

## Rehabilitation of Full Edentulous Mandible with Implants-supported Overdenture Using Attachments: Clinical Cases

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### Abstract

The rehabilitation of the fully edentulous patients, especially in mandible, could be compromised due to their diversity in terms of clinical, medical, anatomical and economic situations. An implant-retained complete overdenture is recommended as the gold standard in the oral rehabilitation of the edentulous mandible due to its relative simplicity, minimal invasiveness, predictability, efficacy and affordability. In this report, two fully edentulous patients under anticiagulatory therapy who were treated with a conventional complete denture on the maxilla and implant retained overdenture supported by freestanding implants placed in the anterior region of the mandible. Locator and magnetic attachments were used for retention of the mandibular overdenture respectively. Patients were satisfied with the final results in esthetic and functional aspects.

**Key Words :** Attachments, Fully edentulous mandible, Implant supported overdenture

### Introduction

The patients under edentulous jaw condition could have substantial difficulties using their conventional complete dentures due to a lack of retention, support and stability which closely related with the chewing ability [1]. Especially in the lower full edentulous cases, we often find more handicapped situations which compromise

the settlement of the prosthesis as compared to maxilla: narrower supporting area; complexity of muscle border verification; and the presence of an extended tongue due to loss of teeth. Redford *et al.* [2] showed that over 50% of mandibular complete dentures have problems with stability and retention with across-arch comparisons indicating that mandibular full denture treatment produced significantly more problems than did

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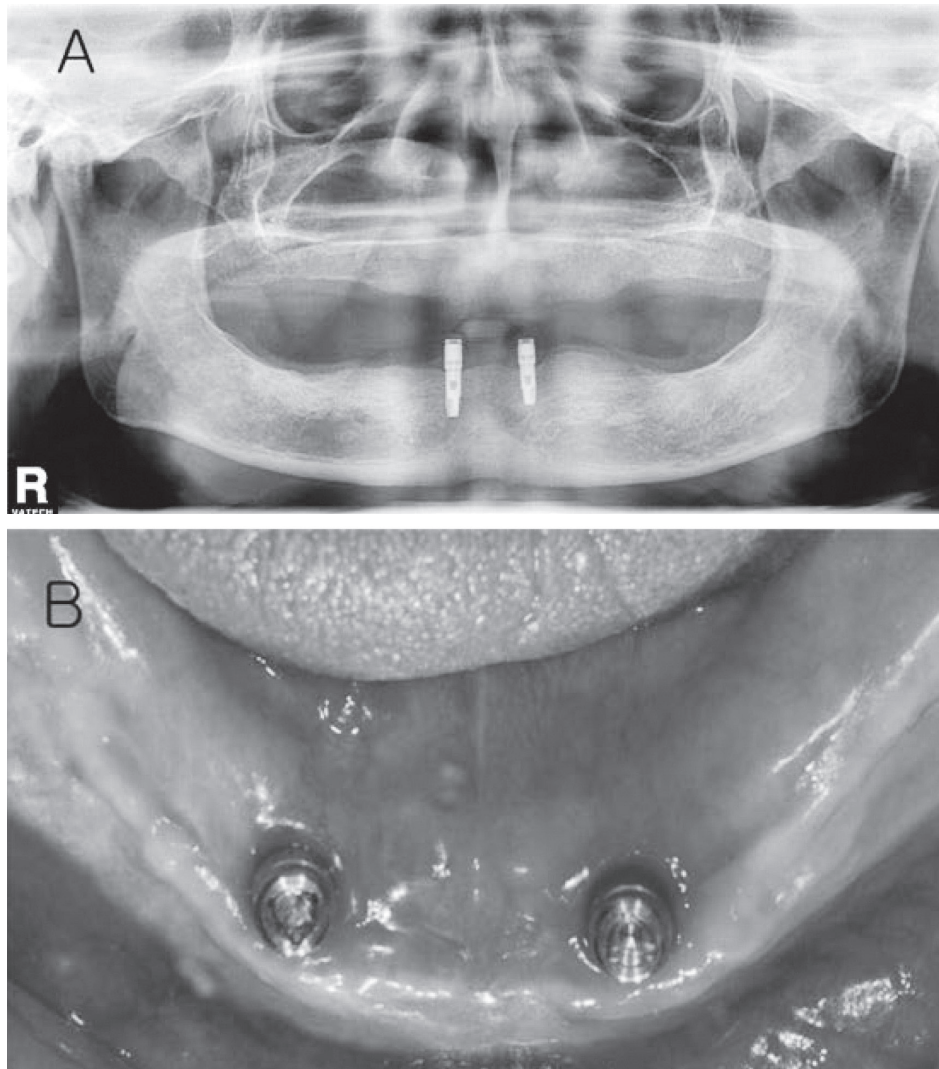
maxillary denture treatment. Patients subjectively perceive the treatment success in terms of increased prosthesis retention and stability [3], however, in most of the mandibular edentulous cases, it may not be possible to achieve optimal results using conventional complete denture treatment alone, thus alternatives must be considered. With the developments in dental implant technology, it is becoming increasingly easier for the clinicians to provide suitable treatment options that can effectively meet functional, economic and social expectations of each individual patient. Though, the most common implant prosthodontic treatment of choice for an edentulous mandible involved the placement of 6-8 implants, all fixed implant-supported prosthesis [4]. However, in patients with severe alveolar bone absorption, aged, medically compromised condition or economic restrictions, the treatment option should be modified into the lesser invasive one. An implant-supported overdenture has been shown to improve masticatory function and patient's satisfaction in complete denture patients [5]. Meanwhile, a mandibular implant overdenture has been reported to be simpler and more cost effective than an implant fixed prosthesis [6]. A minimum two implant supported overdenture in the mandible opposing a maxillary complete denture has even been considered the first treatment choice for completely edentulous patients [7,8]. To anchor overdentures to implants, various attachments such as bars, studs and magnets are utilized. This paper reports on a patient treated using the stud (Locator) and magnet (Magfit) system which are a newly introduced type of attachment. A minimally invasive and less-expensive method are to place endosteal implants in the anterior mandible between the mental foramina.

