Effectiveness and safety of splenectomy for gastric carcinoma: a meta-analysis
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CRD summary
This review evaluated the effectiveness of splenectomy on patients with gastric cancer and concluded that splenectomy had not yet been shown to have superior survival rates to splenic preservation. The review was well conducted and the conclusions are likely to be reliable.

Authors' objectives
To evaluate the impact for patients with gastric cancer of splenectomy on long-term survival, postoperative morbidity and mortality.

Searching
PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), Japan Science and Technology Information Aggregator and Chinese Biomedical Database were searched without language or date restrictions until December 2008 for relevant studies; search terms were reported. Four relevant websites (The National Cancer Institute, European Organisation for Research and Treatment of Cancer, Southwest Oncology Group and American Society of Clinical Oncology) were searched, together with the reference lists of relevant articles, for further papers for inclusion. Unpublished papers were considered for inclusion if they were known by the reviewers.

Study selection
Randomised controlled trials (RCTs) were eligible for inclusion if: patients had gastric carcinoma (as confirmed by endoscopy or biopsy preoperatively), had no distinct metastases or resectable primary tumours, and could tolerate the operation; comparison was between splenectomy and non-splenectomy. Studies needed to report at least one of the following effectiveness or safety outcomes: five-year overall survival rate; overall morbidity rate; numbers of operation-related events; numbers of lymph nodes harvested; operation time; length of hospital time; and reoperation time. Patients with curative or palliative gastrectomies were included; those with other kinds of gastric tumours excluded.

Within the included studies, comparisons included splenectomy and total gastrectomy with total gastrectomy alone or splenectomy with splenic preservation. Outcomes included five-year overall survival, survival by stage, postoperative morbidity and mortality, duration of operation and hospital stay, and numbers of lymph nodes harvested. Paper publication dates ranged from 1985 to 2006.

Two reviewers independently conducted an initial screening of articles based on title, abstracts and keywords. Two other reviewers considered the full text of retrieved articles for inclusion. Disagreements were resolved by consensus and arbitration with a third reviewer.

Assessment of study quality
Articles were assessed as meeting, not meeting or unclear with regard to each of the criteria: whether method of allocation was truly random; whether there was proper allocation concealment; equality of outcomes at baseline; whether eligibility criteria were described; blinding of outcome assessors; loss to follow-up in each arm was described; whether intention-to-treat analyses were considered. Studies that met at least six of the seven criteria were considered to be of high quality, those that met four or five criteria were considered fair quality and those that met three or fewer were low quality.

It appeared that two reviewers independently conducted the validity assessment. Disagreements were resolved by consensus and arbitration with a third reviewer.

Data extraction
The safety and effectiveness outcome measures were extracted independently by two reviewers in order to calculate risk ratios (RRs) with 95% confidence intervals (CIs) for dichotomous outcomes and weighted mean differences.
(WMDs) with 95% CIs for continuous outcomes. If only survival curves were reported, overall five-year survival rates were extracted and converted from these figures.

Disagreements were resolved by consensus and arbitration with a third reviewer.

Methods of synthesis
Risk ratios with 95% CIs for dichotomous outcomes and WMDs with 95% CIs for continuous outcomes were pooled using either a fixed-effect or random-effects approach depending on whether significant heterogeneity was identified. Heterogeneity was assessed using a $\chi^2$ test and considered significant if $p<0.10$. If significant heterogeneity was identified, data were pooled using a random-effects model.

Subgroup analyses were planned that stratified results by tumour location and tumour stage. Sensitivity analyses were planned in which only high-quality studies were pooled.

Results of the review
Three studies (n=482) were included in the meta-analysis. Two trials satisfied four of the seven quality assessment criteria and were assessed as being of fair quality; one trial satisfied none of the criteria and was assessed as being of poor quality.

Five-year overall survival outcomes favoured splenectomy (RR 1.17, 95% CI 0.97 to 1.41; three trials, n = 466 patients, $I^2=0\%$) over the comparator; this difference was not statistically significant at the conventional 5% level. A similar result was observed when only cases with proximal and whole cancer (two trials) were considered. Pooled 30-day postoperative mortality outcomes (based on two studies) favoured splenectomy over the comparator; this effect was not statistically significant at the conventional 5% level.

One trial reported postoperative morbidity and operation-related events that included number of harvested lymph nodes, operation time in minutes, length of hospital stay in days and reoperation; none of the differences between groups for these outcomes were statistically significant at the conventional 5% level.

Authors' conclusions
Splenectomy had not yet been shown to have superior survival rates to splenic preservation.

CRD commentary
This review addressed a clear review question using appropriate and clear inclusion and exclusion criteria. A large number of sources were searched without language or date restrictions; this reduced risks of bias. The screening of articles was conducted in duplicate (which reduced risks of reviewer error and bias) and was clearly reported. The other stages of the review process (including data extraction and validity assessment) also appeared well conducted and clearly described.

The data synthesis approach seemed appropriate and the conclusion is likely to be reliable.

Implications of the review for practice and research
Research: The reviewers stated that further studies with more unified definitions of cancer stages should be conducted; more well-designed large-scale RCTs were needed.

Practice: The reviewers stated that routinely performing splenectomy should not be recommended.

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