

Case Report

Simultaneous Implant Placement with GBR in Large Alveolar Ridge Defect- A Case Report

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ABSTRACT:

In recent years, implant supported dental prosthesis has become one of the main treatment modality to rehabilitate the partially and completely edentulous patients with predictable results and high clinical success. However, to achieve successful implant osseointegration, alveolar ridge volume is one of the key factors. In many patients' especially geriatric, insufficient bone height & width are found frequently that require bone augmentation procedures to gain adequate bone volume for implant surgery. Initial bone grafting and late implant placement is a well-established two stage standard protocol for such cases. However, recently, some studies showed promising outcomes in simultaneous implant placement with bone grafting that not only reduces overall treatment time but also number of surgeries. We are reporting here a case of large alveolar ridge defect where simultaneous implant placement with GBR (Autogenous & Allogenic bone grafting with resorbable barrier membrane) was performed with promising results.

Keywords: Dental implant; Alveolar Ridge Defects; GBR; Simultaneous implant placement.

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INTRODUCTION

Recently, dental implant treatment is becoming one of the most predictable treatment methods to restore the function and esthetics of partial as well as complete edentulism.¹ However, adequate height and width of alveolar ridge are the prerequisite for dental implant placement. Thus, alveolar ridge defects and atrophic residual ridges pose significant challenges to place implant in a considerable number of patients especially, geriatric patients.^{1,2} To overcome this issue, different types of bone augmentation procedures are usually advised that includes, inlay or onlay grafts, guided bone regeneration (GBR), distraction osteogenesis etc.³ Many studies showed that success of implant osseointegration in regenerated bone is similar to native bone.⁴ However, the classical procedure advocates initial bone grafting and a second stage surgery for placement of implants after period of 3–6 months.³ This waiting period

provides enough time for graft maturation, and it mainly depends upon the size of the defect and graft. Also, type of grafts for example, autogenous, allogenic, xenogenic and alloplastic materials affect duration of graft maturation.⁵ The biggest disadvantages of this protocol is second stage implant placement surgery that further delays the prosthetic phase for 2 to 4 month, thus; increases the overall treatment time for the patient. On the other hand, many recent studies have suggested that simultaneous implant placement can be performed with onlay bone grafts without affecting results.^{1,6,7,8} Also, many authors advocated that implant survival may be more dependent on the pristine bone supporting the implant rather than the grafted bone. Thus, bone grafting with simultaneous implant placement not only reduces the treatment time but also number of surgeries.^{9,10,11,12} In this case report, we present a case of simultaneous

implant placement with GBR in large alveolar ridge defect with successful outcomes.

CASE REPORT

A 61 year old male patient reported to our clinic with complains of missing lower left posterior tooth. His past medical history was non-significant. In dental history, he reported multiple root canal treatments of upper and lower teeth with restorations and dental implant treatment in lower right posterior region. Also, he stated extraction of lower left back tooth 3 months ago by a general dentist.

On examination, patient presented poor oral hygiene with staining and occasional calculus as well as

generalized attrition. His tooth number #34 was missing with compromised buccolingual width. He had multiple root canal treated teeth with prosthesis and large restoration. Also, patient had implant-supported prosthesis w.r.t #46 and 47. Socket of missing tooth #34 was healed with thick soft tissue. Mesiodistal space was more than 7 mm and Crown height space was around 9 mm. However, buccolingual width was 5 mm clinically. Radiographic examination showed, mixed radiopaque, radiolucent area at the extraction site of # 34 with 16.5 mm distance from cervical region of #35 to mental foramen. (Fig.1)

Fig.1- Preoperative OPG X-ray showing radiolucent area w.r.t 34 region.



On the basis of above findings, he was advised for oral prophylaxis followed by implant supported prosthesis for #34. Straumann SLA bone level diameter 3.3 mm, length 10 mm with bone grafting was planned.

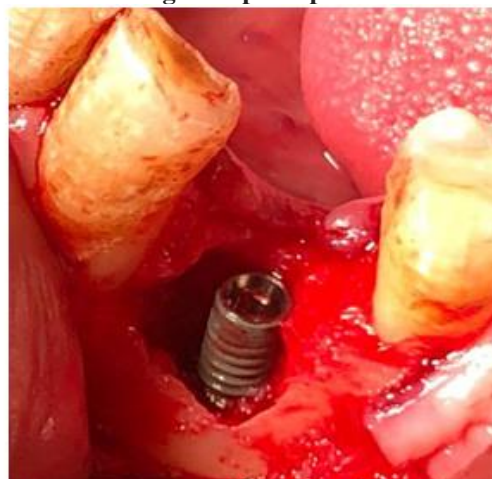
Oral prophylaxis was performed initially. After 10 days of oral prophylaxis implant surgery was performed. Informed consent was taken for implant placement surgery. Chlorhexidine mouth wash (0.12%) rinses were done by the patient. Extra-oral area was prepared with Betadine (10%) and sterile draping done. Lignocaine 2% with 1:200000 epinephrine local infiltrations were performed buccal and lingual sides. Crestal incision was given with

anterior and posterior releasing incisions, and trapezoidal mucoperiosteal flap was raised. Socket was found to be filled with granulation tissue with missing buccal wall. All granulation tissues were curetted till the sound bone found. As a result, a severe horizontal defect was found in the socket. According to Cologne Classification of Alveolar Ridge Defects, it was classified as Horizontal defect, more than 8 mm and inside of the contour (Defect code: H.3. i). (Fig.2). Implant osteotomy was performed at the strategic prosthetic position, Straumann NC bone level diameter 3.3, length 10 mm implant placed. (Fig.3)

