arm. To calculate the average of maximum internal rotation, we converted each internal rotation ROM to a scale of 0 to 12, where Buttock–0, Sacrum–1.5, L5–2, L4–3, L3–4, L2–5, L1–6, Th12–7, Th11–8, Th10–9, Th9–10, Th8–11, Th7–12. Wilcoxon signed-rank test were used for statistical analysis. P values of less than 0.05 were considered statistically significant.

Results: Before initial treatment, ROM (flexion, abduction, external rotation, and internal rotation) in group A (82.5°, 67.2°, 12.8° and Sacrum, respectively) and that in group N (95.6°, 77.2°, 18.3 and Sacrum, respectively) showed no significant difference (p = 0.06, 0.07, 0.14, and 0.67, respectively). At 1 month after treatment, ROM in group A (155.3°, 133.3°, 41.9°, and L3, respectively) was significantly larger than that in group N (135°, 106.6°, 31.9°, and L4, respectively) (p = 0.0004, 0.0032, 0.02 and 0.0093 respectively). However, there was no significant difference in ROM between the two groups at 3 or 5 months after treatment or at final follow-up. At final follow-up, ROM in group A was 159.4°, 146.7°, 48.3°, and L1, respectively, while that in group N was 156.3°, 145.9°, 40.6°, and L2, respectively (p = 0.061, 0.85, 0.14 and 0.42 respectively).

ROM in both group A and that in group N increased significantly: by 76.9°, 60.6°, respectively for flexion (P < 0.0001, P < 0.0001, respectively), by 79.4°, 68.8°, respectively for abduction (P < 0.0001, P < 0.0001, respectively), by 53.6°, 22.3°, respectively for external rotation (P < 0.0001, P < 0.0001, respectively), by 5°, 12.9°, respectively for internal rotation (P < 0.0001, P < 0.0001) at final follow-up. There were no intra-operative or post-operative complications in the thirty-four patients. Specifically, there was no recurrence requiring a release, axillary nerve dysfunction, infection, osteoarthritis, or shoulder intra-operative or post-operative complications in the thirty-four patients. Specifically, there was no recurrence requiring a release, axillary nerve dysfunction, infection, osteoarthritis, or shoulder intra-operative or post-operative complications in the thirty-four patients.

Conclusions: The authors enrolled a consecutive series of 257 shoulders in 243 patients (14 bilateral) that underwent arthroscopic double-row suture anchor repair performed by an independent radiologist at each visit and the Constant score was collected during the last visit. Statistical analyses were performed using R version 3.1.3. Descriptive statistics were used to summarize the data. Data were not normally distributed. Between group differences were evaluated using Wilcoxon rank sum tests (Mann Whitney U test). When 3 or more groups were compared, Kruskal-Wallis tests were posed followed by Wilcoxon rank sum tests for pairwise comparisons (with Holm’s correction for multiplicity). Categorical data were analyzed using Pearson chi-square tests or Fisher’s exact tests. P-values < 0.05 were considered statistically significant.

Results: Of the initial 208 cases included, 1 died (0.5%) before the end of the follow-up period for unrelated causes, 3 cases (1.5%) had subsequent surgery on another joint that prevented them from attending the latest follow-up visit, and 26 cases (12.6%) missed one or more of the scheduled US examinations. Therefore, a total of 176 shoulders (85.4%) from 165 patients (84 men and 81 women) were available for all required follow-up visits with mean age 56.0 years. Ultrasonography revealed retars in 16 shoulders (9.1%) at 3 months, in 6 shoulders (3.4%) at 6 months, and in 5 others (2.8%) at 12 months or longer. While it confirmed intact cuffs in 149 shoulders (84.7%) at last follow-up visit.

Conclusions: Arthroscopic capsular release was useful for increasing shoulder ROM within 1 month after treatment in patients with shoulder stiffness. However, there was no significant difference in shoulder ROM between nonsurgical treatment and arthroscopic capsular release at more than 3 months after treatment. Previous studies reported that shoulder stiffness responds well to nonsurgical treatment in 70% to 90% of patients and arthroscopic capsular release should be performed in patients unresponsive to conservative treatment. In this study, only 16 of 34 (47.1%) patients were treated non-surgically. We think this is because most of patients in this study were treated non-surgically before the first visit to our hospital. Average duration of the disorder before the first visit to our hospital was 8.4 months in this study set. Our results suggest that arthroscopic capsular release might be recommended to patients with persistent shoulder stiffness if they want early improvement of shoulder symptoms. The limitations of this study include its non-randomized study design, with a small sample size. The outcome of the group N might be overestimated because the patients underwent surgery after failing nonsurgical treatment were excluded from the analysis. The other issue that needs to be highlighted is that active ROM, which the risk of retear is highest.

