

## Immediate Loading of an Implant Locator Retained Removable Complete Denture: A Case Report

Ahmad Qazali<sup>1\*</sup>, Hussain Almuayrifi<sup>2</sup>, Osama Bagabas<sup>3</sup>, Fatimah Alshamqity<sup>4</sup> and Sarah Almuzaini<sup>2</sup>

<sup>1</sup>Prosthodontics Department, Taibah University, Saudi Arabia

<sup>2</sup>College of Dentistry, Taibah University, Saudi Arabia

<sup>3</sup>Restorative Dental Sciences Department, Taibah University, Saudi Arabia

<sup>4</sup>Ministry of Health, Saudi Arabia

**\*Corresponding Author:** Ahmad Qazali, Assistant Professor, Department of Prosthodontics, College of Dentistry, Taibah University, Al Madinah Al Munawwarah, Saudi Arabia.

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### Abstract

**Objective:** Since their introduction, mandibular implant overdentures represent a highly predictable and successful treatment modality for edentulous patients. Immediate loading of mandibular implant-retained overdentures has not been extensively reported in the literature. This case report describes a successful 2-year follow-up of clinical and radiographic performances of immediately placed and loaded mandibular implant-retained locator overdenture.

**Method:** Four implants were placed, immediately loaded and patient was instructed to not remove the overdenture for the first week after surgery. The patient was examined at the 1<sup>st</sup> week, 1<sup>st</sup>, 3<sup>rd</sup>, 6<sup>th</sup> months, 1<sup>st</sup> and 2<sup>nd</sup> years after the surgery.

**Results:** After a 2-year follow up period, there was no implant failure, crestal bone levels and implant stability were found to be good.

**Conclusion:** Absence of any complications with good hard and soft tissue health indicates that the immediate loading of four mandibular implants by means of locators overdenture may be a predictable treatment option. This treatment modality also improved the denture stability and comfort of the patient, while keeping a high implant success rate.

**Keywords:** Prosthodontics; Dental Implant; Implant Overdenture; Implant Locator; Removable Denture

### Abbreviations

YLD: Years Lived with Disability; IODs: Implant Retained Overdentures

### Introduction

Oral diseases are now considered a public health problem with an estimated 90% of the world's population affected by some form of oral disease [1]. Dental caries and periodontal disease, both of which lead to tooth loss if left untreated, account for 35% and 10% of all oral problems respectively; and collectively affect 3.9 billion people worldwide [2]. The 2017 Global Burden of Disease study recognizes

tooth loss as the leading cause of years lived with disability (YLD) due to oral conditions, and attributes 7.3 million all-ages YLDs to total tooth loss with a prevalence of 267 million cases in 2017 [3]. Limiting the number of YLD in patients with tooth loss require restorative strategies that not only replace the natural dentition in terms of esthetics but also efficiently reestablish the overall functions of the stomatognathic system like mastication, speech and swallowing.

Complete dentures have proven to be ineffective for a holistic restoration of oral functions in most cases and this where osseointegrated dental implants have proven very effective, leading to a definitive improvement in oral function, phonetics, esthetics and overall quality of life [4-9]. The most critical criteria to ensure longevity and success of implant therapy are attaining and maintaining osseointegration and long-term stability [10,11]. Several studies have reported the advantages of using removable implant retained overdentures (IODs) as an alternative to complete dentures; most important of which is that it minimizes the complications that accompany complete dentures like bone loss and eventual loss of retention, stability and support [6-9,12].

Mandibular implant overdentures have been used in different numbers and different loading protocols by practitioners over the years, depending on the clinical situation [13]. These may be two, three or four interforaminal implants, splinted bars or non-splinted attachment systems delivered in an immediate, early or delayed loading, all these different combinations of implant numbers and loading protocols have high survival rates [6,12-17]. Despite the paucity of longitudinal studies comparing the survival rates of IODs with different number of implants, there are evidences available in literature that can help clinicians make an informed decision.

