

Diagnostics of temporomandibular disorders

This is an excerpt from the full technical report, which is written in Norwegian.

The excerpt provides the report's main messages in English.

No. 10-2013

Systematic review

Title Diagnostics of temporomandibular disorders
Norwegian title Diagnostikk av temporomandibulære tilstander
Institution Norwegian Knowledge Centre for the Health Services
(Nasjonalt kunnskapssenter for helsetjenesten)
Magne Nylenna, *Director*
Authors Strøm, Vegard, *Project leader, Researcher*
Brurberg, Kjetil G, *Researcher*
Dahm, Kristin Thuve, *Researcher*
Kirkehei, Ingvild, *Research librarian*

ISBN 978-82-8121-535-1
ISSN 1890-1298
Report No. 10 – 2013
Project number 716
Type of report Systematic reviews
No. of pages 57 (75 incl. attachments)
Client The Norwegian Directorate of Health
Subject heading (MeSH) Temporomandibular Joint Disorders; Temporomandibular Joint; Craniomandibular Disorders; Diagnosis
Keywords TMD
Citation Strøm, V, Brurberg KG, Dahm KT, Kirkehei I. Diagnostics of temporomandibular disorders. Report from Kunnskapssenteret no. 10–2013. Oslo: Norwegian Knowledge Centre for the Health Services, 2013.

Norwegian Knowledge Centre for the Health Services summarizes and disseminates evidence concerning the effect of treatments, methods, and interventions in health services, in addition to monitoring health service quality. Our goal is to support good decision making in order to provide patients in Norway with the best possible care. The Centre is organized under The Norwegian Directorate for Health, but is scientifically and professionally independent. The Centre has no authority to develop health policy or responsibility to implement policies.

We would like to thank all contributors for their expertise in this project. Norwegian Knowledge Centre for the Health Services assumes final responsibility for the content of this report.

Norwegian Knowledge Centre for the Health Services
Oslo, June 2013

Key messages (English)

Temporomandibular disorder (TMD) is a term used to describe a number of related disorders affecting the temporomandibular joints, masticatory muscles, and associated structures. To diagnose subgroups of TMD, numerous tests are available. The aim of this overview of systematic reviews is to summarize scientific research on accuracy of different diagnostic tests for the presence of TMD. In the absence of a methodological gold standard for the diagnosis of TMD, it is to be emphasized that the findings of this review does not provide a basis for deciding which tests best detect or rule out TMD, but rather whether and to what extent various diagnostic tests lead to the same conclusion.

Main findings

Results from six systematic reviews, comprising 67 primary studies and about 5400 participants demonstrate that:

- MRI, especially sagittal + coronal images, appears to have acceptable accuracy to detect or exclude disc displacement, disc configuration and osseous changes of the temporomandibular joint compared with cryosections (postmortem) or biopsies.
- Ultrasonography seems to have acceptable accuracy to detect, but not exclude, disc displacement compared with MRI.
- Clinical tests of joint sounds, pain and movements do not seem to have satisfactory accuracy to detect or exclude TMD when compared with MRI.
- Electromyography does not seem to have sufficient accuracy to detect or rule out myofascial TMD compared with clinical tests.
- The results must be interpreted with caution, because the primary studies included in the systematic reviews may have methodological weaknesses, the results show great variation, and confidence intervals in accuracy measures are wide or not reported.

Title:

Diagnostics of temporomandibular disorders

Type of publication:

Systematic review

A review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review. Statistical methods (meta-analysis) may or may not be used to analyse and summarise the results of the included studies.

Doesn't answer everything:

- Excludes studies that fall outside of the inclusion criteria
- No health economic evaluation
- No recommendations

Publisher:

Norwegian Knowledge Centre for the Health Services

Updated:

Last search for studies: September 2012

Executive summary (English)

Background

In this overview of systematic reviews we summarize the accuracy of different tests to identify and diagnose temporomandibular disorders (TMD). TMD is a collective term used to describe a number of related disorders affecting the temporomandibular joints, masticatory muscles, and associated structures. The most common signs and symptoms include facial and jaw pain, which can be aggravated by jaw movements, TMD joint noises (clicking or crepitus), and restriction of mandibular movements. The prevalence of TMD signs and symptoms is relatively high, but in most cases resolved spontaneously. In Norway, it is assumed that about 80 persons suffer severe TMD.

Temporomandibular joint disorders may be categorized into extra articular (extra capsular), as myofascial pain disorders, and intra articular (intra capsular) disorders. Intra articular disorders comprise internal derangements (with the sub categories of disc displacement with or without reduction), degenerative joint disorders, and inflammatory TMD. The diagnostic process is seldom straight forward as TMD might comprise different disorders with similar sign and symptoms. Tests used in diagnostics should be accurate, reliable and valid for the purpose. Studies validating diagnostic tests are characterised by the use of an index test, i.e. the test to be evaluated, compared to the results of a reference standard (or gold standard) applied to the same patients. Accuracy of a diagnostic test can be expressed as its sensitivity, specificity and likelihood ratios. Sensitivity is a measure of a tests ability to identify persons that actually has the condition, while specificity is a measure of the tests ability to rule out the presence of a condition.

