

Case Series

Interdisciplinary approach for congenitally missing incisor with orthodontics and dental implant: A case series**Gaurav Gupta¹, D. K. Gupta², Priyanka Gupta³, Kuldeep Singh Rana⁴, Devanshi Sankhla⁵**

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ABSTRACT

Interdisciplinary approaches for congenitally missing teeth, which are frequently presented to the dentist, need a proper treatment plan. Prosthodontic fixed and removable prosthesis, orthodontic movement of maxillary canine to the lateral incisor site and single tooth dental implants, resin-bonded retainers are the various treatment modalities present to replace congenitally missing teeth. When treating the anterior maxilla, especially in the replacement of missing teeth, the important factors which need to be considered is careful treatment planning, space management, augmentation of bone and proper details of implant surgical and prosthetic techniques is required. This case report addresses fundamental considerations related to replacement of congenitally missing upper incisors by a team approach. A combined orthodontic and implant placement treatment approach can give an improved functioning occlusion with favorable aesthetics.

Key words: Missing, Orthodontic Treatment, Dental Implant, Incisor.

Treatment planning for missing maxillary central or lateral incisors poses a challenge to the clinicians as it creates an esthetic problem with specific orthodontic and prosthetic considerations [1]. The frequency of hypodontia varies from 0.27 to 11.0% depending on the methods of registration, grouping of the material, and racial differences according to different investigators. Second premolars and maxillary lateral incisors are found affected in majority of the cases of agenesis among the permanent teeth. Factors which are required to determine the amount of space needed for replacing missing lateral incisors are: mesiodistal width between the anterior teeth and occlusion [2,3,4].

Traditional fixed partial dentures, resin-bonded fixed partial dentures, removable partial dentures and Osseo integrated implant supported prostheses are the prosthetic

options available for replacing missing teeth. Most commonly and biologically conservative options for replacing missing lateral incisors are Osseo integrated implants [1,4,5]. In treatment plans when implants are part of it, their size dictates the amount of space that needs to be opened. To provide optimal gingival health and sufficient bony support, 6 mm is the minimum interdental space needed for a 3.75 mm implant. With the current treatment modalities for congenitally missing incisors, the most preferred method which is esthetic and durable is implant followed with orthodontic treatment. It has been most stable long-term restoration available according to the studies [6,7]. For managing patient with congenitally missing teeth, multiple disciplinary approach is beneficial.

For restorative excellence, proper communication is required in multidisciplinary treatment so as to obtain the

result. The orthodontist should do thorough diagnosis and treatment planning and understand critical parameters of root alignment and symmetrical distribution of edentulous spaces. Diagnostic wax-ups at the end of the orthodontic treatment procedure can be decisive in determining the final tooth position, and consultation with the surgeon who will place the implants [1,7,8,9]. If Implant is 3.75 mm wide, so 1 to 2 mm of space is required between the fixture and the adjacent roots [3, 10]. Usually, 6 to 8 mm of bone between the central incisor and canine roots is recommended. The roots of central incisor and canine teeth are brought into closer proximity when the teeth are aligned orthodontically, i.e., adequate space between the roots is created [2].

Further orthodontic treatment may be necessary to move the roots apart in order to create adequate space for placement of implant and coronal restoration. A minimum of 6 mm of space for the lateral incisor crown is required as the average implant platform is 4.0 mm wide, so space of 1.0 mm mesially and distally between the platforms is required for the proper healing of adjacent tooth and papilla development [4, 5, 10]. The aim of this study is to report case series in which congenitally missing lateral/central incisor was treated with orthodontic interventions and tooth

implantation. The present study is about the interdisciplinary management of hypodontia and not the procedural steps in implant placement.

CASE REPORT-1

An 18-year-old patient reported to the clinic with chief complaint of spacing in upper and lower front tooth region. Upon intraoral examination permanent maxillary lateral incisors were found to be clinically missing with spacing and malformed mandibular anterior teeth [Fig. 1]. The patient's medical history was found to be non-contributory to pertinent findings. Due to the age of the patient, it was suspicious, so OPG was done which revealed missing permanent maxillary lateral incisors [Fig. 2].

