

Case Report on the use of a bone level implant to replace a congenitally absent lateral incisor

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Introduction

Hypodontia is a very common pleomorphism in man and is associated with congenitally missing teeth. The term Anodontia is used where all teeth are absent.^{1, 2, 3} The aetiology could be hereditary, but sometimes no familial history can be identified. Systemic conditions such as Down's syndrome and Ectodermal Dysplasia also show a higher incidence of hypodontia. Developmental conditions like cleft lip or palate could also result in hypodontia due to the lack of alveolar development.³ The prevalence of hypodontia is between 3.5 – 6.5 % in a normal population with a Male:Female ratio of 2:3.³ Except for missing third molars the most common congenitally absent teeth are maxillary second premolars followed by maxillary lateral incisors and thereafter mandibular second premolars.⁴

Missing lateral incisors as well as peg shaped lateral incisors present the clinician with unique and very challenging aesthetic demands. It is helpful to determine from an early stage which final treatment modality would be utilised. Treatment options include space closure, re-establishment of

the space or no treatment at all. These cases are best identified and managed at an early age and usually require a multi-disciplinary approach. If implants are utilised it is important to choose an implant system that is versatile so that any restorative requirement can be addressed. In young patients it becomes important to choose a strong implant design and a system that offers a cone connection and horizontal offset.² With modern treatment modalities a very satisfactory outcome can now be achieved.

The patient and parents should be counseled about the complexities of this unfortunate anomaly as soon as it is identified. All the available long-term treatment options need to be discussed as well as the considerable cost implications of each.

Most patients are diagnosed with hypodontia between the ages of 6 – 12 years. The general dentist is well positioned to manage the case and to make necessary referrals at the appropriate stages of

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Figure 1: Panoramic radiograph at the age of 12 years.



Figure 2: Periapical radiograph showing the 23 in the position of the congenitally absent 22.



Figure 3: Clinical appearance at the age of 16 years. Note the midline shift and crowding.



Figure 4: Peg shaped 12.



Figure 5: The 23 has erupted into the 22 position and the 63 is retained.



Figure 6: Micro screw inserted for anchorage.

development. Regular consultation visits are thus highly recommended and routine maintenance and restoration of the dentition is important as part of the overall management of the patients.⁵

Case Presentation

An 18 year old male with a congenitally missing lateral incisor (22) with retained deciduous predecessor (62) and a peg shaped lateral incisor (12). (Figures 1, 2)

The patient was diagnosed 8 years earlier and followed up annually during subsequent years for monitoring of development as well as prophylactic measures to maintain and improve his oral hygiene. At the age of 16 he was referred to the orthodontist.

The patient exhibited a class I malocclusion with a class III skeletal pattern, an anterior open bite tendency, a slight midline shift and crowding of both dental arches. The 22 is congenitally absent with tooth 23 in the 22 position and

the 12 is a peg-shaped lateral incisor. (Figures 3, 4, 5)

It was decided to utilise fixed appliances to correct the malocclusion. This included distalising the 23 to create space for an implant to replace the missing 22. A compromise treatment plan using the canine as a lateral incisor would have resulted in a poor aesthetic outcome as the canine is usually of a darker chroma, has a bulbous shape, the gingival margin being more apical leading to asymmetry and to the loss of canine guidance.¹ The 12 would be retained and the shape corrected with a full coverage veneer.

Preliminary Treatment

Tooth 63 was extracted and a Jeil® micro bone screw 14mm length (Jeil Medical Corporation) was inserted interproximal of teeth 25/26 to provide the anchorage for distalising the 23. (Figure 6)

Sufficient space had been created for implant placement



Figure 7: Pre-operative view showing 6mm interdental space.
Figure 8: Pre-operative Radiograph. Note the Radiolucent appearance where the implant is likely to be placed.

in the 22 position.⁴ The buccal-palatal bone width was adequate but for the absence of a normal root prominence. It was decided to place a Straumann® 3.3 narrow connection bone level implant of 12mm length with simultaneous labial contour augmentation. Adolescents should have completed growth before implants are placed, particularly in areas of cosmetic concern.⁶

Surgical treatment

Prophylactic antibiotics were given one hour before surgery. The patient rinsed with Corsodyl® for one minute pre-operatively. The surgical phase was performed under local anaesthetic in the dental operatory after the dentist removed the arch wire to facilitate access. (Figure 7, 8)

Radiographically it is apparent that there is a more radiolucent appearance at the site where the implant is planned, due to poor bone structure. The interdental bone

forms a straight line between the 21 and 23 due to the absence of a tooth. The clinical picture demonstrates a lack of root prominence and a lack of normal gingival contour. The space between the 21 and 23 measured 6mm.

