

Immediate placement in the maxillary aesthetic zone

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This particular case report details the immediate replacement procedure of a previously unsuccessfully endodontically treated maxillary central incisor with a one-piece zirconia implant. Atraumatic extraction of the incisor was followed by a curettage procedure to remove any fragments of peri-apical granuloma.

Immediate placement of the implant (one-piece ZiBone zirconia, COHO) with good primary stability was accomplished and the implant was then restored with a zirconia crown four months later. The follow-up after a year found effective osseointegration with optimum function and form.

Case presentation

The patient was a 36-year-old woman, who came for a dental check-up because she was suffering from pain

in the left maxillary anterior tooth area. The pain, according to her, was sudden at the start and it worsened upon biting. The clinical examination of tooth #21 revealed inflammation, pain on percussion and fractured tooth at the cervical margin.

The tooth had been endodontically treated three years before and had not gone through rehabilitation earlier. Radiographic examination showed a fractured crown that had minor root resorption with an associated peri-apical infection (Figs. 1a–c). There was presence of sufficient bone width and height as was radiographically and clinically verified. The poor prognosis for endodontic retreatment was explained to the patient and she requested more conclusive treatment. It was then decided that the tooth needed to be removed and immediately be replaced with a one-piece zirconia implant.

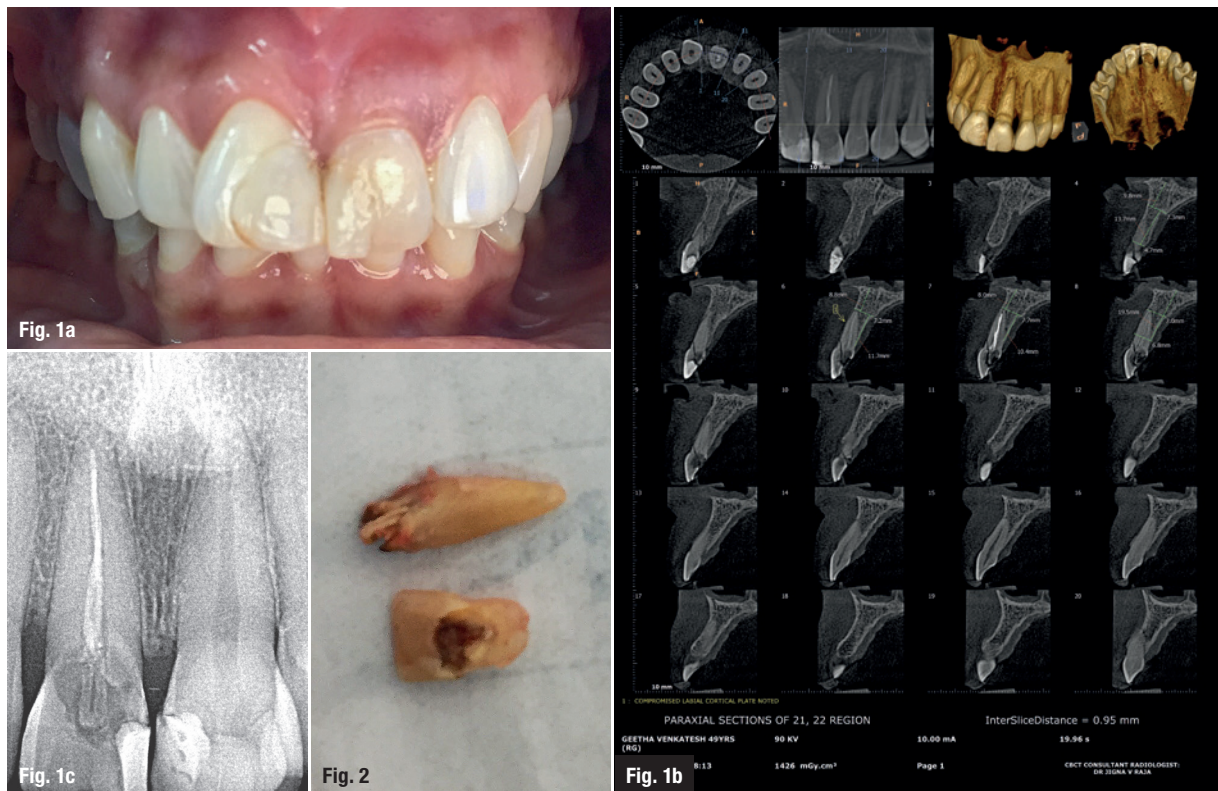


Fig. 1a: Pre-op clinical photograph of tooth #21. Fig. 1b: CBCT scan. Fig. 1c: Radiograph of tooth #21. Fig. 2: Extracted tooth #21.



Figs. 3a–c: One-piece ZiBone zirconia implant (\varnothing 4.0mm, length 12.0mm). **Fig. 4:** Healing state after four months. **Fig. 5:** Restoration of tooth #21 with a zirconia crown. **Figs. 6a & b:** One-year post-op situation and radiograph.

Surgical procedure

Thorough ultrasonic scaling and maintenance were done before extraction and placement of the implant. Under local anaesthesia with lidocaine (Lignox, Indoco with adrenaline of 1:200,000) atraumatic extraction of tooth #21 was performed with the use of a periosteal elevator (Fig. 2). In-depth debridement of the extraction socket was performed using bone curettes for the removal of granulation tissue.

The next procedure was the preparation of the osteotomy sites using a pilot drill and verification followed with the use of direction indicators. Consecutive drilling was then performed all the way to the last implant dimension and one ZiBone zirconia implant (\varnothing 4.0mm, length 12.0mm) was placed in region #21. Primary stability was accomplished at approximately 35Ncm (Figs. 3a–c).

Then, particulate bone grafting material was placed with the objective of filling the gap between the tooth socket and implant. The implant was secured in place using a Geistlich Bio-Gide collagen membrane (Geistlich Biomaterials) and the region was sutured with 3/0 black silk suture thread. It was decided to place the crown at a later stage. The immediate postoperative radiograph showed a parallel and properly placed implant.

For postoperative home care, instructions involved tooth-brushing, rinsing with 0.12% chlorhexidine, and

taking 400 mg of metronidazole and 500 mg of amoxicillin t.i.d. for five days, as well as three days of paracetamol. Removal of the sutures was done after seven days, at which time the wound was seen to be healing well.

Impressions were taken four months later and the zirconia crown was subsequently seated on the implant that had replaced tooth #21 (Fig. 4). Crown occlusion was confirmed with articulating paper of 12 μ in thickness (Fig. 5).

The postoperative review one year later showed that there was no indication of mobility, bone loss, peri-implant laceration or paraesthesia. Furthermore, there was no indication of inflammation of the soft tissue (peri-implant) surrounding the site (Fig. 6).

Discussion

Considerations for using zirconia implants include the material's aesthetic advantages: no galvanic reaction and lower risk of inflammation in comparison to the accidental introduction of titanium particles to the osteotomy site.^{1–3}

After 20 years, there is evidence suggesting that zirconia-based implants are highly biocompatible, in addition to having advantageous physical properties. Further evidence has shown that zirconia has the ability to withstand sustained loads, which implies that zirconia implants are also suitable for replacing posterior teeth.⁴

In this case, metallic implants were not desired by the patient, and for that reason, the single-piece zirconia implant was decided on.^{5,6} The absence of a micro-gap with one-piece implants in comparison to two-piece implants guarantees minimum microleakage and minimal bacterial colonisation, which may otherwise possibly result in bone loss.⁷

Conventional protocols for implant placement, as well as loading in areas with periapical infection, means several months of delay in the implant procedure after extraction, to effectively avoid infecting the surfaces of the implant.⁸ Nevertheless, occurrence of unintentional bone loss is possible while waiting for lesion resolution; this may compromise function and aesthetics. The amount of resorption of crestal bone after tooth extraction can extend to 23 per cent in six months, which may compromise the soft- and hard-tissue structure. Systematic review results advocate that it is possible to place implants in sites with periapical and periodontal infections.^{9,10}

This case entailed the performance of exhaustive surgical debridement before placement of the dental implant. Guided bone regeneration (GBR) was performed as well, for filling of the socket-implant gap. These steps were followed based on the evidence provided by Waasdorp et al.'s systematic review.¹¹

A randomised multicentre controlled trial observed no clinical variances in complications, implant survival and changes in the marginal bone levels when placing single implants early, conventionally or immediately.¹²

A meta-analysis and systematic review that studied the procedures for immediate placing and loading/restoring single implants in frontal maxillary regions provided inspiring outcomes of over 97.9% and 99.0% implant survival rates, respectively.¹³

Both prospective and retrospective studies have been performed, and they supported the immediate placement of implants even in areas with periapical pathology. A reflective analysis (67.3 months of follow-up) of 418 immediately placed implants displaying periapical pathology established an increasing 97.8% survival rate¹⁴.

Another reflective study compared the survival rates of immediate implants placed in sites with and with no periapical pathology. Among the 922 implants, 285 were implanted into sockets with periapical radiolucencies (19.75 months of follow-up).¹⁵ The survival rates of the control and study groups were at 97.5% and at 98.7%, respectively, which happened to be statistically insignificant.

Remarkably, a statistically greater degree of failure has been found for implants placed next to retained teeth with periapical lesions. In a prospective clinical controlled trial

by Siegenthaler et al. in which 13 immediate implants were implanted in areas that exhibited periapical pathology and 16 immediate implants were placed in healthy areas, there was no difference observed between radiographic and clinical parameters.¹⁶ Primary stability was achieved for both groups.

Jung et al. placed immediate implants into areas both with and with no periapical pathology and reported a 100% survival rate five years after the placement.¹⁷ It is vital to keep in mind that studies like these have emphasis on the elimination of pathology both chemotherapeutically and mechanically while supporting GBR wherever it is required.

Surfaces of zirconia implants tend to accumulate less bacteria in comparison to titanium surfaces. This could avert an inflammatory gingival reaction that could aggravate an existing periapical lesion. Reduction in the bacteriological load promotes the biological width formation and mucosal closure that could thwart any apical bacterial colonisation.¹⁸⁻²¹

Conclusion

The immediate placement of a zirconia implant could well benefit areas of existing periapical infection, provided that the infected site undergoes a thorough surgical debridement and GBR is used if necessary, and there is adequate antibiotic coverage and sufficient postoperative maintenance.

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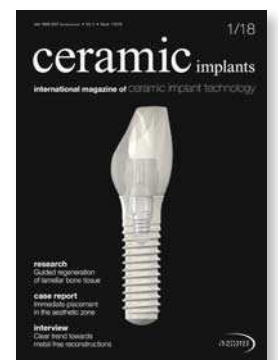


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