Fig.2- Showing large Alveolar Ridge defect.



Fig.3- Implant placed.

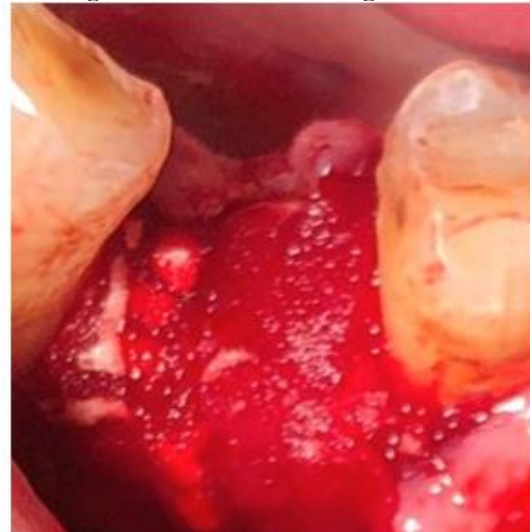


Primary stability was achieved more than 35 Ncm. Cover screw was placed and the defect was filled with autogenous and allogenic bone graft. Autogenous bone chips were taken by safe bone scrapper from #35 - #36 region of mandible using the same incision. Implant surface was covered by autogenous bone chips and the remaining defect was filled with allogenic bone graft. (Fig.4) Around 10% overfilling of the defects was achieved. After that, graft was covered by double layer of collagen membrane. (Fig.5)

Fig.4- Defect covered with bone graft.



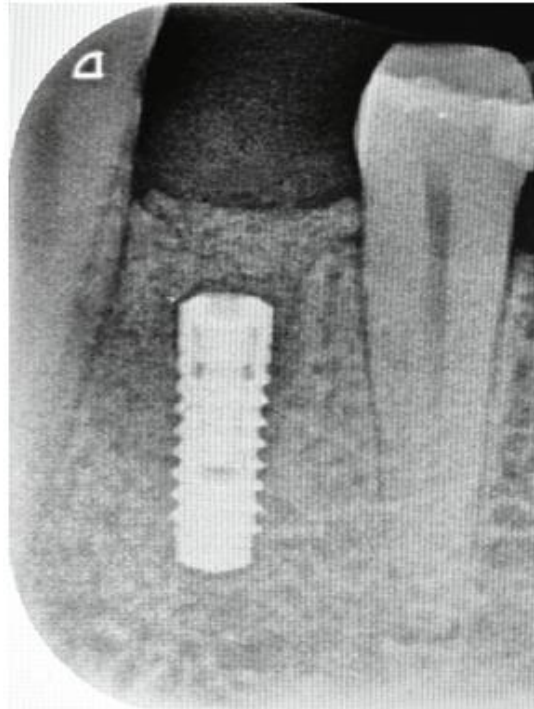
Fig.5- Bone graft covered with Collagen membrane.



Buccal periosteal scoring was done to enhance the flap mobility, and tension free primary closure was achieved with 4-0 PTFE suture. Post operatively, antibiotics and analgesic medications were given for 5 days. Cold sponges and soft diet were advised for 48 hours. Chlorhexidine mouth wash and topical

application were prescribed from the 2nd post-operative day for one week. Also, he was advised to avoid eating from left side and meticulous oral hygiene care. Furthermore, post-operative IOPA x-ray done to confirm the implant position and graft level. (Fig.6)

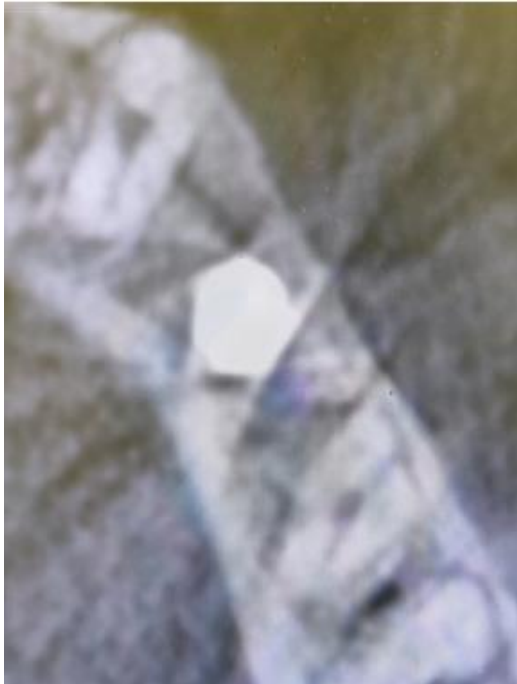
Fig.6- Immediate post-operative X-ray shows implant and bone graft.



