

**Mandibular Overdentures anchored using Two Implants and Single Implant – A Clinical Report**

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**Abstract**

The treatment of choice for the management of edentulous patients for over the years is conventional dentures. But in recent years implant supported overdentures have become the choice of treatment as suggested in the McGill’s consensus. These are used with variation in the types of attachments and implant numbers. Also numerous studies have been done which have proved the effectiveness of implant supported overdentures over conventional complete dentures in terms of retention and stability. But however recent studies are also in favour of Single implant overdentures which have been proved equally

efficient in terms of retention, stability, patient satisfaction and overall quality of life with the added advantage of decreased cost and less invasive procedure. This article describes two clinical cases of mandibular overdentures done using two and a single implant.

**Key words:** Mandibular overdenture, Implant supported, Edentulism, Retention, Stability, ball abutments, Pick up Impression

**Introduction**

Edentulous state is a chronic condition that chiefly affects the oral structures and function of the person. The treatment is more of a palliative kind, aimed to improve

the function and quality of life of the person [1]. The rehabilitation of completely edentulous patients especially with resorbed ridges using a conventional complete denture usually results in compromised retention and stability, decreased chewing efficiency and speech difficulties [2].

With the advent of Osseo integrated dental implants, the prosthetic rehabilitation can now be achieved with better retention and stability, thereby improving the oral function more efficiently with better patient acceptability [3]. “Mandibular two-implant overdenture as first choice of standard treatment for edentulous patients” is a famous statement given at the end of two day symposium held at McGill University in Montreal, Quebec, Canada in 2002(4). Many studies and clinical reports have supported the statement and successful improvement in the oral health was shown with this 2 implant supported treatment modality.

Following the success of two implant overdentures, single implant overdentures have now become the recent trend. This treatment option is also supported by various studies which have found a significant increase in patient’s satisfaction and overall health quality of life after treatment using single implant overdentures [5]. Studies have also shown that even a single implant can significantly increase the maximum bite force [6]. Thus single implant overdenture can be an equally effective and alternative treatment modality, as the biomechanical effects are the same and is more cost effective and less invasive than 2-implant retained overdenture. [7]

This case report discusses both the conventional two implant supported overdenture and a single implant supported over denture procedures.

#### **Case Report: 1**

A 61 year old male patient reported to the Department of Prosthodontics for replacement of his missing teeth. On

intra oral examination, both the maxillary and mandibular arches were edentulous.[Fig1.a] Conventional Mandibular 2 implant supported over denture was planned due to adequate bone height and patient also accepted for the same.

Two root form implants (3.75×9.5 Hi-Tech Implant System) were placed in 33 & 43 region of mandible. After anaesthetizing the region with the local anesthetic agent (2% lidocaine with 1: 80,000 epinephrine), and a mid crestal incision was made with relieving incision. The mucosa was reflected and the selected implants were placed after the osteotomy procedures as prescribed by the manufacturer. Both the implants achieved an insertion torque of 45Ncm. The reflected flap was later sutured using vicryl suture. Required medications, postoperative care and instructions were given to the patient. The implants were allowed to heal for 6 weeks.[Fig.1.b] After 3 months of healing, the implants were evaluated for the osseointegration using radiographic evaluation [Fig.1.c].

Ball abutments are then attached over the implants [Fig1.d]. A preliminary impression of the maxillary and mandibular arches was then made with irreversible hydrocolloid impression material (Chromatex DPI) and primary casts poured. Peripheral tracing was done with low fusing impression compound {DPI}. The secondary impressions of the maxillary and mandibular arches were made with the help of Medium body addition silicone (Reprosil) [Fig.1.e]. The master casts were obtained using type IV gypsum (Ultrarock Kalabhai). The record bases were fabricated after blocking the undercuts in the implant’s healing cap region and wax occlusal rims were fabricated.

