

ARTICLE IN REVIEW:

Successful immediate reconstruction of large mandibular segmental defects using nonvascularized bone grafts

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TITLE: Immediate Reconstruction of Segmental Mandibular Defects with Nonvascular Bone Grafts: A 30-Year Perspective¹

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STUDY DESIGN: Retrospective cohort study, multiple surgeons, single institution

SUMMARY: Reconstruction of mandibular continuity defects following segmental resection remains a challenge and an area of controversy among oral and maxillofacial surgeons. Surgeons have traditionally followed the “6-cm rule”, which advocates for the use of vascularized grafts in defects larger than 6 cm due to the purported increased failure rates of nonvascularized grafts in defects of this size.² This retrospective study evaluated the success of nonvascularized bone grafts, including ViviGen[®], a cellular bone allograft, used in immediate mandibular reconstruction in 47 patients with a diagnosis of benign disease over a 30-year period (1989-2019). The grafts used were tibia bone graft (TBG) or anterior iliac crest (AIC) alone (n=34) or TBG plus either: platelet-rich plasma (PRP; n=2); AIC (n=2); ViviGen and platelet-rich fibrin (PRF; n=2); bone marrow aspirate concentrate (BMAC) and bone morphogenetic protein (BMP) (n=1); or PRP, BMP and freeze-dried allograft (n=6). The average resection size for all patients was 6.9 ± 2.5 cm. The overall success rate of the nonvascularized grafts was 89.4% (42/47 patients). The mean defect size of successful cases was 6.5 ± 2.0 cm, while that for failed grafts was 10.7 ± 3.5 cm. Among the successful cases, 2 utilized ViviGen, in conjunction with TBG and PRF, and had a mean defect size of 7.4 ± 0.8 cm. The authors concluded that they “now favor this tissue-engineering algorithm” in their immediate mandibular reconstruction procedures because the combination yields “an easily handled, predictable tissue-engineering construct.” These results demonstrate that nonvascularized bone grafts, including ViviGen, can be used successfully in the immediate reconstruction of mandibular defects greater than 6 cm.

Successful reconstruction of large (> 6 cm) mandibular defects using nonvascularized grafts:

The overall success rate of nonvascularized grafts was 89.4% (42/47 patients) with a mean defect size of successful cases of 6.5 ± 2.0 cm.

Successful mandibular reconstruction of large segmental defects using ViviGen in conjunction with autograft:

The two cases that included ViviGen in conjunction with tibia bone graft and platelet-rich fibrin had a mean defect size of 7.4 ± 0.8 cm and were both successful.

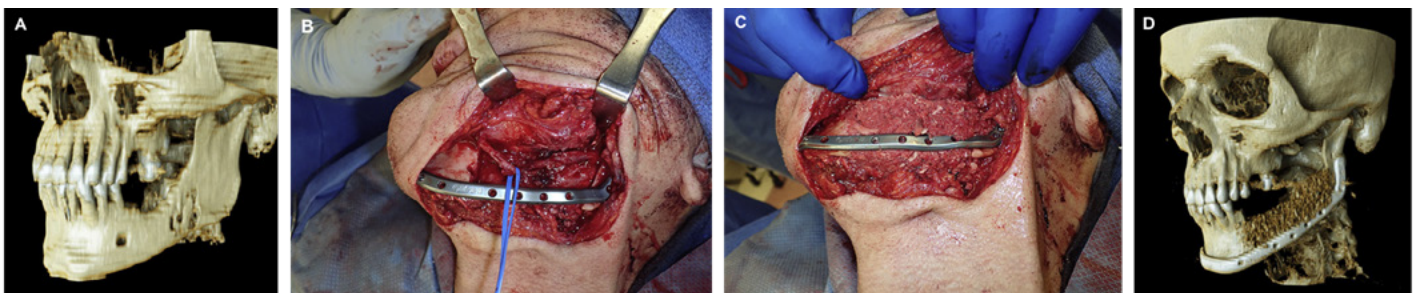
Significant correlation between graft length and graft success:

A significant correlation was found between graft length, which is dictated by the size of the defect, and graft success ($p \leq 0.001$), where larger grafts (including different types of grafting materials) were correlated with decreased success.

References

1. Marschall JS, Kushner GM, Flint RL, Jones LC, Alpert B. Immediate Reconstruction of Segmental Mandibular Defects With Nonvascular Bone Grafts: A 30-Year Perspective. J Oral Maxillofac Surg. 2020;78(11):2099.e1-2099.e9. doi:10.1016/j.joms.2020.03.035
2. Foster RD, Anthony JP, Sharma A, Pogrel MA. Vascularized bone flaps versus nonvascularized bone grafts for mandibular reconstruction: an outcome analysis of primary bony union and endosseous implant success. Head Neck. 1999;21(1):66-71. doi:10.1002/(sici)1097-0347(199901)21:1<66::aid-hed9>3.0.co;2-z

ViviGen Use in Conjunction with Autograft in Reconstruction of Large Mandibular Defects



ViviGen use, in conjunction with autograft, was successful in reconstructing segmental mandibular defects with a mean size of 7.4 ± 0.8 cm, greater than the traditional “6-cm rule” which advocates for using only vascularized grafts in defects of this size. A, Preoperative 3-dimensional (3D) reconstruction. B, Intraoperative photograph of site of resected mandible. C, [Tibia] bone graft with ViviGen and PRF placed in the graft bed. D, Postoperative 3D reconstruction.

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