

# A low-profile universal attachment system with housing welded to metal reinforcement framework to retain mandibular implant overdenture: A clinical report

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## Abstract

Literature has proved that implant-retained overdenture is one of the best prosthetic options in the rehabilitation of complete edentulism. Tissue-supported implant-retained overdentures have been an appropriate treatment modality for atrophic mandibular ridges. In this case report, the patient presented with Class I maxillomandibular relationship and Class II Prosthodontic Diagnostic Index. The patient was concerned about esthetics as well as the retention of the lower denture. Taking into consideration the above concerns, an implant-retained mandibular overdenture was the chosen treatment modality. There are numerous attachment systems that have been used to improve the retention, stability, and support of implant-retained overdenture. Every attachment system has its own set of advantages. The OT Equator is a new line of low-profile attachment which is a radically modified OT-CAP Normo. The rationale for using this attachment is that it is considered the smallest attachment system available with the least overall dimension. It is a resilient and self-aligning attachment system which can be used in limited inter-arch space situation. OT equator derives its name from the OT Dental Laboratory (Bologna, Italy) used as a brand name. Considering these advantages, this was the chosen attachment and proved beneficial in terms of both patient satisfaction and the overall success of the treatment.

**Keywords:** Edentulous mandible, implant-retained overdenture, OT biologic equator attachment

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## INTRODUCTION

Edentulism has a major impact on the masticatory function, psychology, and esthetic appearance of the patients. Progressive bone loss and decreased area of support affect the stability and retention of mandibular dentures.<sup>[1]</sup> Implant-retained mandibular overdentures<sup>[2]</sup>

provide improved retention, increased masticatory efficiency, and psychological benefits.<sup>[3,4]</sup> Literature advocates the use of several attachment systems to aid in the retention, stability, and support of overdenture.<sup>[5]</sup> The purpose of this article is to illustrate the use of new low-profile OT-Equator attachment and describes an

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indirect technique to incorporate housing welded to OT castable connector into mandibular overdenture.

### CASE REPORT

A 61-year-old female patient reported to the Department of Prosthodontics and Crown and Bridge, Postgraduate Clinic, Bharati Vidyapeeth Dental College and Hospital, Pune, India, with a chief complaint of ill-fitting mandibular conventional complete denture along with difficulty in chewing and speech.

While recording case history, the patient revealed no significant medical conditions which will compromise the prosthodontic treatment plan. The patient presented with moderately resorbed maxillary and mandibular ridges and an inter-arch space of 18 mm as recorded in the diagnostic jaw relation.

All the treatment modality options available which will address patients' complaints were discussed, including full-arch implant-supported fixed prosthesis and implant-retained overdenture. However, due to economic constraints, the patient opted for the later.

The clinical protocol taken into consideration was to insert two endosseous implants in the interforaminal region of the mandible for implant tissue-supported overdenture and maxillary complete denture. Diagnostic models were made, and a diagnostic jaw relation was performed followed by teeth arrangement and trial denture for the fabrication of the surgical stent. Two mini 3.5 mm × 13 mm dimension standard length implants were inserted in the mandibular anterior region (Osstem TSIII, Osstem, Seoul, South Korea) [Figure 1]. Conventional loading protocol was followed.

After 3 months, based on the available restorative space and measured cuff heights, after the removal of the healing abutments, two individual equator abutments [Figure 2] (OT Equator, Rhein83 Srl, Bologna, Italy) were selected to retain the prosthesis based on the measured cuff height of 2 mm and screwed on to the implants [Figure 3] using the OT-Equator square screwdriver (Rhein83 Srl, Bologna, Italy). A postoperative radiograph was acquired after the placement of attachments to check for the accuracy of the fit [Figure 4].

Four months after the implant placement and osseointegration, closed-tray friction-fit impression copings (Rhein83 Srl, Bologna, Italy) were placed followed by closed-tray final impression was made with

