Embryology of the Acetabular Labral-Chondral Complex
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Introduction: Acetabular labral tears have been recognized as a common cause of hip pain in young adults 1-3. Neumann et al 4 recently reported that 66% of patients presenting with mechanical symptoms in their hip were found to have labral tears documented on MR arthrogram, with the majority of the tears located anteriorly. Although the body of literature describing labral pathology is growing 5,6, there are relatively few studies of the anatomy of the fetal acetabular labrum and its chondral junction. The purpose of this study was to analyze the embryology of the acetabular labral-chondral complex (ALCC) in order to provide a better understanding of the etiology of its disruption.

Materials and Methods: This is a descriptive study analyzing the prenatal development of the human ALCC. Microscopic examination of 11 fetal hips, aged 8 to 20 weeks gestation, was performed. The anterior and posterior labrum were compared, with attention paid specifically to the transition zone and the collagen fiber orientation.

Results: There were consistent differences, throughout all ages of gestation, noted between the anterior and posterior ALCC. The anterior labrum had a marginal attachment to the chondral rim with an intra-articular projection. The posterior labrum was firmly attached and continuous with the acetabular chondral surface (IMAGE 1). The labral-chondral transition zone was sharp and abrupt, anteriorly, but gradual and interdigitated, posteriorly. Under polarized light, we found the collagen fibers to be arranged parallel to the anterior labral-chondral junction but perpendicular to the posterior labral-chondral junction.

Discussion: We believe that the marginal attachment of the anterior labrum, as well as the orientation of the collagen fibers may render it more prone to damage than the firmly attached posterior labrum. Seldes et al 5 characterized the transition at the anterior ALCC as uniform with no visible differentiation macroscopically between the labral-chondral junction (IMAGE 2). In contrast, our findings show that the disconnection between the antero-superior labrum and acetabular cartilage is a normal variant contrasting with the uniform transition zone of the posterior acetabular labral-chondral junction. The anterior intra-articular projection of the labrum should not be considered as a pathologic feature. This is of clinical interest since the causal relationship between labral and chondral damage and the etiology of labral tears themselves are still being debated 7-9.


Figure 1: Photomicrograph of full-term fetal hip. The fetal hip is held in a position of flexion. Anterior is at the top of the picture, while posterior is at the bottom of the picture. (Stain, hematoxylin and eosin, magnification, ×0).

Figure 2: Illustration of histologic appearance of labrum attachment site. (A) labrum; (B) articular hyaline cartilage; (C) articular cartilage–labrum transition zone; (D) bony acetabulum; (E) tidemark; (F) hip capsule (cut); (G) capsular recess; (H) group of vessels. 1. capsular recess; 2. thickness of labrum; 3. width of labrum. (Reproduced from Seldes et al Anatomy, Histologic Features, and Vascularity of the Adult Acetabular Labrum Clin Orthop 382; pp 232-240, 2001).