Diastasis rectus abdominis: which protocol(s) to apply – Literature review

SUMMARY

A distinctive physio-pathological condition, diastasis rectus abdominis is characterised by an increase in the intermuscular distance along the linea alba, inter-recti distance (IRD). It is diagnosed by observation, palpation and ultrasound, the latter being the gold standard for establishing a diagnosis. The aim of treatment is both functional and aesthetic, involving abdominal rehabilitation exercises. The aim of this article is to list the various protocols that are currently available in the scientific literature concerning this treatment, in order to explore their objectives and the current results.

Description, diagnosis, impacts and risk factors

The word diastasis comes from the Greek word meaning “to separate”. diastasis rectus abdominis, or diastasis recti, corresponds to a pathological separation or distancing of the left and right parts of the rectus abdominis abdominal muscle either side of the linea alba. It was defined by the ANAES (the French National Health Evaluation and Accreditation Agency), in 2020, as “an increase in intermuscular distance at different levels of the linea alba” [1].

Diastasis is the result of excessive stretching of the rectus abdominis muscle, leading to a slackening of the abdominal wall. The linea alba, made up of collagen fibres and connective tissue, then loses its tone and can become distended. This often occurs following pregnancy (46.3% prevalence among women after childbirth [2], reducing to 35-39% 6 months after the birth [3]), due to excessive and inappropriate strain placed on the abdominal muscles, or even after very significant weight gain.

Diagnosis is based on a clinical examination comprising several stages: observation, palpation and ultrasound. Although examination by palpation is widely practised and can form part of the clinical examination, the ultrasound imaging examination is the

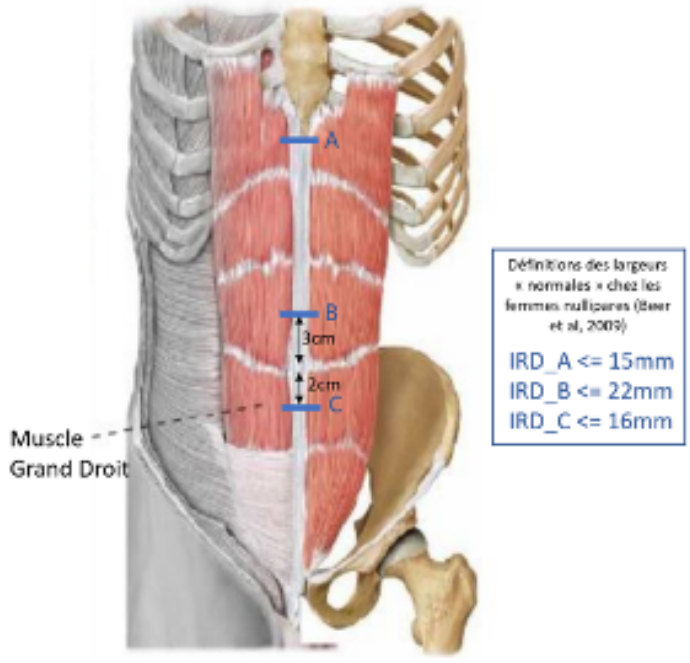


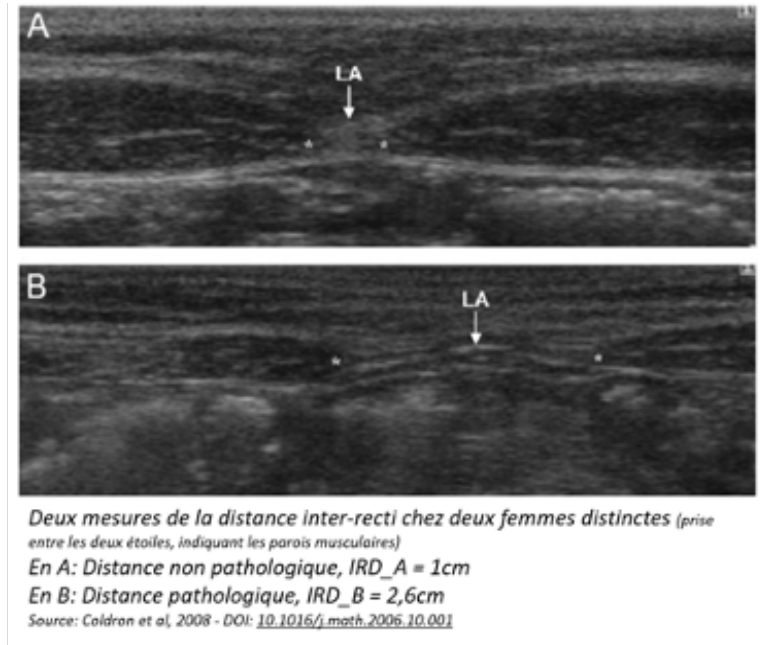
Figure 1: Ultrasound measurement of the IRD: the 3 locations recommended

gold standard and consists of measuring the **intermuscular distance** at several levels of the linea alba (inter-recti distance – IRD), while the probe is positioned transversally [4], [5], [6]. Several studies have been carried out to try to establish the average non-pathological and pathological values. In 2009, Gertrude M. Beer and her team measured the IRD of 150 nulliparous women aged between 20 and 45 years [7]. The measurements were taken by ultrasound at the level of the xiphoid process, 3 cm above the umbilicus and 2 cm below the umbilicus. Although the standard deviations remain quite high, the results of this study are often used as a reference to establish a diagnosis of diastasis: a width greater than 15 mm at the xiphoid, 22 mm at 3 cm above the umbilicus and 16 mm at 2 cm below the umbilicus is recognised as diastasis rectus abdominis.

