AMERICAN COLLEGE OF PROSTHODONTISTS
Your smile. Our specialty.

Fabrication of a Fractured Mandibular Bar-Retained Implant Overdenture Without Implant-Level Impression Making: A Clinical Report

Bulent Uludag, DDS, PhD

Department of Prosthodontics, University of Ankara, Faculty of Dentistry, Ankara, Turkey

The article is associated with the American College of Prosthodontists' journal-based continuing education program. It is accompanied by an online continuing education activity worth 1 credit. Please visit www.wileyonlinelearning.com/jopr to complete the activity and earn credit.

Keywords
Implant-retained overdenture; fracture; bar attachment.

Correspondence
Bulent Uludag, University of Ankara, Faculty of Dentistry, Prosthodontics Dept., Besevler, Ankara 06500, Turkey.
E-mail: bculudag@gmail.com

The author denies any conflicts of interest.

Accepted March 24, 2012

doi: 10.1111/j.1532-849X.2012.00901.x

Abstract

The most frequent mechanical complications of bar-retained implant overdentures (IODs) are fracture of the dentures, loosening of the bar screws, and the need to reactivate the retentive clips. When a bar-retained IOD with an acrylic resin base fractures, the existing bar attachment should be removed to fabricate a new overdenture. So far, no method has been previously described for remaking a fractured mandibular bar-retained IOD without removing the existing bar attachment. This article describes fabrication of a fractured mandibular bar-retained IOD with distally placed ball attachments using attachment transfer analogs. The described technique allows the patient to use the existing overdenture temporarily until the new overdenture is delivered.

Implant-retained overdentures can provide an effective treatment modality for edentulous patients.[1] The clinical comfort achieved is dependent on many factors, including the degree of retention provided by the location and the orientation of the implants, the restorative component fit, the use of attachment elements, and proper denture fabrication.[2] The use of bars to retain and support an implant overdenture (IOD) is a commonly accepted treatment modality.[3,4] However, the use of bar attachments in IODs includes some drawbacks, such as fracture of the prosthesis, extra bulk caused by the presence of the metal bar, and frequent maintenance requirements.[5-7] Of these, prosthesis fractures in implant-retained overdentures have been well documented.[8-12] Reinforcement of the denture base overlying the implants may increase resistance to detrimental stress concentrations and prevent prosthesis fracture.[8,9] In such fractures, the patient is unable to wear the previous denture until it is repaired.[13] Also, the existing bar attachment should be removed to make an abutment level impression to fabricate a new overdenture. So far, remaking a fractured mandibular bar-retained IOD without removal of the preexisting bar has not been described. This article describes the remaking of a fractured mandibular bar-retained IOD with distally placed ball attachments using attachment transfer analogs.

Clinical report

A 55-year-old man complaining of a fractured mandibular bar-retained IOD was referred to the Department of Prosthodontics, University of Ankara, Faculty of Dentistry for prosthetic evaluation. Clinical examination revealed a maxillary complete denture and a mandibular bar-retained IOD with distally placed ball attachments. The mandibular overdenture with an acrylic base was broken into two pieces in the anteroposterior direction. The patient stated that the overdenture was fabricated in a private dental office and already had two repairs in the past 14 months due to similar fracture patterns (Figs 1, 2). The patient was offered a treatment plan including repair of his existing overdenture that could be used temporarily during the fabrication period of a new mandibular bar-retained IOD with a cast metal framework. After patient consent was obtained, the preliminary impression of the mandibular arch was made with an irreversible hydrocolloid impression material (CA37, Cavex Holland B, Haarlem, Netherlands) using stock trays (Teknik Dis Deposu, Istanbul, Turkey). A mandibular custom tray was prepared with autopolymerizing acrylic resin (Meliodent, Heraeus Kulzer, Hanau, Germany). Two prefabricated ball attachment analogs (OT Cap Castable, Rhein83, Bologna, Italy) were cast with a base metal

Figure 1 Fractured mandibular bar-retained implant overdenture.

Figure 2 Intraoral view of the patient before treatment.

