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Proximal Row Carpectomy Does Not Alter Contact Pressures of the Lunate Fossa: A Cadaveric Study

Purpose: Previous studies have suggested that proximal row carpectomy (PRC) results in increased contact pressures and decreased contact areas in the radiocarpal joint. Such experiments, however, used older technologies that may be associated with considerable measurement errors. The purpose of this study was to determine whether there was a significant difference in contact pressure and contact area before and after PRC using TekScan, a newer pressure sensing technology.

Methods: Ten cadaveric specimen were included. Specimen were dissected proximal to the carpal row and potted in fiberglass resin, maintaining the structures of the radiocarpal joint. An ultra-thin Tekscan sensor was secured in the lunate fossa of the radius. The contact pressure and area of each wrist was assessed before and after PRC. The wrists were loaded with 200 N of force for 60 seconds to simulate clenched-fist grip, both before and after PRC. Mean and peak contact pressures and contact areas were recorded and analyzed.

Results: Performing a PRC did not significantly increase mean contact pressure at the lunate fossa compared to the native state (mean increase of 17.4 ± 43.2 N/cm², $P=0.184$). Similarly, the PRC did not significantly alter peak contact pressures at the lunate fossa (intact: 617.2 ± 233.46 N/cm², median= 637.5 N/cm²; PRC: 707.8 ± 156.6 N/cm², median= 728.5 N/cm²; $P=0.169$). In addition, the PRC (0.46 ± 0.15 cm², median= 0.48 cm²) and intact states (0.49 ± 0.25 cm², median= 0.44 cm²) demonstrated similar contact areas ($P=0.681$).

Conclusions: In contrast to prior studies that demonstrated significant increases in contact pressure and decreases in contact area after PRC, our findings propose that performing a PRC does not significantly alter the contact pressures or area of the lunate fossa of the radiocarpal joint. This study suggests that contact pressures are unlikely the sole contributing factor in the pathogenesis of radiocapitate osteoarthritis and pain after PRC.