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Early Effects of Arthroscopic Treatment for Cam-type FAI on Patient Outcomes and Articular Cartilage Health

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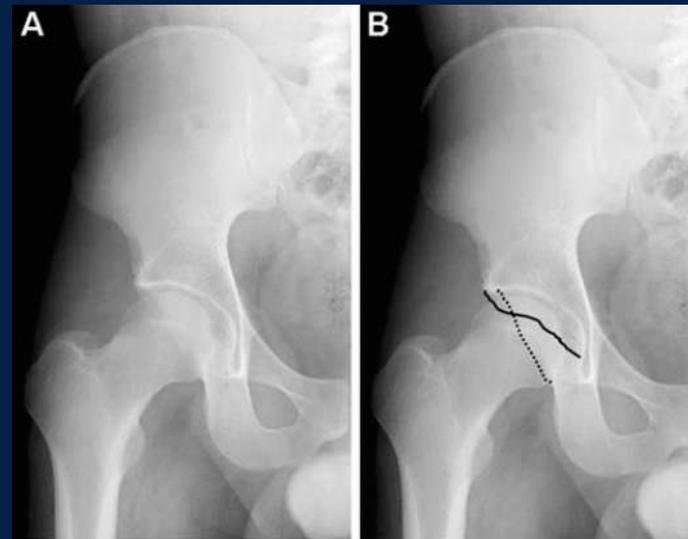
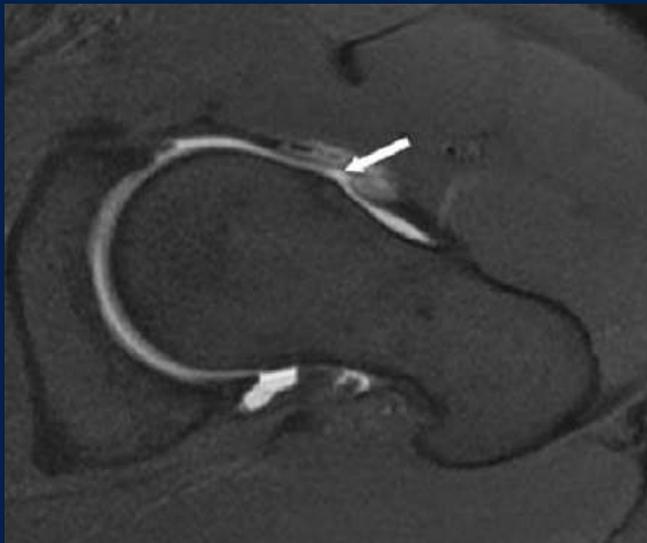


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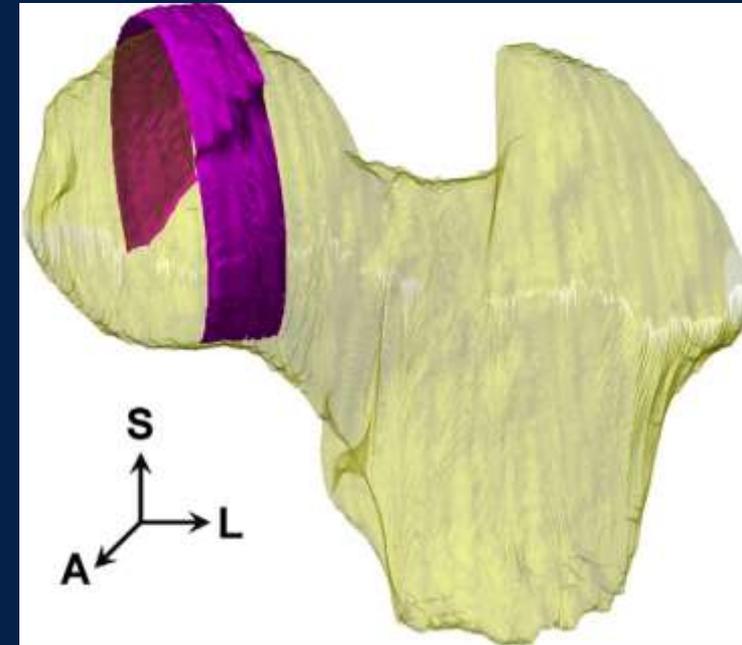
Femoracetabular Impingement (FAI)

