

Management of Spatial Discrepancies for Patients Receiving Implant Therapy Due to Congenitally Missing and Over Retained Maxillary Primary Lateral Incisors: A Case Report

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1. Abstract

Maxillary lateral incisors are one of the most frequently congenitally missing teeth in the mouth. They also very often show agenesis with failure of their permanent counterparts to erupt. Replacement of missing lateral incisors poses a major esthetic risk due to potential problems with inadequate space for implant placement, alveolar ridge deficiency, soft tissue limitations and occlusal problems that can impact replacement of the missing lateral incisor with dental implants. Careful planning requiring a multi-disciplinary approach is needed, and early involvement of an Orthodontist is crucial for Implant success. The goal of this article is to report on effective clinical management of two patients with missing permanent lateral incisors.

2. Introduction

Placement of dental implants in the anterior maxilla presents with unique challenges due to the need to ensure that the implant restoration blends esthetically in shape, size, color and tissue contours with adjacent natural teeth and restorations. Spatial disparities due to inadequate or excessive space can result in poor esthetics, loss of interproximal bone, soft tissue deficiency, overbulked or smaller restorations than contralateral teeth, angulation problems as well as occlusal problems and speech problems. Buser and colleagues recommended that for optimal position of implants in the mesio-distal dimension, 1.5mm space is required for natural teeth roots and adjacent dental implants in order to allow development of optimal tissue contours [1].

Levine and colleagues recommended 10 keys for Successful Esthetic Single Immediate dental implants including completing an Esthetic risk assessment, use of CT scan x-rays, atraumatic tooth extraction, restoration driven implant placement as well as use of narrow and standard implants in the anterior maxilla. For implant restorations, they recommend use of provisional restorations for tissue contours, custom impressions copings and final screw retained restorations for esthetic success of implant restorations [2]. The goal is that application of these principles would increase chances of implant esthetic success. When esthetic risk factors are present such as having limited mesiodistal span due to missing permanent laterals or over retained primary laterals, the goal is to identify ways to mitigate risk caused to result ultimately in esthetic success.

Missing lateral incisors present with difficulties for dentists and options to overcome the risk caused by limited space include to close the space orthodontically, or to reestablish the space for the lateral incisor and replace it with either a conventional bridge, dental implant, or removable prosthesis. If congenitally missing lateral incisors are left untreated, potential esthetic and functional problems can occur.

The most often congenitally missing teeth are third molars [6]. Maxillary lateral incisors are the second most frequently congenitally missing teeth second only to mandibular second premolars when wisdom teeth are not included in assessment [6]. Patients that are missing lateral incisors have more chances of decreased tooth dimension and limited space in jaws compared to patients

with erupted permanent incisors. To determine width of lateral incisors clinicians use the contralateral tooth size when one permanent incisor is fully erupted, when the contralateral incisor is an over-retained primary lateral incisor, or if the size is peg-shaped or the permanent lateral incisor is missing, the space for the incisor is determined using average tooth proportions for lateral incisors, or proportions based on the golden proportion for lateral incisors with reference to adjacent teeth [7].

Studies have found that the use of dental implants to replace congenitally missing teeth is predictable when there is adequate bone quantity and quality and active growth of bone has ceased and become complete [4,5]. A study by Rocuzzo and colleagues also showed that use of 2.9mm narrow diameter implants are a viable option for replacement of missing teeth, with comparable survival rates to use of 3.3mm implants [3]. Lacarbonara and colleagues evaluated 42 mini implants ranging from 2.7mm to 3mm in diameter for 10 years and found high success rates of 89-96% after 10 years, and 100% survival rate.8 Based on their findings they indicated that mini implants are valid therapeutic alternatives to resin bonded bridges and standard sized implants with high success and survival rates [8]. So following Orthodontic phase of therapy, the use of narrow or mini-implants are good option for replacement of missing permanent lateral incisors.

