

## Suturing versus conservative management of lacerations of the hand: randomised controlled trial

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### Abstract

**Objective** To assess the difference in clinical outcome between lacerations of the hand closed with sutures and those treated conservatively.

**Design** Randomised controlled trial.

**Setting** Emergency department in a tertiary hospital.

**Participants** Consecutive patients presenting between 16 February and 30 November 2000 with uncomplicated lacerations of the hand (full thickness <2 cm; without tendon, joint, fracture, or nerve complications) who would normally require sutures. 154 patients were eligible, 58 refused, and 5 were missed; 91 patients with 95 lacerations were enrolled.

**Intervention** Participants were randomised to suturing or conservative treatment.

**Main outcome measures** Primary outcome was cosmetic appearance after three months, rated on a previously validated visual analogue scale. Duration of treatment, pain during treatment, patients' assessment of their outcome, and the time for patients to resume normal activities were also measured.

**Results** Participants treated with sutures and those treated conservatively did not differ significantly in the assessment of cosmetic appearance by independent blinded doctors after three months: 83 mm *v* 80 mm, (mean difference 3 (95% confidence interval -1 to 8) mm) on the visual analogue scale. The mean time to resume normal activities was the same in both groups (3.4 days). Patients treated conservatively had less pain (difference 18 (12 to 24) mm) and treatment time was 14 (10 to 18) min shorter.

**Conclusion** Similar cosmetic and functional outcomes result from either conservative treatment or suturing of small uncomplicated lacerations of the hand, but conservative treatment is faster and less painful.

### Introduction

Lacerations are common simple problems; their treatment requires tremendous resources. Every doctor is asked, "Will this cut need stitches?" with the expectation that the answer is determined using some scientific knowledge. In truth, we give an opinion based on experience. The value of closure and whether it is even needed have never been objectively studied. This study aims to give scientific support to doctors' answers.

Suturing is the most popular method of securely closing wounds, although it has many disadvantages: sutures require the use of needles to inject painful anaesthetics, are time consuming, have the greatest tissue reactivity of any wound closure device, are costly, and are inconvenient for patients.<sup>1</sup>

Normally, wounds repair themselves, regardless of whether wound edges are approximated.<sup>2,3</sup> Most doctors have seen lacerations that were not sutured and healed normally: when infection is a worry wounds and incisions are left to heal by delayed secondary healing, and most heal with functional scars. Case series on the non-closure of hand incisions show that wounds left open heal similarly to those sutured.<sup>4</sup>

The goal of wound healing is to have a functional and cosmetically appealing scar, and to inflict minimal pain and inconvenience on patients. This randomised controlled trial aims to determine whether the conservative management of hand lacerations produces similar clinical outcomes to wounds that are sutured.

### Patients and methods

Patients with lacerations of the hand—that is, lacerations distal to the volar wrist crease—that would normally be treated with sutures were eligible for the study. Patients were excluded if their lacerations were longer than 2 cm; they presented more than eight hours after the injury; haemostasis could not be attained after 15 minutes of pressure; their lacerations had associated or suspected neurovascular, tendon, or bone injury; their lacerations were of the nail bed, were puncture wounds, or were secondary to a bite from any source. Patients with complications from diabetes, receiving anticoagulants or prolonged chronic steroid use (defined as continuous use for more than 14 days, three times a year) were also excluded, as were patients unable to participate in the follow up.

The study took place in the Emergency Department of the University of California, San Francisco Medical Center during the hours of operation of the clinical research unit (11 am to 11 pm) to provide a consecutive patient sample. The committee on human research at the University of California in San Francisco approved the study protocol.

We sought informed consent from eligible patients; if it was given, they were prospectively enrolled and randomised to be treated conservatively or with

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sutures. After lacerations were irrigated under tap water for 1-2 minutes the patient applied direct pressure.

Patients were randomised by a computer, in blocks of 10. We opened sequentially numbered sealed opaque envelopes, with the treatment marked inside, at the time of randomisation. The department of biostatistics randomised and prepared these envelopes; we had no access to the randomisation codes.

Patients randomised to receive sutures had the area of laceration anaesthetised and cleansed, at the health-care providers' discretion. We closed the skin with monofilament suture (United States pharmacopoeia sizes 4-0 or 5-0), using standard sterile techniques, and applied polymyxin B antibiotic ointment containing bacitracin with a gauze dressing to last 24-48 hours.

