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Case Report

Immediate implant placement using socket shield technique followed by delayed implant loading in maxillary canine and premolar region: Two case reports with a follow-up period of 4 years

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ABSTRACT

Introduction: Tooth extraction leads to continuous bone resorption causing the collapsed bone wall. To prevent bone loss and buccal wall collapse in the esthetic areas the socket shield technique was developed.
Case description: Two cases of delayed implant loading of immediately placed implant with socket shield technique in the maxillary anterior and premolar region with a follow-up period of four years are described.
Conclusion: After a follow-up period of four years, both cases depicted higher survival and success rates, better patient satisfaction, and higher implant stability.
Clinical significance: Implant-fixed prosthetic rehabilitation of the non-restorable tooth using the socket shield technique can be one of the conservative, successful and durable treatment outcome for esthetic as well as non-esthetic zones.

1. Introduction

Due to a loss of sensory stimulus and blood flow from the periodontal ligament, tooth extraction results in persistent residual alveolar bone resorption. This reduces bone mass and collapses the buccal plate in the maxillary arch, jeopardising the insertion of dental implants.[1,2] To prevent buccal bone loss, Hurzeler et al developed the socket-shield concept as a predictable and reliable technique for immediate implant placement in the esthetic zone region to preserve the remaining natural root and bone loss.[3–7] He explained how the immediate implant placement technique was used in the region of a non-restorable endodontically treated tooth having a healthy root which was sectioned mesiodistally into buccal and palatal root halves, followed by extraction of the palatal half and preservation of the buccal half to maintain the attachment to bundle bone and vascularity at implant surgical site.[3–5] Many authors have reported the socket shield concept as a successful predictable technique for rehabilitation in the esthetic zones with immediate implant placement.[6–13]

Two cases of delayed implant loading of immediately placed implants using the socket shield technique in the maxillary anterior and premolar regions are described in this article having a four-year follow-up period.[6–13]

2. Case Presentation

2.1. Case report one

A 35-year-old male patient reported with the chief complaint of a fractured root canal treated right maxillary canine since 3 years and wanted a prosthesis.[13] The relevant clinical findings were Ellis class III fracture with the right maxillary canine (Figure 1). A cone-beam computed tomography (CBCT) scan was taken which showed a residual bone width of 7.5 mm and bone height of 13 mm in

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the region of interest (Figure 2). Accordingly, the treatment planned was immediate implant placement of 4 mm X 13 mm dimension using socket shield technique followed by delayed implant loading. Detailed patient information sheet and written informed consent were obtained from the patient.

The implant surgical site was prepared and cleaned with betadine solution and saline. The level of coronal structure of the canine was at the gingival level, using a size 2 peeso reamer the entire gutta-percha was removed from the root canal space. Using a long shank bur the root was sectioned vertically in a mesiodistal direction with the centre at the access opening hole into buccal and palatal halves,[7] followed by breaking of PDL fibres with the aid of periotome for atraumatic extraction of the palatal half with forcep.[1] The buccal half was reduced to bone level and kept 2mm thick using a long round end straight fissure bur thus forming a buccal shield (Figure 3). The osteotomy was done sequentially palatal to the buccal shield engaging the palatal bone for placement of a 4 mm x 13mm dimension DIO Implant (Figure 4). The jumping distance between the implant and the buccal shield was filled with 50% autogenous bone graft and 50% anorganic bovine bone mineral (Bio-oss) and the site was sutured with Vicryl 2.0. To prevent the chances of implant failure due to the lesser amount and less denser bone the second stage surgery was performed after three months of the healing period, for the placement of the temporary abutment and provisional (Figure 5). After two weeks of recall, a customised impression coping was used for making a closed tray implant-level impression using addition silicone (Figure 6). The cement-retained CAD lithium disilicate implant crown was fabricated to enhance the esthetic, enhance the crown coverage and eliminate the screw access hole (Figure 7).

