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Case Report: Bi-Cortical Implant for Immediate Rehabilitation of Tooth with Radicular CYST

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Structured Abstract: Problem Immediate Implant Placement (IIP) has gained popularity for oral rehabilitation in cases of tooth loss due to infection, offering advantages like less invasive surgery, faster recovery, and reduced patient suffering. However, the application of IIP in cases with periapical pathology, such as radicular cysts, remains controversial due to concerns about infection and bone healing. Limited high-quality research has examined the feasibility and outcomes of IIP in infected sites, making it a debated topic in dental surgery. **Approach:** This case report presents the immediate rehabilitation of a tooth affected by a radicular cyst using bi-cortical implants. A 53-year-old female patient with a radicular cyst in the maxillary anterior region underwent tooth extraction followed by immediate implant placement and cyst enucleation. Preoperative CBCT imaging was used to assess the cyst's size and impact on surrounding bone structures. The procedure involved meticulous debridement of the infected site, administration of prophylactic antibiotics, and the use of a one-piece cortico-basal implant to ensure stable anchorage in the compromised bone. **Findings:** The immediate implant placement was successfully performed without complications. The implant provided stable support for a cement-retained prosthesis, which was delivered the following day. Over a six-month follow-up period, the patient exhibited no signs of bone resorption or recurrence of periapical pathology. The soft and hard tissue around the implant remained healthy, demonstrating the feasibility of IIP in a site previously affected by periapical infection. **Conclusion:** This case report supports the viability of immediate implant placement in treating teeth with periapical pathology, such as radicular cysts. Through careful case selection, proper debridement, and the use

of cortico-basal implants, IIP can be a successful treatment modality even in challenging scenarios. Despite the promising outcomes in this case, further clinical studies are necessary to establish the long-term efficacy and safety of IIP in cases involving periapical infections. Individualized treatment planning remains crucial for achieving optimal results.

Keywords: Immediate Implant Placement, Radicular Cyst, Cortico-Basal Implant, Periapical Pathology, Oral Rehabilitation.

Introduction: It is currently a common practise to employ immediate dental implant insertion for oral rehabilitation in individuals who have lost teeth as a result of the infected site. In comparison to the delayed treatment protocol, the immediate implant placement (IIP) protocol provides a number of benefits, including less invasive surgery, a quicker recovery, and less suffering meant for patient. Furthermore, implant insertion immediately following extraction may well maintain the dimensions of the alveolar bone as well as offer the best soft tissue aesthetics (1). The idea of IIP following the extraction of a tooth alongside pathology in periapical region is a incredibly debatable topic, with scarce high-quality research articles published. There is debate on the need for implant therapy to meet both functional and aesthetic criteria in order to be classified as an essential modality. Recent animal studies have also demonstrated that it is viable to generate suitable local circumstances for a bone remodelling process to occur immediately surrounding a dental implant set in an infected socket by performing proper debridement and using antibiotics as a preventative measure (2). The purpose of this study was to offer a clinical case report of a patient who had a radicular cyst that was immediately treated through the use of bi-cortical implants following extraction and cyst enucleation.

Case Report: A 53-year-old female patient who is in excellent health reported to our dental office about a tooth that has been loosening in the region of the upper left front teeth since one to two years. 21 tooth was showing grade III mobility. patient gave the history of root canal treatment with 21,23 teeth; 10 years back & has not received prosthesis since then. The involved tooth was showing signs of discoloration. upon palpation buccal defect was palpated which later confirmed by radiographic findings. Patient wanted an immediate replacement of tooth with fixed prosthesis hence; regardless of pathology & bone defect implant therapy was planned using cortico-basal implant by palatal engagement of implant.

A cone beam computed tomography (CBCT) of 21,22,23 tooth region was advised which showed, well defined, oval, osteolytic lesion measuring approx. 15.1 X 11.4 X 5.6 mm in superior inferior, antero-posterior and transverse dimensions involving left central, lateral and canine was noted. Internal structure is totally radiolucent with no signs of calcification or septae. Perforation of Labial

cortex noted. Palatal cortex appears to be intact. This lesion is approx. 2.5 mm away from the lateral cortex of nasopalatine canal.

lesion is approx. 7 mm away from the floor of the nasal fossa. Based upon radiographic & clinical findings final diagnosis of radicular cyst was made. Vitality test was performed on 11, 22, 23 out of which 11, 22 were vital & 23 was non vital as it was RCT treated 10 yrs back. The patient was planned for RCT with 22, Re-RCT with 23 & extraction of 21 followed by immediate replacement using implant under local anaesthesia. patients got prophylactic antibiotic dose 60 minutes earlier to operation with 1 gm amoxicillin and was continued post operatively twice a day for a week.

