

## Proprioception Strategy Compare with Rotational Kinematic Change after Double Bundles ACL Reconstruction

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**Purpose:** Knee injury, such as rupture of the anterior cruciate ligament (ACL), causes changes in proprioception, thus acting as a crucial element during rehabilitation and regain of proprioception is a major factor contributing to knee stability and function. Otherwise, many clinical study reports residual rotational laxity after single bundle ACL reconstruction, that why double-bundles ACL reconstruction is popular due to could restore the rotation stability. However, restore the knee joint stability is positive relation with proprioception? Kinematic analysis of the knee joint has already proved useful in assessing patients. So, the purpose of our study was to analyze knee rotational laxity and proprioceptive function after 2 years of double-bundles ACL reconstruction. We hypothesized that double-bundles ACL reconstruction would restore knee proprioception and rotational kinematic function to the intact level.

**Materials and Methods:** There were 11 male patients underwent the procedure of arthroscopic double-bundles ACL reconstruction. We also detect 5 intact knees. Mean age is 25.4 years. (range, 20-39). The mean time of post-operation to evaluation are 36.2 months (24 – 52 months). The full extension and neutral rotation positions of the knee could then be determined. Passive and active proprioception as well as rotational laxity was evaluated on both the reconstructed and healthy knee. Then all the patients performed a high-demand and pivoting task after ACL reconstruction. The range of tibial rotation during the pivoting movement was measured by an optical motion analysis system with 10 cameras was used to record the 3-dimensional rotation movements of lower extremities. Three-dimensional coordinates of every marker were exported from the VICON software. With the anthropometric measurements, knee joint kinematics was then calculated. Statistical significance was set at  $P > .05$ .

**Results:** We did not find any statistically significant difference in rotational laxity and active or passive proprioception between reconstructed and healthy knees. The range of tibial rotation was higher in the ACL-deficient knee ( $13.5^{\circ} \pm 3.7^{\circ}$ ) than in the intact knee ( $6.5^{\circ} \pm 3.5^{\circ}$ ). The increased rotation was significant reduced after double-bundle ACL reconstructed knee ( $7.5^{\circ} \pm 2.6^{\circ}$ ) ( $P < 0.05$ ). There was no significant difference in the tibial rotation between the intact knee and the double-bundle ACL reconstructed knee postoperatively more than 2 years ( $P > 0.05$ ). For each knee, active proprioception was found to be statistically different (higher) than passive proprioception ( $P < 0.05$ ).

**Conclusion:** Our study did not exhibit any difference in rotational laxity and proprioception between the reconstructed and the healthy knee. According to our findings, double-bundles ACL reconstruction after 2 years of operation could provide satisfactory recovery of knee laxity and function in the management of ACL tears, which confirms our hypothesis.

## The Correlation of Bone Bruising with Post-traumatic Knee Arthritis Proved by Quantitative T2 MR

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**Introduction:** To our knowledge, few clinical studies have correlated findings of bone bruising with articular cartilage abnormality and associated post-traumatic knee arthritis. We speculated the bone bruise present on MRI might lead to degeneration of the underlying articular cartilage proved by T2 mapping MRI. Our goal is to use functional MRI with 3T T2 mapping to quantifying value of cartilage injury for prediction of osteoarthritis, such as DXA for osteoporosis.

**Materials and Methods:** There were 30 patients with knee injury have underwent MRI from Jan. 2003 to Dec. 2007. There were 19 patients without bone bruising and 11 with bone bruising in MRI. The subgroups in bone bruising were classified with Velleet classification. We follow up the 3-T MRI again at 6 months later. We analysis the date of MRI and pattern of bone bruise and the associated injury. Statistical analysis Mean, SD, and median T2 values were also performed. We compare the relationship between groups.

**Results:** The mean age is about 29.7 year-old in bone bruising group and 28 year-old in non-bruising group. The group with bone bruising consisted of 6 male and 5 female patients. The deviation of T2 value was 17.39 in bruising group and 15.83 in non-bruising group. There was significantly more associated injury in patients with bone bruising than those without bone bruising. The T2 value of cartilage in bone bruise was significantly lower than the normal area.

**Discussion:** We can find out the damaged cartilage area by using MRI T2 mapping and prevent from traumatic arthritis. Furthermore, we can observe the improvement of cartilage after administrating chondro-protection agent by using T2 mapping technology.