The thickness of the linea alba also varies depending on the position: it is thicker towards the top (900 to 1200 µm between the xiphoid process and the umbilical), and thinner towards the base (1700 to 2400 µm between the umbilical and the pubic symphysis) [8]

Certain risk factors are often cited but few systematic studies have been carried out to date that prove a genuine statistical link between the occurrence of diastasis rectus abdominis and these factors [4]. These factors include heavy lifting, weight gain, age, multiple pregnancies and Caesarean sections.

Some patients presenting diastasis rectus abdominis report no other symptoms. For others, the consequences of diastasis rectus abdominis can be pain during exercise, an unsightly protrusion of the stomach and therefore an impact on quality of life [4]. It is also often reported by patients experiencing lumbar pain, intestinal disorders and urinary incompetence, although current studies have not yet demonstrated a significant link [8], [3]. un lien significatif [8], [3].



Deux mesures de la distance inter-recti chez deux femmes distinctes (prise entre les deux étoiles, indiquant les parois musculaires)
En A: Distance non pathologique, IRD_A = 1cm
En B: Distance pathologique, IRD_B = 2,6cm
Source: Coldron et al, 2008 - DOI: 10.1016/j.math.2006.10.001

Figure 2: Ultrasound measurement of the intermuscular distance (source: [14])

Which treatment?

The first-line treatment for diastasis is rehabilitation [9]. However, no protocol has currently been proven significantly successful among patients. So, there currently remain multiple practices and opinions.

The main objective for some masseur-physio-therapists is IRD reduction. This can be achieved by performing isometric exercises of the rectus abdominis muscles and transverse abdominis muscle through the practice of abdominal crunches (“crook lying position”) [10].

Some physiotherapists recommend working the transverse abdominis muscles. Since the linea alba serves to transfer power from one side of the abdominal core to the other, strengthening this structure seems to be a relevant therapeutic objective and contraction of the transverse abdominis muscle seems to be a good means of achieving this [11]. Anatomical studies have shown, in particular, a strong link between the transverse abdominis muscle and the posterior sheath of the rectus abdominis (posterior layer) [12], leading to the belief that the transverse abdominis plays a key role in the reduction of diastasis rectus abdominis.

Recent studies carried out by Diane Lee and Paul Hodges have also shown that the "visual" objective to reduce the distance between the rectus abdominis muscles through abdominal exercises could be revised or adjusted. **The objective would be to strengthen and tighten the linea alba, rather than necessarily reduce this space** [13]. This is because the functional impairments of diastasis are due to linea alba slackness, rather than to its actual width.

Surgery is also a possible therapeutic choice. In the case of postpartum diastasis, it must only be considered 6 to 12 months post-childbirth [9]. The surgery consists in creating tucks in the sheath (fascia) of the rectus abdominis muscles, either through open surgery, laparoscopy or even robot-assisted surgery [15].

EBP physiotherapy protocols?

Several studies have been carried out over the past few years to try to identify the best exercises for treating diastasis rectus abdominis.

To date, no study has been able to describe consensus-based protocols showing significant effectiveness [16] [4].

However, these studies include:

- **Sheppard, 1996** [17]: one of the first studies on the subject setting out a progressive 16-week programme, based on rectus abdominis and transverse abdominis muscle exercises. The programme starts with the practice of targeted recruitment of the transverse abdominis in lying position with knees bent on exhalation, to improve patient ability to recruit the transverse abdominis muscle.

- **Walton et al., 2016** [18]: Randomised controlled study to measure the effect on the size of the diastasis of an 8-week treatment, based on exercises to strengthen the deep abdominal muscles. A noticeable reduction was observed in both groups, with no significant difference between the groups. The programme was based on posterior pelvic tilt, static plank and Kegel-type exercises for the pelvic muscles.

- **Kamel and Yousif, 2017** [19]: Prospective randomised study carried out on 60 women, 2 months postpartum. The study compared weight loss, waist circumference and diastasis size between one group undertaking an 8-week exercise programme, and another group undertaking the same programme, accompanied by neuromuscular electric stimulation (NEMS). Diastasis reduction was supported by the exercises + NEMS treatment, although the programme of training alone also showed a diastasis reduction after the 8 weeks.

- **Gluppe et al., 2018** [20]: Randomised controlled trial on 165 first-time mothers. The test group followed a 6-week exercise programme, based on strengthening the pelvic muscles, with simultaneous daily self-training. The study did not show any significant result on diastasis reduction, but it should be noted that measurements were taken manually.