A tentative jaw relation is then done in the patient and mounted in the semi-adjustable articulator after facebow transfer. The teeth setting was done and wax trial checked in the patient to verify esthetics, vertical dimension and

phonetics [Fig.1.f]. The dentures were then processed using heat cure denture base resin (DPI Heat cure). The dentures were inserted and checked for extensions. Using the direct method, metal housings along with the rubber sleeves [female component] placed over the ball attachments {male component} were picked up using auto polymerizing resin.[Fig.1.g,h] Rubber dam was used to protect tissues and prevent the implant region from acrylic resin's interlocking.

The acrylic resin which was in excess in the intaglio surface was removed and through polishing was done. The denture was delivered to the patient. Denture maintenance and oral hygiene instructions to avoid/prevent plaque accumulation on the coping surface were given. Patient was also briefed about the recall visits.

### **Case Report: 2**

A 55 year old female patient reported to the Department of Prosthodontics for replacing her missing teeth. She lost her teeth few years because of periodontal reasons. On intra oral examination, her maxillary arch and mandibular arch was completely edentulous. Different types of treatment options were given to the patient which consisted of a conventional mandibular denture, mandibular overdenture retained by two implants and a single implant retained mandibular overdenture with a conventional maxillary denture.

A panoramic radiograph was taken to study the condition of the residual ridge [Fig.2.a]. because of adequate amount of alveolar bone and patients affordability and expectations, a single implant mandibular overdenture and a conventional maxillary complete denture were planned for the patient.

An endosteal implant of dimensions 3.8×9.5mm (Adin Implant System) was placed in the midsymphyseal region of mandible in a direction perpendicular to the occlusal plane.[Fig.2.b] After anaesthetizing the region with the

local anesthetic agent (2% lidocaine with 1: 80,000 epinephrine), a mid crestal incision was made with relieving incision. The mucosa was reflected and the selected implant was placed after performing the osteotomy procedures as suggested by the manufacturer. A satisfactory insertion torque of 45Ncm was achieved and the flaps were sutured. A postoperative radiograph was taken to confirm the position of the implant placement. Necessary antibiotics and painkillers were prescribes and the required postoperative care and instructions were given to the patient. The implant was allowed to heal for 6 weeks with the healing cap in place [Fig.2.c,d].

After 3 months of healing, the implant was evaluated for the osseointegration using radiographic evaluation [Fig.2.e]. The ball abutment were then placed over the implant [Fig.2.f].Then the preliminary impression of the maxillary and mandibular arches was made with the help of Alginate (DPI Chromatex) and preliminary casts poured. Special trays were fabricated using autopolymerising resin and border moulding was done with low fusing impression compound {DPI}. The secondary impressions of the maxillary and mandibular arches were made with the help of Medium body addition silicone (Reprosil).[Fig.2.g] The master casts were obtained using type IV gypsum ( Ultrarock Kalabhai).

The record bases were fabricated after blocking the undercuts in the implant's healing cap region and wax occlusal rims were fabricated. A tentative jaw relation is then done in the patient and mounted in the semiadjustable articulator after facebow transfer. The teeth setting was done and wax trial checked in the patient to verify esthetics, vertical dimension and phonetics. The dentures were then processed using heat cure denture base resin (DPI Heat cure). The dentures were inserted and checked for extensions. Using the direct method, metal housing

along with the rubber sleeve [female component] placed over the ball attachment {male component} was picked up using auto polymerizing resin. [Fig.2.h,i] Rubber dam was used to protect tissues and prevent the implant region from acrylic resin's interlocking.

The excess acrylic resin in the intaglio surface was removed and thorough polishing was done. The denture insertion was done and post insertion instructions and recall appointments were given [Fig.2.j].

### **Discussion**

Implant supported overdentures are an effective treatment alternative to the conventional mandibular complete dentures due to several advantages like improved retention, stability, function, comfort and preservation of bone volume. Also placement of implants acts as an irritative stimuli leading to subperiosteal bone formation as described by the Wolffs law [8]. Also they serve as an excellent treatment alternative to implant supported fixed prosthesis due to decreased cost and a relatively simpler method of fabrication. These implant supported overdentures are of different types based on the type of attachments and the number of implants used. These variation are decided based on the amount of support needed from the implants and the ridge mucosa.