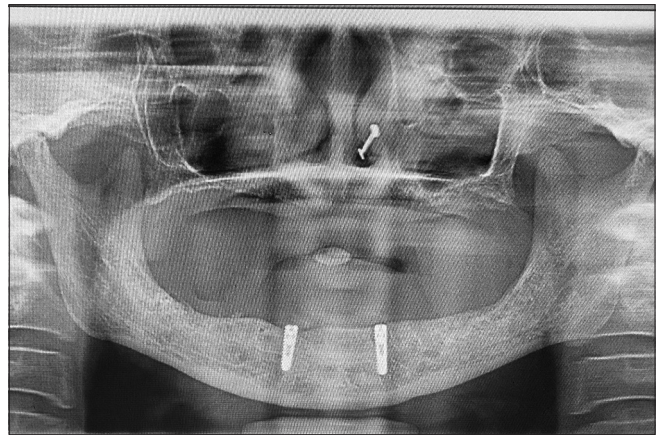


Figure 1: Radiograph showing implant placement

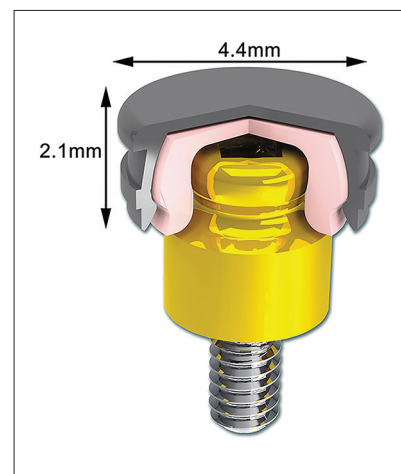


Figure 2: OT Biologic-Equator Attachment (Rhein83 USA Product Catalog 2016–2017)



Figure 3: OT-Equator attachments screwed onto the implants

medium-consistency polyether monophasic impression material (Impregum™ Soft 3M ESPE). The diagnostic teeth arrangement was used for the fabrication of metal reinforcement framework according to the occlusal plane and implant positions on the final cast [Figure 5]. Metal reinforcement framework was welded [Figure 6]

to the metal housings, and metal housings were splinted together for equal force distribution and strengthening of the mandibular denture [Figure 7]. The record base was fabricated, and final jaw relation record [Figure 8] was made followed by metal reinforcement framework trial [Figure 9].

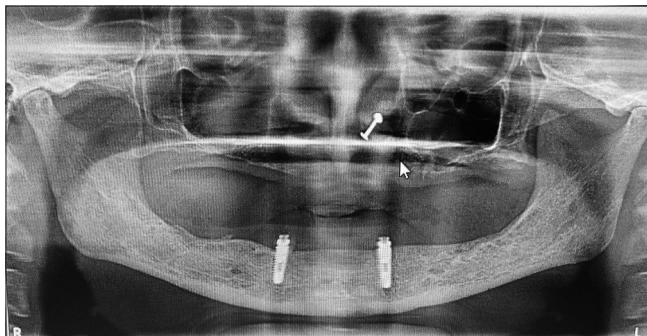
In the forthcoming appointment, the teeth arrangement was tried-in. Metal reinforced framework with welded metal housing was incorporated into mandibular denture during final processing. A panoramic radiograph was obtained to confirm the complete seating of the abutments. Considering the age and comfort of the patient, two implant-retained mandibular overdenture, medium pink soft retention 1200 g elastic retentive caps were placed inside the metal housings of the prosthesis using cap insertion tool [Figures 10 and 11].

A bilaterally balanced occlusal scheme was selected maintaining uniform posterior contacts and no anterior contacts to ensure the stability of the dentures in centric as well as eccentric relation and uniform distribution of stresses. The prosthesis was placed in the patient's mouth [Figure 12]. The patient was instructed to follow given oral hygiene maintenance

practice at home. A 6-month follow-up showed healthy peri-implant tissues and improved patient adaptation and maintenance.

## DISCUSSION

The fundamental objective of rehabilitation of completely edentulous patients using implant-retained overdentures is to increase the retention, stability, and masticatory function, predominantly in the mandibular edentulous ridges.<sup>[3]</sup> Improved function leads to significant enhancement of the psychological state of edentulous patients treated with mandibular implant-retained overdentures.<sup>[6]</sup> The predictable success rate of implants in the anterior mandible is mainly because of two reasons, first due to high certainty of osseointegration and second due to favorable impact on the preservation of alveolar bone around the implant.<sup>[7,8]</sup> Of the many available implant overdenture attachment systems, the stud, ball, and bar attachments have gained popularity due to their improved efficacy.<sup>[9]</sup>



