Research Project Details	
Title	Gait kinematics and plantar pressure analysis using wearable sensors in patients treated operatively versus non-operatively for Achilles tendon ruptures
Investigator(s)	Dr. Prism Schneider, University of Calgary
Funding Period	2022-2028
Budget	$45,000.00
Issue/Rationale	Gait normalization following Achilles tendon rupture is currently determined by highly subjective clinical assessments. Conversely, traditional objective gait analysis requires access to a motion laboratory with expensive equipment and requires labor intensive data analysis. Recent advances in wearable technology, including insole inertial and pressure sensors, have allowed gait analysis to be conducted in real-world settings. Shoe insole sensors are now capable of collecting various kinematic and dynamic parameters from each foot during gait, thus providing the ability to measure functional changes during rehabilitation, as well as side-to-side differences. The time required to return to normal gait following an Achilles tendon rupture remains unknown. Therefore, our study proposes a novel application of pressure- and motion-sensing shoe insoles: to objectively determine the time required for gait to normalize in patients who have sustained an Achilles tendon rupture, by measuring side-to-side differences in real world settings.
Objective(s)	The primary aim of this study is to quantify the time required for gait normalization in patients who have sustained an Achilles tendon rupture. Secondary aims of this study will include comparison of operatively treated and non-operatively treated injuries, complication rates, and sex and gender analysis.
Anticipated Results/ Impact	Patients often require modified duties or time off work following Achilles tendon rupture. The project will contribute to the optimization of clinical and return-to-work outcomes following Achilles tendon ruptures. Our study will provide pragmatic and real-world quantification of the time required to return to function following an Achilles tendon rupture. These data can be correlated to return-to-work times. Additionally, we will be comparing whether operative versus non-operative treatment results in more rapid return-to-work. The results of our study will help inform recommendations for patients striving to regain full function and resume their employment duties in a timely and safe manner. Secondary outcomes of this study will include comparison of operatively treated and non-operatively treated injuries, complication rates, and sex and gender analysis. Analyzing these parameters can help identify whether they have an impact on return-to work timelines.
Keywords	Achilles tendon rupture, gait normalization, return-to-work, sensors, kinematics