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Implant-retained overdenture using self-aligning and short profile attachments and palateless maxillary denture: a case report

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ABSTRACT

Aim A case is reported of the rehabilitation of a completely edentulous patient suffering from gagging problems and with low financial resources with conventional complete dentures.

Case report A 55 years old patient came to the outpatient clinic of the prosthodontics department, Faculty of Oral and Dental Medicine, Cairo University seeking for complete denture prosthesis to restore function and esthetics. He reported problems with his complete dentures as he had an exaggerated gagging reflex which interfered with upper denture wearing. Besides, his mandibular denture was unstable and poorly fitted. This patient was strongly recommended for implant prosthesis and, because of his low financial conditions, an implant overdenture was the most proper treatment. Four implants were placed in the upper arch with self-aligning attachment and two implants in the lower arch with self-aligning attachments.

Conclusion Implant overdenture is a simple, easy, comfortable, effective solution for restoring edentulous patients at a low cost and with no need for bone augmentation procedures.

KEYWORDS Implant; Overdenture; Self-aligning attachment; Short profile attachment; Palateless denture.

INTRODUCTION

Usually implant overdentures enhance food mastication, speech, smiling, esthetics, and retention in comparison with conventional complete dentures (1).

In the management of edentulous patients with an increase in the inter-maxillary distance, fixed prosthesis is not indicated, as the length of teeth will increase and develop a vertical cantilever so that, and an implant overdenture would be a better option. Overdentures are also used in complicated situations such as abnormal skeletal and alveolar cases (2).

Implant overdentures are strongly indicated in situations with moderate ridge resorption when a fixed implant-supported bridge cannot be acceptably placed (3).

An implant-supported overdenture is indicated instead of a fixed prosthesis in many situations such as low socioeconomic status, to avoid bone grafting procedures, medically compromised or debilitated patients to enhance masticatory function, nutritional balance, and to avoid prolonged surgical procedures or general anesthesia (4).

Although the palate is a primary stress-bearing area and its coverage enhances denture support and retention (5), but this may be accompanied by gagging problems and loss of taste (6, 7). There are numerous advantages of palateless complete prostheses that help edentulous patients to overcome many problems with their denture. And evidently it is considered as a lifeboat for upper edentulous patients with extreme gag reflex (8).

Self-aligning attachments have become very popular and widely used since 2001 (Zest Anchors, Escondido, CA, USA). This system is characterized by low profile, self-aligning and dual retention properties, and can tolerate up to 40° inter-implant angulation (9). A recent line of short profile attachment (Equator attachment, Rhein 83, Bologna, Italy) is considered the tiniest attachment in dimensions (vertical height of 2.1 mm and 4.4 mm diameter), so that implant overdenture with this attachment can be used easily

without jeopardizing the health of peri-implant tissues (10).

CASE REPORT

A 55 years old male patient came to the outpatient clinic of the prosthodontics department, Faculty of Oral and Dental Medicine, Cairo University (Cairo, Egypt) seeking for a complete denture to restore function and esthetics (Fig. 1). The patient reported problems with complete dentures as he had an exaggerated gagging reflex which interfered with upper denture wearing. Besides, he had an unstable and poorly fitted mandibular denture. This patient was strongly recommended for implant prosthesis and because of the low financial conditions, implant overdenture was selected as the most proper treatment. Four implants were placed in the upper arch with self-aligning attachments and two implants in the lower arch with short profile attachments.

FIG. 1 Pre-operative intraoral view.