Crevicular incision was taken involving 11, 21, 22, 23 to raise envelope flap; full thickness mucoperiosteal flap was raised. Cyst enucleation done & granulation tissues were removed with the help of curettage. The extraction socket then was flooded by Amoxicillin solution. buccal wall defect was managed with synthetic HA (hydroxyapatite) TCP granule 1cc which will also negotiate dead space. 1 mm straight drill used to perform first osteotomy involving palatal bone & paralleling pin is used to check angulation. After this conical 2mm drill is used to perform final osteotomy cut & 3.5 X 17 mm bi-cortical rough surface implant is placed with 35Nm torque at extraction site. Immediate post operative RVG is taken to check its placement.



FIG. 1 CBCT Scan showing anterior-posterior, superior-inferior extension of the radicular cyst.

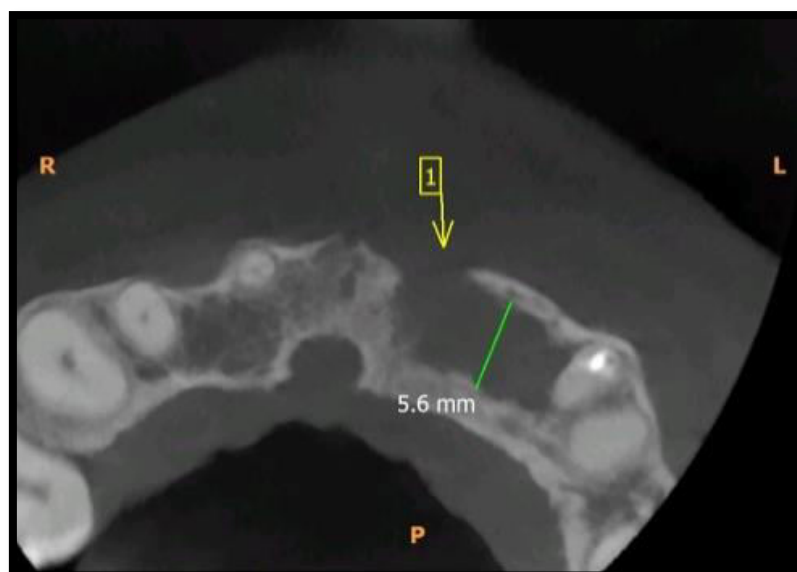


FIG. 2 CBCT scan showing buccal cortical bone loss along with width defect due to radicular cyst at periapical area.

The angulation of abutment is manipulated using hand driver to get favourable position for receiving prosthesis. Impression is taken with addition silicone after placing impression coping & sent to dental lab for PFM prosthesis on the same day. Later cement retained PFM prosthesis was given to patient on subsequent day. During the operation, there were no challenges that were encountered. For the first postoperative week, antibiotics and anti-inflammatory medications were provided. Patient was kept on follow up till 1 year & no complications were recorded.

Discussion: Considering that contamination might impede osseointegration and lead to loss of implants placed in sockets with periapical lesions. periapical pathosis usually contraindicates their rapid replacement with endo-osseous dental implants (3–4).

An option to weakened teeth affected by infectious disorders is the implantation of immediate implants. After tooth extraction, alveolar ridge resorption can significantly limit the amount of remaining bone and jeopardise the placement of implants for the most effective feasible restoration (5).

Immediate implant placement provides benefits on both the social and economic fronts. It not only prevents the alveolar bone level from resorbing, but it also shortens the length of the treatment by combining tooth removal followed by implant placement along with or without bone grafting in single sitting, it reduces the number of surgical procedures. As a consequence, less time is spent on overall therapy, avoids the need of second surgical procedure, and shortens the time required for rehabilitation. (6).

