International Journal of Applied Dental Sciences 2019; 5(3): 293-296

ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2019; 5(3): 293-296

www.oraljournal.com
Received: 07-05-2019
Accepted: 09-06-2019

Dr. Surbhi Jain
Indira Vishnu Smruti Bldg, 2nd Floor, Mahavir Marg, Pen-Raigad, Maharashtra, India

Dr. Asha Rathod
Professor, D. Y. Patil University, School of Dentistry, Nerul, Navi-Mumbai, Maharashtra, India

Dr Rajeev Singh
Professor, D. Y. Patil University, School of Dentistry, Nerul, Navi-Mumbai, Maharashtra, India

Dr. Gaurang Mistry
Professor and Head, D. Y. Patil University, School Of Dentistry, Nerul, Navi-Mumbai, Maharashtra, India

Correspondence
Dr. Amruta AG
Indira Vishnu Smruti Bldg, 2nd Floor, Mahavir Marg, Pen-Raigad, Maharashtra, India

Maxillary tooth-supported bar overdenture: A case report

Dr. Surbhi Jain, Dr. Asha Rathod, Dr Rajeev Singh and Dr. Gaurang Mistry

Abstract
The preliminary objectives of successful prosthetic rehabilitation is to provide comfortable function and esthetics to the patient. An overdenture delays the process of resorption, improves denture foundation area and increases masticatory efficiency (1). Preventive prosthodontics is the branch of prosthodontics that aims at avoiding complete edentulism. Overdenture treatment is influenced by preventive prosthodontics, which uses the natural teeth as abutment teeth for support and hence allows the retention of the prosthesis. Recent advances in technology have introduced various attachment-retained overdenture, which act as shock absorber and stress redirector and also provide various advantages over complete denture like superior retention, support, stability, psychological benefits, and proprioception. This article presents a case report that describes the steps involved in a bar-retained tooth-supported overdenture.

Keywords: Maxillary overdenture, bar overdenture, tooth supported overdenture, clip overdenture

Introduction
Edentulism is a debilitating and irreversible condition and is described as the 'final marker of disease burden for oral health [2]. Edentulism can lead directly to impairment, functional limitation, physical, psychological, and social disability, and handicap [3]. M M Devan stated, "It is perpetual preservation of what already exists and not the meticulous replacement of what is missing" [1]. The removal of intradental and periodontal mechanoreception accompanying tooth loss changes the fine proprioceptive control of jaw function & influences the precision of magnitude, direction, & rate of occlusal load application4.An overdenture delays the process of resorption, improves denture foundation area and increases masticatory efficiency5.Overdenture is one of the most practical measures used in preventive dentistry. In a 4 years study by Renner *et al*, it was found that 50% of the roots used as overdenture abutments remained immobile [6].

Case Report
A 63 year old male patient reported to the Dept of Prosthodontics, at Dr. D.Y Patil University, Nerul, Navi-Mumbai with the chief complaint of difficulty in chewing food, speaking & poor facial appearance due to missing teeth. The patient gave a medical history of paralysis attack 2 years ago & was treated with the same & currently there are no medications for the same. On extraoral examination the patient displayed hollow cheeks and poor lips support. On intraoral examination, teeth present in the maxillary arch were 15, 13, 11, 21, 23, 25 & the edentulous mandibular arch (fig. 1 & 2). Grade III mobility was seen with 15 & 21. Slight supraeruption was seen with all the present teeth. Generalized abrasion along with bone loss was seen.

Fig 1: maxillary arch (intraoral view)

Fig 2: mandibular arch (intraoral view)

Radiographic examination revealed that 15 and 21 had poor bone support. Uneven resorption was seen with the lower right posterior region of the mandible (fig.3). 15 & 21 was advised extraction & soft tissues was allowed to heal completely. Thorough oral prophylaxis was carried out. Patient was advised various treatment options, including implant therapy, cast partial, attachment, telescopic, flexible dentures. The patient was thoughtful in saving the remaining natural teeth and desired minimal tissue coverage from the prosthesis.After consideration of all the key factors involved while deciding the treatment,it was advisable to fabricate a palate free maxillary tooth supported bar overdenture & a metal mesh reinforced mandibular complete denture.

Fig 3: Pre-op OPG view

Primary impressions were made using irreversible hydrocolloid material (fig.4 & 5). Diagnostic casts were made with Type III gypsum product.

Fig 4, 5: Primary impressions were made using alginate

RCT of the remaining teeth was done,to use them as abutments.Tentative jaw relation was recorded on the diagnostic casts (fig.7). A judgment was taken from the mounted casts and abutments were arbitrary prepared leaving 7mm of abutment height for final adjustments at a later stage. A new record base with wax rims was fabricated over the arbitrary prepared abutments & a final jaw relation was recorded.

