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IMMEDIATE PLACEMENT

of Two One-Piece Ceramic Implants in the Aesthetic Zone

Dental implants have revolutionized dentistry and most particularly fixed and removable prosthodontics. Titanium implants have had great success over the last five decades however some challenges have emerged in terms of cosmetic concerns as well as an increasing number of patients requesting less invasive materials and the loss of appeal for implanted metal. The latest research on the long-term stability of titanium and titanium alloys in the body has exposed the vulnerability and the systemic effects of metal alloys when exposed to the oral environment[1]. The breakdown of metals and Titanium alloys are now known to undergo structural breakdown while in the oral environment[2,3] leading to metal ions and particles being found in peri-implant tissues, lymphatic tissues and even distant organs. Most recently clinical reports, immunological research[4] have put into question the widely accepted biocompatibility of titanium and titanium alloy implants.

The clinical situation presented here is one where metal sensitivity was a concern and although the patient never received dental implants in the past, there was concern on his part in having metal alloy implants in his jaws. Furthermore, in this instance the patient had a history of rashes when exposed to metals or non-precious jewellery therefore the request was made to replace the non-restorable teeth with metal free dental implants.

Clinical Case

A 36 year old male presented with extensive decay in the anterior maxilla and a previous experience with restorative dentistry. The anterior maxillary six teeth had deep cervical decay which extended below the gingival level. Upon clinical and radiographic examination, teeth #8 and #9 were determined to be non-restorable. (Figure #1) A Cone Beam CT scan was obtained and reviewed to assess bone levels and anatomy in the areas of planned implant placement. The clinical findings were confirmed upon review of the sagittal sections of the CBCT scan. (Figure #2 and #3)


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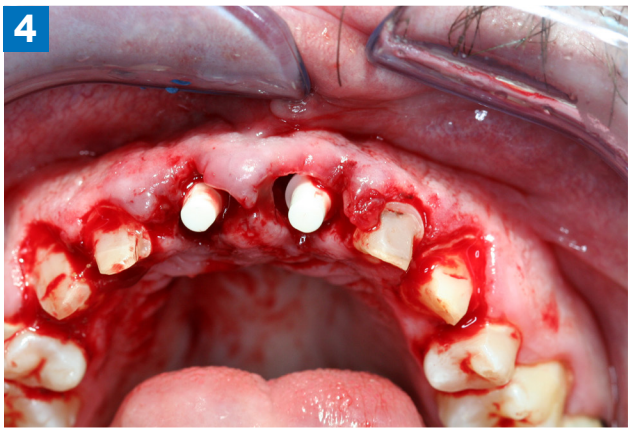
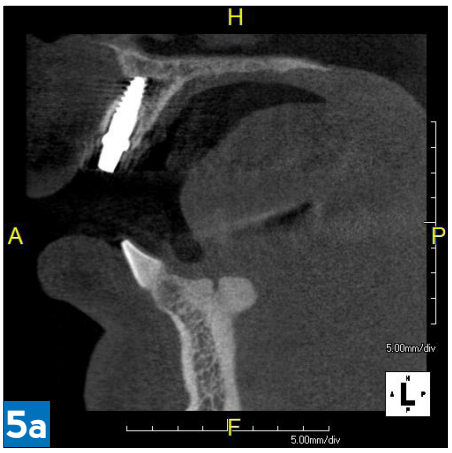
The patient reported a history of metal sensitivity and requested a metal free fixed solution to replace the unrestorable teeth as well as the crowns on his natural teeth. Alternative treatment options were presented including a removable partial denture and a six-unit fixed bridge. The patient opted for extraction of the two maxillary central incisors to be replaced with zirconia ceramic implants. A two-phase treatment plan was established and presented to the patient. The first step would be to prepare, and buildup of the lateral incisors and canines followed by the extraction of the central incisors with immediate placement of two one-piece ceramic implants during the same visit. The second phase was allowing the implants to osseointegrate but also adjust and update the temporary appliance in order to optimize gingival contours. Thirdly was the restorative of the implants and teeth with porcelain fused to zirconia crowns.

