Proteus Peak Velocity Correlation to Force Plates

Proteus has a high correlation to force plate data with a Pearson correlation of .87 with Force Plate Peak Concentric Velocity and .88 with Force Plate Take-Off Velocity as compared to Proteus Peak Velocity.

PURPOSE:

Can Proteus be used as a reliable vertical jump measuring device? How does peak velocity during a countermovement jump measured on Proteus compare to maximum concentric velocity and takeoff velocity during a countermovement jump measured on a force plate?

INTRODUCTION:

Force plates are considered to be the gold standard when measuring force production and lower body imbalances. In real-time, a force plate measures ground reaction force. It is then able to interpolate this force production to measure the peak velocity achieved during a jump. This peak velocity metric is a great predictor of jump height.

Proteus is also able to measure peak velocity and has been validated to be extremely accurate. Proteus takes a different approach to measurement, using 3D resistance to measure displacement in all 3 dimensions. Since it measures displacement in real-time, it is also able to measure velocity in real-time and also gives a peak velocity score during a jump. Given the accuracy of Proteus' velocity measurements, peak velocity during a countermovement jump on Proteus could be used to predict vertical jump height.

HYPOTHESIS:

Given that Proteus can measure real-time displacement in 3 dimensions, peak velocity values collected on Proteus will be comparable to maximum concentric velocity/takeoff velocity values collected from countermovement jumps performed on a set of force plates.

METHODS:

Subjects were placed in a standard starting position and all equipment was calibrated before testing.

Subjects completed sets of jumps on dual force plates while holding the Proteus bar attachment with a Zercher grip. This grip was used as it was found to produce less extraneous movement from the test subjects compared to either a front squat or goblet squat grip. In addition, subjects were coached to minimize accessory movements immediately before, during, and after the jump.

PROCEDURE DETAILS:

Equipment Setup

The bar attachment was placed on Proteus. The force plates (Hawkins Dynamics) were placed in front of Proteus. The Proteus bar attachment was placed over the middle of the force plates with approximately 20 inches of the linear carbon fiber tube exposed from Proteus. The force plates were then leveled. Proteus was then put into freestyle mode and the resistance set to 1 pound.

Testing Procedure

Subjects were tested on Proteus and the force plate simultaneously, to ensure that the same efforts were being recorded.

The subject was then positioned on the force plate while holding the Proteus attachment in a Zercher grip with their feet shoulder-width apart. A verbal cue was given to keep the bar attachment as tight to their body as possible during the set of jumps.

The jump sequence was then initiated in force plate software, having the subject remain still on the force plate while it measured their static ground reaction force (i.e. their body mass) prior to jumping.

When indicated by the force plate software, the subjects performed a maximum effort countermovement jump. Peak velocity value from Proteus was recorded. Once the peak velocity value was recorded, the peak value was cleared on the Proteus touch screen.

The repetition was then saved in the force plate software where Peak Concentric Velocity and Take-Off Velocity were then recorded. This was repeated until a total of 100 repetitions were completed.

RESULTS:

Data analysis indicated a Pearson correlation of .87 with Force Plate Peak Concentric Velocity and .88 with Force Plate Take-Off Velocity as compared to Proteus Peak Velocity. This indicates a high correlation between the two technologies.

DISCUSSION:

The strength of the correlation is particularly impressive as Proteus and the force plate are measuring jump performance at different parts of the body using completely different measurement methods. The force plate is measuring performance at the ground from the feet and Proteus is measuring performance at the handle, which is being held near the sternum abdomen.

The reason that the correlation was not higher was likely due to these differences in measurement method and position. Proteus has a higher level of confounding variables as it relies on the user to perform the exercise with proper form and to stabilize the handle properly during the movement. So to have a correlation this high indicates the strength and accuracy of Proteus measurements. As a correlation of 1.0 is an indication of perfect correlation, it is likely that a score of only .88 was achieved because of the variance of user error.

Although not a perfect correlation to jump performance, this study indicates it is can be used to detect meaningful differences in jump performance. Considering all the other features, metrics, tests, and training protocols that can be performed on the machine, Proteus offers value in being able to provide data that is useful for assessing jump performance as well as an abundance of other benefits. When considering purchasing a device to measure jump performance, Proteus should be considered over force plates for its multitude of other features and benefits.