Figure 1: Pre operative intraoral picture showing Ellis class III fracture with right maxillary canine

2.2. *Case report two*

A 42-year-old female patient reported with the chief complaint of a fractured root canal treated maxillary right first premolar since eight months.[14] The relevant

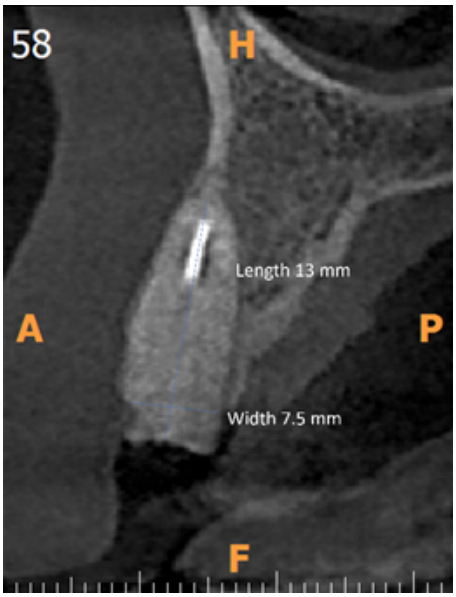

Figure 2: Pre operative radiograph of 13

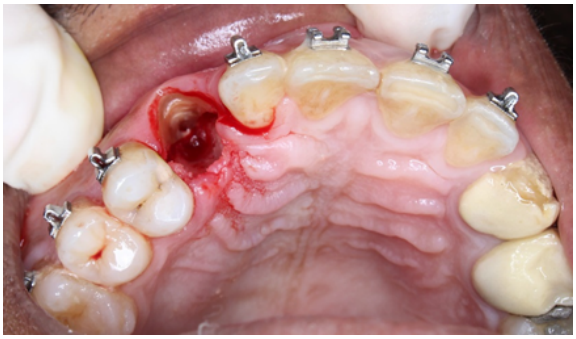

Figure 3: Sectioning of root followed by removal of palatal half and preparation of buccal shield with right maxillary canine

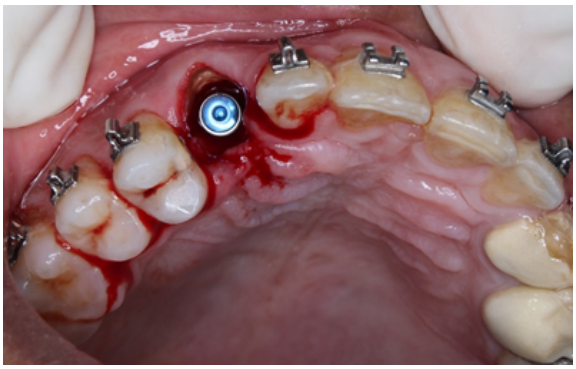

Figure 4: Immediate implant placement in right maxillary canine region

Figure 5: Provisionalisation with right maxillary canine

Figure 6: Customised impression coping

Figure 7: Cement-retained lithium disilicate implant prosthesis with right maxillary canine

Figure 8: Preoperative intraoral picture showing Ellis Class III fracture with right maxillary second premolar

Figure 9: Pre operative radiograph of 15

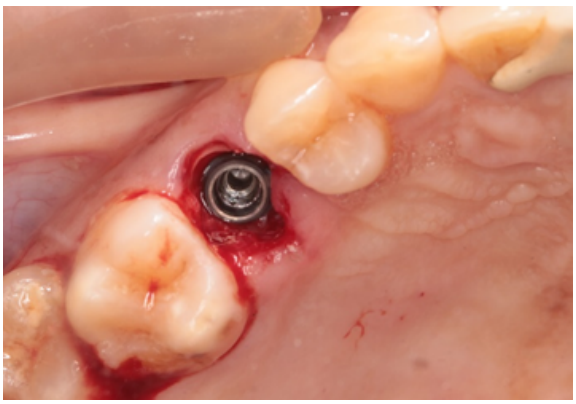

Figure 10: Preparation of buccal shield followed by immediate implant placement withright maxillary premolar region