Periapical pathosis situations are traditionally considered unfavourable for immediate replacement with dental implants. However, insights from orthopaedic

surgery treating vertebral osteomyelitis challenge this notion (4). In vertebral osteomyelitis, it has been shown that diligent bone debridement, antibiotic treatment, and the use of titanium mesh cages can control subacute bone infection. Similar to osseointegration in implant dentistry, these cages provide instant support and stability to deteriorated vertebrae, resulting in effective radiographic bone fusion. (7-8).

In our case report there was periapical cyst in relation with 21,22,23 tooth region & perforation of buccal cortex with 21 conventionally considered unfavourable for immediate replacement was planned for immediate dental implants under meticulous bone debridement, antibiotic therapy which is in accordance with recent review literature.

The use of antibiotics before and after the implant operation is one area where authors who support this procedure have differing opinions. One hour prior to surgery, Lindeboom et al. (9) and Siegenthaler et al. (10) administered preoperative antibiotics, especially clindamycin. A 1.5 g of amoxicillin is given four days prior to surgery on daily basis and continued for ten days following it, according to Casap et al. (11). They reported one of the postoperative complications caused by pseudomembranous colitis, possibly due to prolonged antibiotic use. Other studies did not include preoperative antibiotic administration in their protocols. However,

authors such as Novaes and Novaes Jr. (2), and Siegenthaler et al. (10) suggested using postoperative antibiotics at different doses and durations, but no consensus was reached on this matter. Crespi et al. included antibiotics one hour prior to surgery & continued for about 1 week after the surgical procedure (12).

In our case report, we used antibiotics one hour before surgery; the patients got 1 g amoxicillin before surgery and continued for around 1 week twice a day after the surgical operation, which is consistent with the literature study.

Crespi et al. revealed in a prospective trial that immediate implant insertion into extraction sockets of teeth with periapical disease had no deleterious influence on the bone-healing

process. After 24 months, the implants had a 100% survival rate, and the integration of hard and soft tissues demonstrated equivalent and good results in both the treatment (TG) and control groups (CG) (12).

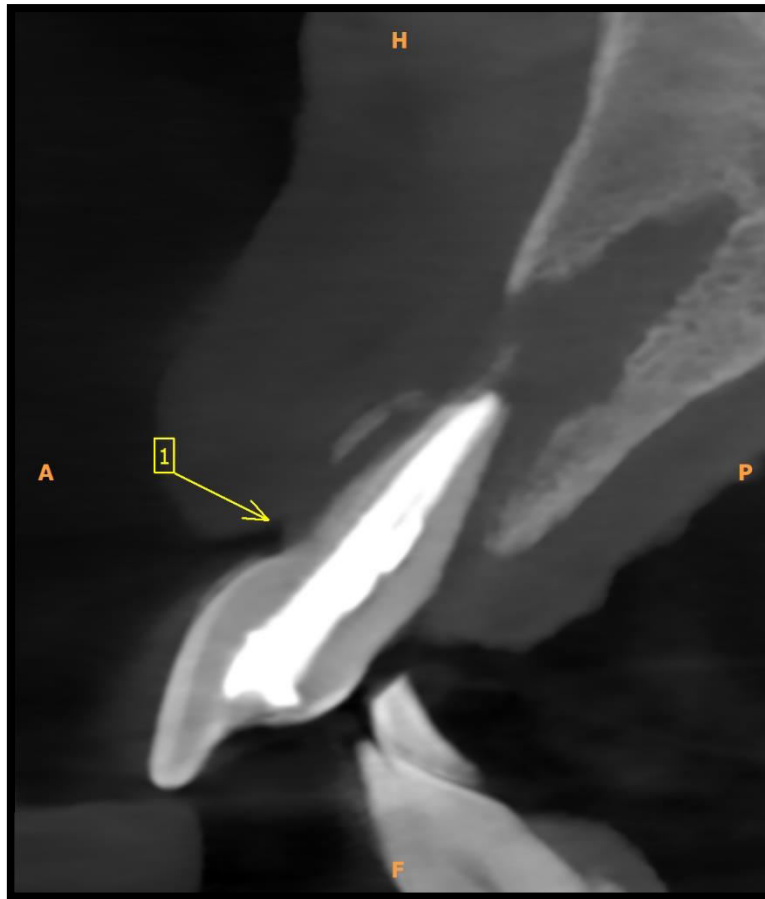


FIG. 3 CBCT scan showing buccal cortical bone loss along with tooth moved from socket & held by soft tissue surrounding.

