

CLINICAL REPORT

Challenges in management of extraction socket with an implant and alloplast - A Case series

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ABSTRACT

Extraction of tooth is followed by physiological events that lead to the resorption of the ridge and difficulty in prosthetic management. Socket preservation is a highlighted area of clinical management and this case series presents the management of extraction sockets in various types of defects and the long-term outcome of the treatment.

Keywords: Socket preservation; Alloplast; Immediate implant; Collagen membrane; Crestal bone loss

INTRODUCTION

Physiological events following extraction of tooth leads to loss of buccal plate of bone with collapse of the ridge form.¹ To maintain the anatomy of the ridge and facilitate replacement, immediate implant placement offers a viable solution. The challenges in the treatment option includes atraumatic extraction of the residual tooth structure and preserve the anatomy of extraction socket.² A single tooth extraction socket has been classified by various authors based on either absence or presence of labial or buccal dehiscence defect (Type 1 or 2), amount of labial or buccal dehiscence defect (Grade 1(<25%), Grade 2(25-50%) or Grade 3(>50%)).^{1,3} Immediate implant placement being common with Type 1 or Grade 1 extraction socket but rehabilitation of socket with dehiscence defect (Type 2) becomes questionable in success. Chu et al had subclassified the type 2 extraction socket depending on the extent of dehiscence defect apically.³ Defect site are managed with autograft, xenograft,

allograft or alloplast, of which later has the advantage of lack of adverse reaction and does not need to be extracted from host site. However, alloplasts are osteoconductive, not bioresorbable, and retained in the graft site for prolonged time. They require a viable bone to enable bone regeneration. This case series elaborates the management of various type of defects and its management with a 3-year follow-up.

CASE SERIES

This case series presents a three-year report of patients rehabilitated with implant placed immediate or within 8 weeks of extraction of an anterior tooth. All the patients in the presented case series did not present with any absolute contraindication for implant placement and after thorough blood investigations, an informed consent was taken before the commencement of treatment. All the patients were rehabilitated with two-piece implant (Myriad plus, Equinox, Straumann, Basel, Switzerland). An

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alloplast, HA- β -TCP composite graft (Ossifi™) (Equinox Medical Technologies BV, Amersfoort, Netherlands) and collagen membrane (Cologide GTR membrane, Cologenesis Health care Pvt ltd, India) for osteoconductive healing were placed before suturing in extensive socket defects.

Case-1: Type 1 Extraction socket

A 23-year-old female patient reported for rehabilitation for her decayed anterior tooth. On radiographic and clinical examination, mutilated, root treated 21 was observed with adequate bone support and absence of any periapical infection. Atraumatic removal of 21 using periosteal elevator was done (Figure 1a) and the extraction socket revealed all walls to be intact depicting Type 1 of extraction socket (Figure 1b). After debridement of extraction socket and conventional osteotomy, immediate implant placement of dimension 4.5 mm \times 13 mm was torque wrenched to 35 N (Figure 1c) and sutures were placed. A jumping gap of less than 0.5mm was observed around implant with a thick biotype of soft tissue and hence no additional graft intervention was undertaken. On clinical and radiographic evaluation after 6 months for osseointegration, the rehabilitation was completed with an esthetic crown (Figure 1d). Figure 1e shows the pre and post-restorative radiograph of the surgical site. On 3 year follow-up, patient had labial dehiscence defect with compromised esthetics.

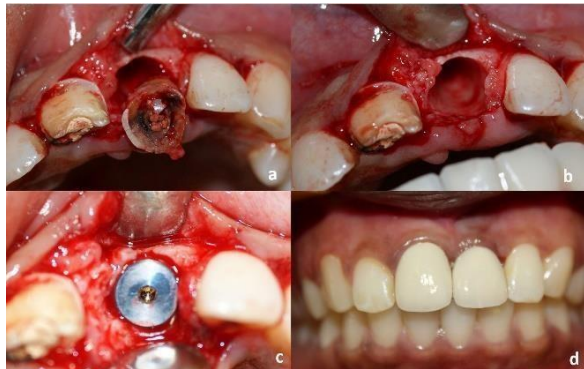


Figure 1(a, b, c, d)

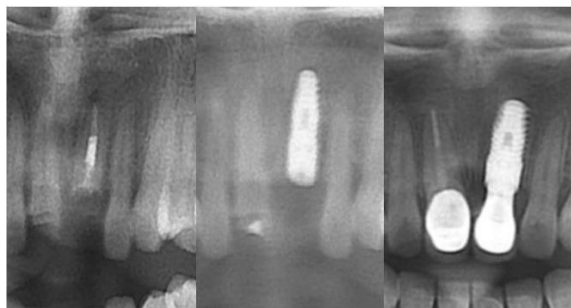


Figure 1e

Case-2: Type 2 Extraction Socket Defect or Grade 1 Labial Dehiscence Defect.