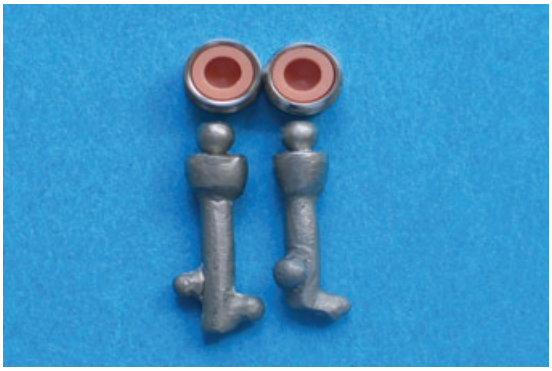

Figure 3 Two cast prefabricated ball attachment analogs and elastic retentive caps with metal housing.

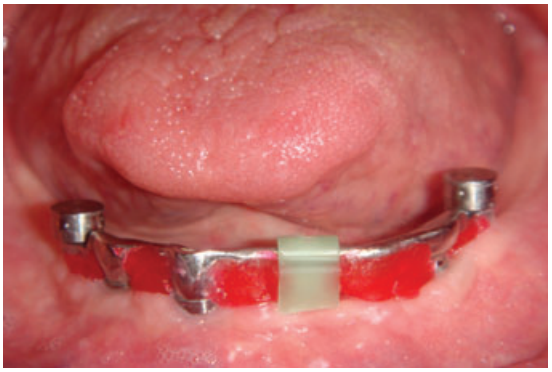

Figure 4 Two elastic retentive caps with metal housing seated on the ball attachments and duplicating matrix placed onto the round-profile bar and blocked out with dental wax.

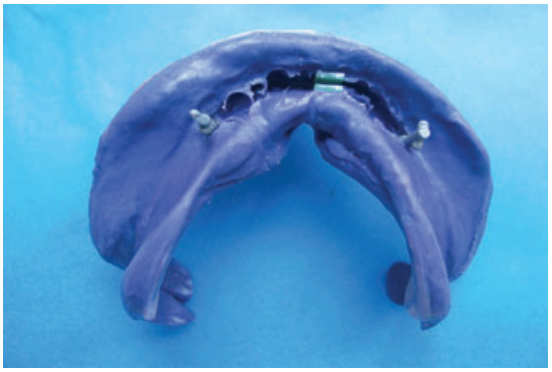

Figure 5 Final mandibular impression and ball attachment elastic retentive cap with metal housing assemblies incorporated into the impression.

Figure 6 Elastic retentive caps with metal housing and duplicating matrix on the mandibular cast.

alloy (Biosil F, Degudent, Hanau, Germany) (Fig 3). Two prefabricated elastic retentive caps with metal housings (OT Cap Castable) were seated on the ball attachments, and a processing clip (Vario-Soft matrices, Bredent, Senden, Germany) was placed on the round-profile bar to provide space for the bar retainer clips. The bar attachment was blocked out using dental wax (Dental Wax, Cavex). A final mandibular impression was made using a polyether-based impression material (Impregum, 3M ESPE, Seefeld, Germany) to pick up the retentive caps and the processing clip (Fig 4). The cast ball attachment analogs were assembled with the prefabricated elastic retentive caps with metal housing (OT Cap Castable) (Fig 5). The mandibular impression was poured with type IV stone (BEGO, Bremen, Germany), and the framework was cast with a base metal alloy (Biosil F) (Fig 6). Two elastic white standard retentive caps (OT Cap Castable) were incorporated into the framework by inserting the retentive caps into the previously formed space obtained by the processing clips with an inserting tool (Rhein 83), and the fit of the metal framework was verified intraorally

Figure 7 View of the mandibular metal framework superstructure intraorally.

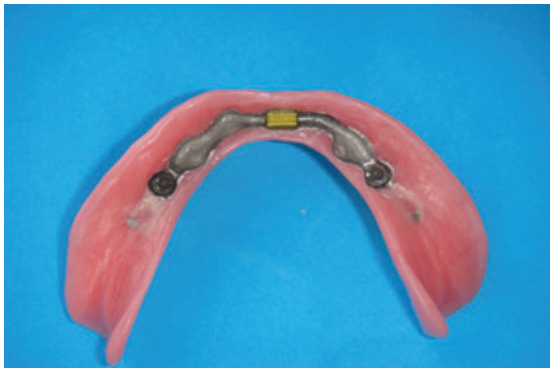

Figure 8 Intaglio view of the finished mandibular bar-retained implant overdenture.

(Fig 7). An impression of the maxillary denture was made with an irreversible hydrocolloid impression material (CA37) using stock trays (Teknik Dis Deposu) and poured with type IV stone (BEGO).

