Systematic review and meta-analysis of the effectiveness of antibiotic prophylaxis in prevention of wound infection after mesh repair of abdominal wall hernia

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CRD summary
The authors concluded that prophylactic antibiotics did not reduce wound infection after groin hernia mesh repair, and that further research is required for other types of abdominal wall hernia. This was a well-conducted and clearly reported review and the authors' conclusions are likely to be reliable.

Authors' objectives
To evaluate the effect of systemic antibiotic prophylaxis on wound infection after mesh repair of abdominal wall hernia.

Searching
MEDLINE, EMBASE, CINAHL, DARE, ACP, LILACS and the Cochrane CENTRAL Register were searched from inception to March 2005 using the reported search terms. No language restrictions were applied. In addition, references from selected papers were screened, experts were contacted and abstracts of leading meetings about hernias over the previous 5 years were manually searched for unpublished studies.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) with a minimum follow-up period of 1 month were eligible for inclusion. In the included studies, the duration of follow-up ranged from 1 month to 2 years.

Specific interventions included in the review
Studies that compared systemic antibiotic prophylaxis with placebo were eligible for inclusion. The included studies used a variety of antibiotics: cefonicid (1 g), cefuroxime (1.5 g), cefazolin (1 to 2 g), ampicillin plus sulbactam (1.5 g) and amoxicillin plus clavulanic acid (2 g).

Participants included in the review
Studies of patients undergoing mesh repair of abdominal wall hernia were eligible for inclusion. Most of the included studies were in patients undergoing open inguinal or femoral hernia mesh repair; one study was in patients undergoing laparoscopic inguinal hernia mesh repair (TAPP), whilst in another patients were undergoing incisional or umbilical hernia mesh repair. The mean age of the participants ranged from 52 to 61 years and at least 86% of the participants in each included study were men (where gender was reported). Where reported, specialists and trainees performed the surgery and the duration of surgery ranged from 34 to 65 minutes.

Outcomes assessed in the review
Studies that used explicit criteria to assess wound infection were eligible for inclusion. The review assessed wound infection and deep infection. Most of the included studies defined infection using Centers for Disease Control and Prevention criteria.

How were decisions on the relevance of primary studies made?
Two reviewers independently selected the studies.

Assessment of study quality
Three reviewers independently assessed validity using the Jadad scale. Any disagreements were resolved by consensus.
Data extraction
Three reviewers independently extracted the data. For each study, the number of patients in each treatment group with the outcome of interest was presented. Odds ratios (ORs) together with their 95% confidence intervals (CIs) were calculated.

Methods of synthesis
How were the studies combined?
Only studies that scored 3 or more on the Jadad validity scale were included in the analysis. Studies in patients undergoing open inguinal or femoral hernia mesh repair were combined using a random-effects meta-analysis. Pooled ORs with 95% CIs were calculated. Pooled numbers-needed-to-treat (NNT) were calculated from the ORs and the background risk of wound infection for patients in the placebo groups.

How were differences between studies investigated?
Statistical heterogeneity was assessed using the chi-squared statistic. A sensitivity analysis was conducted by varying the distribution of bilateral hernias between the two treatment groups (worst-case scenario) in one study where the unit of analysis (patients or hernias) was not clear.

Results of the review
Eight placebo-controlled RCTs were included (2,614 patients with 2,622 hernias).

Two of the 8 studies did not fulfill sufficient quality criteria for inclusion in the meta-analysis as appropriate randomisation was not used. Of the 6 studies included in meta-analyses, all used adequate randomisation and five were double-blind.

Open inguinal or femoral hernia mesh repair (6 RCTs, 2,499 patients with 2,507 hernias).
There was no statistically significant difference between antibiotic and placebo in the incidence of infection, 1.5% versus 3.0% (OR 0.54, 95% CI: 0.24, 1.21); the NNT was 74. No statistically significant heterogeneity was detected (p=0.18). The results were similar in the sensitivity analysis that assumed a worst-case scenario.

There was no statistically significant difference between antibiotics and placebo in the incidence of deep infection, 0.3% versus 0.6% (OR 0.50, 95% CI: 0.12, 2.09); the NNT was 401. No statistically significant heterogeneity was detected (p=0.82).

Authors’ conclusions
There was no reduction in the incidence of wound infection with antibiotic prophylaxis after groin hernia mesh repair; further research is required to evaluate the role of antibiotic prophylaxis for other types of abdominal wall hernia.

CRD commentary
The review addressed a clear question that was defined in terms of the participants, intervention, outcomes and study design. Several relevant sources were searched and attempts were made to reduce publication and language bias. Methods were used to minimise reviewer errors and bias in the study selection, validity assessment and data extraction processes. Only RCTs that met a pre-specified validity score were included in the meta-analyses. Statistical heterogeneity was assessed and studies were appropriately combined using meta-analysis. This was a well-conducted and clearly reported review and the authors’ conclusions are likely to be reliable.

Implications of the review for practice and research
Practice: The authors stated that routine antibiotic prophylaxis was not indicated for patients (especially low-risk patients) undergoing groin hernia mesh repair. Antibiotic prophylaxis could be re-evaluated for higher risk patients.
Research: The authors stated that more RCTs evaluating the use of prophylactic antibiotics in incisional hernia repair are needed.

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