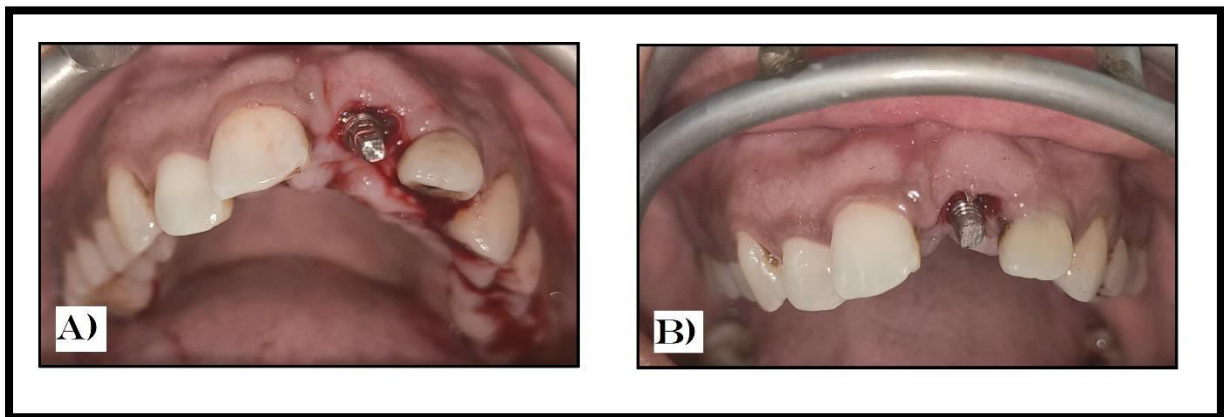


FIG. 4 a) showing placement of bi-cortical basal implant immediately after extraction. 4
 b) after abutment trimming before receiving cement retained PFM crown.

In our case the patient was followed up to 6 months regularly & did not show neither any signs of bone resorption nor signs of active periapical pathology. Hard tissue & soft tissue profile around tooth was devoid of any infection post operatively.

Following tooth extraction, alveolar ridge resorption is considerably more severe in the anteriormaxilla, because ridge resorption frequently causes an undesirable palate-labial discrepancy among the implant and the prosthesis (13).

As per CBCT findings buccal cortical wall defect was evident, & extraction of the tooth will cause rapid alveolar resorption resulting in collapse of ridge, hence immediate implant replacement was planned considering the above-mentioned facts.

Endodontic infections, which are characterised by a mixture of anaerobic bacteria such as *Fusobacterium*, *Prevotella*, *Porphyromonas*, *Actinomyces*, *Streptococcus*, and *Peptostreptococcus*, are responsible for the soaring success frequency seen with implants inserted in fresh-socket having both chronic and acute lesions. These microorganisms are typically constrained to the root canal having infection (14).

Tooth removal, together with degranulation of the socket, has been proven in studies to efficiently remove cultured bacteria (9). Immediate implant insertion following extraction has the possibility to enhance the structural integrity of the fresh sockets after extraction as well as preservation of interdental papillae in the vicinity of the restoration (15).

On the basis of nature of periapical infection & involved micro-organism immediate replacement of tooth using implant after extraction was the best possible way to preserve function & aesthetics.

The use of One-piece Corticobasal implants has been advocated by a number of authors in recent years in order to establish bicortical anchorage and assure implant stability in patients with extensive ridge resorption or inadequate bone support (16).

The single piece implant by integrating the transmucosal portion of abutment as an intrinsic component reduces a structural flaw seen in conventional implants. The effortless change from implant to abutment differentiates one-piece implants, that imitate the framework of a natural tooth and pose many rewards such as a strong unibody design, no split parts, single-stage surgery with either a flap or flapless approach, and straightforward restorative techniques.

A single-piece implant is made to work and be inserted into fresh extraction sockets immediately. One-piece Cortico-basal provides excellent results with few, controllable complications (17-18).

Considering the advantages of One-piece Cortico-basal implants over two-piece, in our case report we used bi-cortical rough surface implant for immediate implant placement which is in accordance with literature review.



FIG 5 a) showing post operative view after receiving permanent PFM prosthesis on the 3rd day of surgery. 5 b) post operative view after 1 year, showing adequate keratinized gingiva around implant & good adaptation of gingiva.