Studies have produced varying results; one study concluded that bone loss or post-operative complications after restoration with IODs is not significantly related to the number of implants supporting the overdenture [18]. Another study showed that mandibular IODs retained with 4 implants (especially those with a ball attachment) showed better survival rates than those retained with two implants [19]. However, when IODs retained with one or two implants were compared, most studies showed that postloading survival rates of both were not significantly different [20,21]. Since implant based prosthodontic care is often cost-restrictive, clinicians usually offer two implant removable IODs to patients which are more economical than the four implant IODs and are a viable alternative to conventional dentures. Many of these patients might wish to upgrade from a removable to fixed implant retained prosthesis later on, but due to cost of additional implant surgery and related complications, may not actually go through. In this situation, placement of four implants might prove to be a prudent solution.

The present case report documents the 2-year follow-up of the performance of a mandibular overdenture retained on four non-splinted implant locator attachment system that was immediately loaded using a slightly modified protocol that is described in this report.

### Case Report

A sixty-year-old relatively healthy female patient came to the dental practice with the chief complaint that she was unable to chew her food properly. Patient was only interested in treatment options that would allow her to obtain teeth instantly and to eat food comfortably. Patient history, Clinical and radiographic examinations, cone beam computed tomography scan and diagnostic casts revealed that the patient was partially dentate and the existing dentition had poor prognosis due to a long-standing history of periodontal disease (Figure 1-5). Patient was classified as Class III as per the Prosthodontic Diagnostic Index classification system for partial edentulism [22]. The anterior mandibular ridge was assessed as mixed D1-D2 density bone with a vertical height of about 15 mm [23]. Patient's medical history did not suggest any contraindication to implant placement. After discussing treatment options with the patient, including functional and esthetic expectations, the patient opted to have an immediately loaded mandibular implant overdenture and a maxillary removable partial denture at the time. A sequential treatment plan was formulated and the maxillary RPD and the mandibular complete denture prostheses were fabricated prior to implant placement surgery.



Figure 1: Initial patient presentation, extraoral frontal view.



Figure 2: Initial patient presentation, intraoral occlusal and side views.



Figure 3: Initial patient presentation; intraoral frontal view.



Figure 4: Initial study casts.

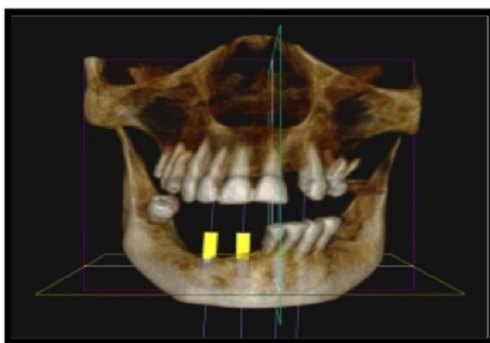
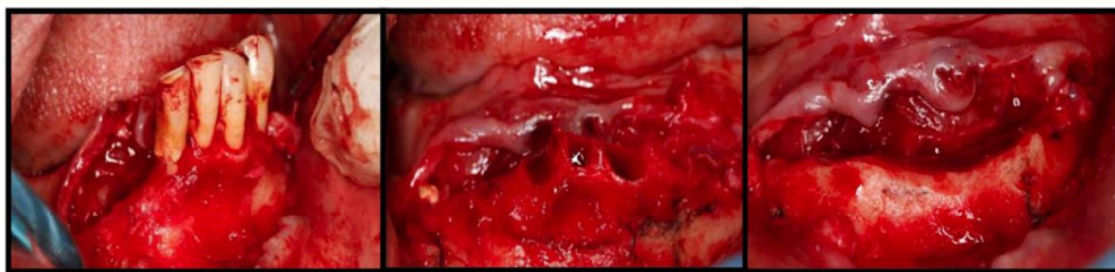
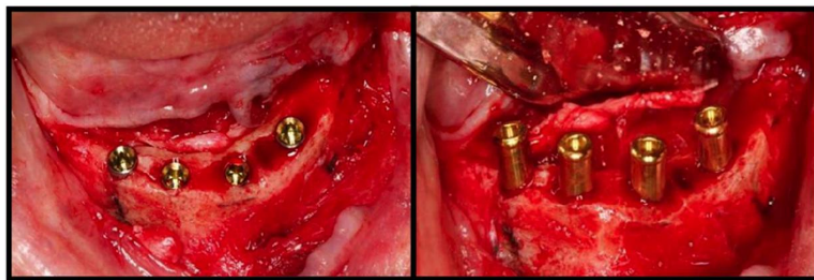


Figure 5: Preoperative cone beam computed tomography implant planning.

