ECRONICON OPEN ACCESS

EC DENTAL SCIENCE
Case Report

Implants with Subcrestal Angular Correction Platform: A Solution to Avoid Facial Screw Access in Implant Crowns in the Anterior Maxilla

David Ko[1], Patrick Wong[2], Sunyoung Ma[3], Vincent Bennani[4] and Andrew Tawse-Smith[4]*

[1]*Faculty of Dentistry, University of Otago, Dunedin, New Zealand*

[2]*Faculty of Dentistry, University of Otago, Dunedin, New Zealand*

[3]*Senior Lecturer, Sir John Walsh Research Institute, Faculty of Dentistry, University of Otago, Dunedin, New Zealand*

[4]*Associate Professor, Sir John Walsh Research Institute, Faculty of Dentistry, University of Otago, Dunedin, New Zealand*

***Corresponding Author:** Andrew Tawse-Smith, Associate Professor, Sir John Walsh Research Institute, Faculty of Dentistry, University of Otago, Dunedin, New Zealand.

Received: February 23, 2018; **Published:** April 17, 2018

Abstract

Single tooth replacement using an implant restoration is commonly done in the anterior maxilla. While a screw-retained implant restoration with the screw access at the palatal side of the crown is preferred for the aesthetic and retrievability, this is not always possible when there is inadequate bone volume for ideal implant positioning. In this case, the use of angled or customised abutment with a cement-retained restoration or cross-pin is necessary. Alternatively, bone augmentation may be performed prior to implant placement to improve the implant position. All these approaches however, add cost and complexity to the treatment. The Co-Axis™ implant features an angled implant shoulder platform that allows correction of screw channel at the subcrestal level. This clinical case report describes the use of the Co-Axis™ implant to restore a missing maxillary right canine.

Keywords: *Dental Implants; Single Tooth; Esthetics; Anterior Maxilla*

Introduction

Placement of an implant in the anterior maxilla highly demands both aesthetic and functional outcome [1]. However, with inclined alveolar ridge of the anterior maxilla, the implant position may not always guarantee the palatal screw-access for restoration and the use of an angled or customized abutment in conjunction with a cement-retained restoration can be necessary. The disadvantage of providing a cement-retained restoration is the possibility of excess cement left within sub-tissue area inducing inflammatory peri-implant diseases [2-4] and difficult retrievability to address any prosthetic complication issue [5]. Prosthetic correction using cross-pin is an alternative but this adds costs and complexity to the treatment. Additional surgical procedure such as bone grafting can also be pursued; however, this results in additional treatment time as well as increased surgical morbidity to the patient. The Co-Axis™ implant (Southern Implants, Irene, South Africa) has been introduced to overcome this anatomical constraint of the pre-maxilla region with subcrestal angular correction at the implant platform level. This unique design allows the implant to be placed at an inclined position following the natural anatomy while maintaining the screw access at the palatal side of the restoration. This clinical case report presents a single tooth replacement of a maxillary right canine using a 12-degree Co-Axis™ implant (Southern Implants, Irene, South Africa).

Case Report

A 23-year-old Asian male with an unremarkable medical history was referred to the Periodontic and Prosthodontic clinics at the Faculty of Dentistry, University of Otago, Dunedin, New Zealand. The patient presented with a missing maxillary right canine and expressed the desire of having an implant restoration (Figure 1A and 1B). The patient had an orthodontic treatment at the age of 13 due to ectopically

erupted teeth and during this time, the palatally impacted maxillary right canine was surgically extracted. Since then he has been wearing a vacuum-formed retainer with an acrylic tooth to maintain the space. An extraoral examination revealed that the patient had an average to high smile line with a slight display of the interproximal papilla and of the labial gingival margin in an animated smile. Upon clinical examination, the adjacent teeth of the missing tooth site were unrestored with no defects. Lateral movements on the right side were guided by the first premolar (14) and on the left side by the maxillary left canine (23). The missing tooth site had an acceptable mesio-distal width with sufficient attached keratinized tissue while the occlusal view showed adequate labio-palatal alveolar width. However, a radiographic examination with cone beam computed tomography (CBCT) revealed that there was a labial bone concavity with limited labio-palatal width (Figure 1). A precise implant position within the alveolar bone was planned with consideration of the appropriate width, length, type of implant and prosthetic abutment, using Simplant 16 Pro (Dentsply, Kessel-Lo, Belgium) surgical treatment planning software. Other treatment options were discussed in comparison with a resin-bonded Maryland bridge and implant therapy with bone augmentation. Subsequently, the patient decided upon angulated implant placement without bone augmentation and to restore the implant with a screw-retained metal-ceramic crown.