A 34 year female reported for replacement of missing mandibular anterior teeth. Clinical and radiographic evaluation revealed missing mandibular central incisors 31,41 and labially placed retained mandibular deciduous lateral incisors with severe gingival recession and mobility. Immediate implant placement in relation to deciduous laterals with delayed loading protocol was planned to rehabilitate the missing teeth. Removal of 31 and 41 was done with periosteal elevator and the evaluation of extraction socket revealed a labial dehiscence involving the coronal third or less than 25% labial defect depicting Type 2A or Grade 1 extraction socket defect (Figure 2a). Immediate implant placement with size 3.3 \times 13 mm was done with a jumping distance of 1 mm labially (Figure 2b). Both grafting (Figure 2c) and guided tissue regeneration were done. The patient was rehabilitated after 5 months with porcelain fused to metal prosthesis (Figure 2d). Figure 2e shows the pre and post-restorative OPG of the surgical site.

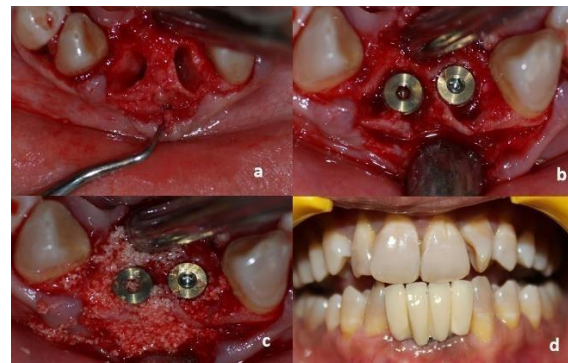


Figure 2(a, b, c, d)



Figure 2e

Case-3: Type 2 Extraction socket defect or Grade 2 Labial dehiscence defect.

A 66 year old male patient referred for opinion regarding replacement options in 11 due to root fracture. Clinical and radiographic examinations revealed malpositioned 11 with root fracture. Immediate implant placement was planned and after atraumatic extraction, a labial dehiscence extending to middle third of the root or less than 50% labial defect

depicting Type 2B or Grade 2 defect (Figure 3a). Implant placement of dimension 4.5 mm×13 mm implant was torqued following osteotomy (Figure 3b) and sutures were placed with an allograft and a collagen membrane (Figure 3c). Patient was recalled after 9 months for rehabilitation and assessed for stability by clinical and radiographic evaluations. Patient presented with 1 mm metal collar exposure of the fixture that did not compromise on gingival esthetics due to low lip line and hence, rehabilitated with a metal ceramic crown (Figure 3d). Figure 3e shows the pre and post-restorative OPG of the surgical site. On 3 year follow-up patient presented with 2 mm of implant thread exposure.

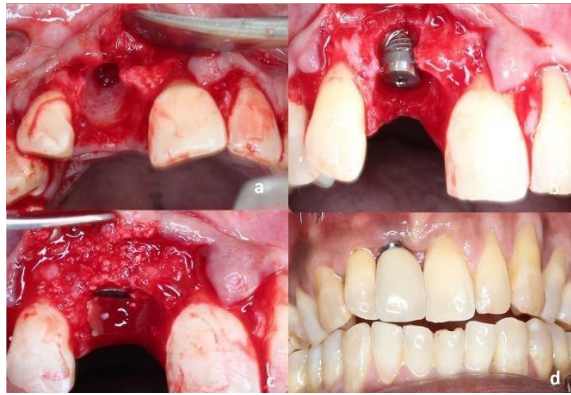


Figure 3 (a, b, c, d)



Figure 3e

Case-4: Type 2 extraction socket defect or Grade 2 Labial dehiscence defect with delayed placement

A 69-year-old male patient reported for replacement for his missing maxillary anterior tooth. History revealed that 21 was extracted 2 weeks before due to decay that was beyond conservative management. Delayed placement of implant was planned after 8 weeks and debridement of granulation tissue was done on periosteal elevation. Labial dehiscence defect was observed extending to middle third of the root or less than 50% labial defect depicting Type 2B or Grade 2 defect (Figure 4a). Implant of size 3.8 mm×13 mm was torqued following osteotomy (Figure 4b). Due to the presence of defect an allograft was placed and the site was covered with collagen membrane (Figure 4c). Implant had achieved secondary stability after 6

months and rehabilitation was completed with a Porcelain fused to metal crown (Figure 4d). Figure 4e shows the pre and post-restorative OPG of the surgical site.