Patients randomised to receive conservative treatment received tap water irrigation and had the same ointment and dressing applied to last 48 hours.

In both groups, use of ointments after 48 hours was discouraged, and patients were given written instructions to keep their wounds clean and dry.

### Clinical outcomes

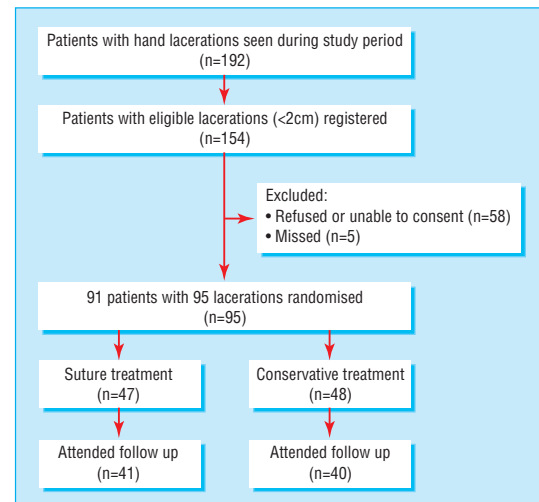
The duration of the procedure, from the start of cleaning the wound, after randomisation, until a dressing was in place, was recorded. Patients rated the pain of their treatment on a standard 100 mm visual analogue scale for pain, with 0 mm corresponding to no pain and 100 mm to the worst pain possible.<sup>5</sup>

We asked patients to return in 8-10 days for their sutures to be removed or their wound to be assessed. We considered wounds to be infected if they had been treated for an infection with antibiotics. We assigned a wound score using a previously validated clinical wound scale.<sup>6</sup> This scale combines six observations: irregularities of contour, separation of wound margin >2 mm, edge inversion, excessive distortion, the absence of step-off borders, and overall cosmetic appearance. Each category is graded 0 or 1. The total is the sum of the scores for each category; 6 is optimal, and 5 or less is suboptimal. We compared the percentage of wounds from each group that scored 6.

Also, in early follow up, we asked patients if and when they had been able to return to normal daily activities, with full normal use of their injured hand.

Follow up after three months—a sufficiently long time—was well attended by patients with 41 sutured and 40 non-sutured lacerations, and we made contact with all patients not completing the study (or their next of kin) to ensure adverse outcomes (infection and patient impression of a bad scar) had not occurred.

At three month follow up the research assistant took a digital photograph of patients' healed wounds.<sup>7</sup> Two independent doctors, who were unaware of the method of treatment, rated the photographs for



Selection of patients and allocation of treatment

cosmetic appearance, on a previously validated visual analogue scale.<sup>8</sup> This scale is 100 mm long with “worst scar” written at 0 mm and “best scar” written at 100 mm. A difference of 12-15 mm is clinically important.<sup>8</sup> Patients rated their own scars on a similar scale.

### Statistical analysis

We considered the distribution, proportion, and descriptive statistics for all outcomes. For the primary outcome (the scores for cosmetic appearance assigned by two doctors blinded to treatment), we used *t* tests for independent samples to compare the treatments.<sup>9</sup> We designed the study to determine clinical significance at the  $P=0.05$  level with 95% power. This allows a difference of at least 10 mm on the visual analogue scale, using an estimated standard deviation of 12.5 mm (estimated 41 lacerations per group).

We analysed the other continuous outcomes with *t* tests for independent samples and the percentage of optimal wound scores and other dichotomous outcomes with  $\chi^2$  tests.

## Results

During the study period, 16 February to 30 November 2000, 58 (38%) patients refused enrolment, 5 (3%) patients were missed, and 91 (59%) patients with 95 lacerations were enrolled. More than 80% (154/192) of all lacerations seen during the study period were eligible (154 consecutive patients). At the end of the trial we evaluated photographs of 41 lacerations treated with sutures and 40 treated conservatively (figure).

Patients treated with sutures and those treated conservatively had similar baseline demographic and clinical characteristics (table 1). The mean scores for cosmetic appearance assigned by doctors blinded to whether treatment had been with suturing or not were not significantly different (83 (range 54-96) mm *v* 80 (49-98) mm; difference 3 mm (95% confidence interval - 1 to 8) mm) (table 2). Patients' ratings of their wound at three months were similar (83 mm *v* 82 mm).

