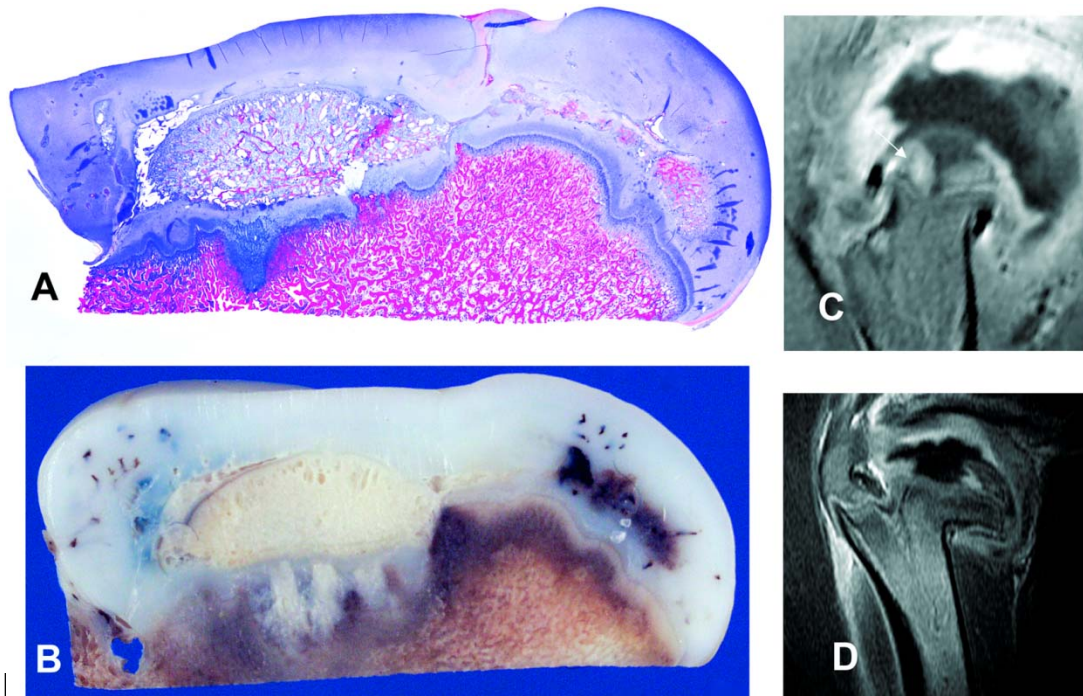
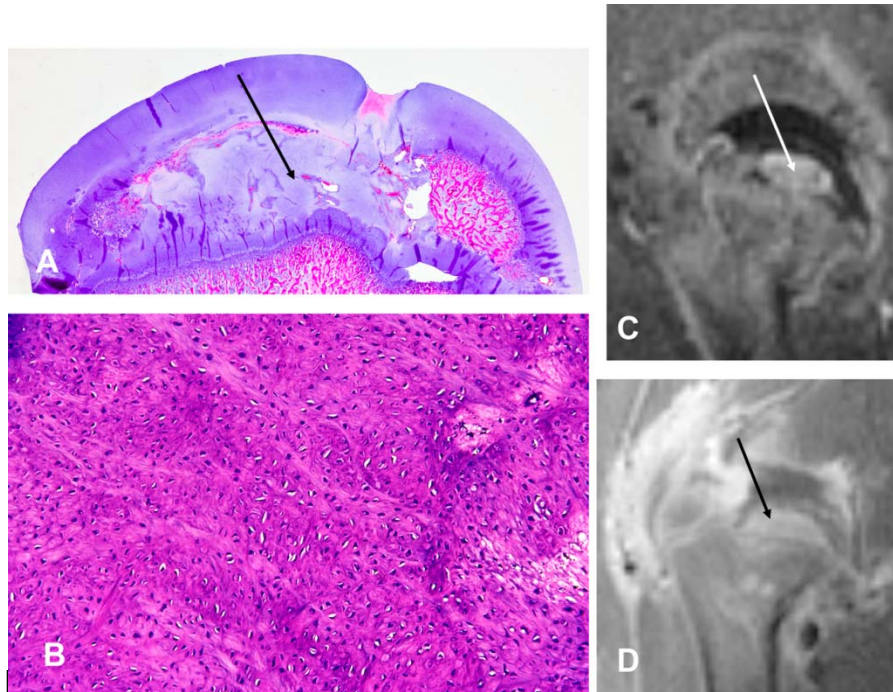


