

# Restoration of Congenitally Missing Lateral Incisors with Single Stage Implants: An Interdisciplinary Approach

<sup>1</sup>Mitha M Shetty, <sup>2</sup>Akshai KR Shetty, <sup>3</sup>N Kalavathy, <sup>4</sup>MR Dinesh, <sup>5</sup>J Sridevi

<sup>1</sup>Assistant Professor, Department of Prosthodontics, DA Pandu Memorial RV Dental College and Hospital, Bengaluru, Karnataka, India

<sup>2</sup>Professor, Department of Orthodontics, DA Pandu Memorial RV Dental College and Hospital, Bengaluru, Karnataka, India

<sup>3</sup>Professor and Head, Department of Prosthodontics, DA Pandu Memorial RV Dental College and Hospital, Bengaluru, Karnataka, India

<sup>4</sup>Professor and Head, Department of Orthodontics, DA Pandu Memorial RV Dental College and Hospital, Bengaluru, Karnataka, India

<sup>5</sup>Professor, Department of Prosthodontics, DA Pandu Memorial RV Dental College and Hospital, Bengaluru, Karnataka, India

**Correspondence:** Mitha M Shetty, Assistant Professor, Department of Prosthodontics, DA Pandu Memorial RV Dental College and Hospital, Bengaluru, Karnataka, India, e-mail: mitha\_mulki@yahoo.co.in

## ABSTRACT

The primary goal of the dental surgeon is to restore function as well as esthetics, and these objectives influence both the surgical and restorative phases of treatment.

This report presents a conservative management of congenitally missing bilateral maxillary lateral incisors that was treated with a multidisciplinary approach between an orthodontist and a prosthodontist to redistribute spaces and establish buccolingual alveolar width by orthodontic movement of permanent canines distally in the maxillary arch followed by placement of implants to achieve a desirable esthetic result.

**Keywords:** Congenitally missing lateral incisor, Immediate loading, Single tooth implant.

## INTRODUCTION

The anterior maxilla is often referred to as the esthetic zone.

Missing maxillary lateral incisors creates an esthetic problem with specific orthodontic and prosthetic considerations, therefore treatment planning always poses a challenge to the clinicians.

The frequency of hypodontia varies, according to different investigators, from 0.27 to 11.0% depending on the methods of registration, grouping of the material and racial differences. The vast majority of cases of agenesis among the permanent teeth involve the second premolars and maxillary lateral incisors.<sup>1</sup>

The required amount of space needed for replacing missing lateral incisors is determined by two factors. The first is the esthetics of mesiodistal width between the anterior teeth. Occlusion is the second factor that affects the amount of space that needs to be created.<sup>2</sup>

The prosthetic options with orthodontic space opening currently available for replacing missing teeth are traditional fixed partial dentures, resin-bonded fixed partial dentures, removable partial dentures and osseointegrated implant supported prostheses.

Osseointegrated implants are the most biologically conservative and most commonly used option for replacing missing lateral incisors.

When implants are part of the treatment plan, their size dictates the amount of space that needs to be opened. The minimum interdental space needed for a 3.75 mm implant

that provides optimal gingival health and sufficient bony support is about 6 mm.

To overcome esthetic and narrow interdental space problems, esthetically oriented prosthetic components are available.

These components include smaller-sized fixtures of 2.8, 3.0 and 3.3 mm width. When the space is adequate and the corresponding implant size is determined, bone thickness should be evaluated. This case report highlights the management of congenitally missing bilateral maxillary lateral incisors with immediate implant loading and provisional restorations using indirect composite crowns.

## CASE REPORT

An 18-year-old female patient presented with the chief complaint of spacing between upper front teeth (Fig. 1). On

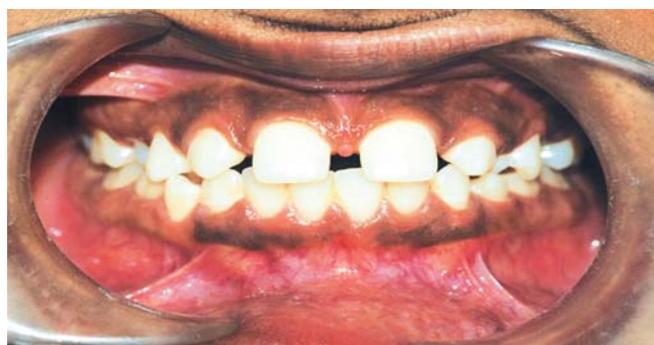


Fig. 1: Pretreatment

intraoral examination patient had missing bilateral maxillary lateral incisors and lower permanent second premolars, retained deciduous lower first molars, bilateral end-on molar and canine relation, rotated maxillary first premolars and hypertrophic maxillary midline frenum. Her lower midline was shifted to the right with respect to facial midline by 2 mm. She had an horizontal overjet of 4 mm, vertical overbite of 2 mm and generalized spacing in maxilla. On extraoral examination, patient had straight profile, straight divergence, normal chin, normal clinical FMA, thin lips, obtuse nasolabial angle and upwardly tipped nose. Cephalometric findings revealed that patient had mildly retrognathic maxilla, average mandible, mild skeletal class III jaw base, average growth pattern, mildly proclined upper and lower incisors. Patient was diagnosed with Angles class II division I malocclusion with missing 11, 22, 33, 45 and retained deciduous lower first molars, rotated 15, 25 and hypertrophic maxillary midline frenum. Patient was explained about various treatment options along with interdisciplinary interaction between the orthodontist and the restorative dentist in order to diagnose and treat patients requiring single-tooth implants to replace the congenitally missing maxillary lateral incisors.