At 8-10 days follow up, optimal wound scores in the sutured and non-sutured groups were similar (92% *v* 89%,  $P=0.71$ ), and patients in both groups stated similar mean times to return to normal activities (3.4 days; difference 0 (- 1.4 to 1.3) days). One sutured wound

**Table 1** Baseline characteristics of patients and their lacerations. Values are means (SD) unless otherwise stated

Characteristic	Treatment	
	Suture (n=47)	Conservative (n=48)
Age (years)	40 (16)	38 (15)
No (%) of women	19 (40)	25 (52)
Length of laceration (cm)	1.4 (0.5)	1.3 (0.5)
No (%) with lacerations to fingers	39 (83)	37 (77)
Time between injury and presentation (min)	81 (51)	80 (54)

**Table 2** Clinical outcomes. Values are means (SD) unless stated otherwise

Clinical outcome	Treatment		Mean difference (95% CI)
	Suture	Conservative	
Cosmetic appearance at 3 months (mm)*:			
Assigned by doctor	83 (10.0)	80 (11.3)	3 (-1 to 8)
Self assigned by patients	83 (18.1)	82 (19.5)	1 (-7 to 9)
Time to resume normal activities (days)	3.4 (3.4)	3.4 (2.9)	0 (-1.4 to 1.3)
% (No) of optimal early wound scores	92 (34/37)	89 (31/36)	3 (-11 to 17)
Pain during treatment (mm)*	31 (16.4)	13 (12.0)	18 (12 to 24)
Duration of treatment (min)	19 (12.8)	5 (4.6)	14 (10 to 18)
No of infections	1	0	—

\*Cosmesis and pain were scored on a visual analogue scale ranging 0-100 mm.

was treated with antibiotics for an infection. No infections were treated in any of the conservatively treated wounds.

Patients' mean rating on the visible analogue pain scale was lower for lacerations treated conservatively (difference 18 (12 to 24) mm). The mean time to treat with sutures was greater than for conservative treatment (19 min *v* 5 min) (difference 14 (10 to 18) min).

## Discussion

The goal of wound care and closure is to have a resultant functional and cosmetically acceptable scar, with low morbidity and high patient satisfaction and comfort. These goals can be achieved by treating simple lacerations of the hand conservatively instead of with sutures. The time saving has implications for health policy.

Uncomplicated lacerations of the hand, shorter than 2 cm, are currently being sutured unnecessarily and would heal with similar results without sutures. In this study, all lacerations needed sutures before randomisation. The inclusion criteria were broad, as eligible lacerations represented over 80% of all lacerations of the hand presented during the study period.

Large gaping wounds should be closed, after meticulous wound care, and our results cannot be generalised to cosmetically sensitive areas such as the face. The suturing of simple lacerations of the hand, however, provides no clinical benefit, as our study

shows: the 95% confidence interval contains zero and is less than 10 mm (a difference of 12-15 mm on the scale is clinically important).

Until recently, few objective randomised trials looking at the clinical outcomes of wound closure techniques have been performed. Previously most guidelines for wound closure were anecdotal or based on animal work. This study builds on the work we started several years ago: to look objectively at the clinical outcomes of wound closure.<sup>10</sup>

This is the first randomised controlled trial to determine whether the conservative management of hand lacerations produces similar clinical outcomes to wounds that are sutured. We expected to obtain these results because, in our experience, wounds that are dehiscenced or those treated with delayed primary closure usually heal without complication: the three phases of wound healing—*inflammation, epithelisation, and maturation*—occur whether or not wounds are securely closed. We were impressed with how inconspicuous most scars were after three months and at the high level of patients' satisfaction with the appearance of their wound.

JQ conceived and designed the methodology, analysed the results, was the principal investigator for funding purposes, and wrote most of the paper. SC and MC contributed to the design of the study and were responsible for review and revision. KS helped to implement the study, interpreted and analysed the data, and reviewed and helped write parts of the paper. JQ is guarantor.

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Competing interests: JQ was paid by Ethicon, a manufacturer of sutures, for speaking at educational symposiums and helping with educational material.

### What is already known on this topic

Sutures provide secure and meticulous wound closure, but their placement is not without associated pain, fear, and increased risk of infection

Wounds heal by second intention if treated without sutures and left open

### What this study adds

Non-suturing of hand lacerations of < 2 cm produced similar cosmetic and functional outcomes to suturing and was faster and less painful

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