Gait Alterations After Anterior Cruciate Ligament Injury and Implications for Return-to-Play Testing

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\section*{INTRODUCTION}

- Reoccurring injury to the anterior cruciate ligament (ACL) is a major problem for individuals who undergo ACL reconstructive surgery despite them meeting current requirements for return-to-play\textsuperscript{1}.
- Previous studies have found alterations in gait kinetics and kinematics of ACL deficient and ACL reconstruction patients\textsuperscript{2}.
- It is unknown if gait parameters, such as peak joint angles and moments, provide different information about patient function from what is provided by return-to-play outcomes.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{gait_cycle.png}
\caption{Gait Cycle.}
\end{figure}

\section*{PURPOSE}

To assess the relationships between peak joint angles, peak joint moments, and return-to-play outcomes for individuals with ACL injury.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{return_to_play_outcomes.png}
\caption{Return-to-Play Outcomes.}
\end{figure}

\section*{MATERIALS & METHODS}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
\textbf{Time Since Injury In Months} & \textbf{Injured Limb} & \textbf{Graft Type} \\
\hline
(mean ± std) & Right & Patellar Tendon \\
6.31 ± 3.41 & Left & Allograft \\
\hline
\end{tabular}
\caption{Subject Demographics.}
\end{table}

\textbf{Subjects}: 6 subjects (3 ACL reconstruction, 3 ACL deficient) volunteered to participate in the study.

\section*{RESULTS}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|}
\hline
\textbf{Return-to-Play Outcomes} & \\ 
\hline
\textbf{Single Hop} & \textbf{Cross Hop} & \textbf{Triple Hop} & \textbf{Timed Hop} & \\
\hline
\end{tabular}
\caption{Return-to-Play Outcomes.

\end{table}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|}
\hline
\textbf{Pearson Correlation Coefficients} & Peak KEA & Peak KFA & Peak KEM & Peak KFM \\
\hline
\textbf{Single Hop Score} & 0.0168 & -0.2133 & -0.5316 & -0.0491 \\
\textbf{Cross Hop Score} & 0.3569 & -0.3150 & 0.4630 & 0.0210 \\
\textbf{Triple Hop Score} & 0.2361 & -0.0852 & -0.2651 & 0.1726 \\
\textbf{Timed Hop Score} & 0.6393 & -0.3263 & -0.5207 & -0.3008 \\
\textbf{QI Score} & 0.1501 & -0.2812 & -0.2095 & 0.2434 \\
\hline
\end{tabular}
\caption{Pearson Correlation Coefficients for Knee Extension Angle (KEA), Knee Flexion Angle (KFA), Knee Extension Moment (KEM), and Knee Flexion Moment (KFM).}
\end{table}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{correlation_plots.png}
\caption{Correlation Plots. (A) Mean Peak Knee Extension Moment vs. Cross Hop Score. (B) Mean Peak Knee Extension Moment vs. Timed Hop Score. (C) Mean Peak Knee Extension Moment vs. Single Hop Score. (D) Mean Peak Knee Extension Moment vs. Triple Hop Score.}
\end{figure}

\section*{CONCLUSIONS}

- Mean peak joint angles and moments had weak to moderately strong relationships with return-to-play outcomes with knee extension moments generally showing the strongest relationships.
- Because of the weak relationships between return-to-play outcomes and other gait parameters, these values may provide unique information about patient outcomes.
- Future research should further explore this relationship to determine clinical relevance of gait testing for return-to-play assessment.

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