INTRODUCTION:
Radial head (RH) arthroplasty is a common response to comminuted RH fractures. Typical complications include improper sizing, leading to changes in joint kinematics. Evidence of these changes should be visible through fluoroscopic images of affected joints. The two examined changes in this study are the ulnar deviation from distal radial translation (DRT), and the widening of the lateral ulnotrochlear joint space (LUT).

METHODS:
Eight fresh-frozen cadaver arms were used. Initial images were taken with the native RH intact. The Kocher approach exposed the radiocapitellar (RC) joint capsule, preserving all ligaments. The RH was excised and Integra Katalyst CoCr (Plainsboro, NJ) telescoping, bipolar, RH inserted. Images were taken with implant sizings: -2mm, 0mm, +2mm, and +4mm, (from native) using 1mm washers preventing implant bipolarity.
AP fluoroscopic images of the elbow were taken at full extension. Joint spaces were measured using Image Pro software (Media Cybernetics, Bethesda, MD), and normalized using known radio-opaque lengths.
Four LUT measurements were made, two medially and two laterally, and normalized by measuring the RH implant diameter. Each set (medial and lateral) were averaged together and the resulting value used for all comparisons.
Images of distal ulnar deviation at the wrist were taken with the wrist in supination and the hand rotated medially. Measurements were from the distal medial radial tip to the distal lateral ulnar tip. Images were normalized by placing a scalpel in the same plane as measurement.

RESULTS:
DRT values were difference paired for each arm using the 0mm values as baselines. One-way ANOVA of the paired values did not show significant DRT with sizing increases (p=0.109). The quotient of DRT and sizing determined comparative impact with the LUT increase.
LUT joint gap measurements were percentage paired, with natives as the baseline, and One-way ANOVA again used. A significant increase in LUT spacing occurred with increased sizings (p<0.01).

DISCUSSION:
Increased ulnar deviation can increase loading on the TFCC, leading to possible TFCC tear, increased articular cartilage wear from carpal misalignment, and eventual wrist instability and arthritis. Figure 2 shows the percentage of the radial lengthening which is represented in DRT. Over-sizing results in small percentages of increased radial length at the wrist, therefore deviation at the elbow must take place, either through rotation of the ulna, or translation. Either of these can be seen through LUT measurements.

Increased LUT space indicates the medial translation of proximal ulna. This can result in Medial Collateral Ligament laxity, leading to increased osteophytes, and arthritis, but has not been shown to be clinically disabling. Use and non-treatment, can create a chronic, painful, disorder.

REFERENCE: