IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 24, Issue 10 Ser. 2 (October. 2025), PP 30-33
www.iosrjournals.org

Simultaneous Implant Placement And Mandibular Symphyseal Block Graft With Particulate Allograft For Rehabilitation Of A Post-Cystic Maxillary Anterior Defect: A Case Report

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Abstract:
Background*: Alveolar bone defects following cyst enucleation in the maxillary anterior region pose a significant challenge for implant rehabilitation due to compromised buccal bone and aesthetic concerns. Autogenous mandibular symphyseal grafts when combined with particulate allograft provides structural support and osteogenic potential for predictable implant outcomes. This case report demonstrates a one-stage approach of implant placement with simultaneous symphyseal block grafting in post-cystic anterior maxillary defect.*
Materials and Methods*: A 25 year-old male underwent cyst enucleation with platelet-rich fibrin (PRF) placement for a radicular cyst at tooth number 21. Six months later , CBCT evaluation revealed a residual buccal cortical defect (~8.5mmX7.46mm). A 4.5mmX10mm Dentium™ Superline implant was placed with simultaneous mandibular symphyseal block graft and particulate allograft to restore buccal plate. The block graft was stabilised with a 1.5mmX6.0mm titanium screw. Fixation screw removal was performed three months post-grafting and definitive prosthetic rehabilitation was delivered four weeks thereafter. Clinical and radiographic follow-up (with RVG) was performed to assess graft integration and implant stability.*
Results*: The graft integrated successfully and the implant demonstrated excellent primary and secondary stability. Soft-tissue contour and ridge volume were preserved providing a favourable emergence profile. No donor-site or recipient-site complications were observed. Prosthetic rehabilitation achieved satisfactory aesthetic and functional outcomes within 11-month treatment duration.*
Conclusion: *Simultaneous implant placement with mandibular symphyseal block graft and particulate allograft is an effective approach for post-cystic anterior maxillary defects. This one-stage procedure ensures predictable ridge reconstruction, stable implant integration and optimal aesthetic results while reducing total treatment time.*
Key Word: *Maxillary anterior alveolar defects; Radicular cyst; Autogenous mandibular symphysis graft; Particulate allograft; Immediate implant placement; Alveolar ridge reconstruction*

Date of Submission: 28-09-2025 Date of Acceptance: 08-10-2025

I. Introduction

Cystic lesions in the anterior maxilla frequently lead to significant alveolar bone loss, jeopardising esthetic implant placement [1]. The resultant buccal plate deficiency necessitates augmentation before or during implant insertion to re-establish ridge volume [2].

Autogenous bone remains the "gold standard" grafting material because of its osteogenic, osteoinductive and osteoconductive capabilities [3,4]. The mandibular symphyseal region is reliable donor site offering dense corticocancellous bone and low morbidity [5-7]. Integration of autogenous block grafts with particulate allograft enhances adaptation and volumetric stability [8,9].

This report presents sequential management of post-cystic defect with simultaneous implant placement and symphyseal block grafting highlighting biologic timing and favourable aesthetic outcome.

II. Material And Methods

Case Presentation

Initial Status -

A 25-year-old male presented in March 2024 with swelling and tenderness in relation to the maxillary left central incisor. Clinical and radiographic examination revealed a well-defined periapical radiolucency associated with tooth #21 diagnosed as a radicular cyst.

Treatment Plan -

Stage I: Cyst enucleation with PRF placement to promote bone regeneration.
Stage II: Implant placem with simultaneous bone augmentation using a mandibular symphyseal block graft and particulate allograft once adequate healing was achieved post-enucleation.

Intraoperative Phase -

The patient initially underwent cyst enucleation with platelet-rich-fibrin (PRF) placement under local anaesthesia in March 2024. A mucoperiosteal flap was elevated and cystic lining was completely removed, PRF membrane were placed in the defect and the flap was closed primarily. Healing was uneventful over the subsequent six months.

In October 2024, approximately six months post-enucleation the patient underwent implant placement with simultaneous grafting. Pre-operative CBCT revealed a residual buccal cortical defect measuring approximately 8.5mmX7.46mm superoinferiorly and mesiodistally respectively. A dentium superline implant (4.5mmX10.0mm) was placed with adequate primary stability. A mandibular symphyseal block graft was harvested intraorally, adapted to buccal defect and fixed with 1.5mmX6.0mm titanium screw. Particulate allograft was layered to fill minor gaps and PRF membrane was applied before flap closure.

At approximately three months post-grafting radiographic evaluation using RVG confirmed graft consolidation and continuity of the buccal plate following which the fixation screw was removed under local anaesthesia.