A palatal line angle incision was made in the event that poor primary stability would be obtained and primary closure necessitated. In addition, this type of incision makes it possible to improve soft tissue contour by moving the tissue to a more favorable position. The use of punching techniques is strongly discouraged, because it removes keratinised gingiva, which could otherwise have enhanced the site. The palatal extent of the incision mimics the shape and position where the palatal part of the healing abutment is likely to fit. This design also creates the possibility to provide a thicker labial tissue by using a roll flap. The full thickness flap was carefully elevated with minimal pressure onto the bone surrounding the teeth without relieving incisions. Relieving incisions are avoided as far as possible as they always cause some scarring, more postoperative pain, bruising and swelling. If a perforation occurs during the osteotomy preparation, or if bone grafting is required, relieving incisions and flap mobilisation would be needed to gain proper access and to achieve tension free closure. (Figure 9)

The 3-dimensional position of any implant is crucial for long-term aesthetic stability. A slight buccal dip was evident and the bucco-palatal dimension was only 4mm. The plan was to place a definitive cement retained crown, therefore the angulation of the implant was planned through the imaginary incisal plane of the missing tooth. The mesio-distal position was planned in the middle of the edentulous

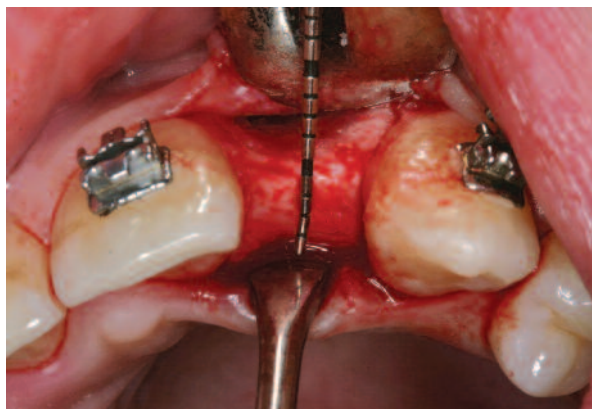


Figure 9: The bucco-palatal dimension is 4 mm. Please note the buccal dip.



Figure 10: The probe is aligned with the CEJ of the adjacent teeth and osteotomy was done to 2 mm below this line.



Figure 11: The morphology after the osteotomy mimics that of an area where a tooth is present.

space. The vertical position of an implant is crucial. With bone level implants the vertical position could be sub-crestal. It was planned to place the implant 2mm below the CEJ of the adjacent teeth, 1mm sub-crestal.

A 3.1mm diameter round burr was used to do an osteotomy in the implant position. This was to establish a bony contour, similar to that around a tooth, to a level of the CEJ of the adjacent teeth. Three millimeters of bone was removed. By removing this excessive bone a crown of the correct length and shape was possible. When bone is removed in such a manner the width of the crest becomes wider and the ridge width, initially 4 mm was now 5,5mm. (Figure 10, 11)

A small diameter (2.3mm) round bur was used to create a purchase point. Whilst working in close proximity to adjacent tooth roots it is preferable to use osteotomy preparation techniques that do not damage the adjacent roots. A sharp osteotome was pushed into the alveolus in the correct 3-dimensional orientation and a favourable

position verified radiographically. A 2mm twist drill was used to prepare the osteotomy to the desired length to allow for a 12 mm implant 1mm subcrestal. Thereafter the 2.8mm twist drill was used to prepare the final osteotomy. The verification radiograph confirmed the correct position. (Figures 12, 13, 14)

There were no palpable perforations, as such there was no need to expose the buccal bone further and relieving incisions were not required. The final profile drill for the 3.3mm bone level implant was used in the crestal part only and because the bone was of a poor quality bone tapping was not done. A Straumann® bone level 3.3mm narrow connection (NC) implant 12 mm long was placed 1mm sub-crestal. Primary stability was adequate and a NC conical D3.6/H 5mm healing abutment was inserted. It is important to verify the final position of an implant so that comparisons can be made in the future. (Figure 15, 16, 17)

Small granule (0,25-1mm) Bio-Oss® was mixed with a

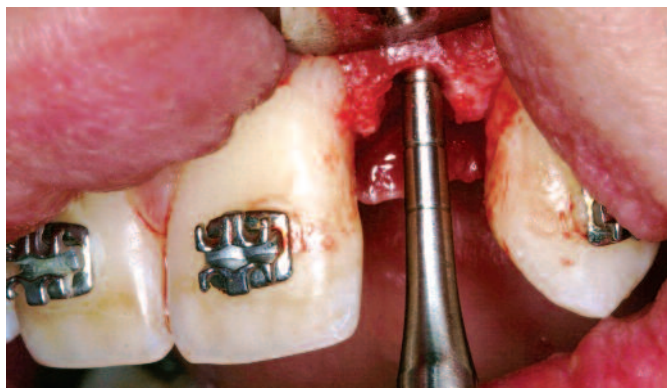


Figure 12: Osteotome in the correct 3-Dimensional orientation.

