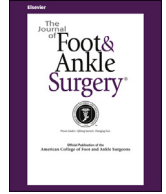




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Does Postoperative Showering or Bathing of a Surgical Site Increase the Incidence of Infection? A Systematic Review of the Literature

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ABSTRACT

Infection is one of the many postoperative complications a surgeon must attempt to control during the perioperative period. Surgeons have used a variety of modalities to prevent surgical site infection and have adhered to a variety of protocols. It has been common for foot and ankle surgeons to recommend that a patient keep the surgical incision covered and dry and to instruct the patient to avoid bathing and showering until the sutures have been removed. Surgeons have theorized that this will reduce contamination of the surgical site and help to prevent infection. We questioned the evidence basis for this practice and undertook a systematic review of electronic databases and other relevant sources regarding the incidence of infection when patients had been allowed to wet their surgical incision site by showering or bathing before suture removal. Nine studies involving 2150 patients met our inclusion criteria. No increased incidence of infection was found in the patients allowed to shower or bathe as a part of their normal daily hygiene before suture removal compared with those who were instructed to keep the site dry until suture removal.

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Infection is 1 of the many postoperative complications that a surgeon must attempt to control during the perioperative period. Surgeons have used a variety of modalities to prevent surgical site infection and have adhered to a variety of protocols. Common interventions have included using antimicrobial soap preoperatively, applying skin antiseptic for surgical site preparation, sterile draping of the surgical site, the use of barrier gowns and masks by personnel in the operating room, and careful washing and gloving of the surgeon's hands (1). Preoperative systemic antibiotics have also been recommended as a part of an infection prevention protocol (2). Many postoperative recommendations have also been proposed to prevent infection. It is common for foot and ankle surgeons to recommend that a patient keep the surgical incision covered and dry until the sutures have been removed. They have theorized that this will reduce contamination of the surgical site and help to prevent infection. Additionally, many have recommended that bathing and showering be avoided until the sutures have been removed (3). However, little research or evidence is available to support this practice of keeping clean uncomplicated surgical wounds covered and dry.

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A review of the published data pertaining to surgical site bandaging provided little to no evidence that this practice prevents infections or changes the surgical outcome. A study by Ajao (4) showed that the use of sterile bandages for longer than 24 to 36 hours postoperatively was not necessary and that using sterile bandages for longer than 36 hours did not reduce the number of surgical wound infections. Additional data have shown that no increase in the incidence of surgical site infection occurred when surgical wounds were not covered with bandages at all after surgery (5). Allowing patients to bathe or shower as part of their normal daily hygiene in the early period after surgical procedures, although not common in foot and ankle surgical practice, has also been studied. These studies have indicated that minimal to no risk of increased surgical site infection exists after a variety of surgical procedures (3,5–12). Despite this evidence, surgeons have tended to follow the classic teaching of dry surgical wound care. Sticha et al (3), in 1998, reported a survey they performed of surgeons certified by the American Board of Podiatric Surgery on their postoperative care protocol. Of the 495 responding, 488 (98.6%) related the use of delayed wound exposure, with the peak at 10 to 14 days. Only 7 respondents (1.4%) related using early wound exposure, starting at 3 to 4 days postoperatively. In an attempt to better understand the role of showering or bathing after surgical procedures, we undertook a systematic review of the published data related to showering or bathing surgical sites in the early stages of healing before suture or staple removal.