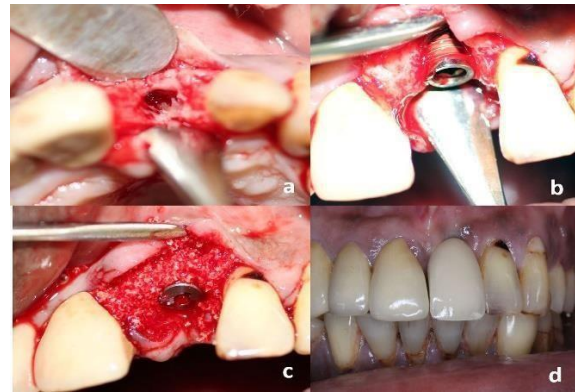


Figure 4 (a, b, c, d)

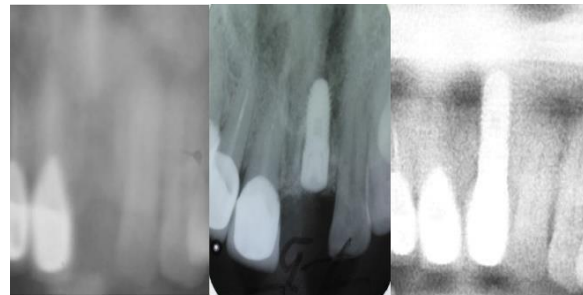


Figure 4e

Case-5: Type 2 Extraction socket defect or Grade 3 Labial dehiscence defect

A 48 year old female reported for replacement of missing tooth and gave history of extraction 1 month back. On evaluation, missing 13 with evident soft tissue healing was observed. After clinical and radiographic evaluation, implant supported prosthesis was planned in 13 region. On elevation of periosteum it was observed the labial dentoalveolar dehiscence defect of more than 10 mm extending apically and an unhealed extraction socket (Figure 5a). The granulation tissue was removed and socket was preserved with an allograft and a collagen membrane was placed over the graft material. Patient was recalled at 6 months and HA granules were observed with compromised bone quality (Figure 5b). Bone expansion was done till 2.8 mm width and implant of size 3.3 mm × 13 mm was torqued only achieve a primary stability of 10N (Figure 5c). The epithelium was approximated and suture placed. Patient was recalled after 6 months and second stage surgery revealed uneventful healing with secondary stability and rehabilitation was completed (Figure 5d). Figure 5e shows the pre and post-restorative OPG of the

surgical site. A three year follow-up revealed vertical bone loss of less than 1.5 mm around the implant.



Figure 5 (a, b, c, d)



Figure 5e

DISCUSSION

Lack of preservation of an extraction socket leads to loss of buccal bone and shift of ridge lingually leading to compromise in prosthetically driven implantology. Literature claimed immediate implant placement to preserve ridge failed to maintain the buccal bone leading to resorption.⁴ This was confirmed with our case 1, wherein labial dehiscence defect was observed in 3-year follow up. Though bone grafting was most common treatment plan in immediate implant placement, we did not utilise bone grafting in Type 1 extraction socket and achieved osseointegration without any defect due to minimal jumping gap and presence of intact labial bone. Literature suggests that the jumping gap of more than 0.5mm with defect can achieve successful bone formation in presence of intact coagulum without addition of bone fill and a barrier membrane.⁵

All the extracted sockets were debrided to remove the granulation tissue and remnant infection. Literature also states that an extensive debridement of socket is not required, but removal of chronic inflamed tissue and foreign bodies are mandatory.⁶ Literature also suggests socket preservation can be delayed by 4-8 weeks post extraction in the presence of acute infection to facilitate natural drainage of inflammatory fluid.⁷ Moreover, the presence of more than 50% of bone defect requires bone grafting to be the best treatment option compared to the use of immediate implant as bone preserver.¹

Alloplastic graft material (Biphasic hydroxyapatite) was chosen in the case series were synthetic biocompatible material with absence of inflammatory

response. Biphasic hydroxyapatite and tricalcium phosphate has mineral composition similar to that of bone and found to be most biocompatible bone graft, however it has only osteoconductive potential.⁸ They do not completely resorb and the particles are retained for a prolonged time that exhibit as an osseointegrated bone around implant in radiographs. These tricalcium phosphate particles generally become encapsulated by fibrous connective tissue and do not stimulate bone growth.⁹ This was more evident during the second stage surgeries of our case series in which the alloplastic material remained as particles over the implant surface. We utilized guided tissue regeneration with a collagen membrane in 4 cases that helped in preventing soft tissue ingrowth into the surgical site and also allowed retention of graft.¹⁰ The membrane also facilitates osteogenic infiltration into the surgical site¹¹ that promoted osseointegration in our cases.

Out of the five cases, implant failed in case-1 after 6 years due to residual infection of root treated adjacent tooth. There were exposure of fixture collar in 2 cases at the peri-implant region at 3rd year. We also noticed at second stage surgery that the alloplast used remained as the same particles with no or very minimal contribution to bone formation at the harvested site. However, the collagen scaffold used helped in soft tissue regeneration.

CONCLUSION

The use of alloplast as an osteoconductive substance around implant should be used with utmost caution since may not induce the desired results as expected. We found that the bioactive ceramic alloplast was tolerant to the soft tissue, but esthetics was compromised due to loss of bone.

CONFLICT OF INTEREST

There is no conflict of interest

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