**Figure 4:** Radiograph showing placement of OT-Equator Attachments



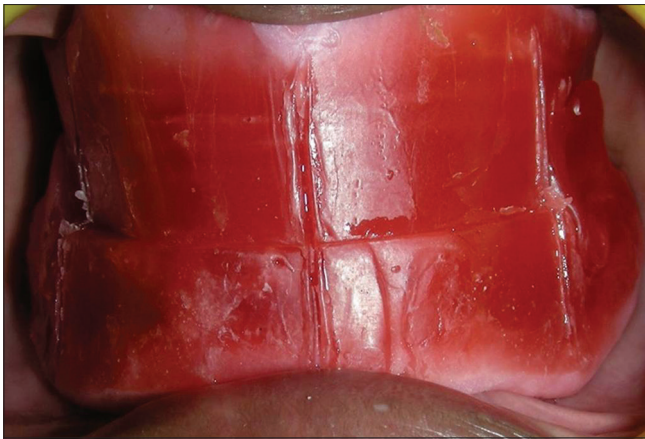
**Figure 5:** Connector pattern for the fabrication of metal reinforcement framework



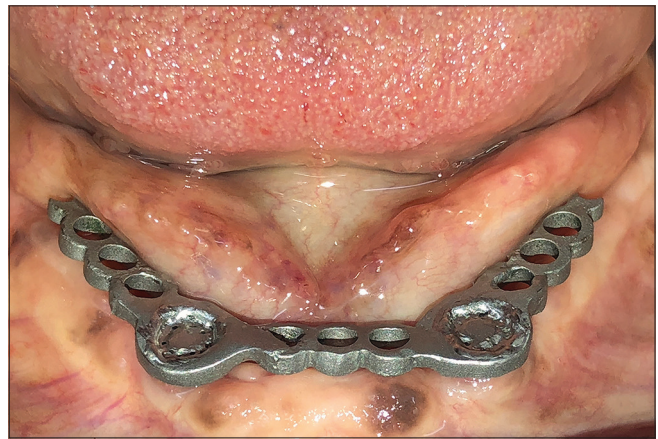
**Figure 6:** Welding of housing to the metal reinforced framework



**Figure 7:** Metal reinforcement framework welded to the metal housings



**Figure 8:** Jaw relation record



**Figure 9:** Trial of metal reinforced framework with welded housings



**Figure 10:** Pink retentive caps placed into the metal housings in the denture



**Figure 11:** Intaglio surface of the denture with pink retentive caps in place

The OT-Equator low-profile direct implant overdenture attachment has significantly minimum overall vertical height and diameter (2.1-mm height and 4.4-mm diameter). It was designed by eliminating the head and neck of the sphere in OT-CAP Normo (Rhein 83). This preserves the equatorial portion and thus gives the attachment its name.<sup>[10,11]</sup> The equator attachment has several advantages which makes it a superior choice when compared to the many available attachment systems. The biological advantage provided by this attachment is to maintain the fibromucosal adherence, emphasizing the formation of gingival barrier, which will prevent the inflammation and peri-implantitis.<sup>[11]</sup> The titanium nitride coating provides maximum resistance to wear, the smallscale metal housing and nylon caps, offer various retention levels and easy replacement of retention caps.<sup>[12]</sup> It is a resilient and self-aligning attachment system with stable retention. Considering these advantages, Equator was the attachment of choice in the present case report. Due to its low profile, it can be easily used in patients with severely compromised inter-arch space. Apart from the versatility,

the only discernible limitation for this attachment is that it does not allow anti-rotational connection and hence not indicated for single-unit restoration.<sup>[11]</sup> In the present case report, the low-profile OT-Equator attachments with reinforced metal framework were used to increase retention of mandibular denture and reduce the risk of denture base fracture over time. The elastic material of the retentive matrix of OT Equator allows distributing the retentive capacity over a larger surface, resulting in long-lasting retention due to the wear reduction at the circumference. On the contrary, locator attachment uses thin rigid matrices, resulting in more complications and prosthetic failure than OT-Equator attachment.<sup>[13]</sup> In addition, OT-Equator attachments allow for the compensation of implant divergence of up to 30°, which may be beneficial in severe mandibular atrophies and where axial implant placement is compromised without bone reconstruction. Furthermore, due to the low profile, prosthetic space can be managed properly, thus providing good esthetic results. Oral hygiene maintenance can be implemented using daily oral hygiene



**Figure 12:** Final optimal esthetic result

measures by the patient, and a professional cleaning by a dental hygienist can be carried out every 4–6 months.<sup>[13]</sup>

### CONCLUSION

The aim of this clinical report is to demonstrate the technique used with OT-Equator attachment to incorporate metal framework along with welded housings into the mandibular denture. This newly designed low-profile attachment is useful in providing a significant amount of retention in patients with limited inter-arch space and helps in improving peri-implant tissue health and denture esthetics.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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