Finally in February 2025 approximately four weeks after screw removal the definitive prosthetic rehabilitation was completed with screw-retained zirconia crown. The total duration from cyst enucleation to final prosthesis delivery was approximately 11 months achieving optimal aesthetic and functional outcomes.

Post Surgical Care –

Post-operatively the patient received Tab. amoxicillin 875mg + clavulanate 125mg TID, Tab. Ibuprofen 400mg TID for analgesia, Tab. Pantoprazole 40mg OD for 5 daysand 0.12% chlorhexidine mouth rinse twice daily for 1 week. A soft diet was advised for 10 days. Healing was uneventful and follow-ups at 1 week, 1 month and 3 months showed no infection or graft exposure.

Bone Augmentation Evaluation & Implant Restoration

Radiovisiography (RVG) at three months post-grafting demonstrated satisfactory graft integration and stable bone levels around implant. Clinically ridge contour and soft tissue thickness were well maintained. The final restoration displayed excellent gingival symmetry and aesthetic integration with adjacent teeth.

III. Result

Postoperative healing was uneventful following both the enucleation and grafting procedures. At six months after cyst enucleation, satisfactory bone regeneration and soft-tissue healing were observed clinically at the recipient site, enabling implant placement. Intraoperatively, the implant achieved excellent primary stability, and the mandibular symphyseal block graft demonstrated precise adaptation to the buccal defect with stable fixation using a 1.5 × 6 mm titanium screw. The particulate allograft filled minor discrepancies between the block graft and the native bone, and a PRF membrane was placed to enhance healing.

At the three-month postoperative follow-up following grafting, RVG imaging revealed progressive radiopacity and continuity of the grafted buccal plate, confirming graft integration. The fixation screw was subsequently removed, and no signs of infection, graft resorption, or soft-tissue dehiscence were noted. Four weeks after screw removal, implant loading was performed with a screw-retained zirconia crown. The final prosthesis demonstrated harmonious gingival contour, natural emergence profile, and satisfactory esthetics with stable peri-implant soft tissues.

At the three-month follow-up after prosthetic rehabilitation, the implant remained stable both clinically and radiographically, with no evidence of marginal bone loss. The donor site in the symphyseal region healed without complications, neurosensory disturbance, or chin contour deformity. Overall, the combined use of autogenous symphyseal block and particulate allograft achieved predictable bone augmentation and successful implant osseointegration within an 11-month total treatment duration.

IV. Discussion

Successful implant placement in the post-cystic anterior maxilla presents unique challenges due to compromised bone volume, potential soft-tissue deficits and high aesthetics demands [10]. Preservation and restoration of the alveolar ridge are critical not only for functional rehabilitation but also to ensure long-term aesthetic outcomes particularly in the maxillary anterior region where the smile line and gingival contour are highly visible. The mandibular symphyseal region serves as an excellent donor site offering dense cortico-cancellous bone that provides both structural support and osteogenic potential making it ideal for localised alveolar reconstruction [11,12]. Montazem et al. Demonstrated that the symphysis provides adequate bone volume for single-tooth grafting with minimal donor-site morbidity allowing predictable outcomes even in aesthetically demanding zones [13].

Autogenous bone grafts remain the "gold standard" due to their inherent osteogenic, osteoinductive and osteoconductive properties [14]. However when combined with particulate allograft the graft can better adapt to irregular defects, fill micro-gaps and reduce the risk of resorption thereby ensuring both dimensional stability and proper ridge contour[15,16]. In the present case the six-month interval following cyst enucleation allowed adequate maturation of native bone providing a suitable environment for implant placement and graft integration. The symphyseal block acted as a rigid scaffold supporting the buccal plate while particulate allograft enhanced bone contact and promoted uniform healing [17,18].

The use of platelet-rich fibrin (PRF) further enhanced angiogenesis, accelerated soft and hard-tissue healing and may have contributed to early osseointegration of the implant [19]. No donor-site complications such as chin parenthesis, neurosensory disturbance or contour deformity were observed which aligns with previous reports by Balaji et al. (2002) and Safi et al. (2021) [20,21].

Current literature supports simultaneous implant placement and bone grafting when primary implant stability can be achieved as it reduces overall treatment duration and enhances patient satisfaction [22,]. This case demonstrates that combining autogenous symphyseal block grafts with particulate allograft in post-cystic defects not only restores alveolar bone dimensions predictably but also maintains soft-tissue aesthetics resulting in stable long term functional and aesthetic outcomes.

V. Conclusion

Simultaneous implant placement with mandibular symphyseal block grafting and particulate allograft is an effective modality for restoring post-cystic anterior maxillary defects. The structured timeline - six months of healing after cyst removal, three months for graft integration and one month to final restoration ensured biologic stability and aesthetic predictability. The approach demonstrates reliable bone regeneration, soft tissue support and long term implant success.

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