

## **TRANSABDOMINAL ULTRASOUND MEASUREMENT OF PELVIC FLOOR MUSCLE ACTIVITY WHEN ACTIVATED VIA A TRANSVERSUS ABDOMINIS MUSCLE CONTRACTION.**

### **Aims of Study**

This study aimed to investigate the relationship of pelvic floor muscle and transversus abdominis (TA) muscle activity during a pelvic floor (PF) muscle contraction. Sapsford et al (1) investigated this relationship using EMG and found there to be consistent co-contraction between these two muscles. Due to this finding, it has been hypothesised that the pelvic floor muscles can be trained indirectly via the transversus abdominis muscle. This is despite the fact that randomised controlled trials have shown that specific training of the pelvic floor muscles is effective in the treatment of stress urinary incontinence (2,3). It has also been shown that a strong pelvic floor contraction is required for effective closure of the urethral sphincter (4). However, a transversus abdominis contraction is a moderate strength, stabilising contraction. To understand the activity of the pelvic floor muscles when performing abdominal tightening of the deep abdominal muscles, transabdominal ultrasound was used to measure the displacement of the pelvic floor muscles, a reflection of a contraction, during this manoeuvre. Transabdominal diagnostic ultrasound has previously been shown to be a valid and reliable measure of pelvic floor muscle activity (5). It was hypothesised that the pelvic floor muscles can be activated more strongly when instructed specifically to contract the pelvic floor rather than indirectly via the transversus abdominis muscle, as measured by a greater displacement of the pelvic floor when imaged on ultrasound.

### **Methods**

A convenience sample of 20 non-pregnant adult female subjects who could perform a series of pelvic floor and transversus abdominis muscle contractions was recruited. Subjects completed a short questionnaire on obstetric history, symptoms of urinary incontinence and prolapse, height and weight, and exercise (both general and pelvic floor muscles). Subjects underwent a bladder filling protocol prior to imaging. Testing was performed in supine, with a 3.5MHz curved linear array ultrasound transducer placed in the midline over their lower abdomen to image the pelvic floor, and a 7.5MHz straight linear array transducer to image the transversus abdominis muscle placed on the lateral abdominal wall. Initially test contractions were imaged and palpated to ensure correct action. Ultrasound measurement of pelvic floor muscle displacement was made following instruction to contract the transversus abdominis muscle alone, the pelvic floor muscles alone and both muscles together. The tests were randomised to avoid order effects. Contraction images were captured and the displacement of the pubocervical fascia measured using electronic callipers on the ultrasound monitor screen. All contractions were held for 3 seconds with rests of 10 seconds and the average of six measurements used for analysis. Results were entered into computer storage and analysed using statistical software.

### **Results**

Pelvic floor muscle contraction alone produced an average displacement of 17mm, TA contraction 8.2mm and combined contraction 13.0mm. A PF contraction alone produced a 65.2% greater displacement of the pelvic floor than a TA contraction alone. When a combined TA and PF contraction was compared with a TA contraction alone there was a 19.1% larger displacement than with the TA contraction alone, however when a combined TA and PF contraction was compared with a PF contraction alone, there was a 33.7% smaller displacement than with a PF contraction alone. Further data analysis will be presented.

### **Conclusions**

The pattern of pelvic floor and transversus abdominis co-contraction varied with instructions to contract either the pelvic floor or the abdominal muscles, with the stronger pelvic floor contraction consistently occurring with instruction to contract the pelvic floor. Variable displacements were obtained when instructions were given to contract one muscle group, then add the other, as the pelvic floor displacements produced with transversus muscle contraction often occurred in a different direction to that of the pelvic floor muscle contraction. From the results of this study, it is suggested that when prescribing exercises to treat pelvic floor dysfunction, pelvic floor muscles should be targeted in the training program.

## **References**

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