In planning Orthodontic procedures to utilize to address limited space from missing lateral incisors, space opening is recommended for unilateral sites missing one lateral incisor, and both space closure and space opening are indicated for bilateral sites [9]. For bilateral sites missing both lateral incisors space opening is indicated for patients with retrusive profile, or sites with Class III molar relationships and patients with deep bite, while space closure involving mesial movement of canine is indicated for Class I and Class II malocclusion without severe anterior crowding [9].

While options to replace congenitally missing teeth with conventional fixed partial dentures present with potential for damage to

adjacent tooth structure due to having to prepare the teeth for restorations, in addition to possibility of damage to the pulp due to the pulp horn occupying a larger volume of space in younger patients, dental implants offer the option of not affecting adjacent teeth and also preserving bone in the alveolar ridge.

Results with implants have also been found to be predictable, offering both esthetic and functional success as long as adequate ridge and space dimensions are present and growth is complete. There is a need for a multi-disciplinary approach for replacing teeth that are congenitally missing teeth including an orthodontist, an implant surgeon and prosthodontist or experienced general dentist [4, 5]. These key players are able to identify amount of space needed for implants to be successful, sequence of care needed to create or close space, implant size requirements and ways of achieving successful implant restorations. In this Case report we look at management of missing maxillary lateral incisors using dental implants for two patients.

3. Case Report 1

A twenty three year old female presented for surgical phase of therapy to replace right lateral incisor tooth #7 which was missing and an over retained left primary incisor #G. She had undergone active orthodontic therapy to create comparable space for both laterals #7 and #10 and to align midline (Figure 1). The goal of her therapy was to complete implant placement and add an acrylic tooth to the arch wire for space maintenance while implant#7 integrated. Followed by completing minor orthodontic alignment and by extraction of tooth #G and immediate implant placement #10. A 3.5mm by 13.5mm Southern Tri-nex tapered implant was placed to replace tooth #7 (Figures 2 and 3). An acrylic tooth was placed on the arch wire for space maintenance to complete minor orthodontic adjustment to create comparable space for #10. After the orthodontic alignment allowing adequate space, her braces were removed and implant #7 restored by restorative dentist (Figures 4-7). Extraction of tooth #G and immediate implant placement for #10 occurred on a different date.



Figure 1: Panoramic X-ray showing initial presentation



Figure 2: Implant Placement flap



Figure 3: Implant #7

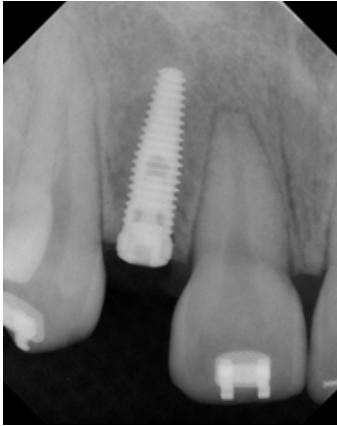


Figure 4: X-ray of Implant #7

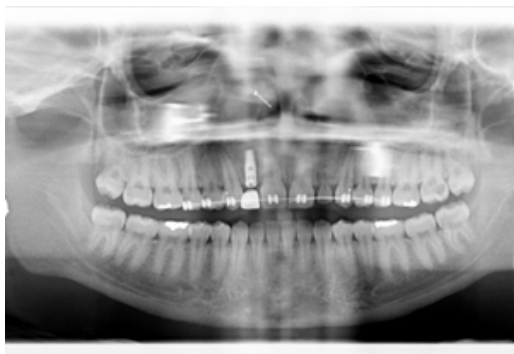


Figure 5: Space correction with Acrylic tooth for space maintenance



Figure 6: Abutment in place #7 and space correction completed



Figure 7: Restored Implant #7

4. Case Report 2

A thirty four year old male was not happy with his smile due to missing tooth #7 and having a mobile primary tooth #G. Based on his initial clinical exam, smile assessment and Cone beam CT scan x-ray assessment he had adequate mesio-distal space to support replacing teeth #7 and #10 with 3.2X10mm diameter implants. He did not want to undergo additional restorative therapy and was happy to only replace the missing permanent laterals only. Since the primary tooth has served as a space maintainer for #10, extraction of tooth #G and immediate implant placement of implant #10 and late implant placement for tooth #7 were performed concurrently. Two 3.2X10mm Implant Direct Legacy 2 implants were placed. The implants were restored by restorative dentist and his pictures and x-rays show that after three years, his implants are healthy with no signs of periimplantitis and are functioning well (Figures 8-14).





