# ARTICLE IN REVIEW:

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

**PUBLICATION:** J Oral Maxillofac Surg, 2020

**TITLE:** Immediate Reconstruction of Segmental Mandibular Defects with Nonvascular Bone Grafts: A 30-Year Perspective[1]

**AUTHORS:** Marschall JS, Kushner GM, Flint RL, Jones LC, Alpert B

**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:

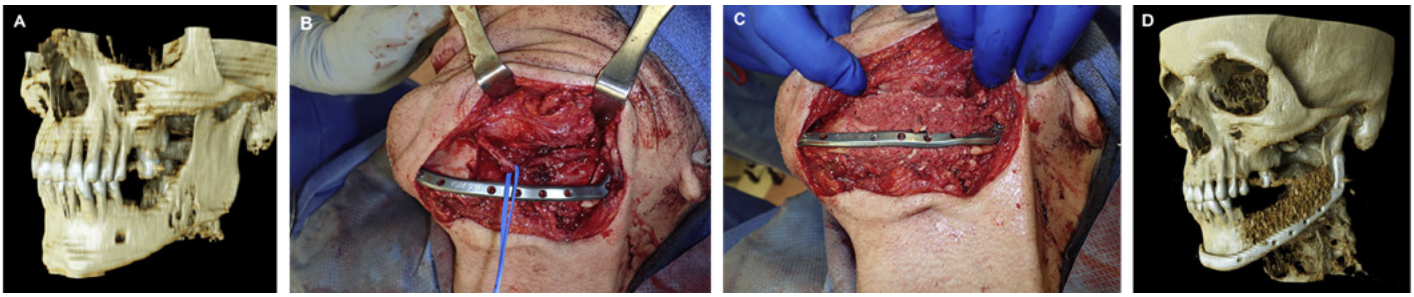
A significant correlation was found between graft length, which is dictated by the size of the defect, and graft success ($p \leq 0.001$), where larger grafts (including different types of grafting materials) were correlated with decreased success.

### 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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