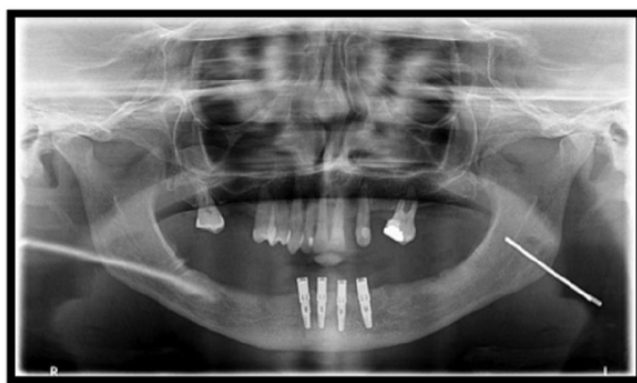
On the day of surgery, teeth number 34, 33, 32, 31 and 47 were extracted along with some alveoplasty (Figure 6) and four implants (3.8 mm × 12 mm) (Tapered Plus, Biohorizons, USA) were placed interforaminally at the crestal level according to the appropriate surgical placement protocol. All implants had initial primary stability of more than 50 Ncm and postoperative radiograph was taken to confirm implants positions (Figure 7 and 8). Four conventional locator abutments (Zest anchors, Zest Dental Solutions, USA) with 3 mm height were torqued to 20 Ncm onto the implants (Figure 7) and size 4-0 coated Vicryl plus (Ethicon, Johnson & Johnson International) sutures were placed to obtain primary closure without covering the locators. The intaglio surface of the mandibular denture was adjusted and implants positions were marked using a polyvinyl siloxane impression material (Blu-Mousse, Parkell, Inc., USA). Channels were drilled through the implants' marks in the denture fitting surface using a straight handpiece and acrylic trimming burs (Chairside, Zest Anchors, Zest Dental Solutions, USA) and locator housings were picked up using auto polymerizing polymethyl methacrylate resin (DuraLay, Reliance Dental Manufacturing LLC, USA) (Figure 9). Excess resin was trimmed and the prosthesis was finished, then polished. Four blue locator inserts were used to replace the black processing inserts and the prosthesis was placed in the patient's mouth (Figure 10).



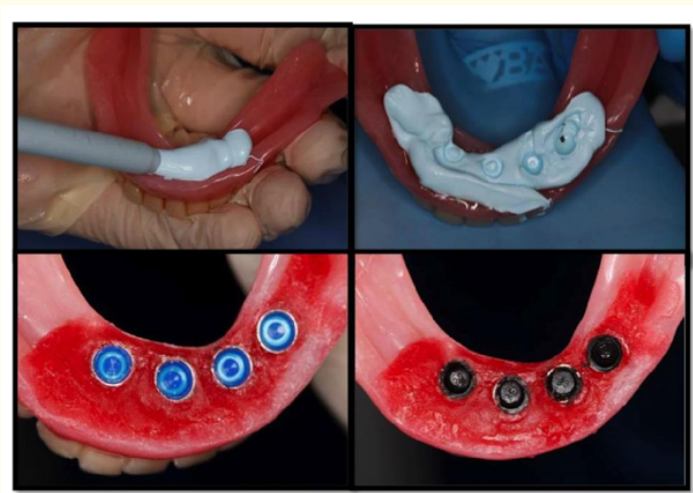
**Figure 6:** Extraction of mandibular teeth, alveoplasty and bone reduction of mandibular ridge.



**Figure 7:** Placement of 4 mandibular implants intra-foraminally and 4 conventional locators torqued onto the implants.



