Meta-analysis of surgical treatments for temporomandibular articular disorders

Reston J T, Turkelson C M

CRD summary
This review assessed the effectiveness of surgical treatment for patients with temporomandibular articular disorders. Surgical treatment, particularly arthrocentesis and arthroscopy for patients with disc displacement without reduction, may help patients who have not responded to nonsurgical treatments. The methods used to select and quality assess included studies were not described, making it difficult to judge the reliability of these conclusions.

Authors' objectives
To assess the effectiveness of surgical treatment for patients with temporomandibular articular disorders.

Searching
MEDLINE, EMBASE and twenty-two other sources (unspecified) were searched up to August 2000. More than 1,600 journals and supplements held by ECRI were also searched. Non-journal publications and conference proceedings from professional organisations, private and government agencies, and reference lists from peer-reviewed and other literature were checked. Only studies published in the English language were included. The authors stated that details of the search strategy and databases searched are available from them on request.

Study selection
Study designs of evaluations included in the review
The studies had to have at least 10 patients, a follow-up of at least one month, and attrition rates of 20% or less to be included. Patients treated in randomised controlled trials (RCTs), prospective or retrospective case series, or retrospective comparative studies were included. The duration of follow-up ranged from one to more than 180 months.

Specific interventions included in the review
Studies of arthrocentesis, arthroscopy, discectomy without replacement, or disc repair/repositioning were eligible for inclusion.

Participants included in the review
Studies of patients with disc displacement with reduction (DDR), disc displacement without reduction (DDWOR), or degenerative joint disease were eligible for inclusion. Studies were excluded if they did not provide details of diagnoses, or did not state that all the patients had received prior unsuccessful nonsurgical treatment.

Outcomes assessed in the review
Studies that did not present outcomes assessed by the patients themselves (pain or a global measure of improvement that included pain) were excluded. Only studies that reported the outcomes separately for patients with the diagnoses specified in the review were included. The primary outcome assessed in the review was treatment success, measured as a patient-rated improvement after treatment. The included studies used different definitions for treatment success.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.
Since the measure of improvement differed between the studies and included both continuous and dichotomous measures, statistical methods were used to estimate a standardised measure of effectiveness to use in the analysis. To extract outcome data, the authors recalculated success rates on an intention-to-treat basis wherever possible, assuming that drop-outs were treatment failures. When studies included patients from more than one diagnostic category, each diagnostic group was treated as if it were a separate study.

**Methods of synthesis**

**How were the studies combined?**

Meta-analysis was used to estimate a pooled effect size (d). Meta-analyses were used to pool all the patient groups and the subgroups DDR only and DDWOR only, defined by diagnosis and type of surgery.

In the meta-analysis, the treatment success rates used in the control group were created artificially using upper and lower estimates of spontaneous recovery from untreated or placebo groups in studies of nonsurgical treatments. The meta-analysis was conducted assuming 0, 37.5 and 75% improvement in the control group. In the subgroup analyses, a Bonferroni adjustment was used to adjust for the effect of multiple comparisons when calculating the statistical significance.

**How were differences between studies investigated?**

Statistical heterogeneity was assessed using the Q statistic. Meta-regression was used to explore the influence of attrition rates, study design (prospective or not), sample size, type of surgery, patients' diagnosis and the length of follow-up.

**Results of the review**

Twenty-two studies were included, from which 30 groups of treated patients were differentiated (1,463 patients).

Most of the studies reported no drop-outs but some studies had drop-out rates up to 12%.

When all 30 treatment groups were pooled assuming 0% spontaneous improvement in the control group, surgical treatment increased success (d=3.39, P<0.000001) and no significant heterogeneity was detected (P=0.767).

Significant heterogeneity was detected when assuming 37.5 or 75% spontaneous improvement in the control group (P=0.011 and P=0.045 respectively). The meta-regression found that treatment success was correlated with the diagnosis. Patients with DDR had significantly less improvement than patients with other diagnoses. After taking the diagnosis into account, the data became statistically homogeneous (P=0.14).

**DDR only.**

At 0 and 37.5% improvement rates in the control group, arthroscopy significantly increased treatment success compared with the control: d (0% control rate) 2.68 (95% confidence interval, CI: 1.75, 3.61, P<0.000001) and d (37.5% control rate) 0.88 (95% CI: 0.54, 1.21, P<0.000001). No significant heterogeneity was detected. Disc repair/repositioning surgery significantly increased success compared with the control: d (0% control rate) 2.73 (95% CI: 1.14, 4.32, P=0.000386) and d (37.5% control rate) 0.73 (95% CI: 0.17, 1.30, P=0.005520). There was no statistically-significant difference for either type of surgery compared with a control success rate of 75% (P=0.49 for arthroscopy; P=0.32 for disc repair/repositioning). No significant difference was found between arthroscopy and disc repair/repositioning in patients with DDR, but the analysis may have been underpowered to detect a difference. No studies were identified of discectomy or arthrocentesis exclusively in patients with DDR.

**DDWOR only.**

Arthroscopy and arthrocentesis significantly improved success using control rates of 0, 37.5 and 75%. There was no significant difference in success for disc repair using a control rate of 75% in spontaneous recovery, but success was significant at the 0 and 37.5% control rates. There was no significant difference between arthroscopy and
arthrocentesis using any of the success rates in the control group; data were presented. No significant heterogeneity was detected for any of the treatment groups. No studies of discectomy only enrolled patients with DDWOR.

Too few studies of patients with DDWOR or degenerative joint disease were identified to permit a meta-analysis.

Authors’ conclusions
Surgical treatment, particularly arthrocentesis and arthroscopy for patients with DDWOR, may help patients who have not responded to nonsurgical treatments. The authors also stated that further research is required.

CRD commentary
The review question was clear in terms of the intervention, diagnoses of participants and outcomes, but the study designs eligible were not defined clearly. The uncertainty of diagnostic categories of temporomandibular joint dysfunction was discussed in the text and the limitations of diagnostic categories were acknowledged. Several relevant sources were searched and attempts were made to locate unpublished studies. Limiting the included studies to those in the English language may have omitted some relevant studies. The methods used to select the studies, assess validity and extract the data were not described; hence, the efforts made to reduce errors and bias cannot be judged.

Statistical heterogeneity was assessed, although the robustness of the methods used to construct the meta-analysis was uncertain. Surgical interventions were not directly compared with spontaneous improvement rates within the same study, but the authors did explore the effect on the results of widely varying control success rates. Information on the number of studies and people who provided data for the various meta-analyses helped to assess the strength of the evidence, but this information was not consistently provided. In addition, because the studies used a wide variety of measures for treatment success, it is not possible to interpret the results from the meta-analysis in clinically meaningful units.

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

Research: The authors stated that RCTs are required to compare commonly used surgical treatments in defined patient groups.

Bibliographic details

PubMedID
12524600

DOI
10.1053/joms.2003.50000

Indexing Status
Subject indexing assigned by NLM

MeSH
Arthroscopy; Dislocations /surgery; Follow-Up Studies; Humans; Osteoarthritis /surgery; Paracentesis; Prospective Studies; Regression Analysis; Retrospective Studies; Temporomandibular Joint Disc /surgery; Temporomandibular Joint Disorders /surgery; Treatment Outcome

AccessionNumber
12003000220
Date bibliographic record published
31/05/2004

Date abstract record published
31/05/2004

Record Status
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.