge has less load bearing surface area which compromises the retention. Therefore, patient cannot function well with traditional complete denture as compared with their natural teeth [12].

Numerous people wearing conventional dentures report that they cannot eat many foods, particularly those that are hard or tough. This forces them to change their diets in unhealthy ways and causes their nutrition to be poorer than that of people with natural teeth [13].

The conventional denture is no longer recommended as the first choice because of the obvious disadvantages of reduced retention and stability, difficulty in speech and chewing, accelerated residual ridge resorption and overall psychological effect on the elderly individual wearing them [14].

From 1970-1980 overdenture became popular and widespread in dentistry[16]. These implants supported overdenture provided excellent support and stability. Patients find the implant overdenture to be significantly more stable, and they rate their ability to chew various foods as significantly easier in addition, they are more comfortable and speak more easily with implant overdentures [15,16]. However, opinions vary as to the minimum number of implants required for adequate anchorage of a mandibular complete denture .For severe mandible atrophy, the prosthetic concept of implant-tissue supported overdenture is frequently used. Cordioli and colleagues have suggested that single implant-supported overdentures may be appropriate for the treatment of edentulism in geriatric patient groups because of diminished functional demands and the realization that implant/patient life expectancy is limited[17].

It has been widely accepted that two-implants-supported mandibular overdentures should be recommended for edentulous patients, although single-implant-supported Overdentures also show practical and clinical potential[18]. With the single implant supported denture, the patients' chewing efficiency was significantly enhanced, indicating an improvement in bite force and retention.

CONCLUSION

It can be concluded that single implant supported denture gives convincing result for resorbed edentulous mandibular ridge as compared to conventional denture. There is increased amount of bite force.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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