The clinical and functional outcomes of ultrasound-guided vs landmark-guided injections for adults with shoulder pathology — a systematic review and meta-analysis

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CRD summary
The authors concluded that there was a statistically significant improvement in short-term pain and abduction using ultrasound-guided rather than landmark-guided steroid injections for adults with shoulder pathology. These differences were small and may not be clinically useful. Weaknesses in the evidence base should be considered when interpreting these findings. The authors’ conclusions reflect the evidence presented and seem reliable.

Authors’ objectives
To compare clinical and functional outcomes of ultrasound-guided and landmark-guided steroid injection for the treatment of adults with shoulder pathology.

Searching
MEDLINE, AMED, and EMBASE were searched up to August 2011. Search terms were not reported. To identify further studies, the reference lists of relevant articles were scanned and authors were contacted. Unpublished literature was sought by various means (reported in the paper), including trial registers. There were no language restrictions.

Study selection
Eligible for inclusion were randomised and non-randomised controlled trials that compared ultrasound-guided versus landmark-guided corticosteroid injections to the shoulder in adults.

The primary outcome of interest was pain, measured by a visual analogue scale at six weeks after the intervention. Secondary outcome measures included the Oxford Shoulder Score, the Shoulder Function Assessment questionnaire, the Constant score, and shoulder range of movement (flexion, abduction, internal and external rotation, and night pain at one and six weeks after the intervention).

The included steroid drugs were triamcinolone, betamethasone, and depo-medrone (dosages varied). Some studies also included a local anaesthetic agent. The frequency of ultrasound transducer probes ranged from 4 to 10MHz and 6 to 18MHz (where reported). There were more women than men. All patients suffered from shoulder pain from various underlying pathologies (patient characteristics were reported in the paper).

Two reviewers independently selected the studies for inclusion.

Assessment of study quality
The quality of included studies was assessed using the Physiotherapy Evidence Database critical appraisal tool (PEDro).

Two reviewers independently carried out the quality assessment. Disagreements were resolved with the involvement of a third reviewer to achieve consensus.

Data extraction
Two reviewers extracted data to enable the calculation of mean differences and 95% confidence intervals.

Methods of synthesis
Where possible, mean differences were statistically pooled in a meta-analysis, and 95% confidence intervals were reported. Standardised mean differences were reported, where appropriate. A random-effects meta-analysis was used where statistical heterogeneity existed ($X^2>p0.10$ or $I^2>20\%$); otherwise a fixed-effect model was used.

Results of the review
Six studies (307 patients; sample size range 40 to 65) were included in the review. The quality of the studies was variable. There were only two randomised controlled trials. One study reported allocation concealment. Three studies
reported blinding of assessor, but none involved blinding of the patient or clinician. Four studies provided complete information on all participants at follow-up. Two studies did not present between-group analyses, although all gave examples of point and variability estimates. Differences were noted in the level of experience amongst those administering the interventions. Follow-up ranged between one and six weeks.

Meta analyses revealed that ultrasound-guided injections were significantly more effective than landmark-guided injections at six weeks for pain reduction (SMD 1.03, 95% CI 0.12 to 1.93; three studies; I²=85%) and abduction range of movement (MD 2.81, 95% CI 0.67 to 4.95; two studies; I²=0%). There was no statistically significant difference between groups for shoulder function (two studies). Other studies were not suitable for statistical pooling; their results were reported in the paper.

**Authors' conclusions**
There was statistically significant difference in short-term pain and abduction favouring ultrasound-guided over landmark-guided steroid injections for adults with shoulder pathology. These differences were small and may not be clinically useful. The available evidence base was limited by a number of important methodological weaknesses which should be considered when interpreting these findings.

**CRD commentary**
The review question was clear and inclusion criteria were adequately specified to enable replication. The search strategy included relevant sources, and steps were taken to identify unpublished literature and minimise language bias. The review process was carried out with sufficient attempts to minimise error and bias.

Study quality was assessed and the results were presented and taken into account when interpreting the review findings. Study characteristics were presented. The methods of synthesis seemed appropriate.

The authors’ conclusions reflect the evidence presented and seem reliable.

**Implications of the review for practice and research**
*Practice:* The authors stated that the available evidence did not support the commissioning of routine ultrasound-guided steroid injection from primary care.

*Research:* The authors stated that a comprehensive randomised controlled trial was needed to determine the best method of steroid injection for shoulder pathology. The cost-effectiveness of interventions should be incorporated into future studies, as should consideration of delivering the service in the community setting.

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