## Case Description

Case I. Mandibular, two implants with Locator stud Abutments and Maxillary full denture

The patient was an 72-year-old male whose chief complaint was that he was unable to eat owing to his very loose lower full denture. He had been the upper and lower full denture wearer for several years. His medical history was cerebral infarction with predominantly hypertension and based on his medical history, consultation with his neurosurgeon was done prior to surgical treatment since he was on aspirin anticoagulant therapy. Physical and radiographic examinations revealed the severe bone resorption of entire maxilla and bilateral mandibular posterior alveolar bone. The symphyseal height of the anterior mandible was 21 mm. In consideration of his expectation of improved stability and the need for an economically-feasible treatment option, an overdenture on two implants option with a conventional full maxillary denture was presented and accepted.

Anticoagulant therapy was stopped and international normalized ration (INR) evaluated prior to implant surgery, followed by the installation of the implants (4 mm, 11.5 mm) (Osstem US II, Osstem Implant Co., Busan, Korea) at sites #33 and 43 (Fig. 1A). Postoperative complications were minimal and healing was uneventful. After 6 months for osseointegration, a final impression for a overdenture at the fixture level using impression copings were obtained with vinyl polysiloxane impression materials (Imprint II, 3M ESPE, St. Paul, MN, USA). Followed by making the mast cast and the appropriate height of the attachments, two Locator abutments are placed are inserted at 20 Ncm (Fig. 1B). The stability, retention, lip support, esthetic, and denture were shown to be appropriately secured (Fig. 2).

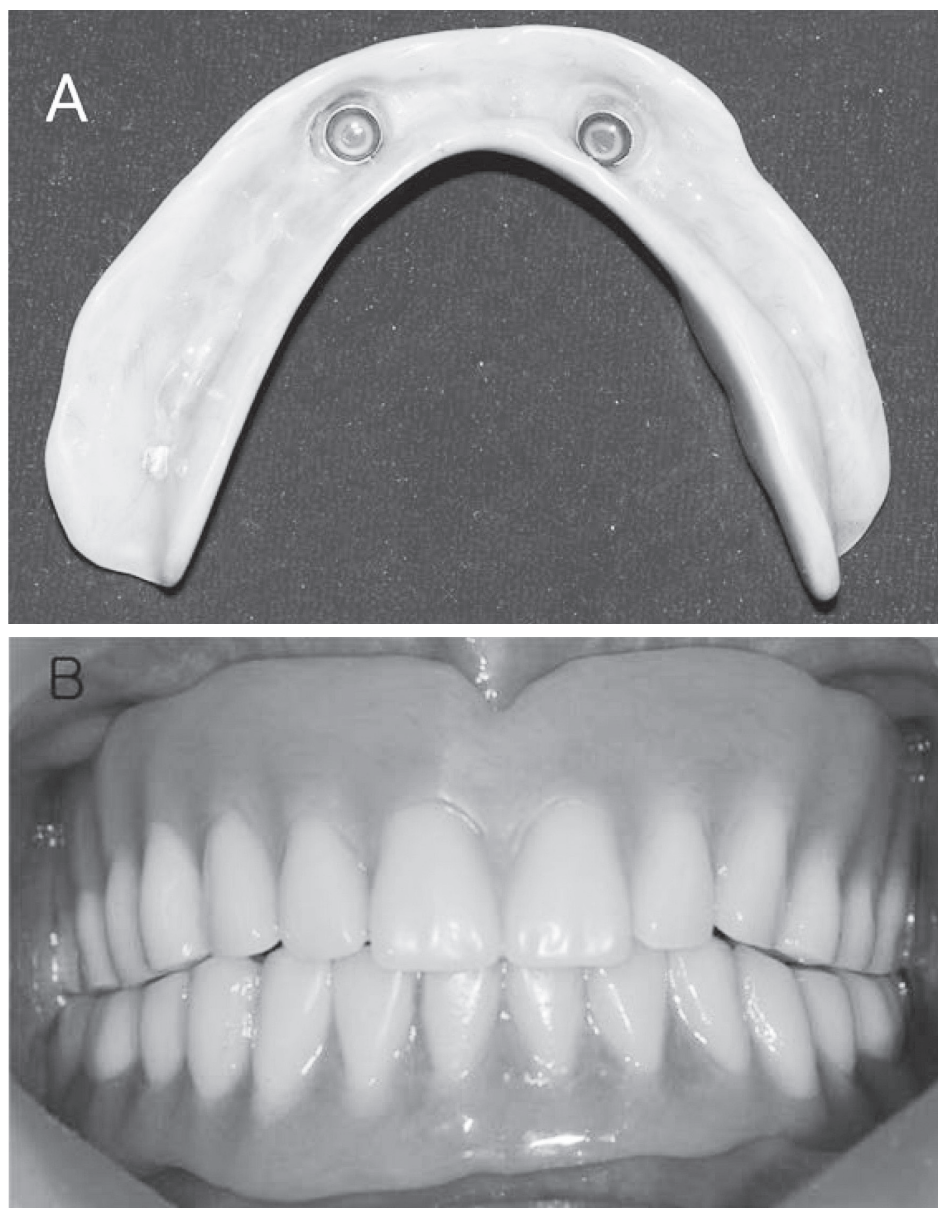


**Fig. 1.** A. The final radiograph shows two implant placement for an overdenture and apparent osseointegration. B. Following implant placement, locator abutments are selected for an abutment finish line of 2 mm above the crest.

Case II: Mandibular, four implants supported and Maxillary two root supported overdenture with magnetic Abutments

The following is a case of a male patient of 65 years old, known terminal periodontitis involved exhibiting severe mobility in remained teeth except #11 and 21 (Fig. 3A). His medical history was found to be pure hypercholesterolemia, primary generalized (osteo) arthrosis and vasovagal syncope history, and had been taken medication of

Aspirin and anti-osteoporosis drug. The patient's main complaint was the exclusion of conventional mandibular full denture wearing after extracting all of remained teeth because he had been aware of its inconvenience and complications due to the lack of retention and stability of the lower muco-supported full prosthesis especially in mandible. After analyzing the case and giving the patient the options, we decided to make a full upper root-supported (#11 and 21) overdenture and in the



