

Stability of Single Implant Supporting Mandibular Overdenture. A Case Report

Mohsen H¹, Agamy EMT², Mohamed GF³

¹Assistant Lecturer of Prosthodontics Faculty of Dentistry Minia University, Egypt

²Professor of Prosthodontics and Vice Dean for Student Affairs Faculty of Dentistry, Minia University, Egypt

³Professor of Prosthodontics and Vice President of Sinai University, Kantara Branch Egypt

ABSTRACT

A Large number of completely edentulous patients are usually not satisfied by their conventional complete dentures. Pleasant denture retention and stability are difficult to be obtained specially in atrophied ridges. The case report describes completely edentulous patient presented to the Outpatient Clinic, Prosthetic Dentistry Department, Minia University. A Complete denture was constructed, and decision of inserting implant was made. Choosing single implant to support the mandibular overdenture was a suitable low-cost treatment option. The single implant was inserted in the para symphyseal area. The implant denture connection was provided by a locator attachment. The follow up period was 12 months from implant insertion. Implant stability was checked using smart peg and ostell device every 3 months. The outcome was pleasant to patient and his ability to eat hard food was regained. The retention and stability were satisfactory to both patient and operators. No signs of implant failure were observed.

Keywords: Single implant, mandibular overdenture

Correspondence:

Mohsen H

Assistant Lecturer of Prosthodontics Faculty of Dentistry Minia University, Egypt

Email: haythamdentist@gmail.com

INTRODUCTION

The traumatic transition from dentulous to edentulous state and wearing dentures is often not well accepted by patients. The patient believes that he lost his youth, esthetics and previous phonetic. Also, physical and psychological deterioration maybe accompanying Side-effects (1). Restoring an edentulous mandible can be achieved with a conventional complete denture, an implant retained fixed prosthesis or implant retained removable overdenture. the ideal treatment option should be selected through prosthodontist - patient relation. Functionally, patients may select treatment options that may be considered inferior to other interventions. So, custom treatment plan should be established for every single patient. (2) when an implant supported fixed prosthesis is not possible due to financial, functional, or anatomical limitations; available evidence suggests that the first-choice standard of care for the edentulous mandible is an overdenture retained by 2 implants. (3) The concept of the mandibular single-implant overdentures is a reality for elderly edentulous populations due to its advantages. These are smallest intervention with satisfactory improvement in the support, retention and stability of complete dentures, less invasive implant surgery in the anterior mandible and reduced implant components and prosthodontic costs. (4)

Single implant supporting mandibular overdenture can simplify the treatment of completely edentulous cases. stability, retention and patient satisfaction can be still maintainable. (5) In six years of clinical study over eleven patients, *Passia* (6) founded that using single implant to retain mandibular denture is a successful treatment option for elderly edentulous patients. Activation of matrix due to loss of retention or its change were the most common prosthetic maintenance intervention. Fracture in denture base at midline area was also a common event, reinforcing the denture bases with a metal framework during repair was sufficient.

Anatomical limitations and vital structures are scanty in the inter-foraminal region. This enhances the process of implant insertion with minimal risk of injuring any near nerve or blood vessel, with a success rate of

≥95% for implants placed in this area. (7) The favorable attachment for overdentures should allow even stress distribution to biological supporting structures (8). Attachment selection depends on the retention needed, jaw anatomy and morphology, function and patient ability for recall visits. Also, implant angulation plays an important role in choosing attachments. (9) Locator attachments are self-aligning and have different colors with different retention values. They are resilient, durable, retentive and can compensate for some angulation between fixture and final restoration. Dual property allows for internal and external retention. Also, they are easily repaired and replaced. (10)

Locator attachment has a low profile and has different vertical heights so it can be used with limited inter arch space. (11) Implant stability can be measured using an adaptor connected to the implant. The technique suggested by **Meredith** (12) can analyze the resonance frequency by commercially produced device called Osstell TM (Osstell AB, Goteborg, Sweden). A measurement of Osstell TM is displayed as implant stability quotient (ISQ) from one to 100, where 100 signifies the highest implant stability. The activated smart peg begins to vibrate, producing electric volt in the probe coil. This magnetic resonance is converted into digital readings by frequency analyzer. (13)

Case Report

sixty years old completely edentulous male patient came to Removable Prosthodontics Department Faculty of Dentistry Minia University with chief complaint of inability to eat. He was seeking for complete denture construction. Clinical examination revealed well developed mandibular ridge. Medical condition was assessed through clinical and laboratory investigations. The patient was medically free that enhanced the use of dental implant to support mandibular overdenture. To overcome the low socioeconomic level of the patient; the decision of inserting single para symphyseal implant was taken. Radiographic evaluation by cone beam computed tomography (CBCT) was done using a duplicate of his denture with gutta percha cones used as radiopaque markers in the fitting surface (**Fig 1**).