There was no history of extraction of teeth. Orthodontic treatment plan was proposed for improving the dental alignment and occlusion with placement of two implants. For this, orthodontic treatment was begun with stainless steel orthodontic wires and brackets in order to create space for placement of implants in place of missing lateral incisors [Fig. 3].



Fig. 1: Pre-treatment intraoral view, Fig. 2: OPG depicting missing maxillary lateral incisors, Fig. 3: Orthodontic treatment for creating space and teeth alignment



Fig. 4a, b: Implants placement at maxillary lateral incisors site, Fig. 5: Periapical radiograph showing implant positioning



Figure 6: Successful rehabilitation

After achieving desired space for implants with aligned teeth, space closure was done in mandibular anterior while maintaining occlusion. Two selected implants were installed on the sites correspondent to the right and left maxillary lateral incisors after bone level assessment [Fig. 4a, b]. Periapical radiograph was taken after selection of prosthetic abutments so to verify implants positioning and adaptation of abutments [Fig. 5]. The correct positioning of the implants allowed sufficient amount of bone and gingival tissue, which was important for maintenance of the supporting tissues on the buccal side. The appropriate plan

and multidisciplinary execution of the treatment plan allowed successful rehabilitation of this case [Fig. 6].

CASE REPORT-2

An 18-year-old reported to the clinic with chief complaint of spacing in upper front tooth region. Family history of missing teeth was there. Intra oral examination revealed missing permanent maxillary left lateral incisor and rotation of maxillary left central incisor [Fig. 7]. OPG was taken for diagnostic evaluation which revealed missing permanent maxillary left lateral incisor and erupting left maxillary canine [Fig. 8]. After discussing possible treatment options patient agreed to undergo orthodontic- implant prosthodontics treatment in an effort to restore form, function and esthetics. Treatment objectives were:

1. Correct the rotation of the maxillary left central incisor
2. Close the spaces in the maxillary anterior
3. Facilitate the proper eruption of the maxillary left canine into the arch
4. To achieve favorable occlusion
5. To restore esthetics



Fig. 7: Missing left maxillary lateral incisor with rotation of central incisor, Fig. 8: OPG depicting missing left lateral incisor and erupting canine, Figure 9: Orthodontic treatment of maxillary arch

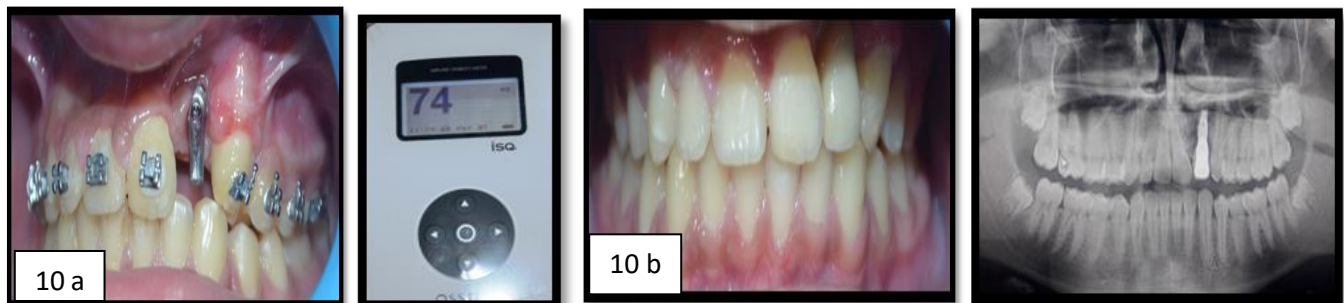


Figure 10a, b: Placement of implant with secondary stability of 74 ISQ, Fig. 11: Satisfied result achieved. Fig. 12: Post treatment OPG

The orthodontic treatment was begun by bonding stainless wires to maxillary arch and ligation wire was bonded to erupting canine in order to facilitate its eruption, thus maintaining space for placement of implant at the site of missing lateral incisor [Fig. 9]. After eruption of the canine and correction of rotation of the central incisor, bone density was checked for implant insertion. After administration of local anesthesia, site was marked, and selected implant was placed. Good secondary stability was achieved of 74 ISQ [Fig. 10a, b]. The positioning was checked in periapical radiograph. Implant was clinically and radiologically evaluated for proper osseointegration and absence of soft tissue complications. After 3 months ceramic crown was given. Patient was recalled for follow ups which gave satisfied results [Fig. 11]. Post treatment OPG was taken to check for any complications [Fig. 12].

