A rare case report of peri-implant bone necrosis: Mapping the distance of initial peri-implant complication toward a path of success

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Abstract

In the past decade, science of implant placement has greatly advanced and at the same time much success has been experienced with the endosseous implant. Despite the long-term predictability of the implants, however, biological, technical and esthetic complications do occur. The use of osseointegrated implants as a foundation for prosthetic replacement of missing teeth has been highly predictable, but still at present, there is no consensus of how to best manage the complications occurring after implant placement. In this report, we discuss post-insertion complication of bone necrosis and its successful management.

Keywords: Complication, implant, osteonecrosis, peri-implantitis

Introduction

Throughout the history of dentistry, esthetic and functional replacement of missing tooth has been a challenge to the clinician. Recently, endosseous implants have emerged as a promising modality for restoration of missing teeth. Compared to a decade back, the placement of implants is becoming more predictable, with increasing success rates ranging from 92% in maxilla and 94% in mandible over a period of 5 years.[1] Even with this high success rate, implants do fail. The complications leading to failure may arise at any stage, from implant placement to abutment insertion. Successful management of these complications still pose a challenge for the clinician.

Alcohol consumption is one of the threats to the successful osseointegration of the implant as it interferes with the wound healing. Alcohol affects the inflammatory phase of wound healing by altering the cytokine levels at the healing site. It also modifies the proliferative response at the site and retards the epithelium formation, collagen synthesis and endothelium formation.[2] These factors together may interfere in the successful osseointegration of implant and lead to complications.

Case Report

A male patient, aged 20 years, reported to the Department of Periodontology and Oral Implantology with the chief complaint of replacement of missing right lower back tooth. Patient wanted the fixed replacement of tooth (#46), but without getting the adjacent teeth grinded. Therefore, treatment option of implant with its benefits and risks was explained to the patient and an informed written consent was procured from him.

A thorough medical, dental and personal history of the patient was recorded. Patient was found to be systemically and periodontally healthy [Figure 1]. The patient revealed that he was an off and on social drinker. The adverse effects of alcohol on healing were explained and the patient was asked to abstain from alcohol during the treatment and healing period.

Diagnostic casts were made along with radiographic assessment of the implant site. A computed tomographic
Salaria, et al.: Managing peri-implant osteonecrosis

(CT) scan of the site was also obtained to accurately assess the dimensions of the site as well as the bone density. The mesiodistal dimension of the implant site was 8 mm and bucco-lingual dimension was 5 mm. The distance of alveolar crest from the anatomical structures like mental foramen and infra-alveolar canal was 16 mm. All the necessary preoperative hematological investigations were carried out before implant placement. Implant surgery was planned for the placement of one piece immediate loading implant (TRX-OP) with of diameter 2.8 mm and length of 13 mm.

Surgical procedure

• A mid crestal incision was given using number 11 blade.
• Full-thickness bucco-lingual mucoperiosteal flaps were elevated to expose the alveolar bone using molt periosteal elevator number 9.
• Preparation of osteotomy site was done according to the manufacturer’s instructions. Drilling was done at a speed of 1000–1500 rpm with normal saline irrigation. An initial indentation at the center of alveolar crest was made using a round bur, followed by a 2-mm pilot drill up to the desired length. Further sequential drilling was done up to the pre-determined length. After each sequence of bone drilling, the paralleling tool was used to check the angulation of the prepared osteotomy site.
• Then, the implant of desired dimension (diameter of 2.8 mm and length of 13 mm) was placed with the hand wrench into the prepared osteotomy site. Torque on the hand wrench was adjusted to 40 N cm. After implant insertion, suturing was done with 4-0 black silk sutures to achieve primary closure [Figure 2].
• Post-insertion clinical examination revealed no significant findings. An immediate post-insertion radiograph revealed desired direction of the implant [Figure 3].
• Patient was discharged after thoroughly explaining the postoperative instructions.