- Morphological abnormality of the hip joint that causes abnormal contact between the femur and acetabular rim during hip joint motion
- Common in young athletic population
- If not treated or managed properly, FAI may lead to degenerative effects of hip joint cartilage



Quantitative Cartilage Imaging

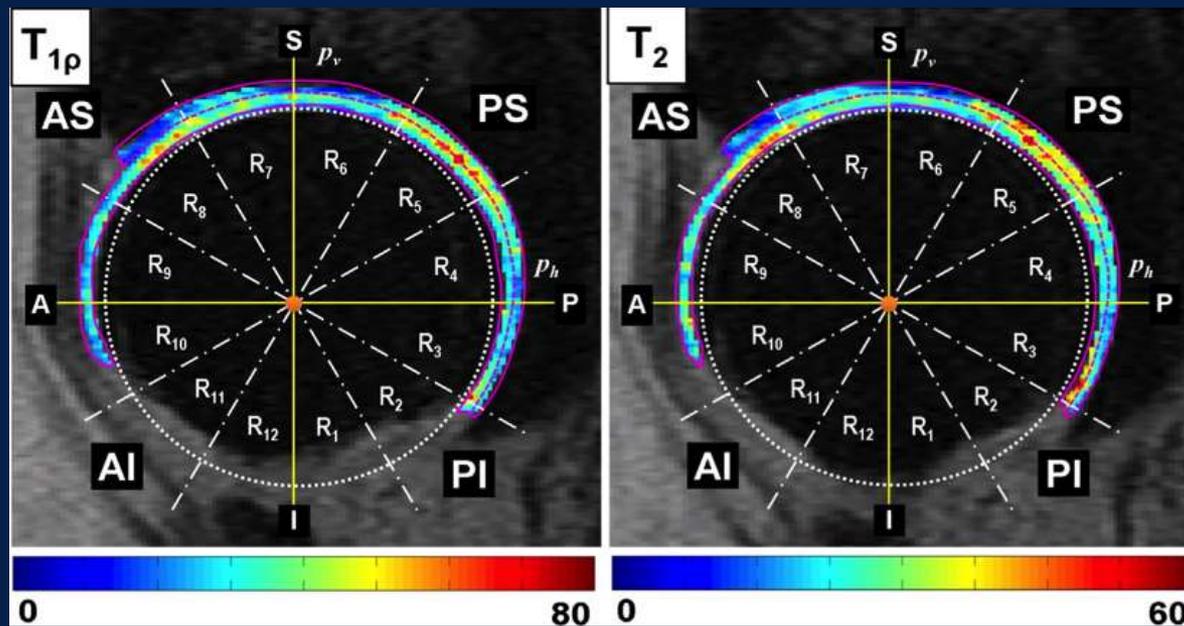
- Cartilage loss and OA symptoms are preceded by damage to the collagen-proteoglycan matrix
- Proteoglycan content increases while collagen content decreases during degeneration
- $T_{1\rho}$ and T_2 mapping are QMRI sequences used to probe proteoglycan content and collagen network integrity
 - Utilize variations in proteoglycan response to detect early cartilage injury



QMRI in the Hip

Use of QMRI in FAI Patients

- QMRI used in both healthy and FAI cohorts from UCSF
- Differences in femoral and acetabular cartilage composition in the anterior superior region of the hip detected for FAI patients
- $T_{1\rho}$ also able to detect acetabular cartilage changes in FAI patients