- **Thabet et al., 2019** [21]: randomised controlled comparison of the impact of a "classic" exercise programme versus an intensive muscle strengthening programme carried out 3 times per week over 8 weeks, on diastasis severity and quality of life (measured by the PF10 score). Diastasis reduction was significantly greater in the participants who followed the intensive muscle strengthening programme. This programme included "abdominal bracing", abdominal respiration, static plank and pelvic floor muscle recruitment exercises. Contractions were held for 5 seconds and repeated 20 times in succession.

More recently, the works of Diane Lee and Paul W. Hodges tried to show that the effectiveness of the treatment through rehabilitation could achieve the same intended objective [13]: instead of focusing on IRD reduction, they suggested concentrating on strengthening the linea alba.

In many protocols (including some of those referred to above), the curl-up exercise is selected as it reduces the IRD, through the contraction of the rectus abdominis. Conversely, the targeted recruitment of the transverse abdominis muscle alone (draw-in manoeuvre, for example), produces a broadening of the IRD. Diane Lee and Paul Hodges decided to concentrate on a criteria other than the IRD alone: they developed a criteria referred to as the **Distortion Index**, which outlines linea alba deformation during the manoeuvres.

GLOSSARY

Inter-recti distance: Width of the linea alba measured between the two walls of the rectus abdominis muscles.

Linea alba slackness: degree of slackness of the tissues of the linea alba.

Distortion Index: Index for outlining linea alba deformation in comparison with the "direct" rectilinear path that could connect the two walls of the rectus abdominis muscles.

It is measured as the average number of deviations observed in comparison with the rectilinear path that could connect the two ends. Their theory is based on the fact that **risk of diastasis rectus abdominis is linked to linea alba distortion rather than the actual gap measured.** This is because the linea alba must have sufficient strength to support the abdominal wall and transfer power between the muscles. They therefore studied protocols aimed at strengthening the linea alba, rather than IRD reduction. The basic exercise therefore consisted in performing a curl-up by first generating a voluntary contraction of the transverse abdominis muscle. They studied the IRD and Distortion Index of two groups of women, the test group had diastasis rectus abdominis according to the criteria set out by Beer and the control did not. They observed that linea alba distortion was reduced by 20% in 62% to 77% of the women with diastasis when they performed the curl-up with pre-activation of the transverse abdominis muscle.

In conclusion, the objective of diastasis rectus abdominis rehabilitation is to strengthen the linea alba, rather than reduce the IRD, through co-contraction work of the isometric abdominal muscles.

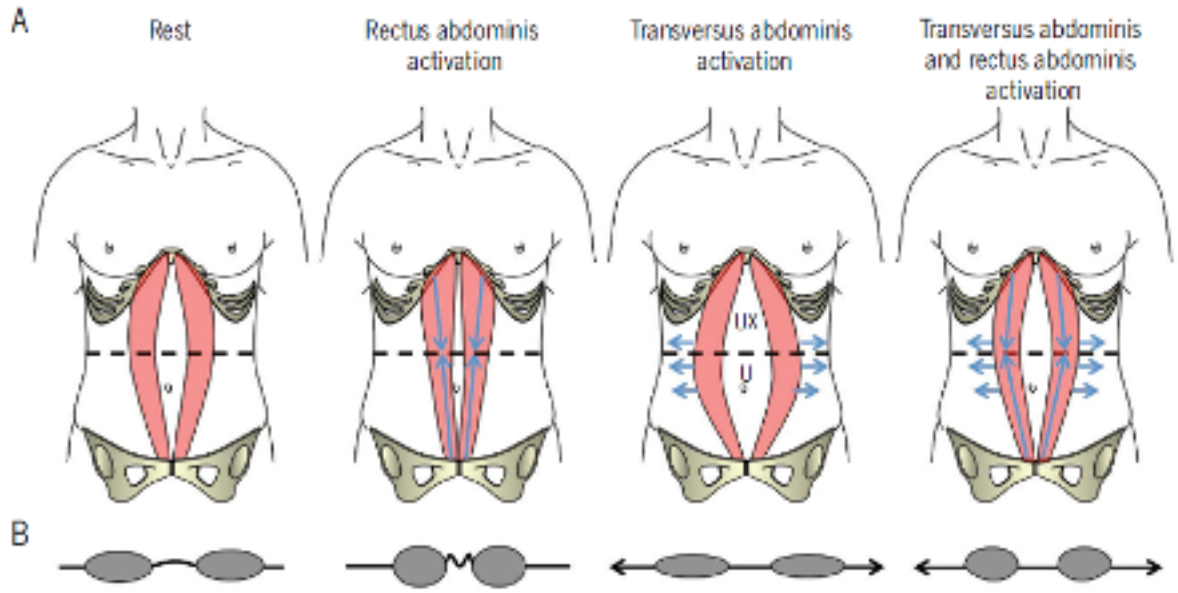


Figure 3: Diagram of the principle behind the concept developed by Diane Lee and Paul Hodges setting out the two common objectives to be assessed: in A, IRD reduction, in B, strengthening of the linea alba (source: [13]).

Further studies must be carried out to go into the subject and method in greater detail.

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