INTRODUCTION:
The vascular supply of the acetabular labrum has not been fully described in the literature. While several studies have examined the supply to this anatomical region, these investigations have either focused on the acetabulum itself [1,2] or were limited to descriptions of the supply to the joint capsule [3]. A central goal of this investigation was to establish how much of the labral and neighboring tissue blood supply is provided by the femoral vessels and how much is provided by the acetabular vessels. A refinement of our knowledge of this blood supply could bring a better understanding of clinical situations such as hip dislocation and pre-reduction traction, the effects of peri-acetabular osteotomies on hip vascularity, and vascular healing response to tears or avulsions of the acetabular labrum.

MATERIALS AND METHODS:
Labral vascularity was studied using four New Zealand white rabbits, 28-32 weeks old and all with open growth plates. The rabbits were anesthetized and the aortic bifurcation and external iliac artery exposed through an anterior midline incision. A 20-gauge cannula was placed in the aorta just above the bifurcation and a 22-gauge cannula was placed in each external iliac artery; these vessels were then ligated just proximal to the cannula insertion. Heparinized saline was injected to ensure cannula patency and the vessels were then immediately injected with Microfil latex solution (Flow Tek Inc., Boulder, Co.), this solution fills the vascular tree and polymerizes over 10-12 hours. Blue Microfil was used for the aortic injection and either yellow or orange Microfil was used for the external iliac injection. The animals were killed, then placed in a refrigerator at 4 deg C for 14 hours to allow for polymerization. The femurs, hip joints, and pelvis were then removed in toto from the animals. The specimens were dehydrated through serial immersions in ethanol and cleared by immersion in 100% xylene. Following clearing, the specimens were infiltrated with a methylmethacrylate-based monomer, this allowed the specimens to be sectioned and the transparency of the monomer allowed undistorted visualization of the vascular systems with each system well represented. In the remaining three specimens, the superior labrum was supplied more consistently by acetabular origin at 25x (Fig. 1). Vessels were most easily identified as being of femoral or acetabular origin at 25x (Fig. 1).

In three of the specimens, the superior labrum was supplied by both vascular systems with each system well represented. In the remaining three specimens, the superior labrum was predominately supplied by the acetabular system and the inferior aspect of the labrum was supplied more consistently by the femoral system. These results may have implications regarding the healing of fractures and soft tissue tears in this area as well as in the response of the labral tissue to acetabular osteotomies. The demonstration of femoral supply to the artery of the ligamentum teres is in agreement with that shown in earlier studies [4]. The demonstration of a dual supply to the greater trochanter by this technique also supports findings from earlier perfusion studies [5]. The Microfil injection technique exhibited both intra-articular and intra-osseous vessels and could be applied to other watershed areas such as the spinal cord, talus, and scaphoid.

RESULTS:
A total of eight hip joints were injected. One specimen was lost during the refinement of the clearing and infiltrating procedures, a second specimen was not used due to incomplete filling of the femoral supply and extravasation of the aortic supply. The coronal sectioning of each specimen allowed for examination of both the superior and inferior portions of the acetabular labrum. In all six specimens examined, the labrum exhibited a shared supply from the femoral and acetabular systems. Determination of supply was done by visual means, vessels were most easily identified as being of femoral or acetabular origin at 25x (Fig. 1).

In three of the specimens, the superior labrum was supplied by both vascular systems with each system well represented. In the remaining three specimens, the superior labrum was predominately supplied by the acetabular system. Four of the specimens also showed prevalent supply by both systems to the inferior labrum, with two specimens showing predominately femoral supply to this area.

In addition to studying the labrum, other areas were examined as well. Sectioning of one of the specimens allowed for clear visualization of the artery of the ligamentum teres (Fig. 2). The specimen demonstrated femoral supply to this vessel. The greater trochanter exhibited variable supply among the specimens, with one specimen showing predominantly internal iliac supply (via gluteal branches) and one specimen showing predominantly femoral supply, the remaining specimens exhibited mixed supply to this area.

DISCUSSION:
In summary, the two color latex injection technique allowed for visualization of a dual blood supply to the labrum and other related hip tissues. The superior aspect of the labrum was supplied more consistently by the acetabular system and the inferior aspect of the labrum was supplied more consistently by the femoral system. These results may have implications regarding the healing of fractures and soft tissue tears in this area as well as in the response of the labral tissue to acetabular osteotomies. The demonstration of femoral supply to the artery of the ligamentum teres is in agreement with that shown in earlier studies [4]. The demonstration of a dual supply to the greater trochanter by this technique also supports findings from earlier perfusion studies [5]. The Microfil injection technique exhibited both intra-articular and intra-osseous vessels and could be applied to other watershed areas such as the spinal cord, talus, and scaphoid.

REFERENCES: