

# Diastasis Recti Abdominis Muscle (DRAM)

## Introduction

Diastasis Recti Abdominis (DRA) is defined as a thinning and widening of the Linea Alba (LA) along with laxity of the anterior abdominal muscles, commonly caused by pregnancy (Mommers et al 2017). The prevalence of DRA varies across the literature. However, there is a general consensus that some separation is normal. Sperstad et al (2016) found that prevalence of mild DRA is high during and after pregnancy, 33% at 21 weeks and 32.6% at 12 months post partum. The relationship between DRA and comorbid conditions such as low back pain and pelvic floor dysfunction (PFD) continues to be unclear. A recent systematic review confirmed that there is a weak correlation between DRA and pelvic organ prolapse (Benjamin et al. 2018). There is weak evidence that DRAM severity is associated with abdominal muscle weakness and severity of low back pain (Benjamin et al. 2019)

## Anatomy

- The linea alba is a band of connective tissue running down the anterior abdomen from the xyphoid process to the pubic symphysis. It is a point of attachment for the abdominal muscles.
- DRAM is diagnosed when the rectus abdominis muscles are separated more than the normal levels (Appendix 1)
- The Inter Recti Distance (IRD) superior to the umbilicus and at the umbilicus is larger in an upright position compared to lying. The IRD was significantly narrower inferior to the umbilicus compared to at the umbilicus and superior to the umbilicus in all positions. (Gillard et al 2018) (C)
- Diastasis above the umbilicus is the most common presentation. If Diastasis affects whole LA, the degree of separation is usually wider above the umbilicus (Corvino et al 2019) (C)

## Risk Factors

- There are biomechanical alterations in the LA of individuals with DRA. Age and parity can affect LA function, older women demonstrated larger IRDs with greater LA distortion, parity can affect stiffness of the LA (Beamish et al 2019) (D).
- Increased maternal age, higher infant birth weight and caesarean section (CS) delivery are risk factors for diastasis recti. (Wang et al. 2020) (D). However, Sancho et al. (2015), dispute that CS is associated with DRAM.

- Larger DRAMS can be correlated with increased maternal weight gain during pregnancy, higher BMI and increased number of deliveries. (Bobowik 2018)(C).
- Antenatal exercise, including abdominal exercise adapted for pregnancy, prior to childbirth can reduce the risk of DRAMs postpartum (Gruszczyńska and Truszczyńska-Baszak, 2018) (B)
- There is some evidence to support that being physically active before pregnancy and maintaining physical activity during pregnancy can prevent a larger DRAM (Bobowik 2018) (C).

### Scope of Practice

These guidelines are designed to guide physiotherapists when treating patients following DRAM diagnosis. A process of systematic review of the current evidence based literature, medical and peer consultation produced these guidelines. They were correct at the time of review. The guidelines should be used in conjunction with the clinical reasoning skills of the physiotherapist and patients should always be treated on a case-by-case basis.

### Aim

The aim of these guidelines is to provide physiotherapy staff with a series of recommendations from the current evidence base to assist them in the assessment and management of patients who have been diagnosed with DRAM, with emphasis on post-partum women.

### Literature review question

What is the best physiotherapy assessment and rehabilitation for DRAM in the post-natal population?

### Search Process

Appraisal process: NHS Lothian DRAMS guideline from April 2017 was selected for review and possible update.

Keywords selected were the same keywords as used in the original guideline.

diastasis rectus	split rectus
rectus abdominis	post-natal
post-birth	pregnancy
ante-natal	physiotherapy
physical therapy	strengthening
advice	core stability
rehabilitation	exercise

### Databases searched:

Medline, Cochrane, PubMed and the NHS Tree of Knowledge from 2015 to 2021.

Articles were obtained, reference lists searched of selected articles, articles appraised, consolidation of evidence, evidence graded and report written.

Total number of articles selected: 29

### **Results:**

There continues to be limited high quality evidence evaluating the assessment and management of DRAM.

There is weak evidence linking DRAM and PFD (Benjamin et al. 2019) (C). However pregnancy and childbirth are independent risk factors for the development of PFD.

