The effectiveness of real time ultrasound as a biofeedback tool for muscle retraining
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CRD summary
The review concluded that there was promising but limited evidence that real time ultrasound biofeedback may improve muscle control and function. Since the authors excluded numerous relevant unpublished studies, the reliability of their conclusions is uncertain.

Authors' objectives
To evaluate the effectiveness of real time ultrasound as a biofeedback tool for muscle retraining.

Searching
Several databases that included MEDLINE, EMBASE, CINAHL, AMED and The Cochrane Library were searched for studies published in English between 1980 and 2007; search terms were reported. Google Scholar was searched for papers in press. Reference lists of retrieved papers were searched. Conference proceedings abstracts were excluded.

Study selection
Studies of the effect of real time ultrasound as a biofeedback tool for muscle re-education were eligible for inclusion. Studies that addressed the reliability or validity of real time ultrasound were excluded. Patients in included studies had low back pain, pelvic floor dysfunction or were asymptomatic. Most patients were female. Mean ages ranged from 18 to 53 years. Abdominal, multifidus and pelvic floor muscles were studied. Comparator groups received either conventional training or verbal and palpatory feedback.

The authors did not state how many reviewers selected studies.

Assessment of study quality
The PEDro scale (based on 11 criteria) was used to evaluate randomised controlled trials (RCTs). A critical appraisal tool based on one by Crombie (1996) was used to assess case studies, series and reports (score out of 9).

Two reviewers independently assessed study quality. Disagreements were resolved by discussion.

Data extraction
This authors did not state how many reviewers extracted data.

Methods of synthesis
A narrative synthesis was presented grouped by muscle type.

Results of the review
Five studies were included: three RCTs (n=103), one case series (n=212) and a case study. PEDro scores ranged from 7 to 9 out of 11. The case series scored 6 out of 9 and the case study scored 5 out of 9.

Two RCTs of abdominal muscles had conflicting results: one (n=48 healthy individuals) reported a statistically significant improvement in abdominal muscle activation; and the other (n=30 with low back pain) reported no significant effect. Both studies found no effect on retention of abdominal muscle performance after real time ultrasound training.

There was limited evidence of effectiveness in training and retention of multifidus muscle (two studies that included one RCT with 25 asymptomatic individuals and one case report) and pelvic floor muscle (one case series with 212 women).
Authors' conclusions
There was promising but limited evidence that real time ultrasound biofeedback may improve muscle control and function. Its rehabilitative efficacy for various patient types and conditions was yet to be investigated comprehensively.

CRD commentary
The review addressed a clear question with broad (and very concise) inclusion criteria. Several electronic databases were searched for relevant studies. The restriction to studies published in English may have left the review may prone to publication or language bias. It appeared that relevant studies were missed (25 studies were excluded for being available only as an abstract). Suitable methods were used to minimise risks of reviewer error and bias when quality assessing studies, but no process details were provided for study selection and data extraction. Study quality was comprehensively assessed and used in interpreting the review results. An appropriate narrative synthesis of the data was undertaken. Heterogeneity between studies was discussed.

Although the authors' cautious conclusions reflected the limited and diverse evidence presented, the omission of numerous relevant unpublished studies made their reliability uncertain.

Implications of the review for practice and research
Practice: The authors stated that the evidence was insufficient to recommend that physiotherapists incorporate real time ultrasound into their practice.

Research: The authors stated a need for RCTs to study long-term effects in symptomatic populations, with adequate blinding and therapist training.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.