OBJECTIVES

• We applied a novel technique to examine sagittal patellar localization in pediatric knees, deemed the Blumensaat-Epiphyseal Containment of the Knee (BECK). This method was developed using lateral radiographs on cadaveric specimens and then applied to a series of pediatric knees with normal patellar localization.

• The BECK angle was formed by the middle third of Blumensaat’s line and the distal femoral physis. Patellar localization was measured as the percentage of the pole-to-pole patellar length contained within the BECK angle (Figure A; Pole-to-Pole patellar length was either fully contained, partially above the epiphysis indicating patella alta, or partially below Blumensaat’s line indicating patella baja).

METHODS

• A series of sagittal radiographs were taken in 15° flexion on 10 fresh-frozen young, cadaveric knees. These defined the BECK angle method of patella localization.

• The method was applied to normal lateral knee radiographs of 60 pediatric patients, grouped into ages 7-9yo, 10-12yo, and 13-16yo (n = 20 each).

• Patellar localization was measured by three authors using the BECK angle method and the ratios of Caton-Deschamps, Koshino-Sugimoto, and Tibial-Plateau-Patella. Statistical comparisons and inter-observer reliability were calculated.

RESULTS

• Flexion angle of the lateral radiographs ranged from 22° to 81°.

• The BECK angle increased with age, with an average BECK angle of 43.5 ± 4.6° (mean ± SD) for the 7-9yo group, 46.8 ± 5.7° for the 10-12yo group, and 49.5° ± 6.6° for 13-16yo group.

• In 95% of the knees (57 of 60) the patella was greater than 50% contained by the BECK angle, and in 77% of the knees (46 of 60) the patella was greater than 75% contained by the BECK angle (Figure B).

• Inter-observer measurement correlation was high, with a Pearson coefficient greater than 0.80 and no significant differences among the observers.

• By comparison, normal patellar height was seen in 82% of the knees using Caton-Deschamps, 65% of the knees using Koshino-Sugimoto, and 44% of the knees using Tibial-Plateau-Patella.

CONCLUSIONS

• The BECK Angle is a reliable method for assessing sagittal pediatric patellar localization without interim computing of ratios. Additionally, it is applicable and valid over a wide range of knee flexion angles.