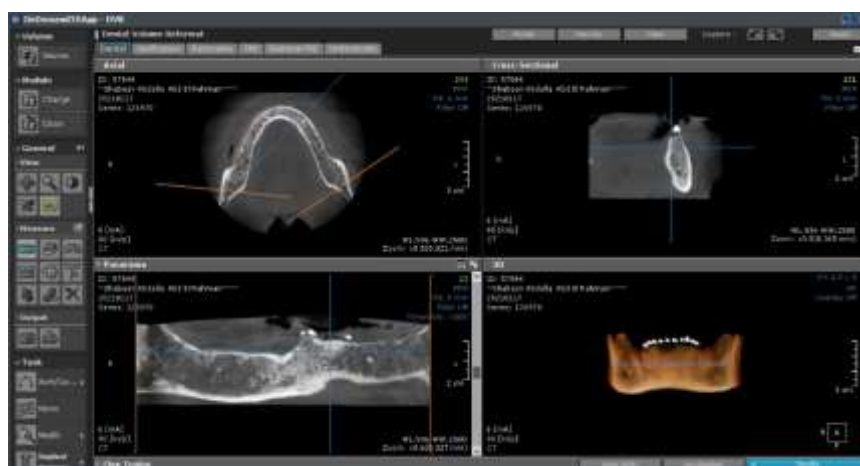


Fig 1 CBCT of the mandibular ridge with radiopaque markers.

Detailed examination of the obtained CBCT was done. Bone quality and quantity were assessed digitally. Bone dimension was measured, and implant type was selected. The implant¹ was 14 mm in length and 3.6 mm in diameter. Computerized surgical stent was fabricated to guide implant insertion in the desired location and angulation.

The surgical guide was printed by 3D printer with single metal sleeve over insertion site and three buccal screw channels. The channels allowed for placement of fixation screws (Fig 2).



Fig 2 surgical guide fixe in place using fixation screws.

Preoperative antibiotic² was administered and continued for 3 days post-operative. Bilateral mental nerve blocks anesthesia³ with lingual infiltration were administered. Low speed hand piece with internal irrigation was used in drilling procedures. osteotomy preparation was performed at the planned implant site by start drill to determine the direction of successive drills. Then using initial cylindrical drill 2.3 diameter and 8mm length followed by final preparation using 3.2 diameter drill length of 14mm.

The implant was manually inserted using a torque wrench until implant was flushed with the bone. External coolant was applied during tightening the implant to avoid overheating of the bone.

Smart peg type 7 was mounted to the fixture to measure implant primary stability using ostell device. Implant stability was measured at implant insertion time and every 3 months for 9 months after loading. Demounting of smart peg was done and covering screw was used to cover the implant internal hex (Fig 3).

¹ Dentium super line implant 6761 Katella Avenue Cypress, CA 90630

² Amoxicillin Clavulinic Acid, Glaxo-Smith Kline-Becheem Great Britain

³ Artinibsa, Laboratorios Inibsa, S.A., Ctra. Sabadell a Granollers, km 14,5, 08185 Llica de Vall, Barcelona- Spain



Fig 3 smart peg type 7 screwed to implant fixture.

Three months after surgery; patient was recalled for implant loading. Starting with implant exposure with punch technique. The healing abutment was mounted to implant fixture allowing for soft tissue healing around implant. One week later, healing abutment was removed,

and the locator attachment was screwed to the fixture. Nylon cap and metal housing of the locator was assembled and placed over the attachment patrex for pick up procedure (Fig 4).



Fig 4 metal housing over locator attachment.

Pick up performed by widening the fitting surface of mandibular denture over implant site followed by preparation of a hole to communicate inner and outer surface of the denture. The aim was to allow for sufficient thickness of the pick-up material. Pick up material was mixed and applied in the hole of the lower denture and patient was instructed to close in centric relation while wearing his complete denture until setting of the pick-up material. After setting of the pick-up material, mandibular denture was removed, and excess material was trimmed away. Denture finishing and polishing was done. Denture was delivered to patient who was recalled after one week for primary inspection. Routine inspection every 3 months was done for maintaining good adaptation and correction of any unwanted situation.