Fabrication of a complete denture

Maxillary and mandibular cold cure acrylic resin (Acrostone, Heliopolis, Cairo, Egypt) special trays were constructed on the previously obtained primary casts. The special trays were adjusted to be 2 mm shorter than the functional depth of the vestibule. Border molding was done using green stick compound (Kerr, Bioggio, Switzerland) and final impression was made using Zinc oxides and eugenol impression material (Cavex. The Netherlands). The impression was boxed and poured

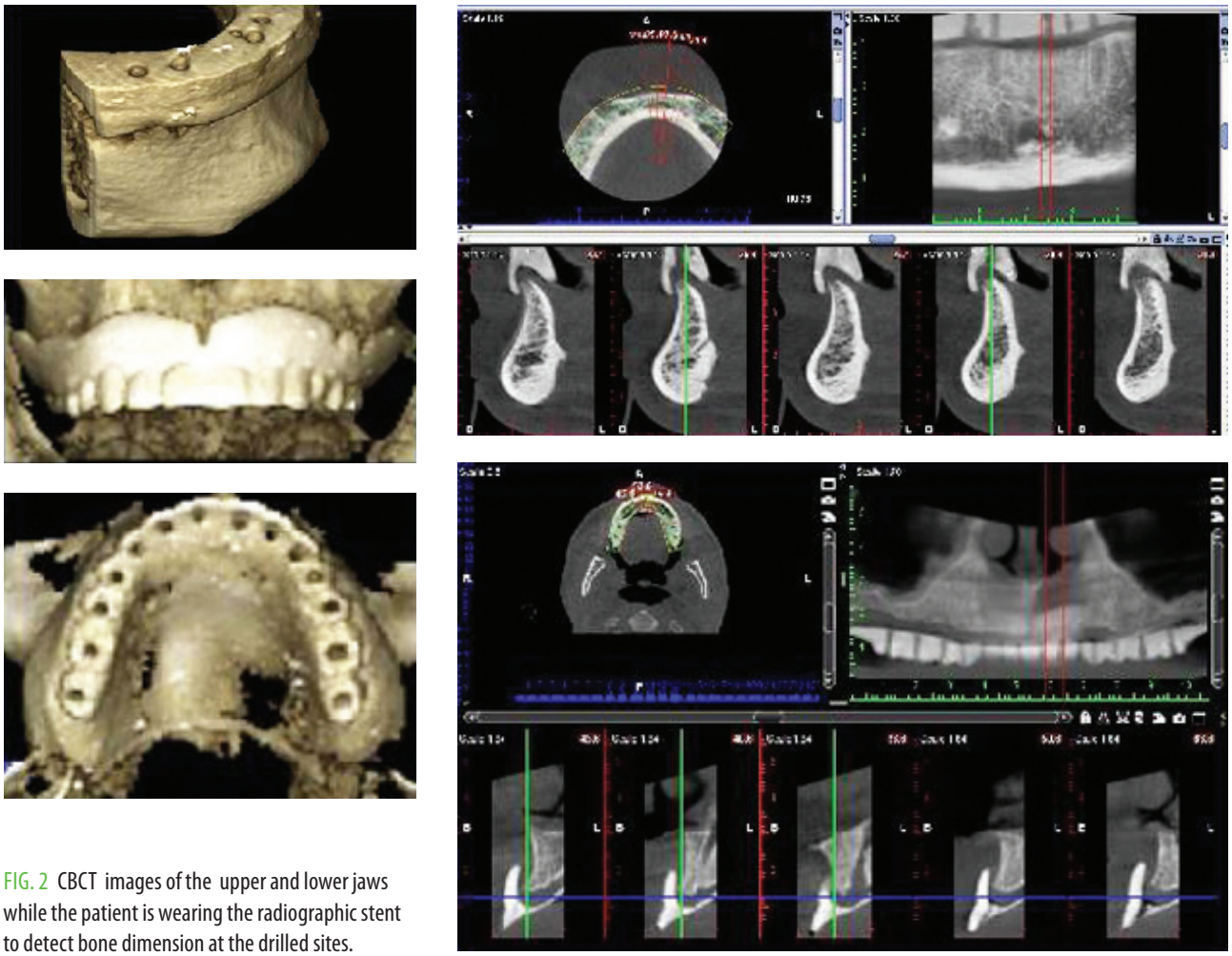
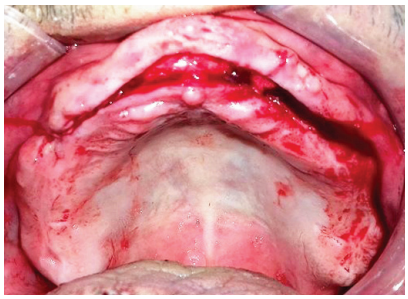
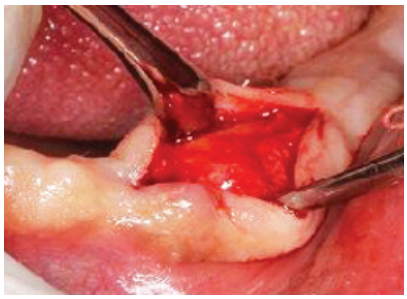


