Meta-analysis of early excision of burns

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CRD summary
This review examined how early excision and grafting of burns compares with conservative treatment. The authors stated that early excision of wounds appears to reduce the length of hospital stay and mortality rates in some patients, but increases the need for blood transfusion. The authors’ findings may not be reliable given the limited data and poor reporting of review methods.

Authors’ objectives
To examine how the early excision and grafting of burns compares with conservative treatment, in adults and children with minor or major burns.

Searching
MEDLINE (inception to July 2004), EMBASE (inception to August 2004 and the Cochrane CENTRAL Register (search date not given) were searched using the keywords 'early excision' and 'burns'. It was not reported whether any language restrictions were applied.

Study selection
Study designs of evaluations included in the review
Only prospective randomised controlled trials (RCTs) were eligible for inclusion in the review.

Specific interventions included in the review
Studies were eligible for inclusion if they assessed the early excision and immediate grafting of burns, compared with treating the burns with only dressings and delaying grafting until after eschar separation. The studies included in the review reported excisions occurring before 24, 72, 120 or 144 hours. Intervention treatments were described as early or acute excision, with or without grafting. The control treatments were described as conservative or as using a specific dressing such as a honey dressing.

Participants included in the review
Studies of adults or children with any type of burn were considered eligible for inclusion. In general, the studies included in the review recruited adult patients; some included children as well, but only one study focused solely on burns in children. Most studies specified a minimum of either 20 or 30% burns, but one study included all burns.

Outcomes assessed in the review
Studies eligible for inclusion had to report at least one of the following outcome measures: mortality, blood loss and transfusion requirements, wound healing time, length of hospital stay, duration of sepsis, operating room hours and long-term morbidity (e.g. joint contactures and hypertrophic scarring).

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 specifically assessed validity. However, they did report whether the included trials were randomised, double-blinded, if the allocation of participants was concealed, and if an intention-to-treat analysis was carried out.

The authors did not state how the validity assessment was performed.
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

The type of burns, timing of excision and the age range of the participants was recorded. Relative risks (RRs) with 95% confidence intervals (CIs) were calculated for dichotomous outcomes, while weighted mean differences (WMDs) or standardised mean differences (SMDs) with 95% CIs were calculated for continuous outcomes, using intention-to-treat data when available.

Methods of synthesis
How were the studies combined?
The studies were combined in a fixed-effects meta-analysis. In the presence of significant heterogeneity, the studies were combined using a random-effects model.

How were differences between studies investigated?
Heterogeneity was investigated using the I-squared statistic and by visually examining the forest plots. An I-squared value of greater than 50% was considered as showing substantial heterogeneity. The authors also used subgroup analyses to compare patients with and without inhalation injuries.

Results of the review
Six RCTs (n=361) were included. One hundred and eighty participants were treated using early excision followed by grafting and 181 were treated conservatively.

All of the studies used appropriate methods to randomise the participants, but the nature of the interventions meant that none of the studies was concealed or the treatments blinded. All of the studies used an intention-to-treat analysis.

There was no significant difference between early excision and conventional treatment in terms of mortality (RR 0.73, 95% CI: 0.52, 1.01; 4 studies). Similarly, no significant difference was seen in mortality when patients with inhalation injuries were considered separately (RR 0.91, 95% CI: 0.66, 1.25; 2 studies). However, a significant reduction favouring early excision over conventional treatment was found for patients without inhalation injuries (RR 0.36, 95% CI: 0.20, 0.65; 2 studies).

Patients receiving early excisions had significantly greater blood transfusion requirements (SMD 1.65 units, 95% CI: 0.51, 2.80; I-squared 87.2%; 3 studies), but shorter hospital stay (SMD -8.89 days, 95% CI: -14.28, -3.50; I-squared 92.5%; 4 studies), than those receiving conservative treatment. However, both of these outcomes were based on random-effects models, owing to significant levels of statistical heterogeneity. The direction and size of effects differed between studies for the duration of sepsis, operating theatre time, number of operations, time required for wound healing, acceptance of skin graft and the incidence of hypertrophic wound healing. The effects for these outcomes could not be pooled because of differences in outcome definition or the absence of relevant data.

Authors’ conclusions
Early excision of wounds appears to reduce mortality rates in patients without inhalation injury; it also increases the need for blood transfusion and reduces the length of time that patients stay in hospital. The authors were unable to draw any conclusions about the duration of sepsis, operating time, time to wound healing, acceptance of skin grafts and the incidence of other long-term morbidities such as hypertrophic scarring.

CRD commentary
This review was based on quite wide inclusion criteria for both the participants and outcome measures, although the criteria for study design limit the findings to better quality studies in terms of those with randomised controlled designs. The inclusion of all types of patients and burns causes problems in terms of pooling the studies, although the authors did attempt to carry out some limited subgroup analyses. However, their review appears to have been limited by a lack of
consensus on which types of outcomes and patients should be studied. Poor reporting within the original studies also limited the authors’ ability to pool the study data. This may be one explanation for the use of WMDs and SMDs, as opposed to hazard ratios, for the time-to-event data. However, by not using survival analyses for the time-to-event data, the authors might have lost relevant data.

The authors also failed to report how studies were selected for review, how the data were extracted and how the quality of the studies was assessed. It is therefore difficult to determine whether the authors have taken adequate steps to prevent selection and reporting biases. Publication bias is also a possibility as there appears to have been little specific attempt to locate unpublished material. It was also unclear whether any language restrictions were placed on the searches. Overall, it is difficult to judge the reliability of the review’s findings given the poor reporting of the authors’ methods. Given this and the limitations of the data, the authors’ findings should be treated with caution.

Implications of the review for practice and research

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

Research: The authors stated that, ideally, large multicentre RCTs should be performed according to strict criteria specifying the inclusion and exclusion criteria, treatments and specific outcome measures. However, they went on to state that such a trial would be ethically unjustifiable given the present level of knowledge regarding the benefits of early excision.

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