Post-insertion complication

Seven days postoperatively, the patient reported to the department for checkup and suture removal. On removal of periodontal dressing, pale white bone devoid of gingiva was observed around the implant on the buccal aspect [Figure 4]. Clinical examination revealed a fibrotic thick gingiva around the exposed bone and on the lingual aspect. Also, the bone was devoid of peristeme and was showing changes toward necrosis. Lingually, a probing depth of 5–6 mm was noticed although the stability of the implant was maintained at the same level as that at the time of insertion. Radiographic examination revealed mild to moderate lytic changes in the bone around the implant [Figure 5].

On taking history, the patient disclosed intake of alcohol for 1 day after implant placement.

Management of complication

• Patient was motivated for strict abstinence from alcohol
Salaria, et al.: Managing peri-implant osteonecrosis

until the healing period of implant.

- Open flap debridement of the affected site with excision of fibrous lateral pocket wall was carried out. Also, buccal osteoplasty was carried out to induce bleeding points on buccal surface of the alveolar bone. All the necessary precautions were taken care not to expose the implant bone contact area.
- The operated area was thoroughly debrided and irrigated with betadine and sutures were placed. The remaining exposed area was covered with sterile tin foil followed by periodontal pack application.
- Follow-up was done every 10 days for 9 months. Periodontal dressing was changed at every appointment after thorough irrigation of the operated site. Also, the patient was put on strict oral hygiene maintenance except for the operated site for which 0.2% chlorhexidine mouth wash twice daily was recommended.

**Outcome**

Clinical examination at 20 weeks revealed almost 70% of the attachment gain around the implant with growth of healthy gingiva over the affected bone [Figure 6]. On radiographic assessment, an increased bone height was observed, more at the mesial aspect than distal.

Follow-up at 40 weeks demonstrated complete healthy soft tissue coverage as well as normal radiographic features at the operated site. Also, radiograph revealed resolution of lytic changes with radiopaque flecks of bone around the implant on the mesial as well as distal aspects [Figures 7 and 8].

**Discussion**

Osteonecrosis of jaw is a severe bone disease which most commonly results from ischemia, usually local. The definitive symptoms include non-healing exposure of either maxillary or mandibular bone through lesions in gingiva.[3] In some cases, the affected bone may be covered by marked pallor affected gingiva. It may be accompanied by pain and inflammation. Similar findings were observed in the present case although the patient experienced no

**Figure 5:** One week postoperative radiograph showing slight changes

**Figure 6:** Twenty weeks postoperative view

**Figure 7:** Forty weeks postoperative view showing complete healing and abutment placement

**Figure 8:** Forty weeks postoperative radiographic view
pain. With careful history recording it was assessed that intake of alcohol 1 day post insertion of implant could be the possible etiological factor.

One of the most profound effects of acute ethanol exposure on wound healing occurs during the inflammatory response, and altered cytokine production is a primary component.[2] Ethanol exposure also impairs the proliferative response during healing, causing delays in epithelial coverage, collagen synthesis, and blood vessel regrowth. Ethanol also impairs the endothelial function, including the ability to form cord-like structures, ultimately resulting in a reduction in capillary density, wound vascularity, and angiogenesis leading to avascular necrosis.[4,5] In the absence of proper blood supply, the bone tissue dies and the bone collapses. The hematopoietic cells are most sensitive and die within 12 hours of anoxia. Experimental evidence suggests that bone cells composed of osteocytes, osteoclasts and osteoblasts follow next and succumb to avascularity within 12–48 hours.[6,7] Similar observation was made in this case where the bone was completely devoid of its cell-rich periosteum due to ethanol-induced avascularity.

One of the treatment options for such kind of avascular necrosis of bone is surgical removal of damaged marrow by curettage and decortication.[8] Decortication is the removal of the superficial part of the cortical bone and exposing cancellous bone, performed in order to accelerate bone healing. Decortication increases tissue metabolism by increasing the vascular supply to this region, triggering greater bone neoformation.[9] In this case of peri-implant bone necrosis, reperfusion of the affected bone was piloted by creating bleeding points on bone surface. Following this treatment modality, a successful bone and soft tissue repair was observed after 40 weeks.

Conclusion

Complications arising post implant insertion are quite common, but literature regarding their management is still lacking. If diagnosed at correct time, these complications can be managed successfully. Thus, a careful clinical and radiographic analysis along with a detailed history at follow-up appointment is important for implant success.

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