A Biomechanical Analysis of the Weight Training Squat Using Dartfish Motion Analysis Software

Methods

- A videotape of the weight training squat was created requiring strict instructions.
- The video was imported, requiring strict instructions into the Dartfish Motion Analysis Software.
- The performance was then carefully analyzed by utilizing a drawing tool (see pictures below).
- Conclusions were drawn by applying biomechanical principles and prior knowledge of weight training kinesiology (see comments below pictures).
- Results were provided to the performer by utilizing the drawing tools to illustrate errors and producing a DVD media book.

Summary

The Dartfish Motion Analysis Software enabled the investigator to more efficiently view the performer's movements than with the known error of "eep billing in," and it allowed him to evaluate the performance using a computerizable format. Also, it allowed him to provide more detailed feedback for improvement to the subjects. The above images were used to publish a DVD media book, which was then given to the subjects as a permanent resource of the instructions and reasoning of performing the weight training squat in a manner that prevents injury.

Abstract

During the Fall 2006 semester, Dr. Cole and her graduate assistant David Ware supervised students in a term project in which the students analyzed a movement of their choice using the latest computer version of the Dartfish Motion Analysis Software. In this project, a weight training squat was analyzed because it is considered to be the "king of all lifts," but it is frequently performed incorrectly.

The biomechanical analysis involved understanding two subjects, who performed the squat in the best of their ability. The subjects were instructed to wear clothing that allowed the view of the lower back and shoulders, and to have their knees and ankles visible. To ensure accurate measurements, strict standards were followed during videographing. A camera, containing a MinDV Cassette tape, was seconded to a tripod and set up in a position allowing it to be perpendicular to the plane of movement. In the middle of the range of movement, which begins as far away from the mat as possible, and ended at full squat. The subject then instructed to stand holding a stabilizing rod, which is the object of know how the lengths allowed the software to calculate the distance and was recorded for 50 seconds. Five trials were recorded per subject with a total of 5 seconds before and after the completion of each squat. After the trials were completed, all data were imported into the Dartfish software.

After a careful review of the data, the same items were collected from the subjects selected for an examination of movement analysis. Strengths and weaknesses of the movement were analyzed and illustrated by the study tool available within the software. The tools allowed the investigator to both quantify and qualify the correct and incorrect movement patterns. Also, the investigator utilized knowledge of physics and biomechanical principles to analyze and give recommendations to the various phases of the movement. A clarification of the recommendations, pictures were shown with the Dartfish software and test was provided to further explore both the corrections and phases.

The investigator created a media book at the conclusion of the analysis to present the results and findings in a DVD format. The DVDs made it possible for the subjects to watch their movements with the analysis recommendations, so that, they could perform the weight training squat more safely, effectively, and efficiently.

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