

Research Project Details	
Title	Dynamic CT to determine normal syndesmosis motion and compare motion after static and dynamic fixation of syndesmotic injuries
Investigator(s)	Dr. Prism Schneider, University of Calgary
Funding Period	2019 – 2021
Budget	\$45,390.00
Issue/Rationale	<p>Ankle injuries are extremely common, especially in the workplace. The syndesmosis is a ligament complex spanning the ankle joint. If the ankle syndesmosis is not perfectly reconstructed after an injury, patients have worse functional outcomes and have difficulty returning to work. The syndesmosis is a dynamic structure and has natural motion, however, our current conventional imaging does not provide a complete picture of syndesmosis injury or surgical repair because it is based on single snapshot image of the syndesmosis in a single ankle position. Injuries of the syndesmosis may be missed or post-operative evaluation of syndesmosis repair may be inaccurate due to the lack of dynamic information.</p>
Objective(s)	<p>We propose to use a novel imaging technique – dynamic computerized tomography (CT) scanning – to determine the normal position of the syndesmosis throughout ankle range of motion as well as after surgical fixation with different surgical techniques for repair. Novel dynamic CT scans of both ankles will be conducted on healthy volunteers and patients who have had surgical repair of their syndesmosis with either a dynamic technique (tightrope) or the traditional static technique (using screws). This data will be analyzed to determine normal syndesmosis motion to compare side-to-side variability, and to compare the two surgical techniques. Defining normal and post-surgical syndesmosis motion will help surgeons develop and select appropriate repair techniques to enable earlier return to activities and work. Knowledge gained from this study will help apply dynamic CT to investigation of other joints and orthopedic problems.</p>
Anticipated Results/ Impact	<p>Given the substantial burden of ankle and syndesmosis injuries on the orthopedic community and in our workforce, developing strategies to improve patient outcomes is of interest to nearly all orthopedic surgeons, patients, and their employers. The new knowledge gained from this study may be used to optimize syndesmosis reduction methods, improve patient outcomes and return to activity, guide the development of new image processing techniques, and highlight the benefits of dynamic CT for future orthopedic research. We hypothesize that patient-specific, non-invasive assessment of syndesmosis motion, based on dynamic CT imaging can be used to inform and promote single-stage surgery, shorter immobilization time, earlier rehabilitation, and potentially earlier return to work. This study aims to reduce barriers to employability due to prolonged ankle immobilization in our patient population with syndesmosis injuries.</p>
Keywords	ankle fractures, syndesmosis, dynamic CT, compare motion, outcomes