

Mini-Implants and Zirconium Crowns in Treating Congenitally Missing Maxillary Lateral Incisors: Case Report

SUMMARY

Background/Aim: A problem of congenitally missing lateral incisors is frequently encountered in dentistry, with several available treatment modalities, the choice depending on each case. **Case Report:** A young female patient with bilateral missing lateral incisors was in need for dental treatment for esthetics. She had spacing among the upper anterior teeth with class I molar relationship. Orthodontic space creation was carried out followed by two-piece mini dental implant placement. Two-stage protocol was followed. After osseointegration, implants were exposed. Healing collars were installed to allow mucosal healing. Closed tray implant level impression was taken. Zirconium crowns were chosen for optimum esthetic results. **Conclusions:** Mini-implants can be used successfully for restoring congenitally missing lateral incisors after space opening. Esthetic results can be enhanced using Zirconium crowns

Key words: Congenitally missing lateral incisors, Mini-implants, Angled abutments, Zirconium crowns

Hend Mahmoud Mohamed Hegazi

Department of Removable Prosthodontics
Department, Cairo University, Egypt

CASE REPORT (CR)

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Introduction

Maxillary lateral incisors are the second most common missing teeth¹. Being located in the esthetic zone, congenitally missing laterals represent a challenging case for dentists as they affect the esthetics and general appearance of the patients. There are several options to treat those patients and the selection of the option depends on several factors. The space can either be closed with canine substitution for the lateral incisor² or it can be opened for prosthetic replacement of the upper lateral incisor. Several options are available for prosthetic replacement including: resin bonded bridge, cantilever bridge, conventional fixed partial denture, or single crown implant restoration³. The choice among these factors depends on occlusal relationship and other occlusal disharmonies, over-jet and over-bite, canine size and shape, condition of adjacent teeth, as well as patient's desire and expectations^{4,5}.

Mini-implants have been reported intensively in literature with a long term high success rates to support

both fixed and removable prosthesis⁶. They can solve problem of reduced bone width in regions with anatomical limitations⁷.

In the following case report, a space between the central incisors and canines was created orthodontically to restore the maxillary lateral incisors with single zirconium crowns on two mini-implants.

Case Report

A young female patient presented to the outpatient clinic at the Faculty of dentistry, Cairo University, with a chief complain of unpleasant appearance and spacing between upper anterior teeth. A thorough examination was performed including extra-oral and intra-oral examinations as well as panoramic X-ray. The patient had congenitally missing upper lateral incisors bilaterally (Figures 1-4).

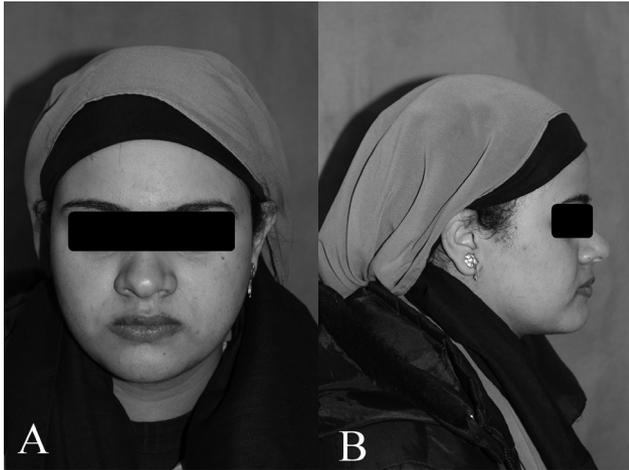


Figure 1. Pre-operative extra-oral photos; A: Frontal view, B: Profile view



Figure 2. Pre-operative occlusion - frontal view



Figure 3. Occlusion. (A) Right side, (B) Left side

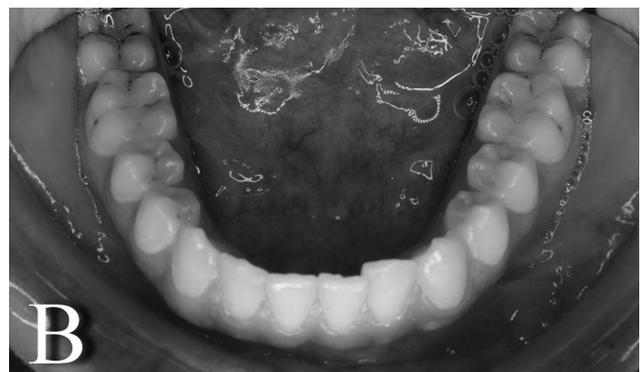


Figure 4. Intra-oral occlusal view. (A) Maxillary arch, (B) Mandibular arch

Treatment Planning

Upper and lower primary impressions were taken to obtain a diagnostic casts. This was followed by a face-bow (Bio-Art Equipamentos Odontológicos Ltda) record to mount the upper cast on a semi-adjustable articulator (Bio-Art Equipamentos Odontológicos Ltda), and a diagnostic bite to mount the lower one. Occlusion

was carefully examined. The patient had Angle's class I molar relationship, with minor occlusal disharmonies. A multi-disciplinary approach combining both orthodontist and prosthodontist was required to restore the esthetics and function. The chosen treatment was space creation by orthodontic movement of the teeth, followed by mini-implant placement to support cemented zirconium crowns for optimum esthetics.