A diagnostic wax-up of the preliminary maxillary model was scanned and digitized into a STL file format using a digital laboratory optical scanner (Ceramill 400; Amann Girrbach). The STL file was then imported into the Simplant software (Dentsply, Kessel-Lo, Belgium) and digitally superimposed on the CBCT 3D image. A virtual template of an angulated external hex implant (Co-Axis™ IBT12d ø4.0 x 13 mm; Southern Implants, Irene, South Africa) was placed within the alveolar process while ensuring the 12-degree off-axis screw access emerged through the cingulum of the proposed final canine restoration (Figure 1C and 1D). Once the planned implant position was finalised, an implant surgical guide was fabricated to assist with the implant surgery. A full thickness flap was elevated on both buccal and labial sides (Figure 2A). The exposed residual alveolar ridge was evaluated and the concave profile on buccal alveolar process near the vestibule was noted. Using the surgical guide, a set of twist drills was used to create an osteotomy with a diameter of 3 mm and depth of 13 mm (Figure 2B). Prior to placing the implant, a depth gauge was inserted to confirm the depth and orientation (Figure 2C). The implant (Co-Axis™ IBT12d ø4.0 mm x 13 mm) was placed and torqued to 35 Ncm using a ratchet wrench (Figure 2D, 2E and 2F). A 3 mm height healing abutment was placed and a rotational flap was performed to cover the interproximal alveolar bone with soft tissue. An intraoral radiograph was taken immediately after the implant placement (Figure 4A).

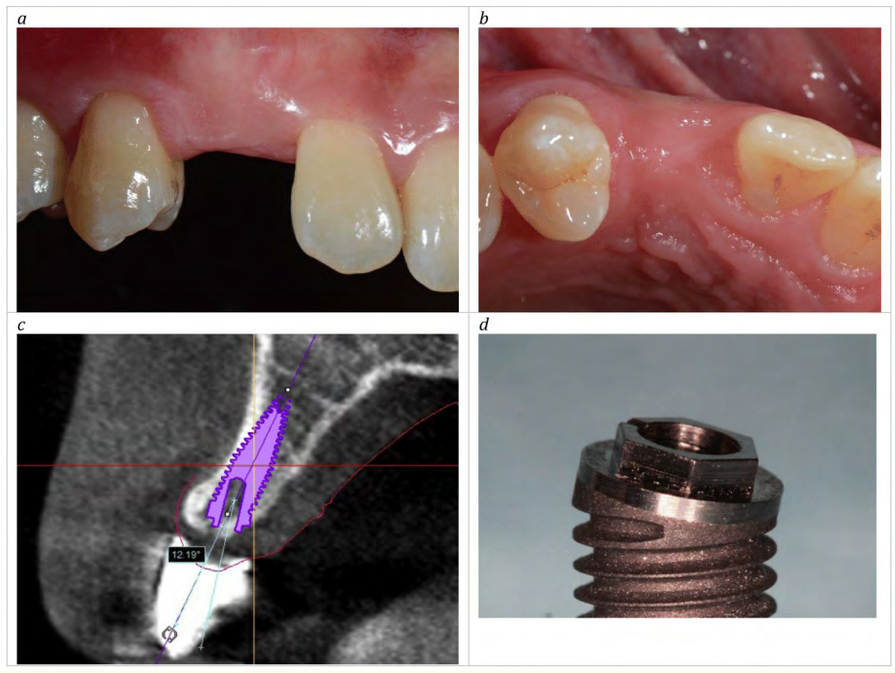

Figure 1: *Lateral (a) and occlusal (b) photograph of 13 edentulous area. CBCT imaging of 13 site (c) and 12 degree tilted platform of tapered Co-Axis Southern Implant (d).*

