INTRODUCTION
The anterior cruciate ligament (ACL) is the most commonly injured of the knee ligaments. Complete ACL tears often result from twisting, non-contact injuries which have a pivot shift like mechanism [2]. From this mechanism of injury a bone bruise is often associated and can be visualized on magnetic resonance imaging (MRI). Concomitant injuries are also common, including cartilage damage, collateral ligament sprains and the presence of meniscus pathology [1, 3]. Clinically these bone bruises vary in size on MRI. The purpose of this study is to determine if there is a relationship between the volumes of bone marrow edema in the tibiofemoral joint and the presence of meniscal pathology in the setting of acute ACL tears.

MATERIALS AND METHODS
Following IRB approval, a retrospective search was conducted for patients with an acute ACL rupture and MR imaging within 30 days of injury. 50 patients met inclusion criteria. Two musculoskeletal radiologists evaluated the lateral and medial menisci with consensus. 3 specific meniscal groups were defined: no meniscal tear, tear of one meniscus (uni-compartmental) and tear of both menisci (bi-compartmental). Sagittal T2 fat suppressed images were de-identified and converted into DICOM images by an honest broker in the Department of Orthopaedic Surgery. Using the closed polygon feature of the OSIRIX VIEWER (Version 3.7.1, Pixmeo Sari, Bernex, Switzerland) small datum points were placed outlining the distal epiphysis on each MRI slice. The demarcated region for each slice was summated to determine bone area.

RESULTS
The number of meniscal tears was as follows: no tear 16/50 (32%), lateral meniscus tear 5/50 (10%), medial meniscus tear 15/50 (30%), both menisci torn/bi-compartmental 14/50 (28%) with uni-compartmental tears totaling 20/50 (40%). There was a relationship between the volume of femoral bone bruise and the presence of meniscal tears (p = < 0.001). Further analysis of the defined meniscal groups revealed a statistically significant difference in femoral bone bruise edema volumes when comparing no meniscal tear to bi-compartmental tears as well as uni-compartmental tears compared to bi-compartmental tears. However, there was no significant difference in bone bruise edema volumes when comparing no meniscal tear to uni-compartmental tears. There was no relationship between tibial bone bruise edema volume and meniscal pathology. Moderate relationship was found between total tibiofemoral bone bruise edema and meniscal tears.

DISCUSSION
There is a statistically significant relationship between femoral bone bruise edema and the presence of meniscal tears, especially in the setting of bi-compartmental pathology. MRI evaluation of menisci can be difficult, especially pathologies of the lateral posterior horn [3] and the use of secondary signs, such as femoral bone bruise edema, can increase confidence in imaging diagnosis of meniscal tears in the setting of acute ACL injury. In conclusion, there is a relationship between femoral bone bruise edema and the presence of meniscus tears in acute ACL injuries. Patients with large femoral bone bruises should be more closely evaluated for meniscus pathology, both radiographic and arthroscopic in the setting of surgical intervention.

REFERENCES