Figure 11: Customised screw-retained zirconia implant crown on right maxillary premolar

clinical findings were Ellis class III fracture, CBCT scan showed bone width of 6.5 mm and bone height of 12mm, (Figure 8) so the treatment planned was immediate implant placement of 4 X 10 mm dimension using socket shield technique followed by delayed implant loading (Figure 9). The surgical procedure included decoronation, root sectioning, implant placement, grafting the jumping distance and suturing followed by second-stage surgery and implant-level impression (Figure 10). For implant prosthesis customised screw-retained zirconia implant crown was screwed to the implant and canine-guided occlusion was given (Figure 11). Both cases were recalled immediately, after one week, after three months and annually for clinical and radiographic evaluation.[2]

To assess the implant stability ostell device was used and both implants showed higher implant stability of 70 implant stability quotient (ISQ) value.[2] The probing depth and bleeding on probing and radiographic assessment of bone loss were used to measure periimplantitis and both implants showed no signs of peri-implantitis. No technical and biological complications were reported for both implants.[3] The visual analog scale was used to measure patient satisfaction and patients were highly satisfied with the implant prosthesis during the follow-up period of 4 years.[4]

3. Discussion

Hurzeler et al developed the socket-shield concept as a reliable technique to preserve the buccal wall collapse and bone loss in the esthetic areas for immediate implant placement.[6–15] Immediate implant placement in the region of a non-restorable endodontically treated tooth having a healthy root which was sectioned mesiodistally into buccal and palatal root halves, followed by extraction of the palatal half and preservation of the buccal half to maintain the attachment to bundle bone and vascularity at implant surgical site.[8–10,15] Many authors reported the socket shield technique as a predictable treatment for maxillary arch immediate implant placement.[6,12–19] Two cases of delayed implant loading of immediately placed implants using the socket shield technique in the maxillary anterior and premolar regions are described in this article having a four-year follow-up period.[6,11–14,19]

Preservation of the natural tooth and conservation of alveolar bone is always better than the total artificial replacement.[7,11,13,19] Extraction followed by delayed implant placement, three-unit fixed dental prosthesis, adhesive bridges, and fibre-reinforced prosthesis are various treatment options for non-restorable, coronally fractured teeth in the maxillary arch.[20] However, tooth extraction without socket preservation can cause a collapse of the buccal wall, three-unit fixed dental prosthesis causes intentional tooth preparation of vital abutment tooth, adhesive bridges can debond after a certain time and fibre-reinforced prosthesis can only be used as a long-term provisional.[20]

Hurzeler et al presented the idea and documented a successful socket shield procedure with immediate implant placement in a beagle dog.[6,7,9,12–15,19] Gluckman et al carried out a retrospective analysis of the implants in the esthetic and posterior areas placed using the socket shield technique.[6,7,10–15,19] Atieh et al, carried out the research and showed favourable results for the buccal bone plate, peri-implant marginal bone levels, and aesthetics around the implants placed using the socket shield technique.[6,7,10–15,19] Hang et al concluded that the modified socket shield technique has higher survival, stability and lower complication rates.[10] Retained apical root fragments, mobility of buccal shield, failure in osseointegration of the implant, and loss of graft material are certain reported disadvantages of the socket shield technique.[6–8,10–15,19]

Two cases of delayed implant loading of immediately placed implants using the socket shield technique in the maxillary anterior and premolar regions were described as having a successful outcome at a four-year follow-up period. However, for more conclusive outcomes on the survival and success rates, clinical trials with longer follow-up periods can be carried out.[6,7,10–15,19]

4. Conclusion

After a four-year follow-up period, both patients showed higher implant stability, high survival and success rates, and better patient satisfaction. One of the most conservative, effective, long-lasting treatment options for non-restorable teeth is socket shield technique-based implant-fixed prosthetic rehabilitation.

5. Source of Funding

None.

6. Conflict of Interest

None.

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