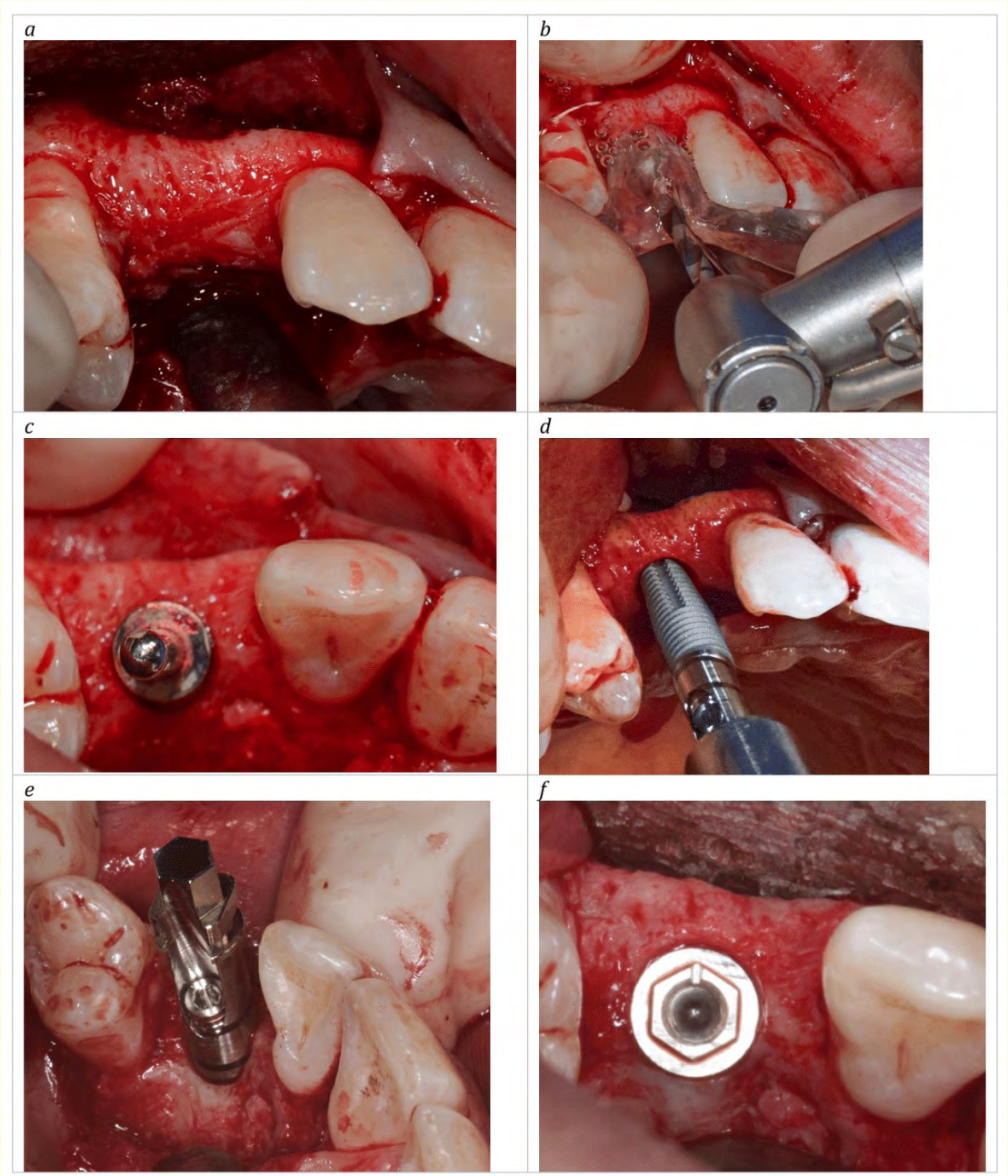

Figure 2: *Clinical photographs of implant surgical procedure showing: A. collapsed alveolar ridge of 13 area; B. Site preparation with surgical stent securing adequate drilling sequence; C. Guiding pin showing adequate 3-dimensional positioning of implant site; D Tapered Co-Axis Southern implant placement; E. Palatal views showing secured palatal access od the Co-Axis implant; F. Occlusal view showing mid-buccal location of the external hex implant.*

Three months after the surgery, an open-tray implant-level impression of the site was made using a custom tray and polyvinylsiloxane impression material (Imprint™ 3, 3M ESPE, USA). A provisional screw-retained implant crown using laboratory composite resin and a titanium cylinder was delivered to assess the aesthetics, phonetics and function. The provisional restoration was modified to re-establish the gingival architecture and to form proper soft tissue emergence profile. Finally, a screw-retained metal-ceramic implant crown with a UCLA abutment was fabricated mimicking the anterior guidance and anatomical shape created during the provisionalization phase (Figure 3A-3D).

Figure 3: *Lateral (a) and front (b) clinical photograph of 13 PFM crown. Occlusal (c) and palatal view (d) showing screw-retained palatal access of the crown.*

At 1-year review, there was no prosthodontic maintenance issue and the peri-implant mucosal health was excellent. The intraoral radiograph indicated limited changes in the marginal bone levels (Figure 4B).

