THE CLINICAL SIGNIFICANCE OF VACUUM MIXING BONE CEMENT AS IT RELATES TO POROSITY AND MECHANICAL STRENGTH

* Mitchell Geiger, MD, Anaheim, CA (a - Zimmer)
Merrill A. Ritter, MD, Mooresville, IN
E. Michael Keating, MD, Mooresville, IN
Jeffrey A. Gunther, MD, Evans, GA
Philip M. Faris, MD, Mooresville, IN
John B. Meding, MD, Mooresville, IN

Text: This controlled study compared the strength and porosity of 48 PMMA cement-implant constructs prepared with open-bowl versus vacuum-mix technique.

Methods: 48 blast-finished, stainless-steel rods, of 13 mm diameter, were implanted, with centralizers, into 17 mm inner diameter tubes, which had been retrograde filled with PMMA cement. The 8 cement preparations used were open-bowl or vacuum-mixed Simplex, Osteobond, Zimmer Doughy or Palacos. Six replications of each condition were performed. The tubes were maintained at 37c. Each tube was cut transversely into 5 segments. The center 3 segments were used for data analysis: push-out strength, cycles to failure, and interface porosity analysis.

Results: Rod push-out data demonstrated that there was no significant difference between open-bowl and vacuum-mixed samples when all cement brands were combined. Mean sheer force for Palacos vacuum-mixed was greater than open-bowl (634+47 vs 423+171) while for Doughy vacuum-mixed was less than open-bowl (901+71 vs 705+82).

Cycles to failure data did not show significant difference when open-bowl and vacuum-mixed were compared when all cements were analyzed individually or combined. Image analysis of cement-implant interfaces demonstrated vacuum-mixing did not significantly reduce void area compared to open-mixing when cements were analyzed individually or combined.

Conclusion: Vacuum mixing does not appear to reduce cement-prosthesis interface porosity or improve its mechanical strength.