**Figure 8:** Radiographic appearance of the implants at the day of surgery.



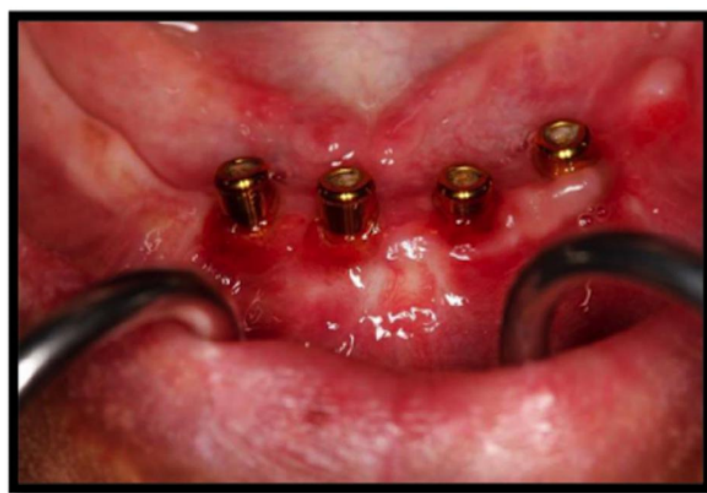
**Figure 9:** Implant positions marked on the intaglio of the mandibular denture and locator housings picked-up with auto-polymerizing resin. Black processing inserts replaced with blue low retention level inserts.



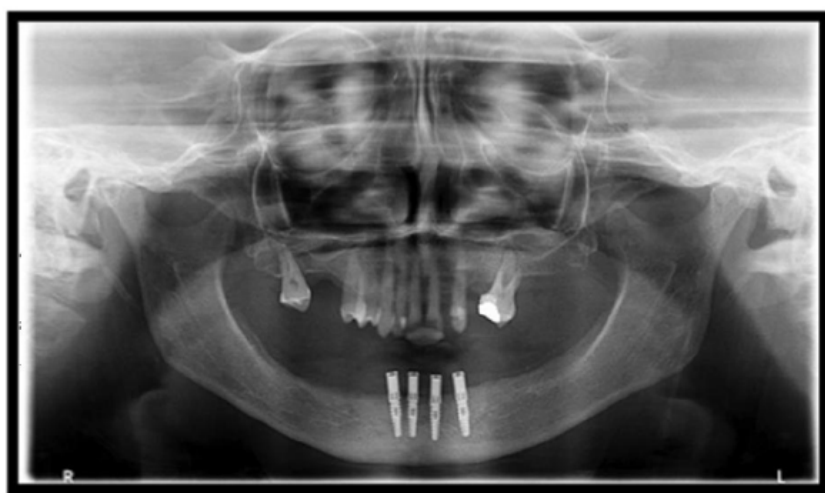
**Figure 10:** Post-operative mandibular prosthesis inserted in patient's mouth.

The patient was given written and verbal post-operative instructions including diet, oral hygiene and she was instructed to not remove the mandibular implant overdenture for the duration of one week. Antibiotic and analgesics were prescribed post-operatively (Augmentin 1g, Paracetamol 500 mg, Ibuprofen 600 mg) for 7 days. A soft diet was recommended to the patient during the early phase (6 - 8

weeks post-operatively). After 7 days, the mandibular prosthesis was disconnected and sutures were removed. At this postoperative visit occlusion was checked, the need for any prosthetic maintenance evaluated and adjustments were completed as necessary. The implants were evaluated clinically and radiographically at the 1<sup>st</sup> week, 1<sup>st</sup>, 3<sup>rd</sup>, 6<sup>th</sup> months, 1<sup>st</sup> and 2<sup>nd</sup> years (Figure 11 and 12) after the surgery for stability and for assessment of crestal bone levels. This treatment method resulted in adequate soft and hard tissue healing with patient satisfaction and the absence of any complications.



**Figure 11:** Post-operative intraoral view of after one month.



**Figure 12:** Radiographic appearance of healed and osseointegrated implants after 2 years.

### Results and Discussion

In recent years, the success of implants has encouraged dental practitioners to increasingly adopt dental implant therapy for the rehabilitation of edentulous jaws. With high survival rates and low post-operative complications, IODs have proven to be a successful treatment modality that significantly improve the oral and facial characteristics of completely edentulous patients and have therefore become an integral part of prosthodontic treatment [4-6,12,24,25]. Longitudinal studies on long term survival rates of mandibular IODs have reported high survival rates of implants irrespective of the number, type of attachment and the loading protocol [26,27]. However, only few case studies are available in literature that document long term survival and success rates of immediate loaded implants, which makes comparisons with other loading protocols a bit cumbersome [14]. Nevertheless, IODs immediately loaded using standard or modified protocols have shown fairly good success [12,16,28].