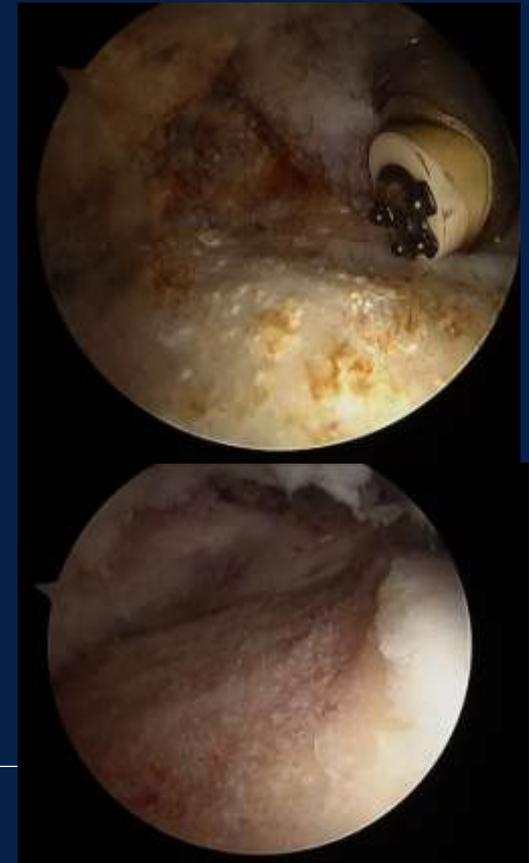


Methods

- Patients undergoing arthroscopic surgery for cam-type FAI without cartilage degeneration recruited prospectively
- All patients received femoroplasty and labral repair by single surgeon (ALZ)
- Patients received QMRI hip prior to surgery (baseline) and 6 months after treatment
- Hip disability and Osteoarthritis Outcome Score (HOOS) surveyed at baseline and 6-month follow-up

Results

- 14 patients (10 male, 4 female, mean age=40, BMI=24.2)
- Average pre-op alpha angle= 61, avg post-op alpha angle= 46
- At 6-month follow-up after surgery, all patients showed significant improvements in HOOS
 - Pain (+22.7, $p=0.001$)
 - Symptoms (+14.2, $p=0.021$)
 - Activities of daily living (+25.6, $p=0.001$)
 - Sports (+38.0 $p<0.001$)
 - Quality of life (39.6, $p<0.001$)