Considering the profile of the patient, following treatment sequence was decided to regain space for the replacement of missing maxillary lateral incisors. Midline diastema was closed and spaces were consolidated in the upper arch. The retained deciduous lower first molars were extracted to correct the molar relation and mandibular midline, for which a preadjusted edgewise appliance with MBT prescription was used. The patient underwent maxillary midline frenectomy to avoid relapse in relation to 11 and 22. At the end of 1st year, it was found to have adequate amount of space to accommodate missing lateral incisors (Fig. 2).

To maintain the space after orthodontic correction a riding pontic was fabricated using tooth colored acrylic resin (Fig. 3).

It is important to evaluate the width of the edentulous space that is created for the lateral incisor when determining the appropriate size of the implant to be placed.

It was planned for implant placement with provisional restoration and finally with a definitive prostheses in relation to bilaterally missing maxillary lateral incisors followed by protracting the lower molars to achieve class I molar relation.

A computed tomography scan of the missing lateral incisors along with a radiographic stent was made to determine the height and width of the bone. The width of the bone in relation to 12 and 22 was 3.4 mm and 3.3 mm (Fig. 4) while the height of the bone in relation to 12 and 22 was 12 mm (Fig. 5). The following measurements of bone indicated the use of narrow diameter implants to restore missing lateral incisors, therefore it was decided to use single stage narrow diameter implants (HI Tech implant system) as these implants are best suited for lateral incisors. The implant size selected was 2.8 × 10 mm.



Fig. 2: Postorthodontic treatment



Fig. 3: Riding pontic for space maintenance



Fig. 4: CT showing bone width in relation to maxillary lateral incisors

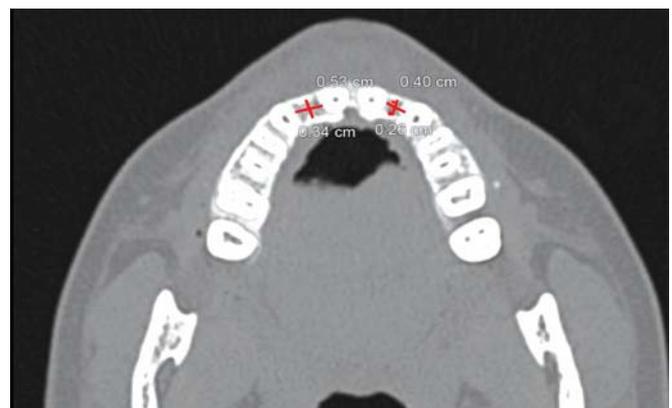


Fig. 5: CT showing bone height in relation to missing maxillary lateral incisors



**Fig. 6:** Surgical stent



**Fig. 7:** Surgical stent placed in the mouth



**Fig. 8:** Incision and flap reflection



**Fig. 9:** Paralleling pin placed to check for angulation in relation to right maxillary lateral incisor



**Fig. 10:** Paralleling pin placed to check for angulation in relation to left maxillary lateral incisor



**Fig. 11:** Sutures placed

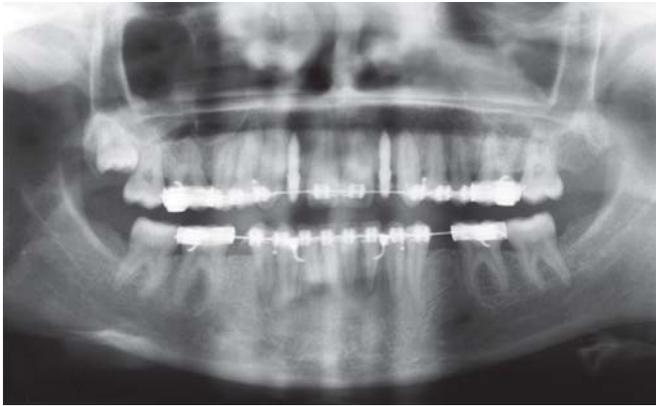
To ensure proper implant placement, a custom surgical template was fabricated using clear autopolymerizing resin from a diagnostic wax-up (Fig. 6).

Surgical procedure for implant placement is carried out, incision and flap is raised (Fig. 8). Surgical stent is placed in the patients mouth (Fig. 7) and osteotomy was carried out to a width appropriate for the diameter of the implant to be placed, paralleling pins were placed and the angulations were checked (Figs 9 and 10) using an intraoral radiograph. Single piece narrow diameter implants were placed to final position using a driver and hand torqued to 30 N to ensure primary stability of implants in relation to missing bilateral maxillary lateral incisors, the surgical site was then sutured (Fig. 11). An orthopantograph was made to view the placement of implants in relation to maxillary lateral incisors (Fig. 12).

