MANAGEMENT OF CONGENITAL MISSING MAXILLARY LATERAL INCISOR BY ORTHODONTIC TREATMENT FOLLOWED BY PROSTHETIC IMPLANT

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ABSTRACT
Malformed or absence of anterior teeth always compromises the aesthetic smile. The maxillary lateral incisor is the second most common congenitally absent tooth. There are several treatment options for replacing the missing maxillary lateral incisor, including canine substitution, tooth-supported restoration, or single-tooth implant. Dental implants are an appropriate treatment option for replacing missing maxillary incisor teeth in adolescents when their dental and skeletal development is complete. This case report presents the treatment of a patient with congenitally missing maxillary lateral incisor with contra lateral peg shaped lateral incisor using dental implants. The paper discusses the aspects of pre-prosthetic orthodontic diagnosis and the treatment that needs to be considered with conservative and fixed prosthetic replacement.

KEYWORDS: Congenitally missing teeth, orthodontic space opening, pre-prosthetic orthodontics, dental implant.

INTRODUCTION
An aesthetic smile can be deeply compromised by malformed or absence of anterior teeth, which subsequently can affect the appearance, temperament, personality and psychological well being of an individual. Hypodontia, the congenital missing teeth, is the most typical dental developmental problem in humans. The lateral incisor, with the prevalence of 1 to 3% stood 1st among all maxillary anterior teeth. In contrast to male, females are 1.37 times more affected than males.1 Missing lateral incisor has been correlated with their anatomical position in the fusion area of facial processes. Congenitally missing teeth is a result of disruption during the early stages of development and is proposed as a mild dysplastic expression of the ectoderm. When a deciduous tooth is congenitally absent, its permanent counterpart might also be missing. Genetics plays a pivotal role in congenital dental aphasia, as confirmed by various studies on monozygotic twins. This multi-factorial etiology can comprise environmental factors as well, since the mixture of environmental and genetic factors might devote to the incidence of dental agenesis. Several studies have shown that MSX1 and PAX9 genes perform a role in early teeth development. PAX 9 is a paired domain transcription factor that perform a critical role in odontogenesis.2 Congenitally missing teeth can be associated with other conditions such as reductions in coronal or radical dimensions of teeth, delayed eruption of other teeth, retained primary teeth, ectopic canine eruption and abnormal dental morphologies such as taurodontism and peg-shaped lateral incisors. Some authors reported that congenitally missing teeth are correlated with dental anomalies such as decreased size of the incisors and canines as well as conical or tapered teeth such as peg lateral.2,3,4 One of the most challenging problems in dentistry is the treatment option for replacement of one or more maxillary lateral incisors that have been lost as a result of traumatic injuries or congenitally missing.5 Age, location, space limitations, alveolar ridge deficiencies, uneven gingival margins, occlusion, and periodontal factors often necessitate an interdisciplinary approach.6,7 Thus the management of maxillary lateral incisor agenesis needs multiple dental specialties like orthodontics, oral surgery, Periodontics and Prosthodontics.

In general, the treatment options include space maintenance or later incisor rehabilitation with prostheses, dental implants, or orthodontic space closure with camouflageing the maxillary canine to resemble the appearance of a lateral incisor.8,9 The prominence of the canine root eminence is another esthetic consideration of the space closure approach in patients with high smile lines.1 When space opening is indicated, both orthodontist and prosthodontist perform a key role in determining and establishing space requirements.10 The restorative approaches can be divided into two categories (single tooth implant, and tooth supported restorations) where dental implants are the most commonly used to rehabilitate congenitally missing maxillary lateral incisors once skeletal maturity has been reached. When dental implants are contra-indicated, there are mainly three available options: removable partial denture, resin bonded...
bridge which is a minimally invasive option for rehabilitation of congenitally missing lateral incisor, and full coverage fixed partial denture. The case report included here describes the interdisciplinary treatment of a missing lateral incisor with peg shaped lateral incisor on contralateral side which is rare to occur and difficult to rehabilitate.

CASE REPORT
A 17-year-old female patient reported to dept of orthodontics with the chief complaint of spacing in the upper anterior region. (Fig. 1) On Extraoral clinical examination patient was with orthogenetic maxilla and mandible with mild proclamation of upper and lower incisors. Intraoral examination revealed the molars were in Angle’s Class I relationship on both sides, class I canine relation on right side & class II canine relation on left side, with an overbite of 4 mm and over jet of 4 mm. The maxillary left lateral incisor (22) was absent and right lateral incisor (12) was peg shaped. There was no previous history of extraction of any tooth. Maxillary labial frenum was attached to interdental papilla between the central incisors causing diastema. Maxillary left canine (23) was drifted mesially encroaching the lateral incisor space creating space distal to canine. The patient was also found to have tongue thrust habit. Panoramic radiographic shows congenitally missing left maxillary lateral incisor (22).

TREATMENT OBJECTIVES
- To close the maxillary midline diastema
- To create optimal spaces for the restoration of the peg shaped right lateral incisor.
- To achieve class I canine relation on left side and a canine-guided occlusion.
- To replace the missing left lateral incisors with implant supported prosthesis.
- To maintain the class I molar relation on both sides.
- To achieve normal over jet and over bite.
- To obtain a pleasing esthetic facial profile.