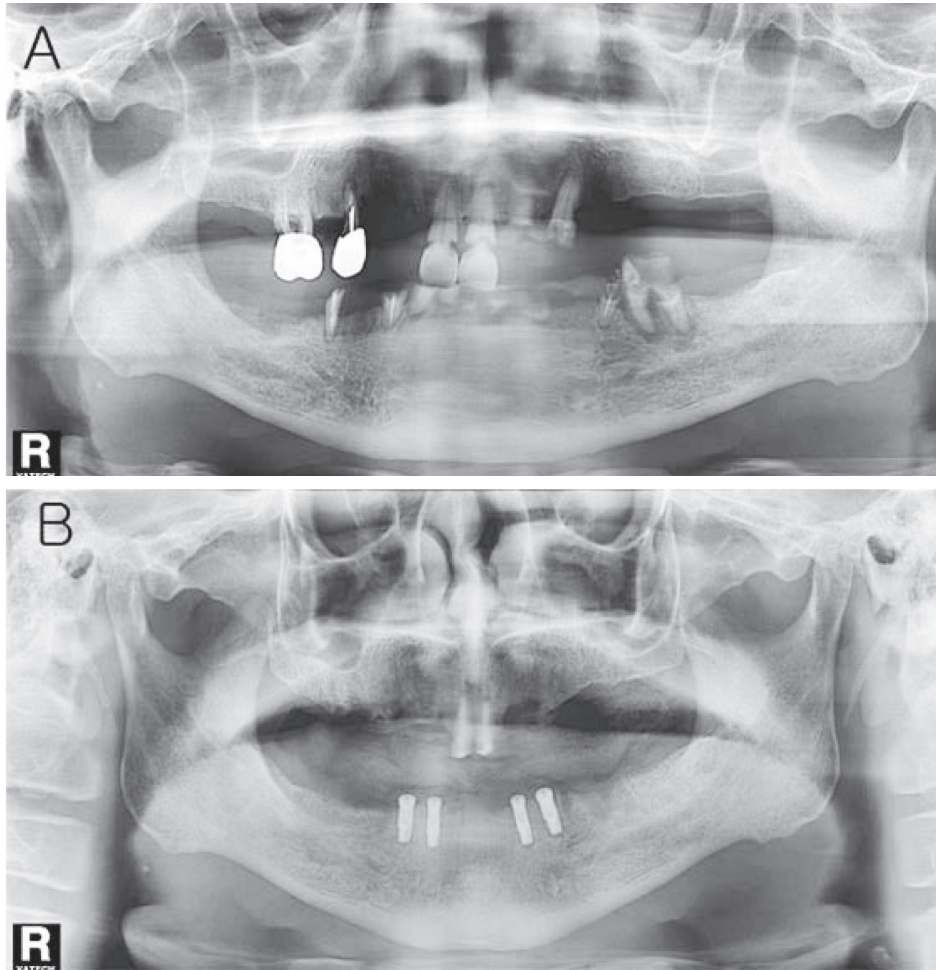
**Fig. 2.** A. The intaglio surface of the fit-checked overdenture reveals the locator abutments and the locator inserts in place. B. Final placement of the removable prosthesis resulted in a very attractive esthetic result and met functional expectations of the patient.

lower part we decided to place four implants of 3.7 mm wide  $\times$  13 mm long (Osstem US II, Osstem Implant Co., Busan, Korea) in symphyseal region (Fig. 3B). Five months after implant placement, pending the osseointegration and gum healing,

magnet keepers (Magfit, Aichi Steel Corporation, Aichi, Japan) were screwed into place on the implants and were tightened to about 30 N/cm.

The height of the keepers was selected and magnets are attached to the denture base (Fig. 4).





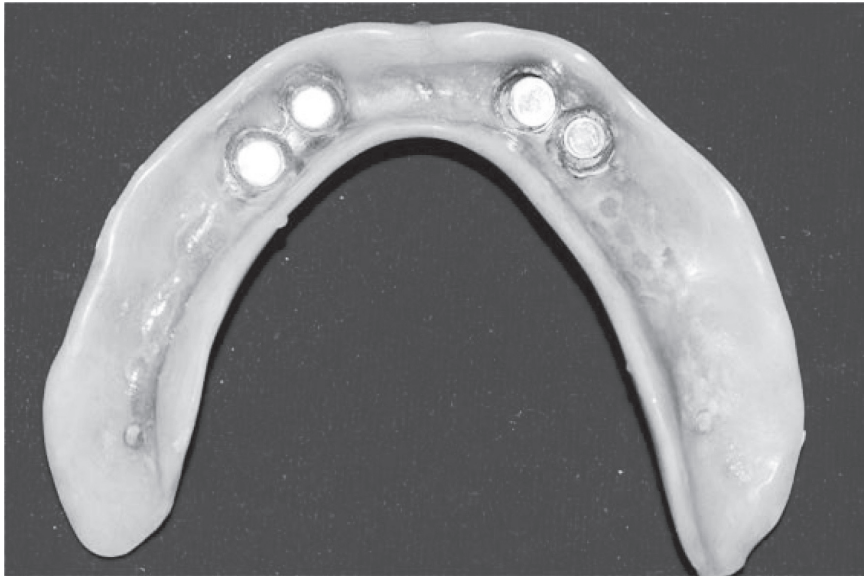
**Fig. 3.** A. Pre-rehabilitation state, panoramic radiograph reveals that patient has been under terminal stage of chronic periodontitis and severe dental caries. B. The final radiograph shows four implants were installed in mandibular symphyseal region for an overdenture and the roots of #11 and 21 teeth were preserved for maxillary full denture.

