

The Change of Fatty Degeneration of the Rotator Cuff Muscles after Surgical Repair– Are the measuring systems reliable? –

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Purpose

To analyze the changes of fatty degeneration (FD) of the rotator cuff muscles after surgical repair, and to evaluate the inter- and intra-observer reliability of the known grading systems.

Materials and Methods

Two specialists of musculoskeletal radiology and 3 shoulder fellowship-trained orthopedic surgeons reviewed the preoperative magnetic resonance arthrography (MRA) and postoperative computed tomography arthrography (CTA) scans of consecutive 75 shoulders which were confirmed as a full-thickness rotator cuff tear during arthroscopic surgery, and were repaired. The FD grades of the each cuff muscle were assessed according to the system of Goutallier et al (5 grades) and Fuchs et al (3 grades). The interclass correlation coefficient (ICC) was analyzed to assess inter-observer reliability. Intra-observer reliability was also determined using data of 3 orthopedic surgeons. The difference of grades between pre- and postoperative fatty degeneration was evaluated using the Wilcoxon signed rank test.

Results

For the change of FD grade after surgery, 3 raters reported the improvement of FD grade for the supraspinatus, 4 raters for the infraspinatus ($p < 0.05$), and 2 raters for the subscapularis ($p < 0.05$). For the inter-observer reliability of FD grade by Goutallier on preoperative MRA, the ICCs were 0.72 (CI, 0.62–0.8) in the supraspinatus, 0.70 (CI, 0.62–0.78) in the infraspinatus and 0.60 (CI, 0.50–0.70) in the subscapularis. In the postoperative grade by CTA, the ICCs demonstrated 0.43 (CI, 0.2–0.61) for the supraspinatus, 0.47 (CI, 0.31–0.62) for the infraspinatus and 0.6 (CI, 0.45–0.72) for the subscapularis. When data were converted according to Fuchs' system, the ICCs for preoperative FD grades showed 0.68 (CI, 0.59–0.77), 0.75 (CI, 0.67–0.82) and 0.6 (CI, 0.5–0.69), respectively. The postoperative FD grades exhibited 0.43 (CI, 0.23–0.60), 0.56 (CI, 0.45–0.67) and 0.63 (CI, 0.54–0.72), respectively.

For intra-observer reliability, ICC were measured 0.70 (CI, 0.5–0.82), 0.63 (CI, 0.45–0.76) and 0.79 (CI, 0.67–0.87) for preoperative supraspinatus, infraspinatus and subscapularis,

respectively and 0.65 (CI, 0.45–0.78), 0.58 (CI, 0.39–0.72) and 0.8 (CI, 0.69–0.87) for postoperative supraspinatus, infraspinatus and subscapularis, respectively.

For the difference of fatty degeneration grade between pre- and postoperative status, 3 raters graded improvement in the supraspinatus ($p < 0.05$), 4 raters graded improved fatty degeneration of the infraspinatus ($p < 0.05$) and 2 raters reported improved the subscapularis grades ($p < 0.05$).

Conclusions

The current study demonstrated the improvement of fatty degeneration of rotator cuff muscles after surgical repair. However, these should be carefully interpreted because of their relatively low reliability in the semi-quantitative grading systems. The semi-quantitative grading system demonstrated only moderate inter-observer reliability and intra-observer reliability.

Key Words: Fatty degeneration, Inter-observer reliability, Intra-observer reliability, Magnetic resonance arthrography, Computed tomography arthrography