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Review

Prevalence of scar contractures after burn: A systematic review

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ABSTRACT

Objective: Burn scar contractures are the pathological outcome of excessive scarring and ongoing scar contraction. Impairment of joint range of motion is a threat to performing activities in daily living. To direct treatment strategies to prevent and/or correct such contractures, insight into the prevalence, course, and determinants is essential.
Methods: A literature search was conducted including Pubmed, Cochrane library, CINAHL, and PEDro. Articles were included if they provided burn scar contracture data to calculate the point prevalence. The quality of the articles was scored. Data were extracted regarding study, subject and burn characteristics, method of scar contracture assessment, point prevalence, and possible determinants.
Results: Nine articles and one abstract could be included for data extraction. The prevalence at discharge was 38-54%, but with a longer time after burn, the prevalence was lower. Contractures were more likely to occur in more severe burns, flame burns, children, female, the cervical spine, and the upper extremity.
Conclusions: The prevalence of burn scar contractures varies considerably between studies. When prevalence is unclear, it is also difficult to investigate potential determinants and evaluate changes in interventions. There is a need for extensive, well-designed longitudinal

Abbreviations: ROM, range of motion; TBSA, total body surface area; OR, Odds Ratio.

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(inter)national studies that investigate prevalence of scar contractures, their evolvement over time, and risk factors.

1. Introduction

Scar contractures are the pathological outcome of excessive scarring and ongoing scar contraction and a well-known complication after burns [1–3]. Scar contractures impair the range of motion (ROM) of joints and thus may limit performing activities of daily living [4,5]. When daily activities cannot be performed optimally, both actual and perceived physical health can be affected and a person's health-related quality of life is threatened [2,5]. Furthermore, there is a risk of secondary conditions, for example, due to overuse of adjacent and/or unaffected joints.

Considerable clinical and research effort has gone into the prevention and treatment of scar contractures including positioning, splinting, exercise, and surgical correction [6–12]. Additionally, specific patient and/or burn related factors may influence the occurrence of scar contractures. Despite all effort, it is well known that scar contractures after burn still occur with the usual methods of care [1,12–16]. To be able to evaluate current care and to direct development of new treatment strategies to prevent and/or correct scar contractures, in our opinion, insight in the prevalence, course and determinants of scar contractures is essential. The aim of this study therefore was to determine the prevalence of scar contractures in patients after burn with attention to possible determinants.

2. Methods

For reporting, the Preferred Reporting Item for Systematic Reviews and Meta-Analysis (PRISMA) was applied.

2.1. Data sources and search strategy

A literature search was conducted making use of electronic databases, checking the reference lists of retrieved relevant articles and reviews, personal knowledge, and serendipitous discovery. The electronic databases that were searched included Pubmed, Cochrane library, CINAHL, and PEDro. Combinations of (variations of) the following keywords and free text were included: burns; thermal injury; contracture; range of motion; incidence; prevalence; and epidemiology. The search was unrestricted in language or publication status but was limited to studies concerning human subjects. The final search was completed in November 2014.

Articles were included if they: (1) considered scar contractures due to burn and (2) provided the total number of patients admitted to a burn center in a specified inclusion period as well as the number of patients with contractures from this population at a certain moment after the burn. As there is no accepted definition of scar contracture, all descriptions of scar contractures after burn were accepted. Excluded were articles describing:

- Scar contractures after reconstructive surgery for burn;
- Burns of only specific etiology;
- Burns only involving a specific joint.

The titles and abstracts of all records identified by the search were independently screened by two researchers (AMO and MKN) to determine eligibility. Full texts of eligible articles were subsequently screened by at least two reviewers (AMO, LJM, and/or MKN). In all instances, differences of opinions were resolved by discussion.

2.2. Data extraction and analyses

Data were extracted regarding study characteristics (e.g., design, patient inclusion period), subject and burn characteristics (e.g., gender, age, extent of burn, number of subjects with contracture, included joints, number of locations affected by burns with contracture), method of scar contracture assessment, and possible additional determinants. Point prevalence was calculated based on the extracted data including confidence intervals [17].

2.3. Quality assessment

The quality of all of the included articles was scored on five items based on a checklist specifically developed to appraise studies reporting prevalence [18]. These items comprised representativeness and description of the population, data analysis, method and time of assessment and subgroups, and confounders.

3. Results

3.1. Study selection

The computerized literature search initially produced 167 articles which was reduced to 150 after duplicates were removed (Fig. 1). Screening titles and abstracts, if necessary, resulted in the exclusion of 135 articles. Two additional articles were identified through other sources. After full text screening, nine articles and one abstract [19] could be included for data extraction. No full text could be traced for the abstract.

3.2. Characteristics of the included studies

Characteristics of the included studies are provided in Table 1. The design of studies was retrospective in five of the studies and prospective also in five. Most of the studies were from the USA (5), but there were also two from Africa, two from Europe, and one from Australia. The decade of patient inclusion varied