FIG. 2 CBCT images of the upper and lower jaws while the patient is wearing the radiographic stent to detect bone dimension at the drilled sites.

FIG. 3 Conversion of the radiographic stent into the surgical stent to help implant placement at the selected sites according to bone dimensions.





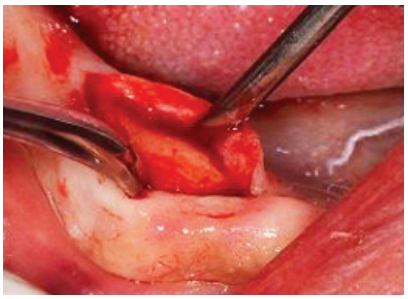


FIG. 4 Incision and flap reflection.

with extra hard stone to obtain a master cast over which occlusion blocks were fabricated. A face bow (Bio-art facebow, Brazil) record was made to mount the upper cast on the articulator (Bioart semi-adjustable articulator, Brazil). The lower cast was mounted in centric occluding relation using the wax (Cavex, the Netherlands) wafer technique.

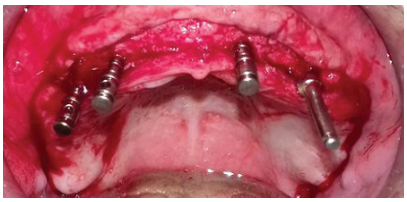
Acrylic resin teeth (Dentsply-Sirona, Wals bei Salzburg. Austria) of appropriate shape, size and shade were arranged and then tried in the patient's mouth for esthetic and phonetic assessment. The prostheses were then waxed up, flasked and processed with heat cured acrylic resin (Acrostone, Heliopolis, Cairo, Egypt). After de-flasking, the prostheses were remounted in the laboratory and occlusion was refined to overcome any processing errors.

Prostheses were finished and polished, then stored in a sealed humid container till delivery. Two weeks after the delivery appointment, clinical remounting was done using a new jaw relation and the previously achieved face bow index.

Construction of the radiographic stent

The mandibular prosthesis was duplicated with silicon material (Zhermac Putty C-silicone impression material, Badia Polesine, Rovigo, Italy) into radiopaque resin. After polymerization the stent was removed from the mold and the excess was removed. This duplicate was used first as a radiographic template. Cavities were drilled in the template corresponding to each tooth for

FIG. 5 Paralleling pins in place.



identification of the implant placement site at the CBCT as the patient wore the radiographic stent during the CBCT scan. After identification of the bone dimensions at the selected sites, the lingual portion of the stent was reduced to be converted into a surgical stent which was used during implant placement to identify the implant site intraorally (at the previously selected sites) during surgery (Fig. 2).

