

# One-piece implants: Careful approach for complex rehabilitation

### ABSTRACT

It is understood that one-piece implant design is a stronger concept as there is no connection between implant and abutment. The absence of a microgap can lead to minimal peri-implant bone loss. Furthermore, there is a reduction of mechanical complications such as screw loosening and abutment fractures. These implants can be immediately placed and can be put through instant function because of their high cortical stabilization. This immediate function protocol has advantages over two-stage surgical placement. Other benefits are fewer surgical appointments, reduced treatment time, and minimal trauma. It is suggested that one-piece implant can be an alternative to conventional implants for edentulous arches where there is a resorbed bone in width and height. Initially, one-piece implants were used as transitional or provisional implants. However, because of biological osseointegration, their removal often became difficult. Several manufacturers obtained approval for its use in defined situations. Proper treatment planning avoided comorbidity associated with augmentation procedures and acceptable esthetic result was achieved.

**Keywords:** Clinical assessment, one piece implant, treatment planning, esthetics

### INTRODUCTION

One-piece implant was originally created to eliminate structural weakness in two-piece design. This is unique because it incorporates prosthetic component and surgical unit. There is elimination of the microgap and always has transmucosal presence. In the present case report, two one-piece implants were used for prosthetic replacement of missing lower incisors. The unavailability of space for accommodation of four incisors in the missing teeth region, knife-edge partial edentulous ridge, and patient's noncommitment to undergo complex augmentation procedures further made the rehabilitation challenging. A modest reconstruction was achieved by careful prosthetic planning with subjective approach and evidence based guidelines.

### CASE REPORT-

A 21-year-old female visited the faculty with the complaint of missing lower anterior teeth [Figure 1]. The subject was

healthy bereft of any medical history. An oral examination of the complete dentition revealed two lower central incisors missing. The present dentition was devoid of any caries and periodontal disease. Her oral hygiene was acceptable. The patient gave a history of losing lower anterior teeth due to traumatic fall. She described presence of extra tooth (natal teeth) in between the two centrals before the fall. On

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**Received:** 10 September 2020, **Revised:** 23 November 2020,  
**Accepted:** 09 January 2021, **Published:** 15 July 2021

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**How to cite this article:** Durrani F, Nahid R, Pandey S, Singh P, Pandey A.  
One-piece implants: Careful approach for complex rehabilitation. Natl J  
Maxillofac Surg 2021;12:266-70.

Access this article online	
<b>Website:</b> www.njms.in	<b>Quick Response Code</b> 
<b>DOI:</b> 10.4103/njms.NJMS_191_20	

computed tomography (CT) evaluation, the mesiodistal space of the partial edentulous ridge was 11 mm [Figure 2]. The buccolingual width was 4.8 mm as per the cross-sectional view (64-slice CT scan) with a depth of 15 mm. The average width of the mandibular central incisor is 5.3 mm of the height and 3.5 mm cervically.<sup>[1]</sup> To accommodate missing incisors in limited space was challenging. The patient insisted for fixed replacement of teeth. All possible treatment options were explained that included teeth supported, resin bonded, as well as implant-retained bridge. The patient's consent was taken for the treatment planned. The preference was for implant-retained teeth as the concept of preparation of adjacent teeth was not acceptable. However, space available was not enough for one wide single two-piece implant which can carry bifurcated custom abutments supporting two/three small crowns. This may be a bad esthetic outcome as compared to two implant-supported restorations.<sup>[2]</sup> There had been a push for dental implants of <3 mm in diameter for definitive restorations. To overcome our problem of reduced length and width space for missing incisors, couple of narrow diameter one-piece implants were used for missing incisors (3 \*11.5). The initial wax-up of the missing teeth was acceptable to the patient and it was converted into a surgical template [Figure 3]. The anesthesia (Xylocaine 2% with 1:80000 adrenaline, AstraZeneca, India) was given near the mental foramina bilaterally in the vestibule. The partial edentulous ridge was exposed with a full-thickness mucoperiosteal flap leaving the papilla of the adjacent teeth. The template fitted perfectly as posterior teeth acted as anchors bilaterally. The existing knife-edge ridge was slightly flattened with crestal osteotomy (4.8 mm width converted to 5.2 mm).

One-piece implant osteotomy are technique sensitive and strict manufacturer guidelines should be followed. Initial osteotomy was at 2500 rpm to the required depth (12 mm) with 1.9 mm width drill. The second osteotomy was with 2.3 mm width drill at reduced rpm of 1500 rpm for full depth. Third osteotomy drill of 2.7 mm width at 800 rpm was half length of the initial created depth (7 mm). Two Crestone one-piece implants (Tag Dental, Israel; 3 mm × 11.5 mm) with interdistance of 3 mm and 1.5 mm from the adjacent teeth were placed. The torque achieved during insertion was <35 Newton. A subepithelial connective tissue graft was taken from the anterior palate with single-incision technique. The procedure started from the mesial border of the first molar to the lateral incisor 2 mm apical to gingival margin of 1/1.5 mm deep. The incisions were undermining the mucosa surface. Initial incision was perpendicular to palatal surface with split-thickness preparation and as the blade angle increased, it became parallel to palatal surface. This incision extended to

about 8 mm from initial incision in a way safe guarding palatine artery. The cutting portion of the blade is approximately 8 mm. The graft size estimation was by two vertical incisions and horizontal incisions. The subepithelial graft with periosteum was obtained after careful elevation with a blunt instrument. The wound was closed with crossed horizontal sling sutures. The graft was properly tucked around the implants and sutured with 5-0 Vicryl (Ethicon) [Figure 4]. Postoperative instructions included soft diet and not to bite from the anterior region for 3 weeks. Oral hygiene was maintained with regular use