At these visits denture retention and stability were evaluated and any complaint was recorded. No gross reduction in implant stability was observed (Table 1).

Table 1: Implant stability at different time intervals.

| Time | Implant stability |
|------------------------|-------------------|
| Implant insertion | 55 |
| Loading | 62 |
| 3 months after loading | 61 |
| 6 months after loading | 62 |
| 9 months after loading | 61 |

DISCUSSION

Single implant was used to support the mandibular overdenture to overcome the low socioeconomic level of the patient. Also, previous studies showed relevant success level of using a single implant. The site of implant insertion was the Para symphyseal area. Area selection was due to anatomical limitation on the symphyseal area. No sufficient bone width was detected. Computerized surgical guide was used to maintain the proper implant position and direction. Shorter healing time with surgical guide over open flap surgery is advantageous. Implant stability was measured using ostell device to provide quantitative way for follow up. Implant

stability was monitored every 3 months to prevent implant failure. Locator attachment system was selected in this case to provide double retention. Engaging internal surface of the patrex in addition to the external one; increases retention value and patient satisfaction. conventional implant loading provides better osseointegration and decreases implant failure possibility due to premature loading. Reduced implant stability value at insertion time was a result of lower bone quality. Primary stability came from degree of implant tightening with corresponding bone. Osseointegration increases implant stability. Routine clinical examination enhances the prognosis and decreases problems that come to surface after denture delivery. Maintenance of a traumatic occlusion and removal of premature contacts prolong denture use time. At all times of inspections, patient was satisfied by his new retentive mandibular overdenture. Patient's chief complaint was eliminated with no signs of inflammation around the implant.

CONCLUSION

Using single implant to support mandibular overdenture may be a viable treatment option for edentulous mandible. This modality gains more importance in cases where there is any limitation that restrict the use of more implants. Further studies are needed to explore more options with single implant.

REFERENCES

1. Abdul Razak P, Jose Richard K M, Thankachan R P, Abdul Hafiz K A, Sameer K M. Geriatric Oral Health: A Review Article. *J Int Oral Health*, 2014; 6 (6): 110-6.
2. Mericske-Stern R, Taylor TD, Belser U. Management of the edentulous patient. *Clin Oral Implants Res*.2000; 11:108-25.
3. Feine JS, Carlsson GE, Awad MA, Chehade A, Duncan WJ Gizani S, et al. The McGill consensus statement on overdentures. Mandibular two-implant overdentures as first choice standard of care for edentulous patient. Montreal, Quebec, May 24-25, 2002. *Int J Oral Maxillofac Implants*. 2002; 17:601-2.
4. Alsabeeha N, Payne AG, De Silva RK, Swain MV. Mandibular single implant overdentures: a review with surgical and prosthodontic perspectives of a novel approach. *Clin Oral Implants Res*. 2009; 20:356-65.
5. Cordioli, G., Majzoub, Z., Castagna, S. Mandibular overdentures anchored to single implants: a five-year prospective study. *J Prosthet Dent*1997; 78 (2): 159-65.
6. Passia N, Wolfart S, Kern M. Six years clinical outcome of single implant retained mandibular overdentures– a pilot study. *Clin Oral Implants Res* 2015; 26:1191-4.
7. Chee W, Jivrai S. Treatment planning of the edentulous mandible. *Br Dent J* 2006; 201: 337-47.
8. Chung K-H. Retention Characteristics of Attachment Systems for Implant Overdentures. *J. Prosthodont* 2004; 13:221-6
9. Evtimovska E. The Change in Retentive Values of Locator Attachments and Hader Clips over Time. *J. Prosthodont* 2009 ;18: 479-83
10. Cakarer S. Complications associated with the ball, bar and Locator attachments for implant-supported overdentures. *Med Oral Patol Oral Cir Bucal*. 2011;16 (7): e953-9.
11. Pasciuta M, Grossmann Y, Finger I. A prosthetic solution to restoring the edentulous mandible with limited interarch using an implant-tissue-supported

overdenture: a clinical report. *J Prosthet Dent* 2005; 93:116-20.

12. Meredith, N. Assessment of implant stability as a prognostic determinant. *Int j Prosthodont* ,1998;11: 491-501.
13. Huang HM, Lee SY, Yeh CY, Lin CT. Resonance frequency assessment of dental implant stability with various bone qualities: a numerical approach. *Clin Oral Implants Res* 2002;13(1):65-74.