Methods

We searched systematically for research literature until September 2012, in the following databases: MEDLINE, EMBASE, AMED, PsycINFO, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects (DARE), ISI Web of knowledge, PubMed, CINAHL, Prospero, Clinical Evidence og UptoDate. We appraised all articles with an abstract in English or a Scandinavian language. Systematic reviews judged to be of high or moderate methodological quality were included, that assessed the diagnostic efficacy of different tests or imaging techniques in detecting TMD, and where the index test was compared with a reference standard and applied on the same patients. Titles and abstracts of identified studies

were assessed independently by three reviewers to judge if the studies matched the inclusion criteria. Included studies were read in full-text and reassessed according to the inclusion criteria. The same three reviewers made independent assessments of the methodological quality of the included studies, categorized as high, medium or unsatisfactory. Check lists were used for this purpose. Information about kappa statistics, from reliability studies, and sensitivity, specificity and likelihood ratios were summarized.

Results

The literature search identified 406 unique references of where 29 articles were read in full-text. Finally, we included six systematic reviews, published in the time period between 2006 and 2012. The reviews comprised totally 67 distinctive studies comprising about 5400 participants. We evaluated three of the reviews to be of high methodological quality, and three to be of moderate quality. The index tests evaluated were clinical tests, magnetic resonance imaging (MRI), ultrasonography and electromyography (EMG). As reference standard, MRI was most often used.

Three systematic reviews, comprising 30 primary studies and about 3900 participants, assessed the diagnostic accuracy of clinical tests compared with MRI in detecting TMD. For *joint sounds*, the estimates for sensitivity ranged from 0.02 to 0.95, and for specificity from 0.14 to 1.0. The corresponding result for *pain* were from 0.05 to 1.0, and from 0.02 to 0.96, for *joint movements* from 0.05 to 0.92, and from 0.08 to 0.97, and for *test clusters* from 0.05 to 0.97 and from 0.26 to 1.0, for sensitivity and specificity, respectively. The positive likelihood ratios (LR+) were in general below 2.5, and the negative ratios (LR-) larger than 0.2.

One systematic review, comprising 22 primary studies and about 430 participants, assessed the diagnostic accuracy of MRI compared with biopsies or cryosections in detecting disk displacements, degenerative or inflammatory TMD. In detecting disk displacements, sensitivity ranged from 0.75 to 0.90 and specificity from 0.63 to 1.0. For disk configuration, the sensitivity was around 0.8, however, with large variance in specificity. For detection of osseous changes the sensitivity ranges from 0.50 to 0.87 and specificity from 0.71 to 1.0. These results were based on 12 primary studies assessed, by the review authors, as having a moderate level of evidence.

One systematic review, comprising 15 primary studies and 924 participants, assessed the diagnostic accuracy of ultrasonography compared with MRI in detecting disk displacements with or without reduction. For detection of disk displacements, with the mouth in closed position, the sensitivity ranged from 0.50 to 0.93, and specificity from 0.47 to 0.92. Static ultrasonography had higher sensitivity than dynamic ultrasonography. For ultrasonography with the mouth in open position, the sensitivity was 0.81 (95 % CI 0.77 -0.84) and the specificity 0.78 (95 % CI 0.74 -0.82). Dynamic ultrasonography had higher sensitivity than static ultrasonography.

One systematic review, comprising two primary studies and 148 participants, assessed the diagnostic accuracy of electromyography compared with clinical test in detecting myofascial TMD. The sensitivity ranged from 0.15 to 0.69, and specificity from 0.67 to 0.98. The two studies had high risk of bias.

Discussion

In the absence of a methodological gold standard for the diagnosis of TMD, it is important to emphasize that the findings of this review does not provide a basis for deciding which tests best detect or rule out TMD, but rather whether and to what extent various diagnostic tests lead to the same conclusion. Many of primary studies have methodological weaknesses that increase the risk that the results are subject to methodological errors. In addition, there is generally a problem that the estimates of diagnostic accuracy studies looking at approximately the same topics vary widely. This may be due to differences in protocols, different use of thresholds and differences in patient populations. A test's sensitivity and specificity depends on the limits set to be ill or not. Attempts to increase the sensitivity of a test will reduce the specificity and vice versa. A sensitivity ≥ 0.7 and specificity > 0.95 can be considered as acceptable thresholds for the diagnosis of TMD. Thus, based on the selection studied, at least 70% of those who actually have the disease will be diagnosed, and the test will be negative in at least 95% of those who actually are healthy. This also means that 30% of those who are sick will be falsely diagnosed as healthy (false negative), and 5% of the healthy will erroneously be diagnosed as diseased (false positive). However, there are few individual studies that measure acceptable values. The lack of precision can be attributed to small primary studies, and considering the wide confidence intervals in the context of the inconsistencies across the included studies, firm conclusions are difficult to draw based on the available data. The populations in the included studies consisted mainly of selected patients from the special health care system, in which purpose was to distinguish between different forms of TMD.

Conclusions

- MRI, especially sagittal + coronal images, appears to have acceptable accuracy to detect or exclude disc displacement, disc configuration and osseous changes of the temporomandibular joint compared with cryosections (postmortem) or biopsies.
- Ultrasonography seems to have acceptable accuracy to detect, but not exclude, disc displacement compared with MRI.
- Clinical tests of joint sounds, pain and movements do not seem to have satisfactory accuracy to detect or exclude TMD when compared with MRI.
- Electromyography does not seem to have sufficient accuracy to detect or rule out myofascial TMD compared with clinical tests.
- The results must be interpreted with caution, because the primary studies included in the systematic reviews may have methodological weaknesses, the results show great variation, and confidence intervals in accuracy measures are wide or not reported.