The implants selected were from Z-systems both 4.1 mm diameter and tapered. Complete blood work of the patient was done, and particular attention was given to vitamin D3 Levels, RBC Mg (Red blood cell Magnesium), blood cholesterol (HDL/LDL) and HbA1C. Vitamin D3 plays an important role in bone healing and bone formation around dental implants[5,6] and RBC Mg is an activator of Vitamin D37. Furthermore, elevated cholesterol has been well documented to interfere with osteoblastic activity and is often correlated to low Vitamin D3 levels. Vitamin D3 levels were initially found at 14 ng/ml and the patient was placed on a weekly intake of 50,000 IU of Vitamin D3 for 6 weeks along with Vitamin K2 and retested. RBC Mg, HbA1C and HDL/LDL cholesterol ratio were all within normal ranges.

After six weeks the patient was retested only for Vitamin D3 which was measured at 45 ng/ml and was asked to continue for another 4 weeks post-surgery. The patient returned for surgery, consents were obtained, local anaesthesia was administered across the anterior maxilla by infiltration. Extractions of the central incisors was done as minimally atraumatic as possible using manual periotomes and piezo surgery all the while taking care to preserve the buccal plate on both sites.

Two one-piece ceramic implants were placed at #8 and #9 (Figure #4). The length of the implant was selected so that it would extend beyond the apex of the extracted roots (Figure #5a and 5b). This was done in order to engage fresh bone and achieve the highest possible primary stability. The manufacturer surgical kit was used, and the prescribed osteotomy protocol closely followed. Insertion torque values for both implants were recorded at 35 Ncm and all implants showed good initial clinical primary stability. A periotest device (Figure #6) was used to assess the stability of the implants immediately after placement.





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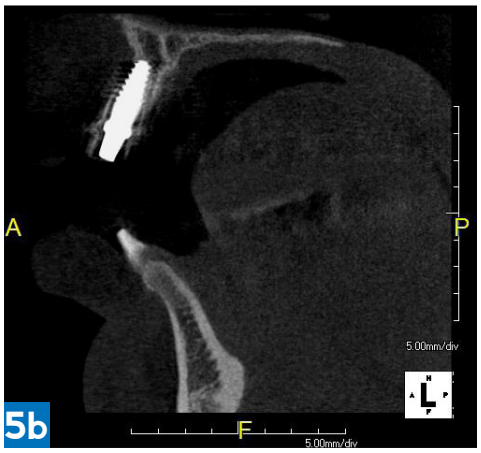

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> "Dental implants have revolutionized dentistry."


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The values recorded were PTV=-4.8 for #8 and PTV=-4.4 for #9 on a scale of 0 to -8 with the latter being the highest achievable stability value. This modality has been well proven and documented to assess implant stability as well as biological readiness for implants to be restored[8].

No bone grafting was necessary as the implant filled the sockets. The initial fixed temporary acrylic bridge was delivered with the crowns on # 8 and #9 not connected to the implant abutments (Figure #7). This was done in order not to exert any premature load on the implants during osseointegration.

Two months after surgery as the soft tissue healed there was some retraction (Figure #8). Impressions were made and a new fixed temporary with improved aesthetics was made milling a PMMA block. The soft tissue was further allowed to mature and conform to the new temporary healing prosthesis. (Figure #9).

The PMMA temporary prosthesis was worn for another four months. The patient returned for the final prosthetics phase, the PMMA temporary fixed bridge was removed and analog impressions were made using polyvinylsiloxane heavy and light body using the closed tray technique. Single crowns were made for each tooth and implant and were cemented using a resin modified glass ionomer cement (Figure #10). The behaviour of the soft tissue was evaluated periodically for a year after permanent crowns cementation and was observed to be stable and most notably to improve further around the implants (Figure #11).

The patient was satisfied with aesthetics of the prostheses. He was returned to his dentist for restorative on the other teeth as well as oral hygiene counselling and maintenance. The patient has been followed up periodically for the last forty-eight months and there have been no complications to date.

Conclusion

Replacement of consecutive teeth with tapered one-piece ceramic implants is an option. One-piece ceramic implants when placed in the proper environment are successful. However, it should be noted that case selection and rigorous treatment planning are crucial for the success of such rehabilitations.

An organized review study recently conducted showed survival rate of 95% of one and two piece zirconia implants [8]. Based on this assessment, the marginal bone loss and survival values of one and two-piece zirconia implant is quite acceptable. Also, it must be highlighted that there is lack of data specifying the outcome of the zirconia dental implants in the long run research studies. Thus, with time it has become essential to conduct more research and clinical studies for obtaining additional information and long-term data. In this context, a case study is also valuable for identification of risk factors for biological and technical complications.

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