Fig. E-1

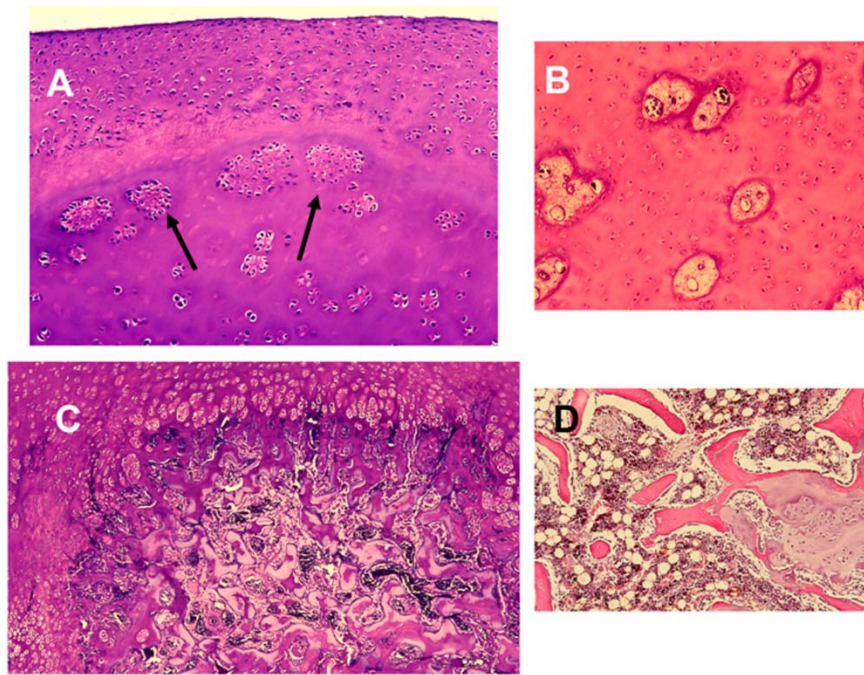
Images of a normal, noninvolved proximal part of the femur at eight weeks after surgery (eleven weeks of age) are shown. *A*: Specimen radiograph shows the spherical femoral head, finely dispersed trabecular bone, physis, thin epiphyseal bone plate (linear dense bone just above the physis), and adjacent neck and greater trochanter. *B*: Midcoronal plane histologic section of the femoral head oriented the same way as the radiograph in *A* shows the smooth, spherical, articular cartilage surface; the thin persisting rim of epiphyseal cartilage; the trabeculae of bone; and the curvilinear physis at bottom. The tissue outlined by the upper left box is shown at higher magnification in *C*; the tissue outlined by the lower central box is shown at higher magnification in *D*; and the surface articular and epiphyseal cartilage from the region of the arrow at upper right is shown at higher magnification in *E* (paraffin-embedded section, 1% toluidine blue stain). *C*: Higher-magnification photomicrograph shows, from top to bottom, articular cartilage, epiphyseal cartilage with which it merges, the physis of the secondary ossification center with hypertrophic cells, and the bone of the secondary ossification center forming by endochondral ossification. At the bottom third, bone and cartilage trabeculae are seen along with hematopoietic marrow (paraffin-embedded section, 1% toluidine blue stain). *D*: Higher-magnification photomicrograph illustrates bone trabeculae of the secondary ossification center at top. The bone plate with a denser accumulation of transversely oriented bone trabeculae is present just above the physeal cartilage. The marrow is a mixture of fatty and hematopoietic elements. The physeal cartilage and the metaphyseal tissue of the neck are seen in the lower half of the image (paraffin-embedded section, 1% toluidine blue stain). *E*: Higher-magnification photomicrograph (from the adjacent tissue section with use of different staining) shows normal surface articular cartilage merging with underlying epiphyseal cartilage with no histologic line of demarcation (paraffin-embedded section, hematoxylin and eosin stain).



