Repair of an osseous facial critical-size defect using augmented fibrin sealant.

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Abstract:

Objective: Osseous defects of the head and neck are a common challenge for the otolaryngologist. To develop improved reconstructive options, osteoconductive engineering experiments are being conducted. A nasal critical-size defect (CSD) model has previously been described in which less than 7% bone healing is observed over 6 months. An implant containing fibrin sealant with and without osteoprogenitor cells is evaluated in this model. Study Design: Randomized controlled trial using a rodent model. Methods: A nasal CSD was surgically created in 18 male retired breeder Sprague-Dawley rats. Six animals were not implanted with any material, six received fibrin sealant consisting of fibrin (25 mg/mL) and thrombin (1000 U/mL), and six were implanted with fibrin sealant and rat calvarial osteoprogenitor cells (1.8 x 10⁶ cells/mL). Thirty days later, the animals were examined at necropsy by planimetry, histological analysis of new bone growth, and radiodensitometric analysis of bone thickness. Results: A thin layer of bone covered the defect in all of the treated animals. A statistically significant increase in bone density ($P < .05$) between fibrin sealant plus osteoprogenitor cells and each of the other groups was shown using radiodensitometric analysis. Histological analysis also confirmed this difference. Conclusion: Osteoprogenitor cells contained within fibrin sealant result in a greater augmentation of bone regeneration than controls or fibrin sealant alone.