EDITOR'S CHOICE

Indications and Predictors for Reconstructive Surgery After Hand Burns

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Purpose The objective of this study was to analyze the prevalence, indications, and type of reconstructive surgery and predictors of the outcomes of reconstructive surgery after hand burns.

Methods A retrospective cohort study was conducted that included all patients admitted with acute hand burns in the Dutch burn centers from January 1998 through December 2002. The details of reconstruction including frequency, timing, indication, and techniques were collected over a 10-year follow-up period.

Results Hand burns were seen in 42% (n = 562 of 1,334) of all patients admitted with acute burns. Reconstructive surgery during the 10-year follow-up period was required in 15%. Contractures, especially of the first web space and little finger, were the most frequent indications for reconstructive surgery. Web spaces 1 to 3 and the little finger were the location most frequently operated on. The most frequently performed surgical technique was release of the contractures and the use of a random flap. Eighty percent of the reconstructive surgery patients required more than 1 reconstructive procedure, most often within 2 years of the initial injury. Secondary operations at the same location were required in 12%. In 40% of the patients, the first reconstructive surgery was performed within the first postburn year.

Significant independent factors related to the need for reconstructive hand surgery were a larger area of full-thickness burns and surgical treatment of the hand during the acute phase.

Conclusions Reconstructive surgery was required in 15% of patients who sustained hand burns. The majority of the patients requiring reconstructive surgery of the hand needed 2 or more operations to correct the contractures of the hand. Contractures of the little finger and first web space were the locations most frequently operated on. Patients with more extensive burns and who required hand surgery during the acute phase were more likely to need reconstructive surgery. *(J Hand Surg Am. 2017;■(■):■−■. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Prognostic IV.

Key words Hand burns.

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In more than 80% of severe burns, the hands are involved even though they only represent approximately 5% of the total body surface area (TBSA).[1,2] Hand burns most often occur from hot fluid spilled from a cup or while trying to protect oneself from flames.[1,3,4] The treatment of the burned hand can be difficult because the anatomy of the hand is complex.[5] Adequate treatment in the acute phase of the burn is of the utmost importance because it dictates, to a large extent, the outcome of the hand. Loss of hand function is often caused by scar contractures and has a great impact on quality of life.[2,6] A prevalence between 5% and 40% of scar contractures involving the hands in patients with burns was described in a recent literature review of Schouten et al.[7] In addition, an occurrence of contractures of 23% after hand burns was described by Schneider et al.[8] In problematic scar contractures, reconstructive surgery is often the only effective treatment option. However, little is known regarding the prevalence and nature of reconstructive surgery performed on the burned hand or the characteristics of patients who require reconstructive surgery after hand burns.[8,9]

The aims of this study were to analyze (1) the prevalence of reconstructive surgery after hand burns, (2) the indications and type of reconstructive surgery, and (3) the predictors for reconstructive surgery.

METHODS

A retrospective cohort study was conducted including all patients with acute burns admitted to the Dutch burn centers between January 1998 and January 2002. Hand burns were defined as burn injuries of the hand, including the wrist. Patients were excluded from the study if (1) they died within 6 months of the burn injury, (2) were lost to follow up, (3) information on the need for reconstructive surgery was not available, or (4) the exact location of burns in the upper extremity was not documented. All medical records were reviewed for the data as listed later. If the data were incomplete, the variable was registered as missing.

Data on sex, age, etiology of burns, body location burned, percentage TBSA burned, percentage of full-thickness TBSA burned, and surgery in the acute phase were obtained from the database. Data on the need for reconstructive surgery during a 10-year follow up period were derived from medical records. In cases in which reconstructive surgery was performed, additional data were collected on the details of the surgery (indication, location, and procedure performed), the number of surgeries, subsequent operations on the same location, and timing of surgery. Reconstructive surgery was defined as surgical treatment after the primary wound closure treatment in the acute phase was completed. This study was approved by the medical ethical board at our institution (protocol 2012-16).

In general, all patients with hand burns were treated following a protocol that included daily dressing changes and the application of local antimicrobials. Hands that had sustained superficial injuries were allowed to heal spontaneously, whereas hands that had clearly sustained full-thickness injury were treated by early excision and grafting. Hands with injuries of uncertain depth were treated expectantly, followed by selective debridement and grafting as soon as demarcation became apparent. In addition, treatment of edema, daily exercising, orthosis fabrication, silicone therapy, and postoperative pressure garments were cornerstones of treatment.

The primary outcome was the prevalence of reconstructive surgery after hand burns. The secondary outcomes were the indications and risk factors for reconstructive surgery after hand burns. These variables consisted of patient characteristics (sex, age), etiology and location of original burns, TBSA burned, full-thickness TBSA burned, hand surgery in the acute phase, number of operations in the acute phase, phase and timing of grafting (early [<7 days] vs delayed [>7 days] grafting).

Descriptive statistics were used to evaluate the prevalence of hand burns. Data analysis included bi- and multivariable logistic regression to identify risk factors for reconstructive surgery after hand burns. The variables with a $P < .20$ in the bivariable logistic analyses were imported in a multivariable logistic regression analysis with a forward procedure in order to evaluate their independent association. Potential predictors were assessed for multicollinearity (variance inflation factor > 10 and tolerance < 0.01). Relative risks were estimated by odds ratios with 95% confidence intervals and P values. For details of the reconstructive surgeries, descriptive statistics were used.

RESULTS

Of the 1907 patients with acute burns admitted to one of the Dutch burn centers between January 1998 and January 2002, 562 patients with burns of the hand were documented (42.1%) A flow chart describing the sample is presented in Figure 1.

Patients with hand burns had a mean age of 31.6 years and were predominantly male. Flame burns were most common occurring in 70.2% of cases (n = 393).