A: Photomicrograph from another piglet eight weeks after surgery shows medial head sphericity, while the lateral two-thirds of the superior cartilage surface are flattened. There is a large persisting necrotic fragment of epiphyseal bone surrounded by fibrous tissue in the lateral half of the head. Note the increased thickness of the articular and epiphyseal cartilage. The physis is intact but wavy and of variable thickness (paraffin-embedded section, hematoxylin and eosin stain). **B:** Photograph of decalcified coronal plane hemisection prior to preparation for histologic analysis shows tissue contrasts. The necrotic oval yellow bone is devoid of vessels compared with the medial femoral head bone and cartilage, which are vascularized. Brown-colored tissue seen as dots or linear accumulations represents blood vessels within the marrow and cartilage. **C:** T1-weighted sequence after gadolinium enhancement at two weeks after surgery shows intermediate signal intensity medially and laterally with revascularization, with low signal intensity because of delayed revascularization at the central and superior parts of the head. **D:** Magnetic resonance imaging with gadolinium enhancement shows no signal uptake in the necrotic bone segment compared with intermediate signal intensity in the medial segment (T1-weighted sequence after gadolinium enhancement).



Histologic section and magnetic resonance images are shown from another piglet eight weeks after surgery in which repair was characterized by large accumulations of cartilage in the central and lateral aspects of the femoral head (epiphysis). The shape of the medial segment of the head and the endochondral sequence of bone formation are well preserved. *A*: Midcoronal plane section of the femoral head shows a normal medial segment but extensive cartilage repair tissue in most of the central and lateral parts of the head. The cartilage surface is much thicker than normal (articular cartilage and underlying epiphyseal cartilage). There is vascularization of the cartilage repair tissue but markedly delayed ossification. The arrow represents the tissue accumulation outlined in the magnetic resonance images in *C* and *D* (plastic-embedded section, 1% toluidine blue stain). *B*: Higher-magnification view of vascularized fibrocartilaginous tissue in the center of the cartilage repair accumulation is shown (paraffin-embedded section, 1% toluidine blue stain). *C*: Magnetic resonance imaging with high signal intensity (arrow) in the central part of the femoral head indicates a vascularized tissue. This region corresponds to the vascularized cartilage in the central and lateral regions of the head. The windows in this image concentrated on the high-signal vascularized tissue collection. Signal intensity at the medial and lateral margins is intermediate with histologic evidence of endochondral bone formation. The thin light rim of the tissue above the high-signal tissue is the rim of articular cartilage (T1-weighted sequence after gadolinium enhancement). *D*: Magnetic resonance imaging shows intermediate signal intensity (arrow) of the vascularized cartilage accumulation in the central femoral head. This section assessed an adjacent region, but the windows were changed to better contrast the articular cartilage above the central deposit (T1-weighted sequence after gadolinium enhancement).



A: Photomicrograph of abnormal articular cartilage from the lateral segment of a deformed femoral head at eight weeks. The surface cartilage is hypercellular and fibrocartilaginous. Slightly below the surface, large circular clusters of cartilage clones (arrows) are seen in a relatively hypocellular matrix (paraffin-embedded section, 1% toluidine blue stain). **B:** Cartilage canals are seen within the lateral epiphyseal cartilage as a repair response. In normal developing femoral head cartilage, such a dense accumulation of canals is not seen. The histologic section was made from the decalcified hemisection in Figure E-2, *B* (paraffin-embedded section, hematoxylin and eosin stain). **C:** Endochondral bone formation is demonstrated in separate foci within cartilage repair sites of the widened epiphyseal cartilage (paraffin-embedded section, 1% toluidine blue stain). **D:** A high-magnification photomicrograph shows persisting physeal cartilage at right and a transphyseal bone bridge at left (paraffin-embedded section, hematoxylin and eosin stain).