Canadian MSK Rehab Research Network

Three-Dimensional Ultrasound Synovial Blood Flow Volume Assessment in Thumb Osteoarthritis Patients

We wanted to know

This study looked at how ultrasound blood flow measures relate to pain and joint function for individuals with thumb osteoarthritis.

What is the problem?

The thumb is a common site of hand osteoarthritis, causing pain and disability. Changes in blood flow in the joint are seen in the disease, but its role is not well understood. Current imaging of joint blood flow shows the structures in two dimensions, when they are three-dimensional (3D) structures. We developed a 3D imaging device to quantify volumes and joint features of osteoarthritis to better image and understand joint blood flow.

How did you study the problem?

We developed a 3D imaging device that takes many ultrasound images to form a 3D image. Nineteen individuals with thumb osteoarthritis were imaged using the system. The joint was identified and measured in the 3D images. The blood flow in the joint region was also measured. We asked participants about daily thumb pain and when pressing the thumb against the fifth digit. We also tested thumb strength using the pinch grip.

What did you find?

We detected and measured blood flow volumes in seven individuals with thumb osteoarthritis. We found that the individuals with detectable blood flow had larger volumes of joint inflammation, lower pain scores, and higher functional scores compared to individuals with thumb osteoarthritis who had no ultrasound-detectable blood flow.

How can this research be used?

This research will help us better understand how blood flow is involved in thumb osteoarthritis and how it relates to pain and thumb function. The novel 3D ultrasound scanning device can provide methods of measuring the joint blood flow to further understand, assess and monitor these features in individuals with thumb osteoarthritis.

Cautions

This study assessed blood flow volumes at one time point, meaning that we cannot determine a cause-and-effect relationship between the blood flow measures and joint pain and function.