Figure 8a and 8b: Initial clinical presentation of patient

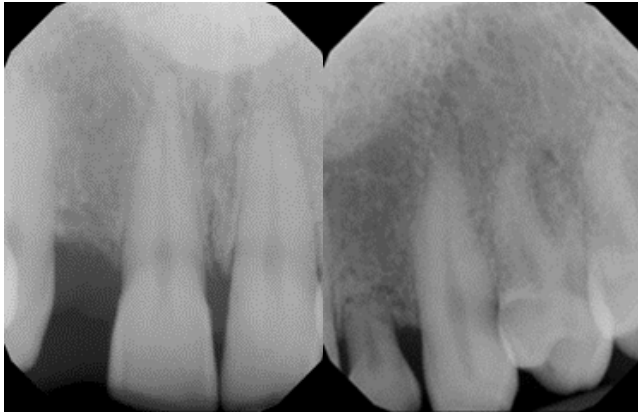


Figure 9a and 9b: Initial x-ray of Missing Permanent lateral incisor and over-retained primary lateral (#G)



Figure 10: Extraction of #G implant placement #7 and #10



Figure 11: Custom abutments in place for #7 and #10



Figure 12: Clinical picture 3 years later

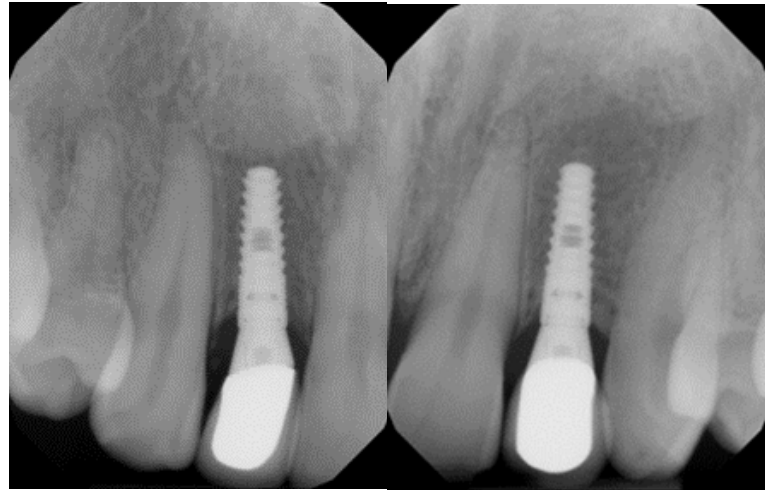


Figure 13 and 14: Xray of implant 3 years later

5. Discussion

Replacement of missing maxillary lateral incisors or over retained primary incisors presents with unique challenges for dentists requiring careful planning and a team approach. Due to the limited space often available, use of standard sized implants might not be an option, but a number of studies have shown that using narrow diameter implants are an efficacious way to replace missing lateral incisors offering the advantages that implants offer such as maintenance of bone and soft tissue in the site and not having to involve adjacent teeth while allowing maintenance of adequate space between implants and adjacent teeth to allow development of tissue contours and prevent bone loss. They also have been shown to have high success and survival rate long term. When there are spatial disparities present, orthodontic therapy has been essential in correcting problems long term and involving an Orthodontist early in the planning process is essential to success. While minor spatial concerns can be addressed by the restorative dentist with procedures such as enameloplasty, obtaining an Orthodontic consultation when there are spatial concerns is essential in directing the direction of care and obtaining a successful outcome.

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