

Bone Graft Composition with RIA from a Native Versus Previously Reamed Long Bone for Bone Graft Harvest?

*Stephanie N. Moore-Lotridge, PhD; Cesar Cereijo, DO; Sam Robert Johnson, BS; Jonathan G. Schoenecker, MD; Cory Alan Collinge, MD; William T. Obremskey, MD, MPH
Vanderbilt University Medical Center, Nashville, TN, United States*

Purpose: Collection of autogenous bone graft from the intramedullary canals of long bones with the reamer-irrigator-aspirator (RIA) system has become common practice across the field of orthopaedic surgery. Prior studies have demonstrated that viable grafting material can be obtained with the RIA system, leading to similar union rates, but significantly less donor-site pain compared to iliac crest grafting. Supported by these prior studies, RIA has been employed in the treatment of nonunions and bone defects. RIA bone graft can be harvested from a “native” long bone or from a long bone that has previously had an intramedullary nail (IMN) placed but is removed as part of the procedure. Little is known regarding the biologic properties of graft obtained by RIA from a native long bone compared to RIA graft obtained after removing an IMN from a long bone. The primary aim of this study was to compare the biologic potential of bone graft harvested from a native long bone (native RIA graft - NR) or previously reamed long bone (re-reamed RIA – RRR) graft.

Methods: NR and RRR aspirates were collected intraoperatively and 5 mL of the aqueous filtrate was collected for analysis. The aqueous filtrate samples underwent stepwise centrifugation to remove cellular debris before analysis on a Luminex multiplex assay. Panel markers included bone morphogenic protein 2, vascular endothelial growth factor, fibroblast growth factor, interleukin-6, interleukin-1beta, osteopontin, and osteoprotegerin. Analyte levels were compared between NR and RRR using multiple t test with a Holm-Sidak correction for multiple comparisons. Threshold for significance was set at $\alpha = 0.05$.

Results: 11 NR and 10 RRR samples were collected as part of this study. Patient demographics, including age, sex, and graft isolation location, were comparable between cohorts. Analyte levels were detected in all aqueous filtrate samples. When comparing NR to RRR aspirates, no statistically significant differences were detected between cohorts for any of the analyte assessed including bone morphogenic protein 2, vascular endothelial growth factor, fibroblast growth factor, interleukin-6, interleukin-1beta, osteopontin, or osteoprotegerin.

Conclusion: These findings demonstrate that the quantitative biological potential of bone grafts from NR and RRR are equivalent. While the liquid aspirate from RIA has been previously demonstrated to be a source for osteoinductive proteins, future analysis of the hard tissue component will aid in further confirmation of the equivalency of RRR to NR bone graft.