Background: The incidence of retear following rotator cuff repair remains a major concern and the cause and timing of retear remains unclear. Most serial imaging studies suggested that retars occur during the first 3 months, but they have short follow-up or limited numbers of serial images. The aim of this study was to prospectively investigate the timing of retars following arthroscopic double-row rotator cuff repair using a sizeable cohort at multiple time intervals. The hypothesis was that the ‘critical period’ extends to the first 6 post-operative months, during which the risk of retear is highest.

Material: The authors enrolled a consecutive series of 257 shoulders in 243 patients (14 bilateral) that underwent arthroscopic double-row suture anchor repair performed by an independent radiologist at each visit and the Constant score was collected during the last visit. Statistical analyses were performed using R version 3.1.3. Descriptive statistics were used to summarize the data. Data were not normally distributed. Between group differences were evaluated using Wilcoxon rank sum tests (Mann Whitney U test). When 3 or more groups were compared, Kruskal-Wallis tests were posed followed by Wilcoxon rank sum tests for pairwise comparisons (with Holm’s correction for multiplicity). Categorical data were analyzed using Pearson chi-square tests or Fisher’s exact tests. P-values < 0.05 were considered statistically significant.

Results: Of the initial 208 cases included, 1 died (0.5%) before the end of the follow-up period for unrelated causes, 3 cases (1.5%) had subsequent surgery on another joint that prevented them from attending the latest follow-up visit, and 26 cases (12.6%) missed one or more of the scheduled US examinations. Therefore, a total of 176 shoulders (85.4%) from 165 patients (84 men and 81 women) were available for all required follow-up visits with mean age 56.0 years. Ultrasonography revealed retars in 16 shoulders (9.1%) at 3 months, in 6 shoulders (3.4%) at 6 months, and in 5 others (2.8%) at 12 months or longer. While it confirmed intact cuffs in 149 shoulders (84.7%) at last follow-up visit (mean, 32.9 months). The incidence of retars was most significantly associated with tear size (p = 0.001) and tendon degeneration (p = 0.003). Retars were observed in 42.1% (8 of 19) of the three-tendon tears, but only in 17.4% (12 of 69) of the two-tendon tears and 8.0% (7 of 88) of the one-tendon tears (p = 0.003). Likewise, the incidence of retars was significantly higher for retracted tendons (p = 0.038) and if the infraspinatus had stage II or III fatty infiltration (p = 0.002). The Constant scores at the last follow-up visit were lower for shoulders that had a retear during the first 6 months compared to shoulders that had a retear after the first six months (p = 0.056) or to shoulders that had no retear (p = 0.001). The incidence of retears was not related to other pre-operative tear characteristics (dominant side, bilateral procedures, or cause of pathology) or to concomitant patient conditions (smoking, diabetes, cardiovascular disease or hypertension).

Considering retear as the end-point, the six-month survival (and 95% Confidence Interval) for the complete series was 87.5% (82.7% – 92.5%). By contrast, the six-month survival was only 57.9% (CI, 39.5% – 85.6%) for three-tendon tears, compared to 88.4% (CI, 81.2% – 96.3) for two-tendon tears and 93.2% (CI, 88.1% – 98.6%) for one-tendon tears. In parallel, the six-month survival was merely 77.6% (CI, 68.2% – 88.3%) for degenerated tendons, compared to 93.6% (CI, 89.1% – 98.3%) for healthy tendons.

Discussion: Most retars occurred during the first three post-operative months (p = 0.16), but occurred between three and six post-operative months (p = 0.6), and a few occurred after 6 months (p = 0.5), considering the long follow-up period of the study. The results therefore confirm the hypothesis that the ‘critical period’ for healing and recovery following rotator cuff repair extends to the first 6 post-operative months, during which the incidence of retars is significantly higher (12.5%) than in the forthcoming months (2.8%). The findings corroborate the recent literature, which indicates that retars occur mostly during the first three post-operative months (9.1%). The observations suggest, however, that the so-called ‘critical period’ may extend until six post-operative months, particularly for patients with risk factors, most notably large tear size, degenerated tendons, tendon retraction and fatty infiltration. Our results suggest that the two factors most associated with early retars are retracted and degenerative tear size and tendon degeneration, which corroborates the recent systematic review of Henry et al. Arthroscopy 2015 who reported a ‘poole rate retear’ rate of 79% following repairs of chronic massive rotator cuff tears.

The main strengths of this study is its relatively large sample size and the acquisition of multiple serial images. The study has several limitations, typical of non-randomized studies, notably the variability of follow-up, the inclusion of patients with various sizes of subscapularis, the use of two different imaging modalities pre-operatively (CT and MRI) to assess muscle quality and fatty infiltration, the inability to analyze the intra- and intra-observer accuracy because US is a dynamic imaging modality and its interpretation must be done in the presence of the patient, and the portion of patients lost to follow-up (14.6%).