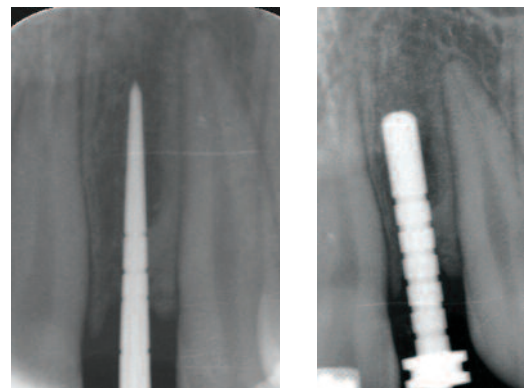


Figure 13: Radiographic verification of osteotome position.
Figure 14: Final position verification with the 2.8mm direction indicator.

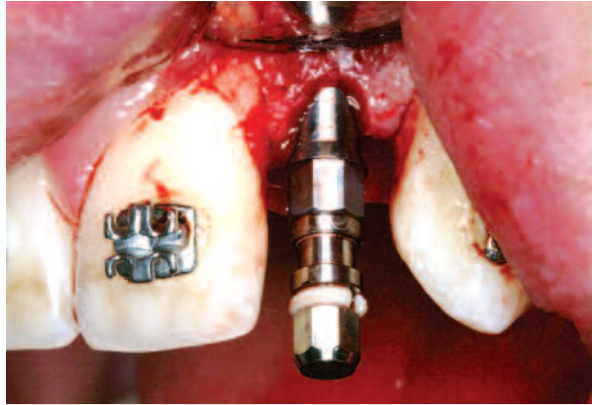


Figure 15: Final implant position before the placement mount is removed.

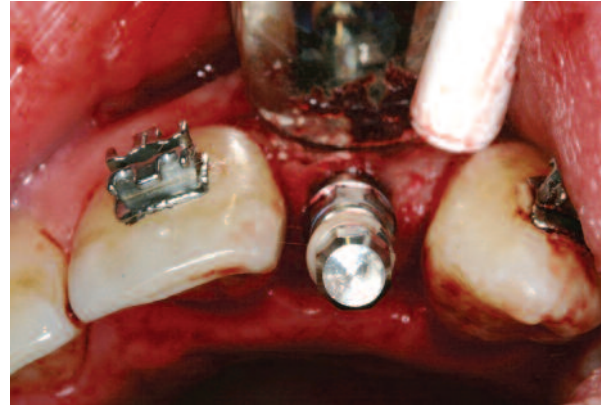


Figure 16: Note the correct 3-dimensional position with the angulation of placement through the incisal plane for provision of a cement retained final crown.

little blood and pushed into a pouch prepared buccal of the implant to create a root prominence. Bio-Oss® was only applied over the bone, apical to the healing abutment. The implant was contained completely within a bony envelope and the Bio-Oss® material was not used as a bone graft, but purely as a contour augmentation to create a root prominence. The Bio-Oss® will become encapsulated in soft tissue. Due to the extremely slow resorption rate of the Bio-Oss® it would help to stabilise soft tissue on the buccal aspect. (Figure 18)

The excess tissue elevated was shaped by removing a half moon piece of epithelium and connective tissue to facilitate better adaptation around the healing abutment and rolled in buccally of the healing abutment. Visyn® 6-0 sutures were used to the mesial and distal aspect of the healing

abutment to approximate the soft tissue. (Figure 19, 20)

The arch wire was replaced immediately after surgery and the sutures removed one week later. Healing was uneventful with minimal post-operative pain. (Figure 21)

The fixed orthodontic appliance was removed shortly afterwards and a Hawley retainer incorporating a prosthetic 22 was fitted.

Restorative Treatment

Six weeks after surgery the patient returned for the restorative phase of treatment. The healing abutment on the implant was then modified to create a better emergence profile. This was achieved with air abrasion of the healing abutment, application of metal primer, bonding agent and flowable composite. The desired effect was

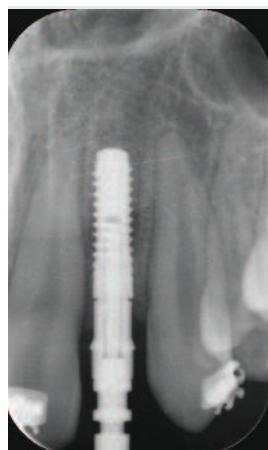


Figure 17: Final implant position.