Fig 6: Tentative jaw relation

Fig 7: Set up trial of the denture

A set of putty indices were made in the edentulous span area to maintain the same jaw relation record for further use. A setup trial was made & the arrangement was checked intraorally for aesthetics & phonetics (fig.7). After the approval of the setup trial, three “v” shaped notches were made on the maxillary cast and a putty index covering the occlusal & buccal surfaces of the trial denture was made.

Fig 8: Visualization of occlusal plane through putty index

The putty index was used to verify the final dimensions of the abutment from the occlusal plane (fig.8). Final tooth preparations were carried out maintaining the parallelism.Gingival retraction with '000' braided cord was carried out using single cord technique (fig.9). A double mix double step elastomeric impression was made.The final upper and lower casts were mounted with the help of the putty indices. Wax up for 4 primary coping along with bar was made.1cm of cantilevered bar was designed after the terminal abutment (fig.10). Intraoral and extraoral seating of the bar was verified (fig.11).

Fig 9: Gingival retraction prior to impression making.

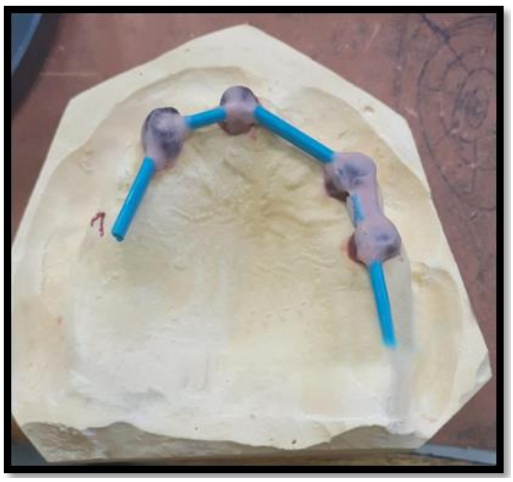

Fig 10: Wax up for primary coping along with bar

Fig 11: Finished and polished bar

Fig 12: The intaglio surface of the final denture. Showing metal framework along with reseliency clips of the maxillary denture and metal mesh reinforced mandibular denture.

The bar trial & the metal framework along with the final setup trial assembly was tried. Once the whole assembly was verified, the denture was sent for fabrication. Four yellow medium resiliency clips were attached to the metal framework for retention. A metal reinforcing mesh is added to the mandibular denture while packing for added strength. Thorough cementing protocol was followed while cementing the bar and patient was asked to close in centric occlusion to ensure uniform pressure (fig.13). Excess cement was removed. Post cementing radiograph of the patient (fig.14). Post delivery instructions were given. Patient was recalled after 1,3 days,1 week & 6 months.

Fig 13: Final occlusion at the patient

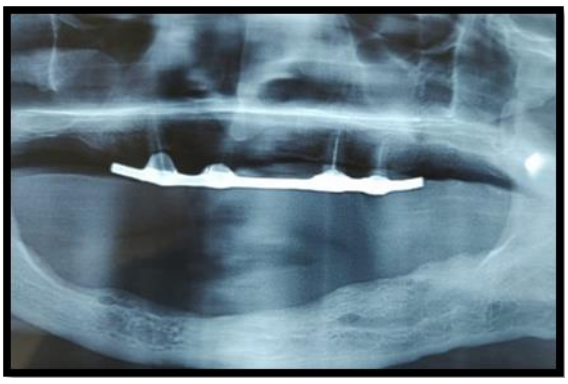

Fig 14: Post cementing radiograph of the denture delivery stage

Fig 15: Pre-op and Post-op

Discussion

The thought behind loosing teeth can be very disturbing to the patient. Considering the age factor, relevant medical history & cost involved, implant therapy was ruled out. Henking [7] stated that Ledger & Atkinson advocated leaving 'Stumps' under artificial dentures for support. Dodge8 believed that the periodontal sense under overdentures helped skilfull manipulation of the appliance and precision in jaw movements. Overdenture helps reduce resorption of surrounding bone and reduces pressure on the alveolar ridge [9]. In case of overdenture prosthesis, proprioception is maintained [10], there is the presence of directional sensitivity; dimensional discrimination; canine response and tactile sensitivity [11]. The average threshold of sensitivity to a load was found to be [10] times as great in denture wearers as in dentulous patients [12, 13] Rissin *et al*. in 1978 compared masticatory performance in patients with natural dentition, complete denture and over denture. They found that the over-denture patients had a chewing efficiency one-third higher than the complete denture patients [14]. In cases with limited interarch space, reinforcement of the denture base with metal framework adjacent to the top of the coping would be effective in reducing overdenture fracture due to reduced thickness of acrylic resin because of the bulkiness of the bar assembly [15]. The success of the tooth-supported overdenture treatment depends upon the proper attachment selection for the particular case. Only those who understand the limitations and benefits of attachments should be treated with attachment retained overdentures. Hence, patient selection is critical to the success of the treatment [16].

A tooth supported Overdenture is very much at the forefront as the treatment modality incorporating Preventive Prosthodontics concepts to the core. Let's not forget our basics rather anew them and make them a regular part of our clinical practice [9].

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