Measurement of Regional Bone Density of the Knee Following Anterior Cruciate Ligament Rupture by Computed Tomography

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Objectives: The purpose of this study was to determine the regional bone mineral density changes of the knee after anterior cruciate ligament rupture and correlate with the duration after injury, age and gender of the patient.
Methods: 31 patients, diagnosed as anterior cruciate ligament rupture with between June 2010 and February 2014, were included in this retrospective study. The measurements were performed in seven predetermined regions by using axial and sagittal plane computed tomography images. The mean trabecular bone densities of these certain regions were measured in terms of Hounsfield units by using a circular region of interest approximately 10-15 mm in diameter.
Results: The trabecular bone densities at four of seven regions were negatively correlated with the duration after injury in Spearman's correlation analysis. The bone densities of D1 (anteromedial area of the proximal tibia), D2 (anterolateral area of the proximal tibia), D3 (posteromedial area of the proximal tibia) and D4 (posterocentral area of the proximal tibia) regions had statistically significant negative correlation with preoperative duration ($P<0.05$, r -0.410, -0.501, -0.418 and -0.439, respectively). Multiple linear regressions analysis demonstrated independent negative correlation between the duration after injury and only D1 region ($p=0.009$).
Conclusion: The present study demonstrated that, bone mineral density of the knee decreases by the time after ACL rupture particularly in anteromedial area of proximal tibia corresponding to ACL fixation area (D1). Thus, prolonged preoperative duration may decrease bone quality and influence the success of reconstructive surgery.

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