Surgical procedure

Six implants were inserted, four in the maxilla and two for the mandible. The radiographic stents were converted into surgical stents by reducing the lingual flange to increase the accessibility and used to identify the pre-planned implant sites (Fig. 3). After administrating adequate infiltration anesthesia (Ubistesin forte, 3M ESPE, Germany), using a Bard

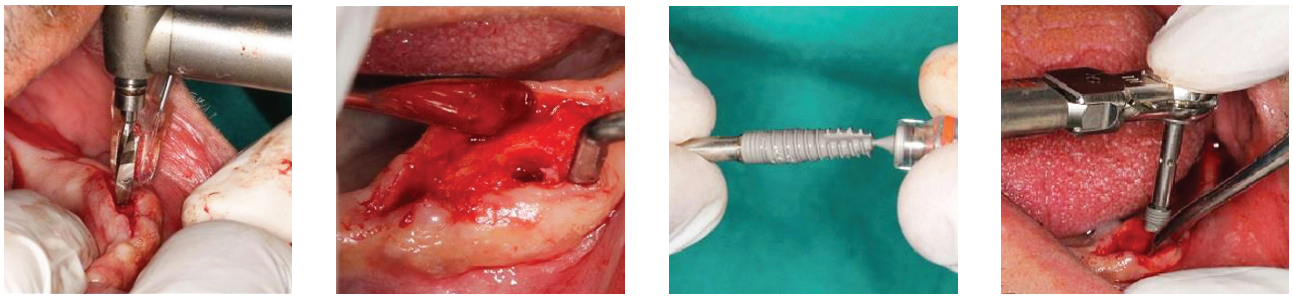


FIG. 6 Completing osteotomy and implant placement.

FIG. 7 The self-aligning attachments used for the upper jaw.

FIG. 8 The self-aligning attachment.

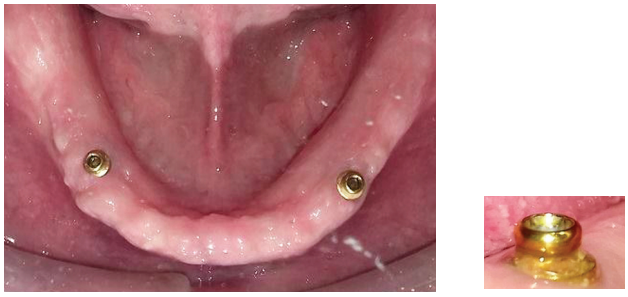


FIG. 9 The short profile attachments used for the lower jaw.

FIG. 10 The short profile attachments.

Parker blade no. 15, crestal incision was done at the planned implant sites, a single continuous flap was done in the maxilla and two small flaps were made in the mandible to prepare the implant sites. A full thickness mucoperiosteal flap was reflected using a sharp mucoperiosteal elevator (Fig. 4). Any crestal bone irregularity was corrected with a bone file. The locator drill was used to determine the point of entry of the implant through the surgical stent.

By using the pilot drill (Ihde Dental, Gommiswald, Switzerland) with a maximum speed of 1400 rpm, drilling was started carefully. Paralleling pins were placed in the holes prepared to evaluate the parallelism (Fig. 5). The manufacturer drilling sequence was followed during the osteotomy. The fixture (Ihde Dental, Gommiswald, Switzerland) was carefully placed in the osteotomy site then, self-tapped to the full depth using the torque wrench (Fig. 6). Covering screws were placed and then interrupted sutures (3/0 silk black braided non-absorbable-sutures, Assut) were made. The fitting surface of the prosthesis was relieved and lined with soft liner to decrease stresses on implants and the surrounding bone.

After the healing phase of osseointegration (3 months), the surgical stent was used to determine the position of the implants with the aid of the periodontal probe. After infiltration anesthesia, implants were uncovered through a small crestal incision. Cover screws were removed; healing collars were placed for each patient for 2 weeks.

Pick up and chairside relining procedure

After gingival healing process was completed, attachments were connected to the implants. Self-aligning attachments (Ihde Dental, Gommiswald, Switzerland) were used to the upper jaw (Fig. 7, 8), while short profile attachments (Equator attachment, Rhein 83, Bologna, Italy) were used for the lower jaw (Fig. 9, 10). X-ray was done to ensure complete seating of the attachments before pick-up procedures (Fig. 11). The palatal portion was removed from the upper prosthesis in order to make it palateless (Fig. 12).

