Diagnostic Ultrasound Imaging in Assessing Medial Elbow Joint Space in College Baseball Pitchers

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Abstract

The use of ultrasound imaging has been in medical practice since the 1950s and recently since the 1980s. The use of ultrasound imaging has been used more regularly to assist the accuracy of the clinical examination in the musculoskeletal orthogonal setting. The enhanced use has been attributed to the safe, portable and less invasive alternative to the MRI. Furthermore ultrasound imaging is an excellent compliment or alternative to other forms of radiography imaging since all patients can undergo sonography the use of sonography is more alternative to the MRI. Furthermore, these data indicate that total innings pitched during a season and year of participation did not have an influence on the MJS width. Further research is recommended to perform multiple imaging testing throughout the entire year (Fall and Spring seasons) to determine specific time points at which MJS width changes in collegiate baseball pitchers. Ultrasound images of the medial joint space on the participant’s throwing arm were obtained using a GE LOGIQ E ultrasound unit (GE Healthcare, Chicago, IL, USA) with a linear probe at 12 MHz.

Methods

Subjects: Thirty three NCAA Division I college men’s baseball pitchers participated with a mean age of 20.4 ± 1.45 SD and body mass index 24.56 ± 1.78 SD. Subjects gave written informed consent before participating, and the protocol was approved by Florida Gulf Coast University’s Institutional Review Board.

Design: A repeated measures, non-randomized 1 x 2 experimental design guided this study. The single independent variable was time with two levels (pretest and posttest). The dependent variable measured in this study was medial joint space (cm). The number of innings pitched and years of collegiate pitching were used as control variables to maintain the potential influence of these control variables on MJS width.

Procedures:

1. Ultrasound images were obtained of the anterior band of the UCL on the participant’s throwing arm using a GE LOGIQ E ultrasound unit (GE Healthcare, Chicago, IL, USA) with a linear probe at 12 MHz.
2. Participants were placed in a supine position with a wedge placed underneath their forearm to maintain their elbow position at a 30° flexion angle. A 5 Nm valgus stress was applied 20 cm distal to the medial epicondyle (see Figure 1).
3. Measurements from the apex of the trochlea to the apex of the ulna were taken (see Figure 2) at the beginning of the competitive baseball season and then 6 weeks later. Three images were measured during each session and the average was used for analysis.

Results

The descriptive statistics for age, BMI, along with # of innings pitched and years of experience are provided in Table 1. The Means, SEs and 95% CI for the MJS width measurements are provided in Table 2. The study revealed that during the course of a 6 week period during a competitive NCAA division 1 baseball season. Follow up paired samples t-tests were performed with total innings pitched during the 6 week time period and total years of intercollegiate experience were used as covariates to assess the potential influence of these control variables on MJS width.

Discussion

A primary goal of this study was to evaluate the effects of time and pitching on the medial elbow joint space over a 6 week period. Prior investigations of the MJS comparing dominant and non-dominant extremity revealed a joint space of 456 cm ± 11 and 372 ± 52, respectively. Furthermore, this study indicated that over a two year period the joint space in the dominant extremity examined during the spring training pre-participation examinations increased on average 0.07 cm. In this current investigation we found the increase to be 0.07 cm during a 6 week in-season period. This suggests that no-seasont changes to the MJS are larger than the year over year changes suggested by Ciccotti et al. It is possible that MJS changes are partially mitigated during the rest period of the off-season.

Conclusions

The results of this investigation demonstrated that MJS width and UCL integrity can be assessed accurately using diagnostic ultrasonic during a valgus stress test. Moreover, these data indicate that total innings pitched during a season and year of participation did not have an influence on the MJS width. Limitations of this study include the sample size of our study, the limited amount of sample, the limited amount of time between the measurements, and the lack of control for the number of pitches thrown by the participants.

References