Figure 1: Initial clinical picture with missing lower incisors



Figure 2: Space available on partial edentulous ridge

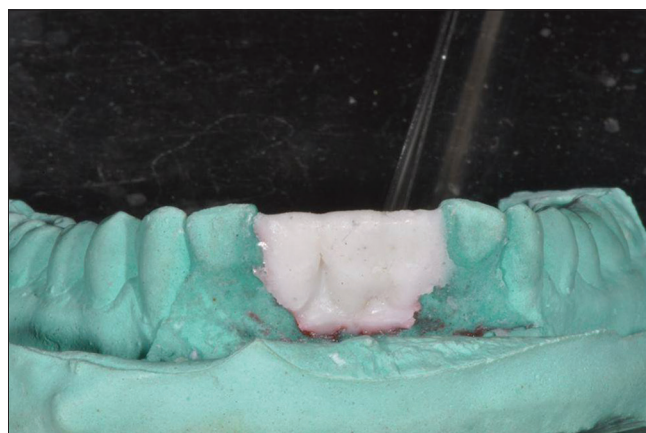


Figure 3: Esthetic wax-up

of fluoride toothpaste except on the surgical area, which was restricted for a week. Prescription included amoxicillin 500 mg and Ibugesic plus three times daily for 5 days. The patient also used chlorhexidine 0.2% two times daily for 7 days.

The implants have an integrated abutment with machined surface for perfect soft tissue bond. Three unit temporary acrylic teeth were cemented with provisional cement (TempBond, Kerr Dental) on the abutments after one month. The intaglio surface of the temporary acrylic bridge was egg shaped which may put pressure on the healing tissues for papilla to grow coronally. The occlusion was kept without contact in centric and eccentric contacts. After 4 months of healing, final three-unit bridge (IPS e. maxZir CAD) was cemented (Multilink Implant, IvoclarVivadent) [Figure 5]. The occlusion was kept with proper anterior guidance without posterior interferences. Oral hygiene instructions were strictly reinforced. The use of super floss around and beneath the prosthesis was explained. The patient was recalled every 6 months for next 2 years

after delivery of prosthesis. At every visit, hard and soft tissue analysis was done. The soft tissue parameters were modified plaque index, bleeding on probing (BOP) around the implants, peri-implant probing depth, and papilla index.

#### Soft tissue evaluation

The mean plaque score was better around implant restoration, there was no BOP, the pocket depth was ranging between  $\frac{3}{4}$  mm, and papillae surrounding the restorations were half the length.

#### Hard tissue evaluation

Radiographs were standardized through paralleling cone technique. The digital caliber measured the space between the bone crest and the fixture at the mesial and distal parts of the one-piece implants in periapical radiographs. The known distance between the two implant threads was used for calibration and determination of the exact magnification of the images. At recall of 1 year, the bone resorption was  $<0.2$  mm from the crestal area [Figures 6 and 7].

#### DISCUSSION

A one-piece implant advantages are fast functional, rehabilitation with reduced operating time, less

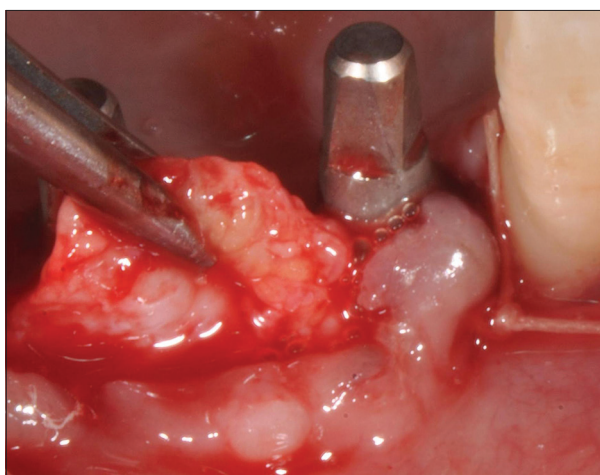


Figure 4: Two one-piece implants 3 mm × 11.5 mm equidistance from each other (3 mm in between 1.5 mm from adjacent teeth along with subepithelial connective tissue graft



Figure 5: Three-unit bridge (IPS e.maxZir CAD)