## Discussion

Basically, edentulous patients are a diverse group comprised of those who are hereditary, medically compromised, economically depressed and geriatric affected. Complete maxillary and mandibular dentures have been the traditional standard of care for edentulous patients for more than a century. Complete denture wearers are usually able to wear an upper denture without problems, but many struggles to eat with the

complete lower denture because it is too mobile. The widespread use of denture adhesives is one indication that these prostheses are inadequate for many denture wearers.

Since dental implant philosophy was first introduced by Brånemark, early researches focused on the bone-implant interface and biological considerations but rather those in implant prosthodontics for the edentulous patient initially received little interest. In recent times, considerable advances in implant dentistry have been made in



**Fig. 4.** Clinical appearance 1 year after attachment of denture with magnets. The intaglio surface of the processed maxillary overdenture reveals the locator abutments and the blue locator inserts in place.

understanding and acceptance the prosthodontic aspects of implant-related treatment, especially in mandibular implant overdenture treatment. It is an attractive treatment option because of its relative simplicity, minimal invasiveness, and affordability [9]. The prosthesis is supported by both implant and mucosa and generally requires fewer implants when compared with the totally implant supported prosthesis design. Fewer implants and movable prosthesis offer a less complex and less expensive option for an elderly or medical compromised edentulous patient [9]. These include decreased bone resorptions; reduced or eliminated prosthesis movements; better esthetics; improved tooth positions; better occlusion, including improved occlusal load direction; and increased occlusal function and maintenance of the occlusal vertical dimension. Additionally, a direct relationship has been shown between prosthesis retention and stability and patient satisfaction [10,11].

In this paper, two major considerations were evaluated for both patients before making the

treatment plan. Medical management of the older patient presents additional challenges, as they had ischemic stroke history and cardiovascular problem respectively. In addition, they were on anti-coagulants, which made it necessary to bring down their INR to 1.0-1.5 prior to implant surgery through the consultation with the corresponding departments. Financial aspects were considered as well, because general costs for full fixed implant supported restoration with bone grafting in bimaxillary edentulous state were about 3 to 4 times expensive those of implant overdenture therapy in these cases.

There are various options for implant-supported overdenture attachments such as bars, studs and magnets et cetera. Though bar attachment system has the greatest retention [12], dimensional change due to the errors, increased chair time and high cost of fabrication are problems in that system. Locator attachments are available in different vertical heights and they are resilient, retentive, and durable and have some built-in angulation

compensation. In addition, repair and replacement are easy and fast [13,14]. Open-field aluminum-nickle-cobalt magnets have been used in prosthodontics for many years, but success has been limited because these magnets are susceptible to corrosion by the saliva and because their retentive force is weak relative to the initial retention offered by mechanical attachments. A new system has been introduced to seal the metal capsule around a magnet and thus to protect it from corrosion in the mouth. According to one manufacturer, the integrity of the system is assured by carefully micro laser welding the 2 parts of the capsule together to a depth of about 70  $\mu\text{m}$  [15,16].

In these cases, two edentulous patient were provided by implants supported overdenture using attachments that can effectively meet functional, economic and social expectations of each individual patient. However, periodic recall check is necessary and long-term clinical results are required to maintain their quality of life .

## Conclusion

This report demonstrates the successful use of endosteal implants together with attachments in the mandibular symphyseal area for two edentulous patients. This improves retention and stability of the lower denture and could provide the patients with an advanced and a better masticatory quality when compared as the conventional full denture.

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