

Original Research

Comparative evaluation of retentive property of different prosthodontic rehabilitation method for edentulous patients

Mohammad Kashif Noorani¹, Kumar Adarsh², Yasar S.Patel³, Kunal Gaurav Seth⁴, Priya Singh⁵, Suprabha Sharan⁶

¹M.D.S, Dept of prosthodontics; Senior lecturer; Dr. B.R. Ambedkar Institute of dental Sciences & Hospital, Patna, Bihar;

²MDS Orthodontics & dentofacial orthopedics; Senior lecturer; Dr. B.R. Ambedkar Institute of dental Sciences & Hospital; Patna, Bihar;

³MDS Oral and Maxillofacial Surgery, Private Practitioner, Surat Gujarat;

⁴MDS, Department of Periodontology, Private Practitioner, Muzaffarpur, Bihar;

⁵MDS, Department of Prosthodontics, Private Practitioner, Patna, Bihar;

⁶Private Practitioner, Patna, Bihar

ABSTRACT:

Introduction- Insufficient retention and stability of the prosthesis, decreased chewing efficiency, and discomfort during mastication is considered as main problem associated with conventional complete denture. In order to overcome these problems implant overdenture came into existence. This study was designed to determine a better as well as economical treatment option for edentulous mandible in north Indian population. **Material and method-** The study was designed to evaluate the retention force among different dental prosthetic options. 10 patients with conventional denture, 10 with single implant supported overdenture and 10 patients with two implant supported overdenture were selected. A wire loop (0.9mm in diameter) was placed on the geometrical center of the polished lingual surface to which the pull end of the force meter was attached. A vertical upward force was applied to dislodge the denture while the patient was sitting in an upright position. This force was measured in Newton and recorded as the denture's retention. **Result-** The mean value of retention force among all these three treatment modalities was measured and tabulated for both right and left side, ANOVA and post hoc Tukey HSD test was applied to evaluate and compare the retention force among all these three treatment modality. The mean retention value for conventional complete denture, single implant supported overdenture and two implant supported overdenture was $4.38 \pm 0.113N$, $8.62 \pm 0.141N$ and $28.20 \pm 0.424N$. **Conclusion-** Two implant supported overdenture was considered as minimal requirement for implant supported overdenture, but single implant supported overdenture also provides a significantly higher retention than the conventional complete denture.

Keywords: Retention, overdenture, implant.

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Correspondence: Dr. Kumar Adarsh, MDS Orthodontics & dentofacial orthopedics; Senior lecturer, Dr. B.R. Ambedkar Institute of dental Sciences & Hospital, Patna, Bihar, India

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INTRODUCTION

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. 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. 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.

Despite of satisfactory result of conventional complete denture some problems, such as insufficient retention and stability of the prosthesis, decreased chewing efficiency, and discomfort during mastication, continue to remain. These issues can be resolved effectively by using a dental implants. These implant overdenture can be implant-retained overdenture or an implant-supported overdenture according to the number of implants utilized with the prosthesis. The advantage¹⁻³ of better retention and stability are cited in different studies; however some studies have reported contradictory results also⁴⁻⁶.

MATERIAL AND METHOD

The study was designed to evaluate the retention force among different dental prosthetic options. 10 patients with conventional denture, 10 with single implant supported overdenture and 10 patients with two implant supported overdenture were selected following these inclusion and exclusion criteria.

Inclusion criteria:-

1. Patient’s age ranged from 55 to 70 years old (mean age of 60 years)
2. Resorbed ridge with an adequate amount of keratinized mucosa
3. Skeletal Class I patients with adequate interarch distance with parallel ridges
4. Free from temporomandibular disorders

Exclusion criteria:-

1. Class II and III skeletal relationship

2. Irradiated patient or patient undergoing chemotherapy
3. Smokers
4. Patients with a history of parafunctional habits (e.g. Clenching or bruxism)
5. Osteoporosis and hyperparathyroidism
6. Systemic diseases with known effect on implant surgery as uncontrolled diabetic