There is weak evidence that DRAM severity is associated with reduced health related quality of life, decreased abdominal muscle strength and lumbopelvic pain. (Benjamin et al 2019) (C).

### **Assessment**

- Ultrasound is the gold standard assessment tool for inter recti distance, however is not readily available in most clinical settings. (Gillard et al 2018) (C)
- The IRD can be reliably measured with US in crook lying, sitting and standing superior to the umbilicus, at the umbilicus and inferior to the umbilicus (Gillard et al. 2018) (C)
- Palpation technique of assessing DRAMS has high intra rater reliability, moderate inter rater reliability and is easily applied in the clinical setting. Patients can reliably be taught the palpation assessment method. (Cardialliac et al. 2020) (D)
- DRAMs should be assessed at rest and in curl up position (Dufour et al 2018 (D), Donnelly 2018 (D))
- Due to differences in IRD along the length of the LA, measurements should be taken superior to the umbilicus, at the umbilicus and inferior to the umbilicus. (Corvino et al. 2019, (D) Gillard et al. 2018 (c))
- Assessment of DRAMS should not only be focused on the IRD. Palpate for depth and quality of tissue integrity (LA) at rest. Assess development of tension through the LA with voluntary pelvic floor and transverse abdominis co-contraction. (Dufour et al. 2018 (D), Donnelly 2018) (D).
- Assessment of DRAMS should be holistic and take in to account the person, posture, position, respiration pattern, ribcage placement, load and defect (Donnelly 2018)(D).
- Ideally ensure optimal pelvic floor contraction through a digital exam performed by qualified physiotherapist. (Dufour et al. 2018 (D))

## DRAM- Treatment

There have been limited developments in to the research of the most effective treatment of DRAMS. More studies are needed to investigate the effect of specific exercises as part of a program aimed to reduce DRA, with special emphasis on long-term follow-up.

Physiotherapy programs including postural advice, abdominal strengthening exercises, education and advice in relation to DRAM have demonstrated reduction in DRAM in the early postpartum period (Bobowik and Dabek 2018; Gruszczyńska, and Truszczyńska-Baszak 2018; Dufour et al., 2019) (B)

- In DRAMS patients, at 8 weeks postnatal, over half continue to have an abnormally wide IRD and although some (60%) recover by 6 months by 1 year up to 40% have not (Mota et al. 2015). At 6 months postnatal there is unlikely to be spontaneous reduction of DRAM (Bobowik 2018) (C).

There is no evidence to support one type of exercise, frequency or intensity of exercise in DRAMS rehabilitation. However, there is evidence to support combined training transversus abdominis (TrA) muscles and rectus abdominis (RA) muscles.

- The optimal strategy in the DRA therapy is combining the activity of TrA and RA muscles, (Michalska 2018) (D) (Lee and Hodges 2016) (C)
- Early postnatal exercises should include activation of the Pelvic Floor Muscles (PFMs) and TrA progressing to exercises involving all the abdominal muscles and functionally orientated exercises (Dufour et al., 2019) (D).
- It is widely accepted that RA activation reduces the IRD whilst activation of the transverse abdominis widens IRD. However, RA activation has the potential to distort the LA as the muscle bellies approximate. Pre activation of the transverse abdominis followed by RA demonstrated better tension and load transfer at the LA. (Lee and Hodges 2016) (C).
- Widening the IRD by TrA activation may not only improve functional outcome but improve cosmetic outcome. Exercises that widen the IRD, increase the tension in the LA, preventing its distortion and enabling it to control the abdominal contents (Lee & Hodges 2018) (C)
- Exercises that reduced IRD include abdominal crunch, isometric leg lift, isometric trunk lift and combined isometric trunk and leg lift, head lift and twisted curl up. (Sancho et al; Gluppe 2020; Bobowik 2018;Kamel and Yousif, 2017; Dafkou 2020) In keeping with the evidence presented by Lee and Hodges it is preferable for function to teach these exercises with prior TRA activation.
- It is understood that body position can affect IRD, the IRD is naturally wider in upright positions (Gillard et al 2018) (C). The specific effect of posture on IRD in people with DRAMS is not entirely clear and requires further investigation.