Studies have listed out few critical criteria for success of IODs with an immediately loaded protocol. Presence of adequate bone (both height and width), implant location, coating and length as well as absence of any systemic conditions that may contraindicate implant placement are the most important when it comes to immediately loaded IODs [29-31]. In the present case, patient had adequate bone height of 15 mm and did not suffer from any preexisting systemic disease and this may have contributed significantly to the stability and success after a 2-year follow-up. Adequate ridge height and width in the patient enabled the placement of longer implants with sufficient width.

Mandibular implant overdentures can be retained using different types of attachments which are divided into categories - splinted attachments and solitary attachments [4-9,14-17,24,32]. Example of a splinted type is the bar/clip attachment whereas the ball, ERA, magnet, and locator types are solitary type attachments that are connected to an implant individually and provide retention through mechanical engagement of male and female parts [4-9,24,32]. Generally, stresses from implants are transferred vertically to the surrounding bone but horizontal forces are also generated by the location, number and direction of masticatory forces on the implants [12,17,24,25,33]. The denture base receives a considerable amount of bending forces that are then transmitted to the alveolar bone below it which causes the base to behave as a fulcrum line - this makes the attachment type a very important criteria that affects the overall success of the IOD. The clinicians preferred the use of locator attachments in this case as these have demonstrated better success than other attachment methods in case of un-splinted implants during immediate loading [15,34,35].

Stress transmission in the IOD is also determined by the number of implants that support the IOD; greater number of implants placed following strict restorative parameters and protocols demonstrate higher success and survival rates [6,13,17,23,36]. Moreover, placing a higher number of well-planned and well-placed implants allows the added option of future upgrades from a removable to a fixed implant prosthesis, possibly without the need for additional surgery in patients who desire to make the transition. The desirable results demonstrated by the implant therapy delivered to the patient in this case after the 2-year follow-up should encourage clinicians to adopt this treatment protocol in similar cases in their practice.

### Conclusion

The clinical case described in this report indicate that four intra-foraminally placed dental implants with immediate loading using an implant locator overdenture prosthesis can be a successful treatment option with a predictable outcome thereby increasing patient satisfaction and reducing treatment time. This treatment method offers increased stability and comfort while maintaining a high implant success rate.

Further clinical corroboration is needed for this treatment modality, preferably with randomized clinical trials to conclusively establish its superiority over other methods.



**Acknowledgements**

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**Conflict of Interest**


The authors declare that they have no conflict of interest regarding the publication of this paper.

**Consent**

The patient gave written consent prior to beginning the treatment procedure (Appendix 1).

**Appendix 1**

Kingdom of Saudi Arabia  
Ministry of Higher Education  
Taibah University  
College of Dentistry



المملكة العربية السعودية  
وزارة التعليم العالي  
جامعة طيبة  
كلية طب الأسنان

إدارة العيادات بكلية طب الأسنان  
( Informed consent نموذج الموافقة على العلاج في العيادات بكلية طب الأسنان جامعة طيبة )