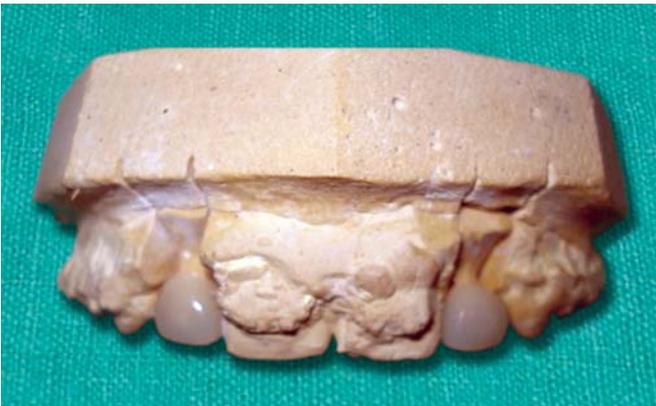
It was then decided to fabricate provisional restorations within 24 hours for which impressions of the abutments were made using irreversible hydrocolloid impression material and poured in stone.

Provisional crowns were fabricated using indirect composite technique (Adoro) for accurate shade selection and better esthetic results (Figs 13 and 14).

The provisional crowns were tried on the abutment of the implants and adjusted such that the crowns were kept out of contact proximally and occlusally both in centric and eccentric positions. The provisionals were then cemented using tempbond (Fig. 15).



**Fig. 12:** Postoperative OPG showing implants placed in relation to 12 and 22



**Fig. 13:** An indirect technique to fabricate provisional crowns using composite material (Adoro)



**Fig. 14:** Provisional crowns palatal view



**Fig. 15:** Provisional crowns in relation to 12 and 22

## DISCUSSION

Treatment of tooth loss or agenesis in the anterior maxilla with single-tooth implant supported crowns is well documented (Jemt et al, 1990; Andersson et al, 1995; Henry et al, 1996; Scheller et al, 1998).

Many restorative options exist for the replacement of congenitally missing lateral incisors. Depending on the type of final restoration that is chosen, interdisciplinary management of these patients often plays a vital role in the facilitation of treatment. One of the most common treatment alternatives for the replacement of congenitally missing teeth is a single-tooth implant.

The main advantage of this type of restoration is that it leaves the adjacent teeth intact. To provide adequate room both in the coronal and apical areas, orthodontics is often necessary.

Orthodontic therapy for space opening should not be started before the age of 13 years, so as to prevent the relapse and progression of bone atrophy.

The time of implantation should be close to the end of orthodontic treatment. As opposed to starting orthodontic space closure early, orthodontic space opening before implantation should be started late.

If an implant restoration is to replace the missing lateral incisor, the thickness of the alveolus must be adequate to allow proper implant placement. Without the eruption of the permanent lateral incisor, the osseous ridge in this area does not fully develop. If the permanent canine is allowed to erupt mesially through the alveolus into the lateral position, its large buccolingual width will influence the thickness of the edentulous ridge. When the permanent canine is orthodontically moved distally, an increased buccolingual alveolar width is established.<sup>3</sup>

Studies have shown that if the implant site is developed by this orthodontic tooth movement, its buccolingual width remains stable over time.<sup>4</sup>

The high success rate of dental implants has changed the quality of life for many patients. Immediate loading finds its application in some clinical cases and certainly adds another modality of treatment for the implant placement.

The terms ‘nonfunctional immediate loading’ and ‘immediate restoration’ are used when a prosthesis is fixed to the implants within 72 hours without achieving full occlusal contact with the opposing dentition.<sup>5</sup>

These implant restorations are essentially used for esthetic and psychological benefit during implant therapy.<sup>6</sup>

The advantages of this 1-stage procedure are obvious and include immediate function and esthetics.

Dental implants that are immediately loaded should be stable after insertion, and they should be rigidly splinted around the curvature of the arch. Immediate loading protocols for implant retained over dentures and fixed bridges were reviewed. It is shown that successful premature loading protocols require a careful and strict patient selection

aimed to achieve the best primary stability.<sup>7</sup> In addition, the provisional prosthesis should not be disturbed (if possible) during the healing process that occurs approximately two months after placement.

When a provisional restoration is placed, the subgingival contours and shape of the provisional will influence the position of the soft tissue.<sup>8</sup> Rather than proceeding directly to the final impression and fabrication of the definitive crown, a provisional restoration should be placed on the implant. The main purpose of placing a provisional restoration is to prosthetically guide the soft tissue into its final position.<sup>9</sup>

These simple guidelines have allowed for the predictable treatment of many patients who would otherwise have had to wear their dentures during the healing period or even go without them during the initial postoperative period.

In conclusion, implant placement combined with orthodontic treatment is acceptable as a treatment option with proper patient selection for good esthetics and soft tissue outcome.

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