Retention force testing

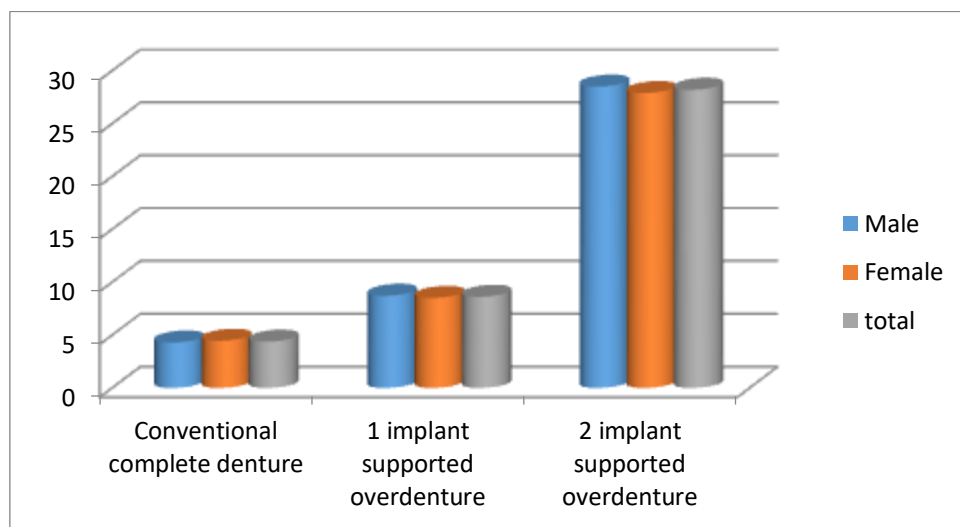
The method used by Burns^{7,8} et al. was used in this study for retention force measurement. Patient was allowed to sit upright with head resting firmly against the headrest. The mandibular denture was positioned correctly and the patient was asked to rest his tongue passively on the floor of the mouth with its tip adjacent to the anterior denture teeth. A wire loop (0.9mm in diameter) was placed on the geometrical center of the polished lingual surface to which the pull end of the force meter was attached. A vertical upward force was applied to dislodge the denture while the patient was sitting in an upright position. This force was measured in Newton and recorded as the denture’s retention.

RESULTS

The mean value of retention force among all these three treatment modalities was measured and tabulated for both right and left side, ANOVA and post hoc Tukey HSD test was applied to evaluate and compare the retention force among all these three treatment modality.

Table 1: Mean values of Retention force (in N) of both the genders using conventional dentures, single implant supported overdenture and 2 implant supported overdenture

	Conventional complete denture	1 implant supported overdenture	2 implant supported overdenture
Male	4.30±0.55	8.72 ± 2.86	28.5 ±3.22
Female	4.46±0.577	8.52±1.32	27.9 ±2.92
total	4.38±0.113	8.62±0.141	28.20±0.424



Graph no. 1: Mean values of Retention force (in N) of both the genders in three groups

One-way ANOVA for intergroup comparison between three groups in relation to gender

source	sum of squares SS	degrees of freedom vv	Mean square MS	F statistic	p-value
treatment	968.7464	2	484.3732	13,657.1391	1.0593e-11*
error	0.2128	6	0.0355		
total	968.9592	8			

*p-value<0.05 is significant

Tukey HSD results

Treatments pair	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inference
Conv vs 1-implant	38.9957	0.0010053	** p<0.01
Conv vs 2-implant	219.0747	0.0010053	** p<0.01
1-implant vs 2-implant	180.0790	0.0010053	** p<0.01

DISCUSSION

Denture retention has been defined as 'resistance of a denture to vertical movement away from the tissues'⁹ and as 'that quality inherent in the prosthesis acting to resist the forces of dislodgement along the path of insertion'¹⁰ It is clear then that ordinarily retention is regarded as a property of the denture rather than of the patient.

There is general acceptance among clinicians that to achieve retention in complete dentures there first needs to be an accurate fit of the denture base to the mucosa so that the space between the two is as small as possible. Secondly, there needs to be a border seal, which is achieved by extending the denture flanges to fill the sulci.

Many physical forces and factors have been credited with causing or enhancing retention, eg atmospheric pressure, vacuum, adhesion, cohesion, wettability, surface roughness, gravity, surface tension, viscosity, base adaptation, border seal and muscular control¹¹.

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.

From 1970-1980 overdenture became popular and widespread in dentistry. 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.

Mandibular two-implant overdenture have been shown to be superior to conventional dentures. In the present study we found a significant difference in retention among all these modalities. The mean retention value for conventional complete denture, single implant supported overdenture and two implant supported overdenture was 4.38±0.113N, 8.62±0.141N and 28.20±0.424N.

CONCLUSION

Two implant supported overdenture was considered as minimal requirement for implant supported overdenture, but single implant supported overdenture also provides a significantly higher retention than the conventional complete denture.

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