Metal housings were seated over the attachments according to the type to be picked up, and then

rubber bands were placed around the attachments to prevent excess lining material from escaping under the attachment housing (Fig. 13).
The soft liner was completely removed and using pressure indicating paste, chambers were created on the fitting surface of the prostheses corresponding to the metal housing of the attachments, and space was created to allow discharge of the excess material during pick-up procedures. Complete seating of the relieved prosthesis over the attachments and its housing without any interference were carefully checked.
The fitting surface of the prostheses was cleaned, dried and painted with hard liner adhesive. According to the manufacturer's rules, the adhesive was left for 5 minutes before hard liner paste (Promedica, Hardliner CD, Germany) application on the fitting surface of the dentures (Fig. 14) and also to the patient's mouth around the metal housing of the attachment. Then prostheses with the paste were inserted intraorally and the patient was instructed to close in centric occlusion. Gentle molding of prosthetic borders was done while the patient was closing.
After complete hardening of the paste, the prosthesis was carefully removed from the patient mouth and excess material was trimmed and polished (Fig. 15). At that step, the prostheses were ready to use.

DISCUSSION

Implant-retained overdenture is considered an adequate treatment for this case, as many studies report that it is superior to conventional dentures in terms of patient satisfaction, chewing efficiency, nutritional health, social activity, and easier fabrication (11-17).
Cone beam computed tomography (CBCT) is useful to accurately calculate bone dimensions and density in the planned area. It is important to be away from vital structures by at least 1-2 mm, while leaving at least 1.5 mm of bone on the labial and lingual aspects of the implant (18).
To decrease infection risk during and after implant installation and to increase implant integration, pre and post-surgical antibiotics and chlorhexidine mouthwash were prescribed (19). The use of mouth rinse immediately before implant insertion and second-

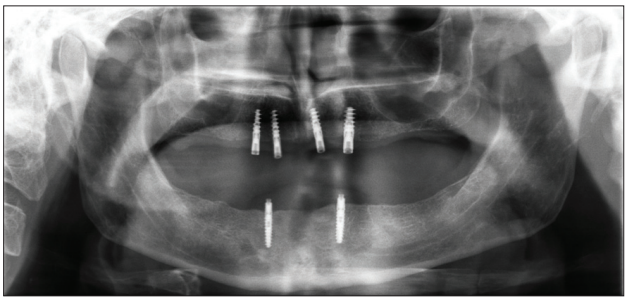


FIG. 11 Panoramic x-ray for implants with the attachments.

FIG. 12 Palateless maxillary denture.

FIG. 13 Metal housing placed over the attachments with the rubber bands

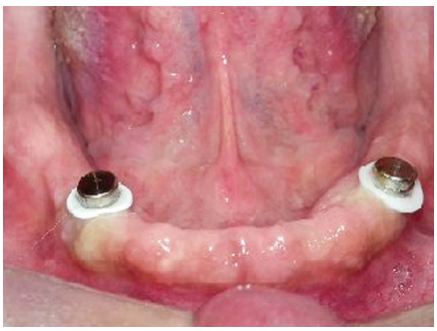


FIG. 14 Application of hardliner paste to the fitting surface of the dentures.

FIG. 15 Final prosthesis after finishing.

stage surgery, as well as its daily use for two weeks after surgery, would decrease the risk of postsurgical infection (20).

We used the direct pick-up procedure as it significantly reduces the rate of error from clinical impression and laboratory processing. To avoid pressured spots, the adaptation of soft tissue surface of the mandibular prosthesis should be re-assessed with a pressure indicating paste (21).

Palateless design was selected for the upper arch to decrease discomfort in speech and loss of taste. This design also potently decreases the gagging reflex and increases the patients' ability to wear the prosthesis comfortably (22).

CONCLUSION

Implant overdenture is a simple, easy, comfortable, effective solution for restoring edentulous patients with no need for bone augmentation procedures and require low cost interventions.

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