Until recent years two implant supported overdenture has been the treatment of choice based on the McGill's consensus which advocates mandibular two implant overdenture as the first choice standard of care for the edentulous patients. These implant supported overdentures are superior to conventional complete dentures not only in terms of retention and stability but also in terms of overall satisfaction, chewing efficiency, nutrition, confidence and ease of fabrication [2]. Also the technique of direct intraoral pick of the housing of the ball abutment is found to be superior to indirect techniques in terms of aftercare over a long period of time [9].

Feine and Carlson consider it the golden standard for the treatment of mandibular edentulism [4]. Also a study by Attard and Zarb which was done for a period of 10 to 19 years proved the McGill's consensus to be true [10]. Thus there are several long term studies which have proved the effectiveness of two implant overdentures over the conventional complete dentures.

However despite such tremendous biomechanical and psychosocial success of two implant supported overdenture, the number of patients in the Indian population taking up this treatment is very less because of the cost factor which can be beyond the scope for many patients. Hence in recent times the number of minimum implants needed for an overdenture has become debatable. Many studies have been done to compare the efficiency of single implant overdentures over the two implant supported overdentures. These studies have proved the single implant overdenture to be equally effective especially in patients with cost concern.

The first evidence of the use of single implant overdenture appears in the literature in the year 1993 [11] by the author Cordioli who also did a follow up for 5 years and published the same in the year 1997.

The cost of two implant supported overdenture is found to be 1.75 times more than that of a single implant overdenture [12]. A study by Maeda et al has proved the biomechanical effects of single implant overdenture in terms of withstanding lateral force and functional load in the molars to be the same as two implant supported overdenture[7].

Also it has been proved that the application of occlusal load produces less concentration of stress around the single implant as it is dissipated by the lateral movement of the denture [13]. El. Sheikh et al concluded in his study that overdenture supported using single dental implant as reliable , safe and most cost effective treatment option. A

prospective study over a period of 3 years by Liddelow has proved that the treatment outcome is excellent with an oxidized single implant placed with immediate loading [15]. A systematic review and meta analysis done by Murali et al over the survival rate of 1 versus 2 implant overdenture found no significant difference in the survival rate [16].

However long term clinical studies followed up for a period of 10 years and above is lacking for Single Implant Overdentures. A 3 dimensional finite element analysis recommends the use of silicone housing with ball attachment to reduce the funnel shaped bone loss around the single implant [17].

Though there are several studies which have proved the efficiency of single implant overdentures in rehabilitating the edentulous patients, more studies which actually compare the efficiency between single and two implant overdentures are needed to advocate it as the first treatment of choice for mandibular edentulism.

### Conclusion

The cases that were discussed in the article concludes that the first and finest treatment option in completely edentulous patient management is implant supported overdenture which improves their quality of life. The single implant overdentures can be as effective as two implant supported overdentures in terms of withstanding lateral forces and functional molar loads, retention, stability and overall quality of life of the patient. Hence the choice of treatment is decided based on the patient's health conditions, bone density, patient's willingness for the treatment and affordability.

