A novel approach of physical assessment of upper limb fascia in graft-versus-host-disease - Pilot Study

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Background:
Chronic graft versus host disease (cGVHD) is a complication which arises post haematopoietic stem cell transplant (HSCT) and has been reported to effect around 50-60% of the patients. cGVHD although can affect various organs in the body, fasciitis and scleroderma in the upper and lower limbs is of a major concern as it can result in reduced function, increased pain, poor quality of life and limit range of motion. The musculoskeletal problems in cGVHD patients can prevent patients from returning to work, activities of daily life and to participate in social life.

The assessment of musculoskeletal aspect of cGVHD proposed by the NIH appears to be an efficient clinical tool for day-to-day quick snapshot of functional assessment, however, it does not necessarily capture the diverse functional deficiencies which are crucial for the allied healthcare professionals in making informed decisions when planning and customising rehab programs, return to work plans, including functional capacity evaluation, and return to leisure or healthy competitive sports. Capturing accurate functional capacity is not only useful in monitoring minor changes in the abilities of a patient but can also help clinicians and patients make informed choices with regards to their future plans.

The concept of standard active and passive joint range of motion measurement appears extraneous for fasciitis considering most patients suffering from fasciitis will have multi joint level involvement due to the way the myofascial chain is interconnected. For example, the upper limb deep fascia interconnects all the arm muscles; proximally its incessant with the axillary fascia, pectoralis fascia and deltoid fascia, and distally with the palmar fascia thus demonstrating the anatomical continuity between all the muscles of the flexor compartment of the upper limb. Understanding the fascia as a continuous chain connecting the various body structures and its biomechanical influence over multi joint level is empirical in establishing how functional evaluation in cGVHD patients should be measured. Morphologically and functionally, fascia in different parts of the body are different and furthermore there also exists a direct correlation between the fascial thickness measurement between symptomatic and asymptomatic patients. Furthermore, understanding of various fascia distribution in the body can help determine the amount of stretch required as different fascia has different tensile strength. Interestingly although the fascia classification includes superficial, deep and epimysium, the relationship between the type of fascia affected versus the impact on the functional limitation is yet to be studied within the cGVHD scenario, perhaps a topic of research for the future.

Here we introduce a novel concept in the quantitative measurement for the upper limb range of motion in cGVHD patients. The measurement techniques was developed based on

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similarities from collection of various individual patients clinical and functional presentation during their out-patient visit.

**Aim of the pilot study:**
To establish a standardised quantitative method of capturing upper limb functional movement in cGVHD patients with skin and fascia involvement.

**Method:**
After identifying 3 patients with cGVHD, verbal consent was obtained to carry out movement assessment and each measurement was carried out by a designated physical therapy staff who was provided prior training on this novel method of measuring and recording the movement. Post assessment, each patient was provided with a set of stretching exercises to perform at home and the functional movement was re assessed at 3 weeks, 6 weeks and 3 months interval.

**The novel assessment method:**

**Fingers:**
- Able to keep the hand flat on a table with fingers fully extended (look for arch at the palm of the hand).
- Able to lift the fingers in extension keeping the palm in contact with the table (Measure the distance from nail to the table using a ruler).

**Wrist:**
- Place the hand at the end of the table (forearm pronated and wrist at the edge of the table) and keeping fingers in extension, perform a wrist ext.
- Place the hand at the end of the table (forearm pronated and wrist at the edge of the table), fingers in flexion, perform a wrist ext.

**Elbow:**
- Able to extend the elbow completely with forearm in supination, wrist and fingers straight.
- Able to extend the elbow completely with forearm in supination, wrist and fingers extended.
Shoulder:
- Able to abduct the shoulder 90 degrees with elbow and wrist extended
- Able to abduct the shoulder to 90 degrees and elbow 90 degrees, back flat on the wall and can keep dorsum of the hands in contact with the wall.

Results:
Three patients in total were assessed and monitored over a period of 3 months using the proposed assessment method. Although none of the three patients recovered from the scleroderma and fasciitis completely, the methodology adapted for capturing the functional limitation was found to be more practical for this patient group when compared to normal joint range of motion measurement.

Conclusion:
This novel approach of measuring the functional capacity by studying the upper limb myofascial pattern appears to be a reliable tool in capturing, monitoring and evaluating functional incapacity in cGVHD patients.