MRI Prediction of Surgical Treatment for Juvenile Osteochondritis Dissecans (OCD)

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Juvenile osteochondritis dissecans (OCD) is an abnormality of joint cartilage and its underlying bone. It is a leading cause of joint pain in children (affecting approximately 1 in every 1,000 children) and predisposes patients to early osteoarthritis and osteonecrosis. Its precise cause remains unknown, though repetitive trauma and multiple other factors have been implicated. Magnetic resonance imaging (MRI) aids patient management by assessing the mechanical stability of the bone and cartilage defects. Unfortunately, imaging criteria established for adults do not translate well to juvenile patients. This study aimed to determine whether quantitative analysis of standard MRI sequences of knee, elbow, and ankle joints could predict the need for surgery. The proposed hypothesis was that signal intensity could distinguish between those receiving conservative management and those requiring surgery. Using pretreatment MRI sequences from the IU Health Radiology Information Systems, 41 skeletally immature patients with OCD were analyzed retrospectively to quantify the cartilage signal on standard anatomy (PD or T1) and fluid-sensitive sequences (STIR or T2 fat saturation). The entire cartilage portion of the lesion was quantified using manual segmentation (with signal intensity normalized to the opposite condyle as an internal control). Logistic regression assessed whether lesion signal intensity could discriminate surgical or non-surgical management with receiver operator characteristic (ROC) curves obtained to identify the optimal signal intensity threshold. Unfortunately, neither type of sequence could discriminate between surgical and non-surgical patients. Likewise, signal intensity was not a good predictor of surgical stability in patients undergoing surgery. Future studies will assess signal intensity at individual joints. In addition, future studies will evaluate cartilage-specific clinical sequences to determine if quantitative cartilage analysis can improve diagnostic accuracy in these patients.