

Does the French Paradox Cementing Technique Improve or Compromise Femoral Stem Stability? An In Vitro Cadaver Study

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INTRODUCTION: The French Paradox (FP) technique, characterized by line-to-line cementing, has recently been applied to polished tapered stems with favorable results despite the thin cement mantle created. This technique contravenes the recommended minimum 2 mm cement mantle described in the standard (STD) cementing technique. This study aimed to compare the FP and STD cementing techniques by comparing the cement mantle thickness, and micromotion and alignment of a polished tapered stem under clinically relevant loads in a biomechanical model.

METHODS:

Polished tapered cemented femoral stems were implanted into four pairs of fresh-frozen human cadaveric hips. Femurs within each pair were randomly allocated to receive either the STD or FP technique. Stems were implanted using standard 3rd generation cementing techniques. Five Linear Variable Displacement Transducers (LVDTs) were used to measure the real-time motion of the stem relative to the femur. The specimens were mounted onto a joint motion simulator and loaded for five thousand cycles of axial compression (0–1,600 N) followed by five thousand cycles of internal torsion (0–15 Nm). Permanent migration and inducible motion were quantified, and stem alignment and cement mantle thickness were assessed.

RESULTS:

No significant differences were found in permanent migration, initial and long-term inducible motion, or stem alignment between techniques. The mean permanent migration was below 20 μm , and initial and long-term inducible motions were below 100 μm for both techniques. The FP technique resulted in a thinner cement mantle ($\Delta 1.0 \pm 0.2$ mm). No deficient areas in the cement mantle were noted in any of the specimens.

DISCUSSION AND CONCLUSION:

Both FP and STD cementing techniques resulted in well-fixed stems with low inducible motion and no significant differences in micromotion or alignment in a biomechanical model.