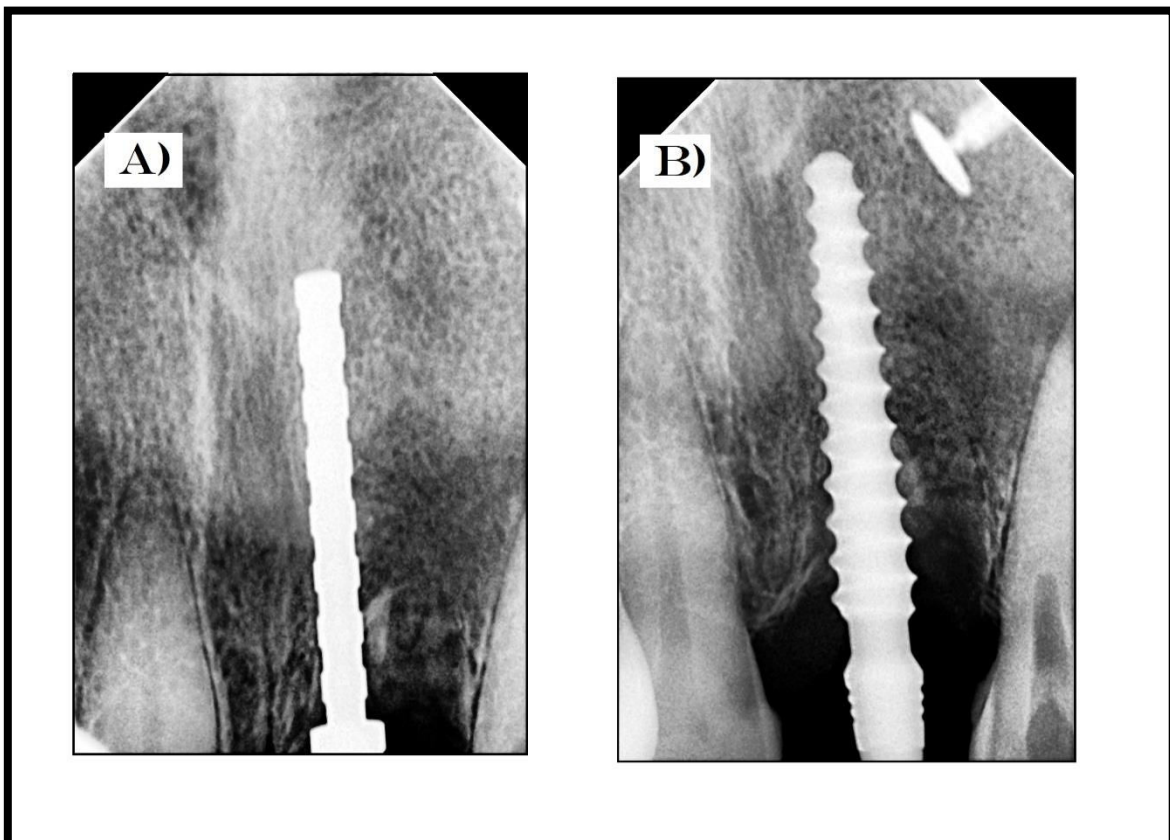


FIG. 6 a) paralleling pin was placed to check the direction of the osteotomy. 6 b) bi-cortical basal implant was placed in palatal bone with torque around 35 Nm before placing graft material to cover buccal defect & dead space.

Conclusion: In conclusion, the present case study illustrates the effective use of immediate implant insertion for radicular cyst treatment following tooth extraction with cyst enucleation. Despite the controversy surrounding this approach in cases of periapical pathosis, meticulous debridement and prophylactic antibiotic use created favourable conditions for bone remodelling around the implant. The

utilization of one-piece cortico-basal implants further facilitated stable anchorage and simplified the restorative process, resulting in functional and aesthetically pleasing outcomes.

Overall, immediate implant placement offers several advantages over delayed treatment protocols, such as reduced surgical interventions and shorter treatment times. While this case highlights the potential of immediate implant placement in challenging scenarios, further research and clinical studies are warranted to solidify its efficacy in periapical disease cases. Individual patient factors and careful case selection remain critical for successful outcomes when employing immediate implant placement in such situations.

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