Computed tomography diagnosis of ischemia and complete obstruction in small bowel obstruction: a systematic review

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CRD summary
This review attempted to assess the role of computed tomography (CT) in the diagnostic workup of patients with small bowel obstruction. It concluded that CT is highly accurate for the diagnosis of ischaemia. Poor definition of inclusion criteria, a limited search strategy, poor reporting of review methodology or details of included studies, and the inappropriate use of aggregate measures of diagnostic accuracy severely limit the reliability of the findings.

Authors' objectives
To assess the diagnostic accuracy of computed tomography (CT) for ischaemia and complete obstruction in patients with small bowel obstruction (SBO).

Searching
MEDLINE and the Cochrane Library were searched from inception to 2004; the search terms were reported. The search was limited to studies published in the English language. Studies published in abstract form only were not included.

Study selection
Study designs of evaluations included in the review
No inclusion criteria for the study design were specified. Prospective and retrospective studies were included.

Specific interventions included in the review
Studies of CT were eligible for inclusion. No further details of the CT techniques used were reported.

Reference standard test against which the new test was compared
No inclusion criteria for the reference standard were specified. The authors stated that the included studies were required to establish whether SBO was complete or high grade and whether ischaemia was identified. The reference standard for ischaemia was a finding of ischaemia at surgery, or discharge diagnosis of SBO without ischaemia for non-surgical patients. The reference standard for complete or high-grade obstruction was findings at surgery, or enteroclysis.

Participants included in the review
Studies of patients presenting with clinical signs and symptoms of SBO were eligible for inclusion.

Outcomes assessed in the review
No inclusion criteria for diagnostic accuracy outcome measures were specified. The review reported the sensitivity, specificity, and positive and negative predictive values for all included studies.

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.
Methods of synthesis
How were the studies combined?
Overall estimates of sensitivity, specificity, and positive and negative predictive values were calculated separately for the detection of high-grade/complete obstruction and for the detection of ischaemia.

How were differences between studies investigated?
No assessment of between-study heterogeneity was reported.

Results of the review
Fifteen studies, with a total of 1,011 participants, were included in the review. Eleven studies reported CT diagnosis of bowel ischaemia in SBO, of which seven were prospective (n=484) and four were retrospective (n=259). Seven studies reported CT diagnosis of complete or high-grade SBO, of which two were prospective (n=126) and five were retrospective (n=282).

Ischaemia (11 studies, 743 participants).
The pooled estimates of positive and negative predictive values were 79% (range: 69 to 100) and 93% (range: 33 to 100), respectively. The pooled estimates of sensitivity and specificity were 83% (range: 63 to 100) and 92% (range: 61 to 100), respectively.

Complete/high-grade obstruction (7 studies, 408 participants).
The pooled estimates of positive and negative predictive values were 92% (range: 84 to 100) and 93% (range: 76 to 100), respectively. The pooled estimates of sensitivity and specificity were 92% (range: 81 to 100) and 94% (range: 68 to 100), respectively.

Authors' conclusions
CT is highly accurate for the diagnosis of ischaemia in SBO. A CT finding of 'partial SBO' is likely to represent a condition that will resolve without surgery.

CRD commentary
The authors of the review set out to address a clearly stated research question on the diagnostic work-up of SBO. However, the poor specification of inclusion criteria and a lack of detail about the included studies made it difficult to assess what was considered an appropriate data set to address this question. The search strategy used to identify studies was limited and the restriction to English language studies further exacerbated the danger of relevant data being missed. The methodology of the review process was not reported and there was no attempt to assess the methodological quality of the included studies. It is therefore not possible to assess the likely impact of error or bias introduced during the review process or as a result of methodological deficiencies in the included studies.

The authors did not report the method used to derive pooled estimates of diagnostic accuracy, but these appear to have been derived from simple addition of the 2x2 data from the included studies. Such a method would not be valid since it assumes that the participants in the included studies can be treated as belonging to a single study population. The lack of reported detail on the included studies (e.g. participant characteristics, test and reference standard details) makes it impossible to judge the degree of clinical heterogeneity present and, therefore, whether pooling was appropriate at all; the authors acknowledge the presence of a number of sources of heterogeneity in their discussion. The wide range of reported values for accuracy measures for the individual included studies suggests the likely presence of statistical heterogeneity, though no test of this was reported.

The authors' conclusion, that CT is highly accurate for the diagnosis of ischaemia in SBO, is unlikely to be reliable given the methodological limitations outlined and the apparent heterogeneity in the data presented. Data supporting the conclusion that a CT finding of ‘partial SBO’ represents a condition that is likely to resolve without surgery were not presented.
Implications of the review for practice and research
Practice: The authors made no specific recommendations for clinical practice and recognised that their ability to do so was impeded by the heterogeneity of the studies included in their review.

Research: The authors stated that the development of clinical practice recommendations requires an evaluation of the clinical and cost-effectiveness of using CT in patients with SBO.

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