Orthodontic phase

It lasted for about a year and a half. Distalization of the canines bilaterally was performed till a space of 6 mm was created to accommodate a lateral incisor in harmony with the patient's dentition.

Surgical phase

A cone beam computed tomography (CBCT) was performed to determine the available width and height of bone for proper implant size selection. Two-piece mini dental implants were used as there was not enough bone width for regular implant placement. A size 3mm x 12mm was chosen to restore left lateral incisor and 3.3mm x 12 mm for the right one.

After administration of local anesthesia with 2.2 ml of Mepivacaine (Scandonest 2%, Mepivacaine HCl, USP) as a labial and palatal infiltration, a crestal incision and sulcular one were made around the central incisor and the canine using Bard Parker blade no. 15 (Hu-Friedy Mfg. Co., LLC). This was followed by a full thickness flap elevation and reflection with a sharp mucoperiosteal elevator. The implant osteotomy was created using a reduction hand piece (1:16) at a speed of 1200 rpm with a physio-dispenser and adequate flow of sterile saline solution. The implant was initially placed manually then continued with a ratchet till the implant flushed with the bone surface. The flap edges were repositioned and sutured. Patient was instructed to apply cold fomentation for 12 h post-surgically, take an anti-inflammatory drug (Cataflam® Novartis Pharma, S.A.E. Cairo-under license from Novartis Pharma AG., Basle, Switzerland) 3 times for 2 days, as well as broad spectrum antibiotic for 5 days and to follow the usual oral hygiene measures in combination with Chlorhexidine mouth wash (Antiseptol mouth wash; Chlohexidine gluconate, Kahira Pharmaceuticals) three to four times daily for 2 weeks. The patient was recalled after one week to remove the sutures.

Prosthetic phase

Implants were allowed to osseointegrate for a period of 3 months. After that, they were exposed by a crestal incision and healing collars were installed. They were left in place for 2 weeks to allow for mucosal healing (Figure 5), after which closed tray coping transfers were attached to the implants and their proper seating was verified with periapical X-rays (Figure 6). An implant level impression was made. Impression transfers were attached to fixture analogues and re-inserted into their place in the

impression (Figure 7). The use of 2-piece implant system allowed for proper abutment selection for optimum esthetic results. Angled abutments were chosen to allow for correction of the axial inclination of the implants dictated by the available bone. They had titanium nitride coated collars. Impression was sent to the lab where a master cast with tissue mimic was obtained to construct the zirconium crowns (Figures 8 and 9). First, the lab sent zirconium cores for try-in. Then, they were built into full crowns. Abutments were screwed to the implant at a torque of 30 N/cm. Implant protected occlusion was assured to allow for long term success. Crowns were cemented temporarily to allow any further adjustments. After crowns installation, the patient was completely satisfied with the results (Figures 10 and 11).



Figure 5. Mucosa healed around healing collars



Figure 6. Impression transfers



Figure 7. Impression with the transfers attached to the analogues in place



Figure 8. Poured cast with tissue mimic



Figure 9. Angled abutments (with titanium nitride coated collars) on the cast



Figure 10. Occlusion after crowns insertion (delivery). (A) Right side, (B) Left side



Figure 11. Extra-oral frontal view (post-delivery)

Discussion

The chosen treatment plan for this patient was to open the space where the patient had a molar class I relationship and had no concomitant needs to treat

malocclusion. Moreover, distalization of permanent canines to their proper positions might help in alveolar ridge development in the lateral incisor region. This also would enhance the final esthetic results rather than canine substitution for the lateral incisor. Besides, having the permanent canine in place would help to obtain a stable final occlusion⁷.

The space required for maxillary lateral incisor is about 5-7 mm⁵. The space created orthodontic treatment was about 6 mm bilaterally, which was sufficient for restoring lateral incisors. Since she was an adult patient, there was no problem for implant placement because growth of the maxilla was completed.

CBCT was performed to determine the needed implants' dimensions. There was deficiency in the labio-palatal dimension. This was overcome by using mini-implants, which contribute the avoidance of additional bone grafting surgery. Mini-implants can be supplied either as single piece or two-piece. Although single piece implants have the advantage of strength and simple restorative procedures, they provide little flexibility in abutment angulation and customization to meet the esthetic requirements⁷. Implants were placed with axial inclination labially to avoid labial fenestration, which was corrected later on using angled abutments⁸. The use

of two-piece implants allowed for the correction of the axial inclination with angulated abutment. The abutments had a titanium nitride coated collar giving a gold hue which allowed for optimal esthetics. Zirconium crowns were made to restore the lateral incisors which enhanced the final esthetic results. Implant protected occlusion is important to avoid un-necessary forces falling on the implants predicting a long-term success.

Conclusions

Oral rehabilitation of patients with congenitally missing lateral incisors can be achieved with orthodontic space opening combined with implant placement to support single crowns when other conditions permit. Mini-implants can be used successfully to over-come problem of insufficient bone.

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Correspondence:

Hend Mahmoud Mohamed Hegazi
Department of removable prosthodontics, Faculty of dentistry, Cairo University, Egypt
e-mail: hend.hegazi@dentistry.cu.edu.eg