

Vitamin D level in the rotator cuff muscle and serum correlates with postoperative muscle performance at 1 year after rotator cuff repair

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Objectives: Previously, we reported that tissue vitamin D (tVD) in the rotator cuff muscle had strong correlation with pre-operative serum vitamin D (sVD). Furthermore, tVD reflected more on the preoperative muscle power. This study was a follow-up study to evaluate correlations of tVD, vitamin D receptor (VDR), and postoperative sVD with rotator cuff muscle performance, fatty degeneration, healing failure, and functional outcomes at 1 year after rotator cuff repair (RCR).

Methods: Between March and October in 2017, 36 patients who underwent RCR were prospectively enrolled and 26 patients were followed at 1 year postoperatively and analyzed. tVD was assessed using liquid chromatography, and the VDR was measured by western blotting. sVD was checked preoperatively, 6 months, and 1 year post-operatively. At 1 year after surgery, isokinetic muscle performance test (IMPT), ASES score and Constant score were evaluated, and MRI was used to analyze fatty degeneration and the healing failure.

Results: The mean level of sVD at 1 year post-operatively was 20.5 ± 9.2 ng/ml. Only six patients had normal level of sVD (> 20 ng/ml, 23.1%), while 19 patients had insufficiency (10 - 20 ng/ml, 73.0%), and one patient had deficiency (< 10 ng/ml, 3.8%). Lower sVD at pre-operatively had lower sVD at 6 months and 1 year post-operatively (all $p < 0.05$). Higher pre-operative and 1 year post-operative sVD had less deficiency of IMPT in abduction (pre-operative, post-operative; CC; Abduction, -0.324, -0.395, $p = 0.047$, 0.041, respectively) However, no correlation was found in deficiency of IMPT in ER, IR (pre-operative, post-operative; CC; ER, IR; 0.025, -0.042; $p = 0.926$, 0.874, respectively; post-operative; CC; ER, IR; -0.250, -0.157; $p = 0.333$, 0.548, respectively). Although, there was no correlation was found between torque of muscle power at 1 year post-operatively with pre- and post-operative sVD (all $p > 0.05$), higher tVD had higher torque of abduction (CC: 0.440, $p = 0.043$), and showed tendency of higher torque of external rotation (ER) (CC: 0.335, $p = 0.077$). There was no correlation of tVD and sVD with functional outcomes, fatty degeneration and re-tear rate (all $p > 0.05$). VDR showed no correlation with any variables (all $p > 0.05$).

Conclusions: tVD and sVD showed positive correlation with rotator cuff muscle performance at 1 year after RCR. Regarding lower sVD at pre-operatively had lower sVD at 1 year post-operatively, and considering lower sVD had higher deficiency of muscle power, supplementation of vitamin D to these patients with low sVD would enhance rotator cuff muscle performance postoperatively.

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