<p>Name <u>Zainab Al-Nakhi</u></p> <p>Mobile number <u>0503216400</u></p> <p>No. civil registry _____</p> <p>Dear applicant for treatment in the clinics of the Faculty of Dentistry :Thank you for your interest in receiving treatment at the College Clinics. Please read the following information carefully and sign in the exact place</p> <p>1- The comprehensive treatment program at the college may take several months, and your admission to the program includes a commitment by you to be present at the dates determined during that period. The remedial steps are taken by the students of the college under the supervision of professors, consultants and specialists in the college.</p> <p>2 - The most complex and advanced treatment cases that exceed the capabilities of students will be treated by faculty members of consultants and specialists as provided by the program of treatment and education of the College.</p> <p>3 - Work in regular dental clinics from Sunday to Thursday from 8 am to 12 noon and from 1 pm to 4 pm.</p> <p>4 - When you apply for treatment for the first time you will enter the clinics of the initial detection to be so sorting as called for by your illness.</p> <p>5. If you have to be absent on time, please inform us by telephone at (8618332) at least four hours in advance. If you do not meet the deadlines and repeated three consecutive times without an excuse, you may be forced to terminate your treatment program. College.</p> <p>6 - Although all efforts will be made to complete all your therapeutic requirements, we can not meet these requirements only within the limits and possibilities of the educational program in college, and that your acceptance of treatment in one of the departments in the clinics of the College does not mean that we are obliged to provide treatment to you in other sections.</p> <p>7 - You can take advantage of your radiographs, photographs, dental molds and some medical information about your condition without mentioning any special data for research purposes, in the case of non-invasive descriptive research.</p> <p>8. My signature below is that I have been fully aware of the above information and that I would like to receive treatment at the College Clinics and I agree with any diagnostic or therapeutic procedures that may be required.</p>	<p>الاسم رقم الجوال رقم السجل المدني</p> <p>عزيزي المتقدم للعلاج في عيادات كلية طب الأسنان: شكراً لاهتمامكم في تلقي العلاج بعيادات الكلية، يرجى قراءة المعلومات التالية بعناية والتوقيع في المكان المحدد لذلك.</p> <p>١- برنامج العلاج الشامل بالكلية قد يستغرق عدة أشهر، وإن الانضمامكم للبرنامج يتضمن التزاماً من جانبك بالتواجد في المواعيد التي تحدد لكم خلال تلك الفترة، للخطوات العلاجية يقوم بها طلاب الكلية تحت إشراف أساتذة واستشاريين وأخصائيين في الكلية.</p> <p>٢- الحالات العلاجية الأكثر تعقيداً وتقدماً والتي تتحدى قدرات الطلاب سيتم علاجها بواسطة أعضاء هيئة التدريس من استشاريين وأخصائيين حسب ما يتاحه البرنامج العلاجي والتطبيعي للكلية.</p> <p>٣- العمل بعيادات الأسنان منتظم من الأحد وإلى الخميس من الثامنة صباحاً وحتى الثانية عشر ظهراً ومن الواحدة ظهراً وحتى الرابعة مساءً.</p> <p>٤- عند التقدم للعلاج للمرة الأولى سيتم دخولكم لعيادات الكشف الأولى ليتم بذلك الفرز حسب ما تستدعيه حالتكم المرضية.</p> <p>٥- في حالة يضطرركم للتخلف عن الحضور في الموعد المحدد يرجى الإبلاغ بذلك على الهاتف رقم (٨٦١٨٣٣٢) قبل الموعد المحدد بأربع وعشرون ساعة على الأقل، وإن عدم التزامكم بالمواعيد المحددة وتكرار التخلف عن الحضور ثلاث مرات متتالية بدون عذر قد يضطروننا لسفوف إلى إنهاء برنامجكم العلاجي بالكلية.</p> <p>٦- مع أن كل الجهود ستبذل لإتمام جميع متطلباتكم العلاجية، فإلا لا نستطيع لرفاه بهمة المتطلبات إلا في حدود وإمكانيات البرنامج التعليمي في الكلية، وإن قبولكم للعلاج بأحد الأقسام في عيادات الكلية لا يعني ذلك التزاماً منا بتوفير العلاج لكم بقية الأقسام.</p> <p>٧- يمكن الاستفادة من صور الأشعة الخاصة بكم والصور الفوتوغرافية وقوالب الأسنان وبعض المعلومات الطبية عن حالتكم المرضية من دون الإشارة لأي بيانات خاصة لإغراض بحثية، في حالة إجراء بحوث وصفية غير تنقلية.</p> <p>٨- توقيعكم بالأسفل يفيد بأنكم قد أقمتم إيماناً تاماً بالمعلومات المدونة أعلاه وأنتي أُرغب في تلقي العلاج في عيادات الكلية ولوافق على ما قد يتطلبه ذلك من إجراءات تشخيصية أو علاجية.</p>
<p>Signature <u>[Signature]</u> التوقيع</p> <p>Time _____ الوقت</p>	<p>الاسم التاريخ</p> <p>name Date <u>2/3/2017</u></p>

حروزان بن محمد  
خطيب رقم ٣

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