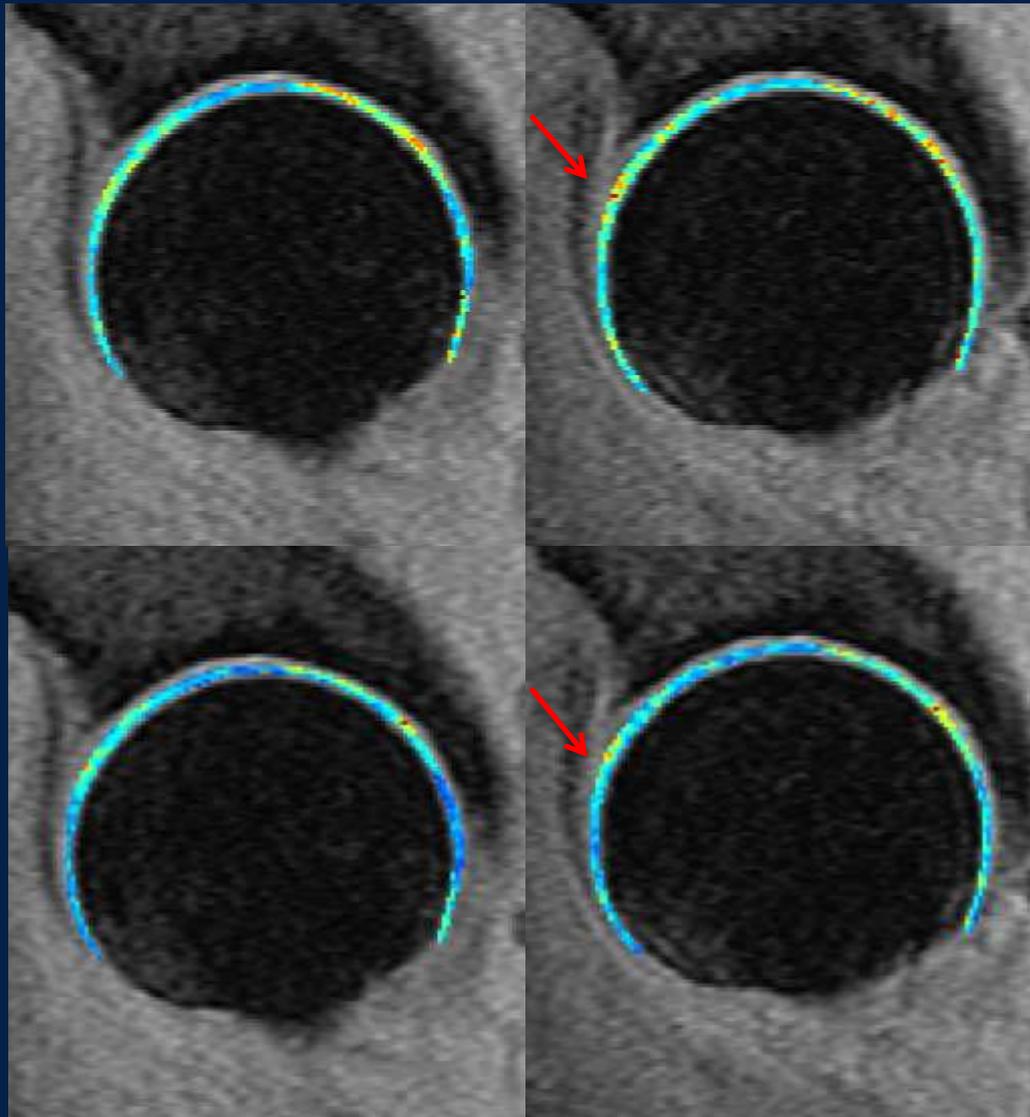
QMRI Results

- Baseline QMRI findings demonstrated increased $T_{1\rho}/T_2$ relaxation times to be correlated with lower HOOS subscores
- Arthroscopic findings of acetabular chondral degeneration/delamination correlated with areas of greater $T_{1\rho}/T_2$ relaxation time
- Acetabular articular cartilage demonstrated no significant changes in biochemical composition between pre- and 6 month post-op scans
- Articular cartilage at the anterosuperior aspect of the femoral head (zone 2) at 6 months showed
 - Increased $T_{1\rho}$ times (mean change 2.4 ± 3.0 ms, $p=0.02$)
 - Increased T_2 times (2.3 ± 2.2 ms, $p=0.003$)
 - No significant correlation between change in cartilage relaxation times and changes in HOOS subscores after surgery

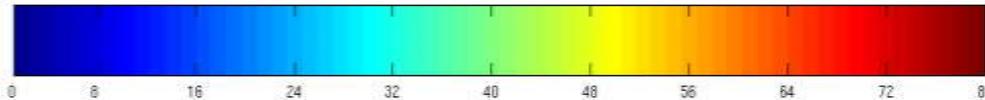
Pre-operative Scan

Post-operative Scan

T1rho



T2



Sagittal plane view. Increased cartilage signal in anterosuperior femoral head shown on QMRI is labeled with red arrow

Discussion

- Quantitative cartilage imaging may indicate an acute increase in stress to articular cartilage at the anterosuperior aspect of the femoral head
- This may be a result of increased loading to this region after femoroplasty of the head-neck junction
 - Joint kinematics may be altered by removal of mechanical impingement from Cam lesion
 - May give rise to increase load in the femoral head
- QMRI findings post-op do not correlate with patient reported scores
- Further analysis is needed to evaluate changes with prolonged follow-up

Conclusion

- Patient reported outcomes improved significantly 6 months after arthroscopic surgery for cam-type FAI
- Quantitative cartilage imaging may indicate an acute increase in stress to articular cartilage at the anterosuperior aspect of the femoral head that did not correlate with early patient outcomes



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