ABSTRACT INTRODUCTION:

Type 2 superior labrum anterior posterior lesions in the shoulder are routinely repaired. However, a sublabral recess may be a variant of normal anatomy1–2. Some degree of controversy exists regarding the anatomy of the origin of the long head of biceps tendon and superior labrum. Further, there is significant disparity between findings reported in the adult literature and studies of fetal shoulder anatomy. The primary research objective was to determine if a naturally occurring cleft exists between the superior labrum and the glenoid in the human fetus. The secondary objective was to identify the origin of the long head of the biceps tendon and whether it altered with fetal development.

METHODS:

The fetal specimens used in the study were obtained from spontaneous abortion; ethics approval was obtained. Eight fetal shoulder specimens were examined. Gestational age ranged from 12 to 20 weeks. Specimens were fixed in formalin, embedded in paraffin, and serially cut in the coronal plane using 6 micrometers thin sections. The coronal plane was chosen as this provided the best visualization of the superior labrum and superior glenoid, and would therefore optimize visualization of a cleft between the superior labrum and glenoid, if present. Serial examination through the coronal plane would also allow for the precise identification of the biceps tendon origin. The sections were stained with hematoxylin and eosin, and with Azan. Specimens were also studied with polarized light in order to visualize the extent to which the collagen fibers of the biceps tendon arise from the labrum. All specimens were examined with a light microscope, and digital micrographs were taken of all sections for later review and for preparation of composite images.

RESULTS:

There was no histologic evidence of a cleft between the superior glenoid and superior labrum in any of the histologic sections or at any stage of development of the specimens. A smooth zone of transition was observed from the superior labrum to the superior glenoid (Figure 1).

The biceps tendon arose from the superior labrum alone in all specimens (Figure 2). We did not observe the long head of biceps originating from the superior glenoid cartilage anlage in any specimen. The origin of the biceps extended from the anterior margin of the superior labrum to the posterior margin evenly in all specimens. The supraglenoid tubercle was not observed in any of the specimens.

DISCUSSION:

Disparity exists between fetal and cadaveric studies regarding the anatomy of the biceps origin and superior labrum3–9. The supraglenoid tubercle in adults is a bony landmark but in fetuses is still cartilaginous. The labrum is a fibrocellular structure that enhances the surface area of the glenoid, functionally producing a more stable joint. Lesions to the labrum as described by Snyder et al. appear to be acquired, with the possible exception of type II lesions10. It has been previously suggested that these lesions may in fact be normal variants1–2. The present study has limitations. There were only eight specimens available for study, and the study was limited to histological analysis, with no study of gross specimens. The range of specimen development was limited to 12-20 weeks. Our investigations failed to demonstrate a cleft between the superior glenoid and superior labrum in the fetal shoulder between 12 and 20 weeks gestational age. This suggests that the findings observed by Snyder et al. regarding type 2 lesions may be acquired. Regarding the origin of the long head of the biceps tendon, our observations are similar to previously published3–5. In Aboul-Mahasen’s et al. fetal study on the shoulder, in the specimens of 9-16 weeks gestational age only the sagittal plane was used to examine the shoulder2. This limited their ability to interpret structures in the coronal plane, which otherwise would require three-dimensional reconstruction. We observed that in all cases the origin of the biceps occurred from the superior labrum alone, and no evidence that the biceps tendon arises from the glenoid. Our observations contrast with adult cadaveric studies which have demonstrated an attachment to the supraglenoid tubercle11.

REFERENCES
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Figure 1: 14 weeks gestational age, Azan stain, 10x magnification. Supraspinatus (SS) seen. Biceps tendon (B) is seen as an elongation from the superior labrum (SL) and originates from the superior labrum (laterally). Glenoid (G), humeral head (HH).

Figure 2: 16 weeks gestational age, Azan stain, 5x magnification. Biceps (B) tendon seen originating from superior labrum (SL). Glenoid present at bottom right of image, humeral head (HH) bottom left.