The maxillomandibular jaw relationship was obtained with a mandibular record base and occlusion rims. The casts were transferred to a semi-adjustable articulator (Denar Advantage; Teledyne Waterpik, Ft Collins, CO) using a facebow transfer. Artificial teeth (Vitapan Cuspiform, VITA Zahnfabrik, Bad Säckingen, Germany) with a cuspal inclination of 23 to 28° were selected and arranged on the record bases for a trial denture, and the trial arrangement was evaluated intraorally. The occlusal vertical dimension and centric relation were confirmed, a protrusive record was obtained, and a bilaterally balanced occlusion was achieved on the articulator.[14] The denture was processed with a conventional heat-processing technique using polymethylmethacrylate resin (Meliodent), finished, polished, and delivered to the patient (Figs 8 and 9).

Discussion

In the present report, remaking a fractured mandibular bar-retained IOD with distally placed ball attachments using attachment transfer analogs has been described. Acyrlic base fractures are mostly attributed to the denture function, base material processing variables, porosity, presence of cracks, and poor adaptation of the denture base. Due to the complex design of the supporting bars, mandibular overdenture bases should be reinforced. In general, when a bar-implant-retained overdenture with an acrylic base fractures, the existing bar attachment should be removed to fabricate a new overdenture; however, this treatment modality requires prolonged chairside time. Also, the patient cannot use the previous overdenture during the fabrication of the new one. Using the presented technique, it is possible to make a new bar-retained IOD without making an implant level impression.

Figure 9 Intraoral view of the patient after treatment.

Conclusion

The described technique enables repair of the fractured bar-retained overdenture intraorally so the patient can temporarily use the existing implant-retained overdenture during the fabrication of a new overdenture. The advantages of the described technique are reduced chairside time, reduced treatment cost, and increased patient satisfaction. The disadvantage of the approach is the increased technique sensitivity. A final impression with superior accuracy is mandatory, and all the attachment assemblies should be fully inserted into the impression to warrant optimum framework fit of the new bar-retained implant overdenture.

References

1. Mericske-Stern R, Zarb GA: Overdentures: an alternative implant methodology for edentulous patients. Int J Prosthodont 1993;6:203-208.
2. Williams BH, Ochiai KT, Hojo S, et al: Retention of maxillary implant overdenture bars of different designs. J Prosthet Dent 2001;86:603-607.
3. Masri R, Driscoll CF: Mechanical failure of an implant-retained bar: a clinical report. J Prosthodont 2004;13:184-186.
4. Rasmussen JM, Koka S, Eckert SE, et al: Repair of a milled cantilevered implant overdenture bar: a clinical report. J Prosthet Dent 2006;96:84-87.

5. Batenburg RH, Meijer HJ, Raghoebar GM, et al: Treatment concept for mandibular overdentures supported by endosseous implants: a literature review. Int J Oral Maxillofac Implants 1998;13:539-545.
6. Bergendal T, Engquist B: Implant-supported overdentures: a longitudinal prospective study. Int J Oral Maxillofac Implants 1998;13:253-262.
7. Jemt T, Book K, Karlsson S: Occlusal force and mandibular movements in patients with removable overdentures and fixed prostheses supported by implants in the maxilla. Int J Oral Maxillofac Implants 1993;8:301-308.
8. Naert I, De Clercq M, Theuniers G, et al: Overdentures supported by osseointegrated fixtures for the edentulous mandible: a 2.5-year report. Int J Oral Maxillofac Implants 1988;3:191-196.
9. Carlson B, Carlsson GE: Prosthodontic complications in osseointegrated dental implant treatment. Int J Oral Maxillofac Implants 1994;9:90-94.
10. Walton JN, MacEntee MI: Problems with prostheses on implants: a retrospective study. J Prosthet Dent 1994;71: 283-288.
11. Chaffee NR, Felton DA, Cooper LF, et al: Prosthetic complications in an implant-retained mandibular overdenture population: initial analysis of a prospective study. J Prosthet Dent 2002;87:40-44.
12. Gonda T, Ikebe K, Dong J, et al: Effect of reinforcement on overdenture strain. J Dent Res 2007;86:667-671.
13. Gonda T, Maeda Y,Walton JN, et al: Fracture incidence in mandibular overdentures retained by one or two implants. J Prosthet Dent 2010;103:178-181.
14. Uludag B, Sahin V, Celik G: Fabrication of a maxillary implant-supported overdenture retained by two cemented bars: a clinical report. J Prosthet Dent 2007;97:249-251.