Figure 18: Bio-Oss mixed with a little blood.

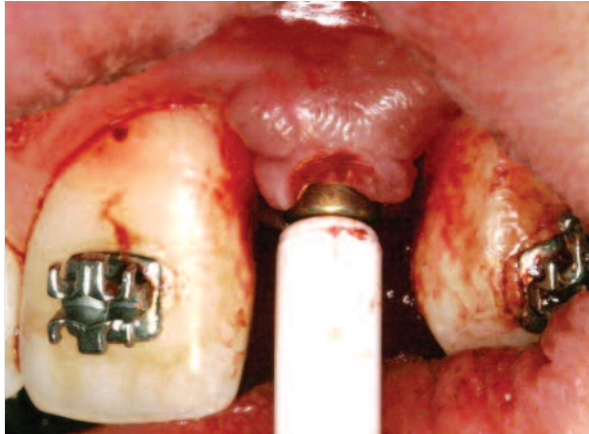


Figure 19: Removal of a half moon of epithelium to facilitate better adaptation of the roll flap around the healing abutment.

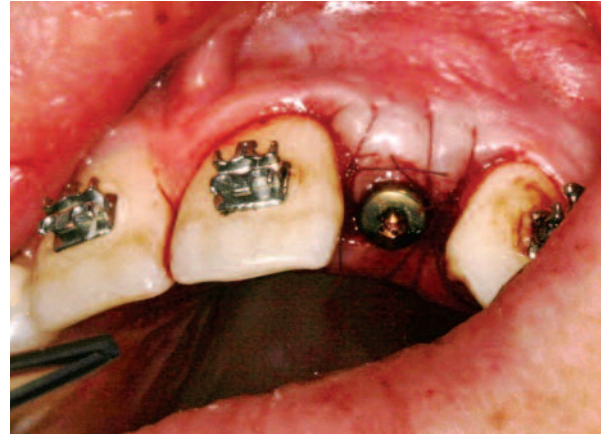


Figure 20: Immediately post surgery after suturing of the roll flap. Note the excess buccal tissue created by utilising the bone filler and roll flap.

achieved in that the soft tissue moved in a bucco-apical direction creating a more labial emergence profile. A harmonious gingival contour with the adjacent teeth was established. (Figure 22)

It was suggested from the outset that a crown lengthening procedure on the peg shaped lateral would create a longer crown length and a more symmetrical gingival contour in relation to the contra-lateral incisor. The patient decided to keep treatment simple and avoid further surgery and cost.

An open tray NC impression coping was connected to

the implant and verified radiographically. The 12 was minimally prepared for a full coverage veneer. A polyether impression compound was used to take the final impression, taking great care to record the soft tissue emergence profile.

A customised final abutment was cast accordingly and torqued to 35 Ncm. The porcelain fused to metal crown was cemented with Tempbond®. The Emax® full coverage veneer was luted with transparent Rely-X® veneer cement, and the upper Hawley retainer adjusted to fit. (Figures 23, 24, 25)

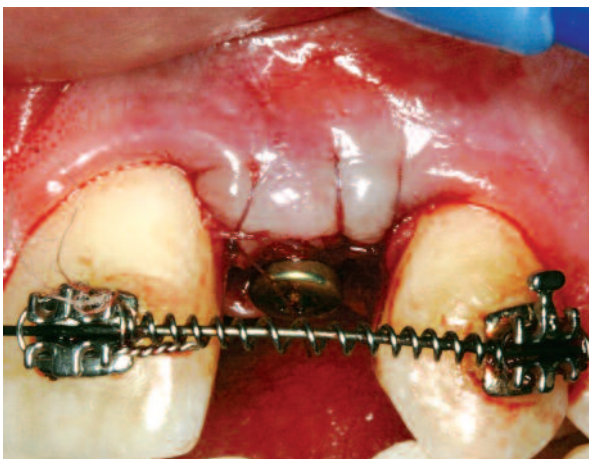


Figure 21: Replacement of the arch wire to prevent tooth movement during the integration period.



Figure 22: Modified NC healing abutment to create the correct emergence profile.



Figure 23: Frontal view on the day of cementation.



Figure 24: Final. Note the beautiful fill of papillae on both sides and the correct gingival contour due to osteotomy provided during implant placement.



Figure 25: Final radiograph showing seating of the final crown.

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