Follow up was done on 3rd, 7th, and 14th post-operative day. Healing was smooth and uneventful. Sutures were removed on 14th day. Then he was called on monthly follow up for 4 months. After 4.5 months

IOPA X-ray followed by CBCT scans were obtained to assess the newly formed bone and its interface with the implants that showed adequate amount of bone formation around the implant. (Fig.7 & 8)

Fig.7 & 8- CBCT Axial and Coronal sections, respectively taken after 4.5 months, showing adequate bone formation buccal to the implant.



Second stage implant surgery was done after 5 months of implant placement under local anesthesia. Implant was found completely covered with newly formed bone that was removed by scalpel and implant recovered. It showed around 2 mm of bone buccal to implant. (Fig.9) Cover -screw was removed, and

implant stability was checked clinically. It was found osseointegrated. Healing abutment of 5 mm height and 4.5 mm wide was placed and suturing done maintaining the adequate keratinized tissue around the healing abutment, (Fig.10) and IOPA x-ray was taken.

Fig.9- Second stage surgery after 5 months shows adequate bone formation around the implant.

Fig.10- Healing abutment placed.



(Fig.11)After one week, sutures were removed and patient was prepared for implant supported prosthesis. Post-prosthesis placement, in one year of follow-up, patient showed stable soft tissue and bone level. (Fig.12) He is still on follow up.

Fig.11- IOPA X-ray after second stage surgery.

Fig.12- Follow up X-ray 1 year after prosthesis placement.



DISCUSSION

Since the introduction dental implant, the number of patients with implant-supported prostheses has grown exponentially as it has greater clinical outcomes and high degree of predictability when it is performed properly.¹ However, adequate alveolar bone volume is the one of the key requirements to attain osseointegration and success of implant treatment.³ Several studies showed that that at least 1 mm of bone width buccal and lingual to the implant surface is needed to assure long-term bone coverage. Thus, patients with insufficient bone height or width require bone augmentation procedure to achieve sufficient bone volume for long term clinical success.⁴ The standard protocol is to perform bone grafting first and wait for 3 to 6 months for graft maturation and healthy bone formation. After that period, implant placement surgery should be done that further requires 3 to 4 months for the implant to be osseointegrated.³ Afterwards, prosthetic phase can be started. Although this classical protocol is highly predictable, it requires two surgeries. At the same time, it prolongs overall treatment time.

In recent years, researches have shown that simultaneous implant placement with bone grafting in alveolar ridge defect has successful outcomes without affecting implant stability or osseointegration.^{1,5,6,7,8,9} It shortens the treatment time and reduces the number of surgeries, therefore; more acceptable for patients. Moreover, it reduces the overall cost of treatment as well. However, case selection for simultaneous implant placement with bone grafting is one of the most critical factors and should be done carefully by evaluating the clinical parameters.^{11,12} On the

contrary, the risks of the simultaneous implant graft procedure are that graft failure implies also implant failure, and while implant osseointegration may be achieved in apical zone, there may be no such integration in the bone in coronal zone.³

In our case, patient was healthy with no significant medical history, non-smoker, controlled periodontal disease, and thick gingival biotype. Moreover, although alveolar defect was large, it was mainly horizontal and inside the contour. Also, patient agreed to follow post-surgical instructions properly and multiple follow up visits. Thus, we decided to perform combined implant graft procedure and place mixture of autogenous & allogenic bone graft materials with resorbable barrier membrane.⁵ We carried out grafting and implant insertion at the same time, achieving good primary implant and graft stability. We did over-grafting to compensate the resorption of the grafts.¹³ After waiting period of graft maturation for 5 months, re-entry procedure was performed. Implant stability was checked in all direction directions with enough bone around the implant. Newly formed bone was found healthy and vascular. Healing abutment was placed, and adequate keratinized tissue around the healing abutment was achieved. After 1 week, prosthetic phase was started to restore the implant. After implant loading, patient was followed up for 1 year, showed healthy peri-implant soft tissue and stable bone level.

CONCLUSION

Although standard two stage protocol is well established and evidence based, single-stage implant placement and simultaneous bone grafting showed

promising results in correcting small and medium sized alveolar ridge defects. However, only a limited number of studies suggested no significant difference in implant survival between the simultaneous and delayed placement of implants with bone grafts. Thus, we recommend further studies comparing single and two stage implant placement to provide robust evidence. Meanwhile, its surgeon's observation and assessment to evaluate each case individually based on the quality of the native bone, and its ability to provide primary stability for same time implant placement.

CONFLICT OF INTEREST

None

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