## **Surgery:**

Abdominoplasty is the term used to describe a variety of procedures to reshape the abdomen. Since the previous DRAMS guidelines, there is new evidence in the surgical management of patients with DRAMS.

Abdominoplasty should be considered for patients with DRAMS symptoms that also have an IRD of over 3 cm who present with ongoing symptoms such as pain, dissatisfaction with appearance and abdominal wall weakness despite conservative input. In these patient groups exercise training is shown to increase muscle strength objectively but not subjectively. To improve quality of life and reduce functional disability, quill suture or mesh techniques should be the operative approach taken (Emanuelsson et al. 2016). (A)

Open surgical and laparoscopic methods for surgery are safe and effective in treating patients with DRAMS (Hassan El Hawary 2020) (B). For women that have had unsuccessful results from conservatively managed DRAMS, surgery can have positive outcomes. The surgical group demonstrated better abdominal trunk function, improved quality of life and improved urinary incontinence post-surgery (A. Olsson et al 2019) (D). Correction of muscle width during abdominoplasty might be an effective adjunct to achieve the proper tension in primary and revision procedures for DRAMS. (L. Janes, M. Fracol and G. Dumanian 2019) (D)

\*On contacting obstetric surgeons and women's health physiotherapists within NHS Lothian, we have found no evidence abdominoplasty is carried out in our health board for DRAM.

**Appendix 1:**

The following papers are still referenced despite being out with the search criteria time frame as they are the original papers and have not been superceded.

Table 1 Normal inter-recti distance Beer et al (2009) (A2)

Level	Inter-recti distance
xyphoid	7mm +/- 5mm
3cm above umbilicus	13mm +/- 7mm
2cm below umbilicus	8mm +/- 6mm

Table 2 Normal Inter-recti Distance Rath et al (1996) (D)

Level	Inter-recti distance	
	< 45 years old	> 45 years old
Supra umbilical level	10mm	15mm
Umbilicus	27mm	27 mm
Between symphysis pubis and umbilicus	9mm	14mm

Abnormal gaps have been reported as:

- >1.5cm (Engelhardt, 1998; Gilleard & Brown, 1996)
- >2cm (Potter et al, 1997; Lo et al, 1999)
- >2.5cm (Candido et al 2005)
- >2.7cm (Benjamin et al, 2014; Boissonnault & Blaschak 1988)
- >2 fingers when measured in crook lying (Bursch, 1987; Sheppard, 1996)

} Lying at rest

## Appendix 2

### Revised grading system for recommendations in evidence based guidelines

- **Levels of evidence**
- *1++* High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
- *1+* Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
- *1–* Meta-analyses, systematic reviews or RCTs, or RCTs with a high risk of bias
- *2++* High quality systematic reviews of case-control or cohort studies *or*
- High quality case-control or cohort studies with a very low risk of confounding, bias, or chance and a high probability that the relationship is causal
- *2+* Well conducted case-control or cohort studies with a low risk of confounding, bias, or chance and a moderate probability that the relationship is causal
- *2–* Case-control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal
- *3* Non-analytic studies, eg case reports, case series
- *4* Expert opinion
- **Grades of recommendations**
- *A* At least one meta-analysis, systematic review, or RCT rated as *1++* and directly applicable to the target population *or*
- A systematic review of RCTs or a body of evidence consisting principally of studies rated as *1+* directly applicable to the target population and demonstrating overall consistency of results
- *B* A body of evidence including studies rated as *2++* directly applicable to the target population and demonstrating overall consistency of results *or*
- Extrapolated evidence from studies rated as *1++* or *1+*
- *C* A body of evidence including studies rated as *2+* directly applicable to the target population and demonstrating overall consistency of results *or*
- Extrapolated evidence from studies rated as *2++*
- *D* Evidence level *3* or *4* *or*
- Extrapolated evidence from studies rated as *2+*

Developed by Robin Harbour and Juliet Miller for the Scottish Intercollegiate Guidelines Network (SIGN) Grading Group. BMJ VOLUME 323 11 AUGUST 2001.

† Arbitrarily, the following cut-off points have been used by Lothian Physiotherapy Network Group: large study size \_ 50 patients per intervention group; moderate study size \_ 30 patients per intervention group.

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