CASE REPORT-3

A 20-year-old patient came to the clinic with chief complaint of spacing in upper front tooth region upon intra oral examination missing maxillary right lateral incisor was

found with erupting canine in place of lateral incisor [Fig. 13]. OPG was taken to evaluate the diagnosis, which showed congenitally missing permanent maxillary right lateral incisor [Fig. 14].

After discussing the treatment options with the patient, the treatment plan included orthodontic correction of misaligned canine and creating space for implant and implant placement at canine place as there was transposition of canine in place of lateral incisor. Orthodontic treatment was done by placing stainless steel arch wires bonded to upper and lower teeth in order to bring the erupting maxillary right canine into the lateral incisor place and also creating space for placement of implant [Fig. 15].

After achieving the desired space for implant placement and bringing canine into its place, bone density was checked and implant selection was done. Selected implant was placed at the created space. Orthodontic treatment was continued till proper overjet and overbite was achieved and occlusion was maintained [Fig. 16]. Periapical radiograph was taken to check for the implant positioning [Fig. 17].



Fig. 13: Missing maxillary right lateral incisor and canine in place of lateral incisor, Fig. 14: OPG depicting congenital absence of maxillary right lateral incisor, Fig. 15: Orthodontic correction of canine and creating space for implant



Fig. 16: Placement of implant at canine place and canine aligned at lateral incisor place, Fig. 17: Periapical radiograph for checking implant positioning, Fig. 18: Successful treatment of congenitally missing right maxillary lateral incisor



Figure 19: Post treatment OPG

Finally, matching abutment was given after osseointegration. A proper emergence profile had been developed, patient's cooperation in maintaining oral hygiene was excellent [Fig. 18]. Post treatment OPG was done to check for any complications [Fig. 19].

DISCUSSION

The unique and appropriate candidates for tooth replacement using Osseo integrated implants are the patients afflicted with congenital absence of either single or multiple teeth. Though replacement of missing tissues is done with adjunctive procedures to optimize esthetics and longevity (11,12). Here in present case series all four cases presented with congenital absence of either central incisor or lateral incisors. Ancillary treatment with orthodontics and oral surgery are required as these patients have differences in spatial position relative to the opposing arch.

For an interdisciplinary approach to ensure optimal treatment and timing of treatment a thorough diagnostic work-up should be included. [10,13]. We also did orthodontic treatment in order to create space for implant placement, thus following interdisciplinary approach. For treatment of tooth loss with good prognoses, titanium endosseous implants have become a successful treatment as they provide a promising treatment option for the replacement of congenitally missing teeth. There are various advantages such as preservation of adjacent natural tooth structure, preservation of the alveolar ridge, and achievement of optimal esthetic and restorative [14,15].

Some of the limitations for the implant patient are inadequate available space, inadequate alveolar ridge thickness, and inadequate alveolar bone support for gingival papilla. Another factor that plays an important role is the age of the patient at the time of implant placement or

completed skeletal growth, because if before the cessation growth periods, the implant is placed, it can cause various esthetic and functional problems. Hence, orthodontic treatment is required when the space available between the adjacent roots and the adjacent crowns is inadequate [10].

Advanced orthodontic-implant prosthodontics treatment results not only in the restoration of function and form to the congenitally involved missing dentition but also give marked improvement in aesthetics of the patient. This article also demonstrates the value of a multidisciplinary approach in therapeutic treatment and restoration of a congenitally involved missing teeth in dentition to achieve long-lasting functional as well as esthetic results.

CONCLUSION

Most patients with congenitally missing teeth, dental implants are the treatment of choice. An implant will provide esthetics and function and preserve tooth structure and alveolar bone. However, this case report series demonstrates that this approach may be used successfully as an alternative to current invasive methods. Hence, for successful restorative treatment, it includes interdisciplinary treatment planning for implant, pre-prosthetic orthodontic tooth alignment to create adequate space and finally implant surgery and prosthesis.

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