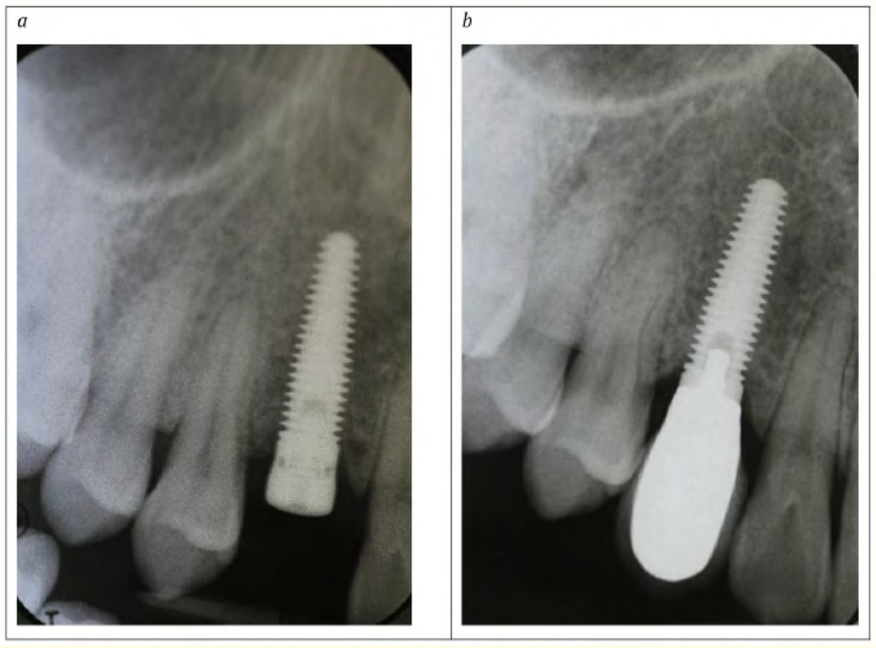

Figure 4: *Radiographic images of 13 implant, immediately after implant placement (a); and after one year of functional loading (b).*

Discussion

This clinical case report describes using an oral implant with a tilted platform for a single-tooth replacement in an anterior maxilla with a limited alveolar ridge dimension. The Co-Axis™ implant (Southern Implants, Irene, South Africa) features a subcrestal correction of the implant angulation by using a tilted implant platform. In this clinical case, a 12-degree correction at the crestal level has allowed an inclined implant placement within the residual alveolar ridge without any bone augmentation while maintaining a palatal screw access. There was no other prosthetic intervention needed to correct the screw channel thus resulting in a simple rehabilitation approach and yet achieving a good aesthetic outcome.

Literature has shown other prosthetic intervention such as using angulated or customized abutments with lingual set-screws or dental cement to retain the crowns. However, these options have the known disadvantages of increased treatment costs or difficulty in retrievability and the possible risk of jeopardizing peri-implant health due to excess cement. Recently with the use of computer-aided design and computer-aided manufacturing (CAD/CAM), the screw channels can also be corrected within the abutments and thus maintaining the retention by using a specially designed prosthetic screw and screwdriver [6]. However, any long-term clinical outcomes are yet to be reported.

Conclusion

This case report highlights using an oral implant with an innovative design to overcome the challenges of placing an implant in the anterior maxilla with anatomical limitation.

The unique design of the Co-Axis™ implants offers implant placement at compromised ridge anatomy of the anterior maxilla without the need for surgical and prosthodontic corrections to achieve an aesthetic, retrievable, screw-retained single implant restoration.

Bibliography

1. Buser D., *et al*. "Optimizing esthetics for implant restorations in the anterior maxilla: anatomic and surgical considerations". *International Journal of Oral and Maxillofacial Implants* 19 (2004): 43-61.

2. Wilson Jr TG. "The positive relationship between excess cement and peri-implant disease: a prospective clinical endoscopic study". *Journal of Periodontology* 80.9 (2009): 1388-1392.

3. Korsch M., *et al*. "Cement-associated signs of inflammation: retrospective analysis of the effect of excess cement on peri-implant tissue". *International Journal of Prosthodontics* 28.1 (2015): 11-18.

4. Staubli N., *et al*. "Excess cement and the risk of peri-implant disease – a systematic review". *Clinical Oral Implants Research* 28.10 (2017): 1278-1290.

5. Ma S and Fenton A. "Screw- versus cement-retained implant prostheses: a systematic review of prosthodontic maintenance and complications". *International Journal of Prosthodontics* 28.2 (2015): 127-145.

6. Gjelvold B., *et al*. "Angled screw channel: an alternative to cemented single-implant restorations – three clinical examples". *International Journal of Prosthodontics* 29.1 (2016): 74-76.

Volume 17 Issue 5 May 2018