Treatment Procedure:
Treatment Plan Is Divided In To Two Phases.
A) Orthodontic Phase
B) Prosthodontic Phase
The aim of the orthodontic phase is to create the space for replacement of left maxillary lateral incisor by distalizing the maxillary left canine and closing the midline diastema to match the upper facial midline. The option of space creation by distalizing canine was preferred due to a presenting Class II canine with spacing present distal to maxillary left canine. The space required for restoration of peg shaped right maxillary lateral incisor was obtained by closure of midline diastema. Orthodontic treatment was started with a 0.022” MBT Pre-adjusted Edgewise appliance with upper fixed tongue crib. The sequence of arch wires started initially with 0.016” martensitic Nickel Titanium arch wire which were sequentially followed by 0.018” Stainless Steel, 0.016 x 0.022” Stainless Steel, 0.017x 0.025” Stainless Steel and 0.019 x 0.025” Stainless Steel arch wires. Space between the maxillary central incisors was closed with elastic chain and left maxillary canine has been retracted with closed coil Nitinol spring on 19X25 stainless steel arch wire. After this sufficient space was gained for replacement of left maxillary lateral incisor and for building up of right maxillary lateral incisor. Root parallelism was checked for proper facilitation of prosthetic implant placement. Pre-prosthetic orthodontic treatment period lasted for 14 months.

Fig. 1(A 17-year-old female with Class I molar relationship on both side, class II canine on left side with anterior spacing in maxillary and increased overjet & overbite with missing left lateral incisors with peg shaped right lateral incisor before treatment.)

Fig. 2 (a) 0.016 NiTi ligated in maxillary and mandibular arch. (b) 0.019 x 0.025 stainless steel wire in upper arch, NITI colosed coil spring to retract Left maxillary canine,(c) alignment of lower arch
B. Prosthodontic Phase:
Radiographic examination revealed the height and width of the bone to be 15 mm and 4.1 mm respectively whereas the thickness of the soft tissue was found to be approximately 2 mm all over. Implant placement site was confirmed with a radiographic stent made with clear heat cure acrylic resin. These analyses enabled us to determine the angulations of the implant to the bone. At the time of surgery, depression was seen on the labial aspect of left maxillary lateral incisor as expected. A pilot hole of 2.5 mm twist drill was made in the radiographic stent at the implant placement site. The osteotomy site was further enlarged to a diameter of 3.8 mm and up to the length of 15 mm. Implant (Kisses Implant system, Biogenesis) of diameter 3.8 mm and 13 mm length was inserted into the prepared implant site using the torque wrench till the implant neck was flushed with the crestal bone. During the osteotomy drills, the autogenous bone particles were collected and mixed with patient’s blood and saline and placed in the area of fenestration. A healing
cap was placed and Silk sutures (Ethicon non absorbable surgical suture, Black braided silk, Johnson&Johnson, India) were placed to approximate the flap. Progideresorbable barrier membrane of approximately the size of the defect was tucked in over the bone graft. Arch wire was placed back immediately. Suture removal was done after 1 week of recall. From the previously used acrylic partial denture, a lateral incisor tooth was gouged on the palatal aspect. On suture removal, they were bonded with arch wire with no contact. During the second stage surgery, an implant level impression was made for the fabrication of the provisional restorations which were fabricated using tooth colored heat cure acrylic resin. Proper anatomic shape and contour was given to the provisional and the contact area was established 5 mm above the crestal bone without occlusal contact. After 3 months, growth of the interproximal papillae with a well-formed gingival cuff were seen around the implant. Implant level final impression (closed tray technique) was made. Final prostheses were fabricated with satisfactory outcome. The post treatment OPG showing stable Implant as shown in Fig. 3. Final treatment outcome is as shown in figure 4.

Fig. 3 (Implant placement)

Fig. 4 Post treatment Photographs

DISCUSSION
Orthodontic space closure procedure has been reported as favorable for periodontal health preservation compared with prosthetic replacements, the presence of undesirable buccal corridors may be a drawback for smile esthetics, as well as the inherent size, shape, and shade of canines if orthodontically moved. In the opposite, the choice of orthodontic space opening facilitates the maintenance of the canines of their natural position within the dental arch having the ideal intercuspatation through first premolars, and provision of canine-protected occlusion. 1 However, a prosthetic restoration should replace the missing lateral

Missing lateral incisor with peg shaped lateral incisor leads to an obvious asymmetry in the patients smile. The use of dental implants in the esthetic zone is well documented in literature. When maxillary lateral incisor is congenitally missing, permanent canine frequently erupt mesial to their normal position. Moving the tooth distally healthy bone formation will occur leads to adequate bucco-lingual width to allow proper implant placement. Proper angulations of the adjacent root are required.

CONCLUSION
The successful restorative treatment depends on interdisciplinary treatment planning, especially if prosthetic orthodontic tooth alignment is required similar to case report. Dental implants are a treatment of choice for most patients with congenitally missing laterals. An implant will preserve adjacent tooth structure and alveolar bone and provide esthetics and function. Golden proportion can play a key role in such cases by providing reference for space consideration.

REFERENCES
