Imaging in appendicitis: a review with special emphasis on the treatment of women

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CRD summary
This review assessed computed tomography (CT) in diagnosing appendicitis in adults. The authors concluded that the results support the routine use of CT in men and women with suspected appendicitis. The exclusion of equivocal results from the included studies might have inflated the diagnostic accuracy of CT. The results presented were insufficient to support the authors’ conclusions.

Authors’ objectives
To assess the accuracy of computed tomography (CT) scanning in diagnosing appendicitis in adults.

Searching
PubMed was searched from January to July 2003 for studies published in English; the search terms were stated. The reference lists in identified studies were also checked.

Study selection
Study designs of evaluations included in the review
Prospective diagnostic accuracy studies were eligible for inclusion.

Specific interventions included in the review
Studies of CT scanning were eligible for inclusion. The studies used unfocused CT with and without contrast; focused CT with and without oral, intravenous or rectal contrast; and focused or unfocused helical CT with and without contrast. The studies used similar criteria to diagnose appendicitis using CT. Such criteria included appendiceal diameter of more than 6 mm with periappendiceal inflammation; nonopacification with oral or rectal contrast material with periappendiceal inflammation; or the presence of an appendicolith. Controlled trials compared CT with either ultrasound or standard treatment.

Reference standard test against which the new test was compared
The inclusion criteria were not specified in terms of a reference standard test. All of the included studies compared CT with pathological diagnosis if the patient underwent appendectomy, or prolonged follow-up (usually 3 months) for patients not undergoing appendectomy.

Participants included in the review
Studies that included adults with suspected appendicitis were eligible for inclusion, whereas studies that recruited only children were excluded.

The included studies were of men, women and children. The studies used different inclusion criteria: many studies excluded patients with typical presentations, while others included patients with typical and atypical presentations. The studies generally defined atypical presentations as missing one of the classical signs of appendicitis (right lower quadrant point tenderness, elevated temperature, raised white blood cell count and anorexia). One study also included women with a clinically suspected acute gynaecological condition, and another was in patients with an acute abdomen. The review aimed to focus on women, but most of the studies did not report the results separately for men and women.

Outcomes assessed in the review
The inclusion criteria were not specified in terms of outcomes. The review assessed the sensitivity, specificity, diagnostic accuracy, and the number of alternative diagnoses and altered treatment plans after CT scanning.

How were decisions on the relevance of primary studies made?
One reviewer selected studies meeting the study design criterion.
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. The extracted data included study design, sample size and characteristics, type of CT scan and results.

Methods of synthesis
How were the studies combined?
The ranges of the sensitivity and specificity values were reported. The results were discussed separately for one RCT that compared CT with standard treatment and studies in which the likelihood of appendicitis was assessed before the CT scan.

How were differences between studies investigated?
Differences between the studies were not discussed.

Results of the review
Twenty-one prospective studies (2,799 patients) were included: 2 randomised controlled trials (RCTs; 234 patients) and 19 prospective studies without a control group (2,565 patients).

The sample sizes ranged from 31 to 308. Most of the studies involved about 100 patients.

The sensitivity of the CT scan ranged from 77% (specificity 94%) to 100% (specificity 93 to 97%), while the specificity ranged from 83% (sensitivity 92%) to 100% (sensitivity 91 to 97%).

Alternative diagnoses were made as a result of the CT scan in 6 to 36% of the patients.

One RCT (106 patients with atypical presentation) found that CT increased sensitivity, specificity and accuracy compared with ultrasound (no data were presented).

One RCT (128 patients with suspected appendicitis) compared pre-operative CT with standard treatment. Patients (8 of 65) with equivocal CT readings were excluded. This RCT found that the negative appendectomy rate was 5% with CT and 19% with standard treatment.

Authors’ conclusions
The results supported the routine use of CT in men and women with suspected appendicitis.

CRD commentary
The review question was clear in terms of the study design, intervention and outcomes. The inclusion criteria were not defined in terms of a reference standard test. Only one database was searched and this might have resulted in the omission of other relevant studies. It was not stated whether eligible studies were restricted by date of publication. No attempts were made to minimise language or publication bias. The methods used to select the studies and extract the data were not described, so it is not known whether any efforts were made to reduce errors and bias. It was not stated whether the review authors extracted or calculated diagnostic accuracy values. The authors do not appear to have undertaken any validity assessment.

The authors correctly stated that the exclusion of patients with equivocal CT readings might have influenced the results. Since the quality of the included studies and the methods used to conduct the review were not reported, overall, it is difficult to comment on the strength of the evidence underpinning the authors’ conclusions.
Implications of the review for practice and research
Practice: The authors stated that the results support the routine use of CT in men and women with suspected appendicitis.

Research: The authors stated that an adequately powered, multicentre RCT is required to assess the value of CT scanning in all patients with suspected appendicitis, and to evaluate the effect of confounding variables such as age, gender and pregnancy.

Bibliographic details

PubMedID
14662234

Other publications of related interest
This additional published commentary may also be of interest. Edmonds M. Review: the use of computed tomographic scanning has high sensitivity, specificity, and accuracy for diagnosing acute appendicitis in adults. Evid Based Med 2004;9:121.

Indexing Status
Subject indexing assigned by NLM

MeSH
Appendicitis /radiography; Female; Humans; Prospective Studies; Sex Factors; Tomography, X-Ray Computed

AccessionNumber
12003002504

Date bibliographic record published
31/03/2005

Date abstract record published
31/03/2005

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.