Modern Mandible Reconstruction Utilizing the Chimeric Fibula Free Flap and Double-Barreling Techniques

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Introduction The fibula osteocutaneous flap is now commonly used to reconstruct composite mandibular defects. Difficulties in flap execution are invariably related to the dynamic relationship of the bone orientation and the skin paddle inset. Traditional design has been limited to a single-strut bony design in order to restore mandibular continuity, without restoration of mandibular height and contour. Full chimeric design of the fibula allows for the routine use of a double barrel strut to optimize functional and aesthetic outcomes. The purpose of this study was to critically evaluate these techniques during reconstruction of composite mandibular defects.

Methods A retrospective review was conducted of all patients who underwent mandible reconstruction by the senior author (CHL) from 2006-2013. All patients had a chimeric fibula design, with a full posterior crural septum release and division. Only patients who underwent composite mandible reconstruction utilizing a double-barrel technique were isolated. Patient demographics, surgical techniques, and outcomes were critically evaluated.

Results Fifty-nine patients were identified during the study period. Average follow-up was 148 weeks. A double free flap was utilized in 27% of patients. The average number of fibula osteotomies was 1.9. The average length of each bone segment was 4.4cm. A double skin paddle was utilized in 7% of patients, with the remainder utilizing a single skin paddle. Early perfusion-related re-operation occurred in 10% of patients. No complete flap losses occurred (0%). Partial paddle skin loss occurred in 12% of patients. Three patients (5%) experienced complications related to the barreled bone segment requiring re-operation. Few subjective patient complaints were found and no cases of drooling were documented. Overall, revision surgery related to contouring and/or plate removal occurred in 34% of patients.

Conclusion Utilizing a full chimeric design of the fibula osteocutaneous flap allows for greater degrees of freedom for flap insetting options. The double barrel technique more closely matches the mandibular height. With similar complication rates as traditional methods, utilizing these modern techniques may result in improved functional and cosmetic outcomes.

Disclosures None