Radiation synovectomy with yttrium-90, rhenium-186 and erbium-169: a systematic literature review with meta-analyses

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CRD summary
The authors concluded that the reported success rates of radiosynoviorthesis were high, but differences in effect with glucocorticoid injection were less evident. There was marked heterogeneity in study design of the (small number) of comparative studies. The results represented the evidence presented, but possibly inappropriate pooling made the reliability of the conclusion unclear.

Authors' objectives
To determine the effectiveness of radiosynoviorthesis (RSO) with Yttrium, Rhenium and Erbium.

Searching
MEDLINE, EMBASE, The Cochrane Library and CINAHL were searched from January 1971 to February 2007 for articles in English. Search terms were reported. A manual search of references of eligible articles was performed.

Study selection
Eligible studies specified a joint disease, reported outcomes of at least five RSO procedures and had a minimum follow-up of six months.

Seventy per cent of the included studies were of Yttrium; others were of Erbium and/or Rhenium. Most studies were in patients with rheumatoid arthritis. Other joint diseases included psoriatic arthritis, haemophilic haemarthrosis, osteoarthritis, inflammatory arthritis, pigmented villonodular synovitis and pyrophosphate arthropathy. Affected joints included shoulder, elbow, wrist, finger, knee, hip, ankle and metatarsophalangeal joints. Comparators, where applicable, included saline, triamcinolone, methylprednisolone, saline and prednisolone, osmic acid, cortivazol, surgical synovectomy, non-radioactive Yttrium, Dysprosium, placebo and glucocorticoid injection. The outcome of interest appeared to be the success percentage at six months and at 12 months; success was not defined by the authors.

Two authors performed study selection. Disagreements were resolved by consensus.

Assessment of study quality
The authors did not state that they assessed validity, but level of evidence was assessed based on Oxford Centre of Evidence-based Medicine levels of evidence for therapy studies.

Data extraction
Data were extracted in order to calculate odds ratios (ORs) and 95% confidence intervals (CI).

The authors did not state how data extraction was performed.

Methods of synthesis
Odds ratios for individual randomised controlled trials (RCTs) and for individual cohort studies or low quality RCTs that compared RSO to saline or glucocorticoid injection were combined in meta-analyses using a random effects model. Meta-analysis was performed for the knee only and for the small joints only at six months and at 12 months. Heterogeneity was assessed using the Q test. Publication bias was assessed using the Begg test and Duval and Tweedie's trim-and-fill. Fail safe-N (number of missing studies to yield a non-significant p-value) was calculated.

Results of the review
Seventy studies (7,919 joints) were included in the review: 49 studies (3,540 joints) assessed Yttrium (one RCT, nine cohort or low-quality RCTs, 39 case series) and 21 (4,379 joints) assessed Erbium and/or Rhenium (three RCTs, four
cohort or low-quality RCTs, 14 case series). Thirteen studies were included in the meta-analyses.

At six months, RSO of the knee with Yttrium was more effective than glucocorticoid or saline (OR 4, 95% CI 1.24 to 14; five studies). At 12 months there was no statistically significant difference (OR 1.7, 95% CI 0.69 to 4; three studies). There was evidence of statistically significant heterogeneity (values for Q-tests not reported).

Reported success rates for Yttrium ranged from 24% to 100% at six months and from 29% to 94% at greater than or equal to 12 months; for Erbium/Rhenium success rates were 69% to 100% at six months and from 54% to 100% at greater than or equal to 12 months.

At six months there was no statistically significant difference between ROS of the small joints with Erbium/Rhenium compared to glucocorticoid or saline (OR 2.0, 95% CI 0.66 to 6; five studies). At 12 months RSO of the finger joints using Erbium/Rhenium was more effective than glucocorticoid or saline (OR 2.0, 95% CI 1.09 to 3.5; six studies). There was evidence of statistically significant heterogeneity (values for Q-tests not reported).

Sources of heterogeneity were not explored due to the small number of included studies. The Begg test showed no evidence of publication bias, but Duval and Tweedie’s trim-and-fill did. The authors acknowledged that the analysis of publication bias was hampered by the small number of studies in the analyses. Fail safe N was >10.

Authors’ conclusions
Reported success rates of RSO were high. Differences in effect with glucocorticoid injection were less evident. There was marked heterogeneity in study design of the (small number) of comparative studies.

CRD commentary
The review addressed a clear research question with the exception of the outcome. Although inclusion criteria were specified, they were broad. The search was adequate although limited to studies in English, which increased the risk of language bias. There were no apparent attempts to locate unpublished material, which increased the risk of publication bias. The authors assessed publication bias, but this was inappropriate given the small number of included studies. The authors did not assess study quality; they provided an assessment of levels of evidence, which was not very informative. The meta-analyses may have been inappropriate given that the authors did not define their outcome measure of success percentage and saline and glucocorticoid were treated as equivalent comparators. The authors did not report how many reviewers were involved in the data extraction, which made it unclear whether the process was subject to reviewer error or bias.

The results represented the evidence presented, but the reliability of the authors’ conclusion is unclear as the pooling may have been inappropriate.

Implications of the review for practice and research
The authors did not state any implications for practice and research.

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