Assessment of bone quality within the tuberosities of the osteoporotic humeral head: relevance for anchor positioning in rotator cuff repair.

Abstract:
Tears of the rotator cuff are highly prevalent in patients older than 60 years, thereby presenting a population also suffering from osteopenia or osteoporosis. Suture fixation in the bone depends on the holding strength of the anchoring technique, whether a bone tunnel or suture anchor is selected. Because of osteopenic or osteoporotic bone changes, suture anchors in the older patient might pull out, resulting in failure of repair. The aim of our study was to analyze the bone quality within the tuberosities of the osteoporotic humeral head using high-resolution quantitative computed tomography (HR-pQCT). Descriptive laboratory study. Thirty-six human cadaveric shoulders were analyzed using HR-pQCT. The mean bone volume to total volume (BV/TV) as well as trabecular bone mineral densities (trabBMDs) of the greater tuberosity (GT) and the lesser tuberosity (LT) were determined. Within the GT, 6 volumes of interest (VOIs) within the LT, and 2 VOIs and 1 control volume within the subchondral area beyond the articular surface were set. Comparing BV/TV of the medial and the lateral row, significantly higher values were found medially (P< .001). The highest BV/TV, 0.030% ± 0.027%, was found in the posteromedial portion of the GT (P< .05). Regarding the analysis of the LT, no difference was found comparing the superior (BV/TV: 0.024% ± 0.027%);
0.022\%) and the inferior (BV/TV: 0.019\% + or - 0.016\%) portion. Analyzing trabBMD, equal proportions were found. An inverse correlation with a correlation coefficient of -0.68 was found regarding BV/TV of the posterior portion of the GT and age (P<.05). Significant regional differences of trabecular microarchitecture were found in our HR-pQCT study. The volume of highest bone quality resulted for the posteromedial aspect of the GT. Moreover, a significant correlation of bone quality within the GT and age was found, while the bone quality within the LT seems to be independent from it. The shape of the rotator cuff tear largely determines the bony site of tendon reattachment, although the surgeon has distinct options to modify anchor positioning. According to our results, placement of suture anchors in a medialized way at the border to the articular surface might guarantee a better structural bone stock.

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