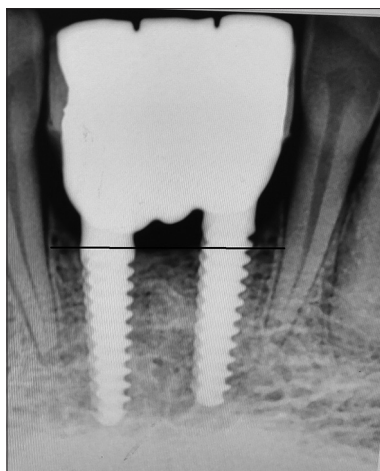


Figure 6: Intraoral periapical radiograph with digital caliber measurement

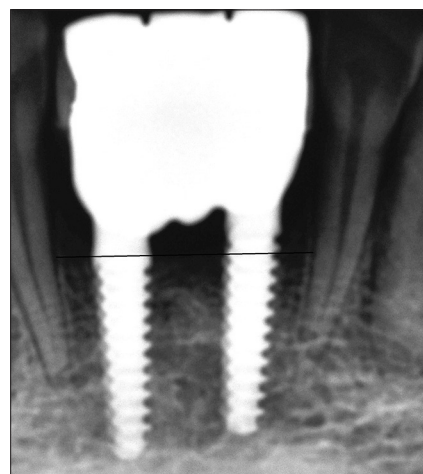


Figure 7: One-year intraoral periapical radiograph with digital caliber measurement



armamentarium, no damage to surrounding tissues, and better use of space limitations. Patient compliance is better with one-piece implants than two-stage procedures: less inflammation, pain, and stress because of few prosthetic appointments. Other advantages are better osseointegration, lesser micromovements, and good soft tissue healing.<sup>[3]</sup>

The replacement of mandibular incisors needs special consideration. The challenges associated are limited space, complex surrounding anatomy, and potentially tough esthetic requirements.

Missing lower incisors can be rehabilitated with fixed partial dentures, adhesive bridge, or implant-retained crowns. In our patient with accidental damage, three teeth were lost but neighboring teeth remain unharmed. Their preparation as abutment teeth would be invasive and may further increase the risk of biological complications such as pulpitis. In gaps with more than one missing tooth, there may be unfavorable physics for a bridge in the anterior zone. A predictable alternative for the replacement of teeth in the said area in some cases is implant-retained restoration. Loss of teeth brings resorption and remodeling of surrounding tissues with time. Several approaches like guided bone regeneration with autogenous bone, bone replacement materials in combination with membranes, cortical bone plate method and distraction technique have been described in literature for the defect like ours.<sup>[4-8]</sup> A classification of tooth gaps can therefore relate to the bone level of the neighboring teeth and the number of teeth to be replaced: A Class I defect is with loss of a single tooth and a bone level of about 1 mm from the cemento-enamel junction of the neighboring teeth, while in a Class II defect, this distance is > 1 mm. A Class III defect would have > 1 missing tooth.<sup>[9]</sup> In addition to available bone, there are other anatomical restrictions such as reduced interradicular space for single or multiple implants, proximity of neighboring teeth, and crowding. Our patient lost three teeth along with modest hard and soft tissue. As the patient was not inclined for extensive augmentation procedures, the treatment done was evidence based and well accepted by the patient.

Barrachina-Diez *et al.*<sup>[10]</sup> did systematic review and meta-analysis on long-term outcome of one-piece implants. It concluded that high long-term survival rates can be observed with one-piece implants (96.79%) after a period of 5 years. Finne *et al.*<sup>[11]</sup> in their 3-year prospective multicenter study evaluated marginal bone levels and soft tissue health around the one-piece implants. They concluded that one-piece implant has the capacity to maintain stable hard and soft tissues around implants after

1 year of initial bone remodeling. de Oliveira Limírio *et al.*<sup>[12]</sup> completed a clinical comparison between one- and two-piece implants for marginal bone loss and implant survival. The meta-analysis concluded that both designs of implants demonstrated equal effectiveness in the rehabilitation of patients requiring implants. Kadkhodazadeh *et al.*<sup>[13]</sup> stated in their 10-year follow-up study for marginal bone loss around one-piece implants a predictable restoration of maxillary lateral incisors and mandibular incisors with modest bone loss. Rojo *et al.*<sup>[14]</sup> did a randomized control trial on subepithelial connective tissue graft from lateral palate and maxillary tuberosity and their role in volume gain around oral implants. They concluded that both grafts are effective in soft tissue increase but the long term prognosis is still a matter of debate. In our case, the patient's complex anatomy along with space limitations for missing incisors required careful treatment planning. The time restrictions and noncommitment for augmentation procedures further aggravated the decision-making. The treatment with two one-piece implants and a three-unit implant fixed restoration was well accepted by the patient. She was satisfied with the rehabilitation in terms of function and esthetics.

## CONCLUSION

Replacement of missing lower incisors on one-piece implants can be an alternative for multiple guided bone regeneration procedures in modest cases of resorption. However, a cautious approach and an experienced surgeon is needed to bring out a good outcome.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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