Systematic review and meta-analysis of the incidence of incisional hernia at the site of stoma closure

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CRD summary
The authors concluded that one in three patients may develop a hernia after stoma closure and around half of hernias that are detected require repair. Risk of hernia was greater after colostomy closure than ileostomy closure. The conclusions reflect the available evidence but potential for bias in the review process and limited reporting of trial quality make the conclusions uncertain.

Authors' objectives
To assess the incidence and reoperation rates of incisional hernia following stoma closure.

Searching
PubMed, EMBASE, The Cochrane Library and Current Controlled Trials were searched up to 31 December 2010 for relevant studies published in English. Search terms were reported. Citations of related articles were scanned. Reference lists of recent reviews and papers accepted for this study were handsearched.

Study selection
Randomised controlled trials (RCTs), prospective observation studies and retrospective cohort studies that provided data on the incidence of incisional hernia following stoma closure in patients aged 16 years and older were eligible for inclusion. Studies with more than 10% of patients with abdominal wall trauma were excluded if separate data extraction was not possible.

Where reported, median age ranged from 16 to 90 years. Types of ostomy procedures in the included studies were loop ileostomy, end ileostomy, loop colostomy and end colostomy. The most common indication for formation of stoma was colorectal cancer followed by diverticular disease and inflammatory disease. Trauma was the indication for stoma construction in 1% of patients. Closure of loop ileostomy was the most commonly performed procedure.

The authors did not state how many reviewers were involved in study selection.

Assessment of study quality
Included studies were assessed for strength of evidence using the revised grading system of the Scottish Intercollegiate Guidelines Network (SIGN).

Two reviewers independently evaluated study quality. Any disagreement was resolved by consensus.

Data extraction
Data were collected on stoma reversal rate, incidence of incisional hernia and how this was assessed and how many hernias needed surgical repair.

Two reviewers independently extracted these data. Any disagreement was resolved by consensus.

Methods of synthesis
Pooled odds ratios (OR) and 95% confidence intervals (CI) were calculated using a fixed-effect model. Heterogeneity was assessed using $I^2$ and $X^2$ statistics. An $I^2$ statistic greater than 50% was considered evidence of heterogeneity. Incidence of incisional hernia rate and surgical repair rate were pooled and reported as an overall percentage. A funnel plot was used to assess publication bias.

Results of the review
Thirty-four studies (2,729 unique stoma closures) were included in the review: two RCTs, five prospective studies and 29 retrospective studies. The quality of included studies appeared to be variable (acknowledged by the authors). Median
follow-up from closure was 36 months (range two weeks to 9.8 years), where reported.

Overall incidence of incisional hernia was 7% (range 0% to 48%). The reoperation rate of patients who developed an incisional hernia and needed a surgical repair was 51%. There was a lower risk of incisional hernia following reversal of ileostomy compared to colostomy (OR 0.28, 95% CI 0.12 to 0.65; I²=0%; six studies). A funnel plot suggested a low risk of publication bias. The imaging studies reported higher detection rate with computed tomography (CT) compared to ultrasound (19% versus 48%). When these studies (assessment for hernia was primary endpoint) were combined, a clinical hernia rate of 30% and a combined clinical and radiological hernia rate of 35% were found (three studies).

Differences in age, gender and body mass index (BMI) were not predictive factors for herniation. One study found that patients with concomitant illness such as diabetes, chronic obstructive pulmonary disease and hypertension were at greater risk of developing an incisional hernia.

**Authors' conclusions**
One in three patients may develop a hernia after stoma closure and around half of hernias that are detected require repair. Risk of hernia is greater after colostomy closure than after ileostomy closure. Clinical measures to reduce the development of these hernias warrant consideration.

**CRD commentary**
The review addressed a clear question and was supported by appropriate inclusion criteria. The search covered a range of relevant sources. Unpublished studies and studies in languages other than English were not searched for, so relevant studies may have been missed. Appropriate methods were used to reduce reviewer error and bias during data extraction and quality assessment; it was unclear whether similar methods were used for study selection. A quality assessment tool was applied but the summary results (presented as levels of evidence) did not allow interpretation of individual criteria.

Appropriate methods were used to pool the results. Statistical heterogeneity was assessed. The authors acknowledged that in most studies the primary aim was not the rate of incisional hernia following stoma closure and would not have focused on reporting the exact hernia rate. The lack of good quality studies and the short follow-up in some studies might have resulted in underestimation of the true rate of hernia formation.

The authors' conclusions reflect the available evidence presented but potential for bias in the review process and limited reporting of trial quality make the conclusions uncertain.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that further studies should address the risk factors due to stoma site hernia and their impact on quality of life. Biological mesh reinforcement should be investigated for stoma closure in a prospective multicentre trial.

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