

Pelvic Physical Therapy Distance Journal Club

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Difference in linea alba stiffness and linea alba distortion between women with and without diastasis recti abdominis: the impact of measurement site and task. Beamish N, Green N, Nieuwold E, et al. JOSPT. 2019;49(9):656-665.

Introduction: DRA (Diastasis Rectus Abdominis) is seen in 33-74% of women in the postpartum period and about 30% of women will have persistent DRA at 1 year post partum. Most research has focused on the IRD as the primary outcome measure of improvement, but others have proposed that the ability of the linea alba connective tissue to transmit forces across the IRD may be more important than the actual width of the IRD. A 2016 article authored by Lee and Hodges described the linea alba distortion as a measure that may relate to tension on the abdominal wall needed to generate force with movements such as the abdominal curl up task. (*Distortion measured on Ultrasound imaging in the Lee and Hodges article has a formula and excellent pictures for explanation. Distortion Index= Area created by the linea alba and the shortest distance between rectus abdominis muscle bellies divided by shortest distance between rectus abdominis muscle bellies. The lowest distortion index is a 1.0 where these numbers are the same, indicating no distortion of the linea alba.*)

Aims of this study: (1) examine impact of measurement site and task on the morphological and biomechanical features of the linea alba (**LA**) in women with and without DRA (2) investigate 2 and 3 way linear relationships among IRD, LA stiffness, and LA distortion (3) determine whether linear relationships between IRD, LA stiffness, and LA distortion are different between women with and without DRA.

Study Design: cross sectional observational cohort study

Methods: Participants: total 20 women: nulliparous or at least 1 year postpartum from a recent pregnancy/vaginal delivery. (Exclusions p658 top left column)

Data Collection: Ultrasound images+ videos and Elastography images collected under all conditions in combination of sites and tasks below:

Sites: superior umbilicus, 3 cm above, 5 cm above

Tasks: Rest, Head lift (**HL**); Semi curl-up (**SCU**)

Defined IRD: >2.0cm avg across 3 measurement sites AND >2.2cm at 3cm above the umbilicus. (At rest is implied but not specifically noted in the Hills article)

Results/Discussion: significant findings (p<0.05)

- Women without DRA classification:
 - o *did* have increased stiffness from rest to SCU
- Women with DRA classification:
 - o *did not* have increased LA stiffness with HL or SCU
 - o had *more LA distortion* at all sites (umbilicus, 3cm, 5cm), which was increased from rest to SCU
 - o showed a *reduction* in IRD with SCU
- both groups
 - o had lowest LA stiffness at the superior umbilical location
 - o *Higher* distortion was associated with *lower* stiffness for all participants
- **Strengths of the study:**
 - o Correlates with results of previous study by Lee and Hodges 2016 study regarding LA distortion.
 - o Use of reliable and validated US Imaging locations.
 - o Use of Real Time Us is clinically becoming more readily and widely used and available

- Areas of weakness:

- Did not standardize the # of reps performed to obtain images – could more reps = increased stiffness or decreased IRD?
- Elastography is not clinically and widely available and many cannot use this currently in the clinic. There are not other “stiffness” measures like it except perhaps palpation at this time
- No functional tasks testing used in this study (such as Anterior Straight Leg Raise)
- Participants overall had mild DRA IRD, so the data may not apply to moderate to severe DRA

Conclusions:

Narrowing in the IRD during curl up task is consistent with previous studies and is thought to be related to rectus abdominis approximation. LA stiffness was investigated for the first time using elastography and is sensitive to task, DRA status, and *anistrophy*. LA distortion is best seen in a SCU task and is suspected to be an important factor in rehabilitation and application to functional tasks.

Clinical Application: Therapists should consider not only IRD measurements but also evaluate linea alba for stiffness and/or distortion and ability to transmit force across the abdomen during functional tasks.

Questions for the group:

1. Has anyone used Elastography for application to skeletal muscles at all? In LA stiffness?
 - a. How does that inform your practice and treatment of DRA?
2. For those using real time US imaging, has anyone assessed distortion or calculated a Distortion Index?
3. If you do not use real time US imaging, are therapists confident in use of palpation or other techniques in creating “LA stiffness” by activating the transversus abdominis? How do you test for this and teach it?

Other resources:

February 2020 Journal Club: Dufour S et al. Establishing Expert-Based Recommendations for the conservative management of pregnancy-related diastasis rectus abdominis: A Delphi Study. JWHPT 2020; 43(2):73-81.

October 2018 Journal Club: Lee. D and Hodges, P. Behavior of the Linea Alba During a Curl-up Task in Diastasis Rectus Abdominis: An Observational Study. JOSPT. 2016, Vol 46 (7).580-589.

Definition: Anistrophy: the property of a material which allows it to change or assume different properties in different directions, as opposed to isotropy. It can be defined as a difference, when measured along different axes, in a material's physical or mechanical properties.