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### Legends Figures



Fig 1.a: Pre operative intra oral image



Fig 1.b: After implant placement



Fig 1.c: OPG after implant placement



Fig 1.d: Ball abutments placed



Fig 1.e: Mandibular secondary impression made

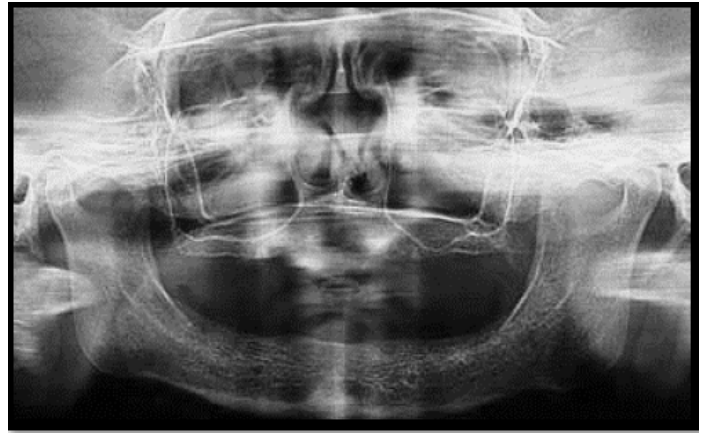


Fig 2.a: Preoperative OPG radiograph



Fig 1.f: Wax trial

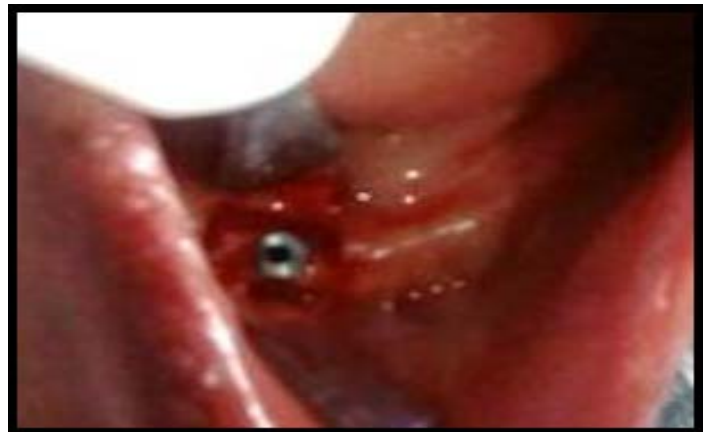


Fig 2.b: Single ADIN dental implant placed in mandibular anterior region



Fig 1.g: Metal housing with rubber sleeves placed



Fig 2.c. Healing cap placed and left for 6 weeks

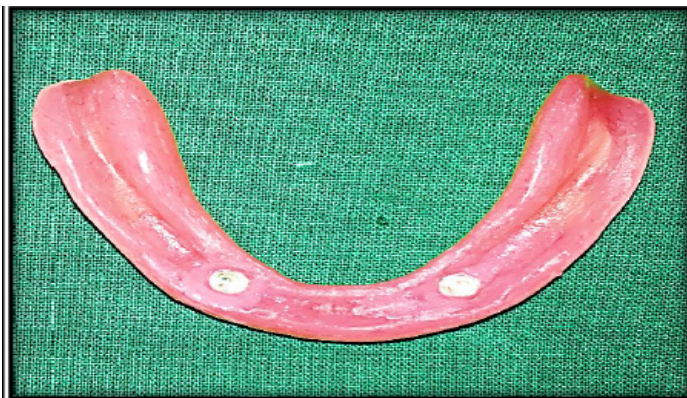


Fig 1.h: Pickup impression made using auto polymerizing resin



Fig 2.d. Healing after 3 months



Fig 2.h. O-ring with Metal housing placed

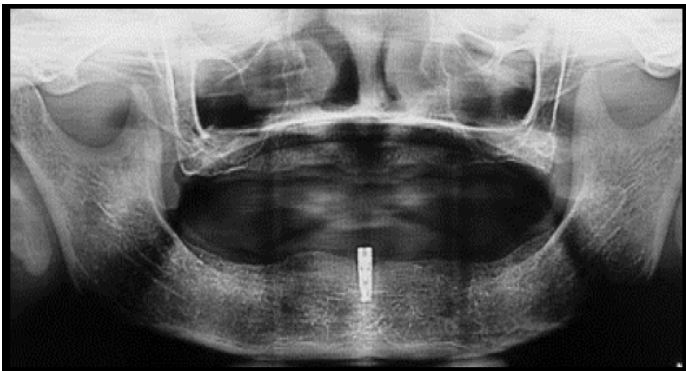


Fig 2.e. Radiographic evaluation of osseointegrated implants after 3 months



Fig 2.i. Pickup impression made using auto polymerizing resin



Fig 2.f. Ball abutment placed



Fig 2.j. Denture Insertion made



Fig 2.g. Maxillary and Mandibular definitive impression made