**Supplementary Material**

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| **Table 1:** Sequence parameters for the baseline imaging protocol at 3T | | | | | |  |
| Sequence | Coronal PD Blade FD | Axial T2 TRUFI FS | Sagittal T2 FS Blade | Sagittal T1 TSE | Coronal T1 TSE FS | Sagittal oblique 2-Point Dixon |
| Echo time (ms) | 34 | 4.84 | 71 | 11 | 12 | 1.31, 2.57 |
| Repetition time (ms) | 2200 | 11.2 | 3800 | 450 | 500 | 6.69 |
| Bandwidth (Hz/px) | 220 | 200 | 120 | 200 | 200 | 1010 |
| Acquisition Matrix | 384x384 | 512x256 | 256x256 | 384x397 | 448x358 | 120x160 |
| Slice Thickness (mm) | 4 | 1,7 | 4 | 4 | 3 | 3 |
| Slice number | 20 | 52 | 24 | 29 | 20 | 52 |
| FOV (mm) | 159x159 | 180x180 | 160x160 | 159x159 | 160x160 | 160x160 |
| Acquisition time (min) | 3.40 | 3.41 | 3.10 | 2.04 | 2.11 | 1.02 |

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| **Table 2:** Sequence parameters for the follow-up imaging protocol with metal artifact reduction at 1.5T | | | | | | |
| Sequence | Coronal PD Dixon MARS | Sagittal T1 TSE Dixon MARS | Sagittal TIRM MARS | Coronal T1 TSE Dixon MARS | Axial PD TSE Dixon MARS | Sagittal oblique 2-Point Dixon |
| Echo time (ms) | 41 | 10 | 47 | 12 | 41 | 2.39, 4.77 |
| Repetition time (ms) | 2900 | 431 | 4000 | 578 | 3620 | 6.69 |
| Bandwidth (Hz/px) | 250 | 395 | 300 | 395 | 250 | 475 |
| Acquisition Matrix | 326x284 | 307x384 | 256x205 | 307x384 | 384x326 | 120x160 |
| Slice Thickness (mm) | 4 | 4 | 4 | 3 | 3 | 3 |
| Slice number | 20 | 29 | 23 | 19 | 25 | 52 |
| FOV (mm) | 160x160 | 159x159 | 170x170 | 160x160 | 169x169 | 160x160 |
| Acquisition time (min) | 3.14 | 2.16 | 3.40 | 3.02 | 3.40 | 1.02 |



**Supplementary Figure 1**

Bland-Altman plots for fat fraction measurements on 3T MRI and 1.5T MRI of the SSP muscle (**A**), the ISP muscle (**B**) and the SSC muscle (**C**). A separate cohort of 15 patients scanned within one week were examined on a 3T and 1.5T MR scanner. After calculating the FF, the RC muscles were segmented. Bland-Altman plots were generated to show the limits of agreement. No major deviation from the mean was found for 1.5T versus 3T measurements.



**Supplementary Figure 2**

Receiver operating characteristic (*ROC*) curves for the Goutallier scoring of the SSP muscle (**A**), ISP muscle (**B**) and SSC muscle (**C**) to distinguish patients with failed arthroscopic RC repair and intact/healed arthroscopic RC repair. The area under the curve (*AUC*) was 0.61 for the SSP muscle, 0.63 for the ISP muscle and 0.70 for the SSC muscle.