Patients and Methods

We performed a systematic review of electronic databases, including PubMed, Google Scholar, OVID, ACP Journal Club, and Cochrane Central Register of Controlled Trials. The search terms used were “can stitches get wet,” “can incisions get wet,” “incision care,” “postoperative incision care,” and “surgical incision care.” The additional search terms used were “water” OR “wet” OR “bath” OR “shower” AND “sutures” OR “wound” OR “incision,” “water” OR “wet” OR “bath” OR “shower” AND “infection” OR “complication,” and “water” OR “wet” OR “bath” OR “shower” AND “sutures” OR “wound” OR “incision” AND “infection” OR “complication.” A manual search of common foot and ankle journals and general surgical references was completed, and bibliographic search was made of all available references. The restrictions included those journal studies published within the past 50 years, English language only, and human studies. Three of us initially assessed the studies by abstract review, and the pertinent studies were selected for full review by the 2 senior authors (P.D., M.F.) independently. The criteria for study inclusion was either a case series or a prospective observation with clearly defined patient groups assessing outcomes of showering or bathing a surgical incision site with patient numbers greater than 50. Allowing a surgical site to become “wet” was defined as the daily normal hygiene of bathing or showering with tap water without coverage of the incision site. This could include the use of soap or the avoidance of cleansing agents. Swimming, soaking, and other forms of prolonged emersion were not considered normal daily hygiene. Agreement was achieved on the studies to be included in the present review using these criteria. The studies were graded according to their design, use of clearly defined methods, rational and objective outcomes, appropriate follow-up, controlled variables, controlled study populations, and the absence of mixed modalities. The studies that were determined to be level 1, 2, 3, and 4 according to the American College of Foot and Ankle Surgeons levels of clinical evidence guidelines as referenced in the “Journal of Foot and Ankle Surgery Guide for Authors” (13) were included. Level 5 reports were excluded. No limitations for study inclusion were used according to the anatomic site, procedure performed, surgical technique, or closure method.

Results

Our search yielded 15 potential references, of which 9 (60%) were included in the final review after the limits of inclusion were applied. Specifically, 5 evidence-based medicine level II studies, 1 evidence-based medicine level III study, and 3 evidence-based medicine level IV studies met our inclusion criteria. All references were obtained and reviewed in September 2012. A total of 2150 patients were included, of whom 1639 subjects (76.23%) were allowed to bathe or shower and wet the surgical site before suture or staple removal. The period ranged from immediately postoperatively to 5 days postoperatively. Of the remaining 511 patients (23.77% of the total), 295 (13.72% of the total and 57.73% of the remaining patients) were not allowed to wet the incision site until after suture or staple removal, and 216 (10.05% of the total, 42.27% of the remaining patients) were not allowed to wet their wound immediately, but a specific period was not noted in the methods section. The anatomic site, surgical procedure, and method of closure varied in the included studies. The studies all appeared to use tap water. This was mentioned specifically in several studies, and the others did not state anything to the contrary. All the patients allowed to bathe or shower were instructed to do so with the bandage

off. The studies varied on whether soap or antibiotic soap was to be used. A summary of the findings of the selected studies is presented in the Table. Because of the variety of anatomic sites and procedures and the diversity of the study design, we believed a meta-analysis would not provide meaningful data. As noted in the tabular results, none of the studies reported an increase in wound complication or wound infection using early showering or bathing protocols (Table).

Discussion

The purpose of the present review was to evaluate the basis for the recommendation to keep sutured surgical incisions dry during the course of healing. The 9 studies in our review included 5 prospective randomized trials, 1 of which was a multicenter trial, 1 prospective cohort of 100 patients with a historical control group, and 3 prospective case series without a control group. These 9 studies revealed that showering or bathing an incision had no bearing on the rate of infection (3,5–12). The evidence reviewed suggests that early bathing or showering of surgical wound incisions does not pose a risk of infection. Patients can return to their normal bathing or showering routine as soon as 12 hours after surgery and, perhaps even earlier, without the fear of increasing their risk of infection. We found no data discussing evidenced-based reasons for keeping a wound dry and covered until suture removal.

Additional studies are needed to assess whether various suture materials might play a role in the risk of infection when washing is permitted after surgery. Of the included studies, 4 used nylon sutures, 2 used either stainless steel staples or sutures and clips, 1 used polypropylene sutures, 1 used a combination of absorbable and nonabsorbable sutures, and 1 did not mention the suture in their Methods section (3,5–12). Other possible considerations include the nutritional status of the patient, immunosuppression, corticosteroids, the rate of perfusion to the wounded area, and so forth. Each of these factors might play a role in the determination of exactly how early a patient should be allowed to shower after a sutured surgical incision. It appears from the available evidence that bathing or showering in the early stages of recovery is not a provocative variable for postoperative infection to develop.

The limitations of the present systematic review included the lack of a meta-analysis. We believed that owing to the varied nature of the studies, procedures reviewed, and levels of evidence, a meta-analysis would not have provided meaningful results. Only English language reports or those translated into English were included, which excluded any non-English language studies. The studies presented were extremely diverse with regard to the anatomic site and surgical procedures studied and, therefore, might not represent accurate recommendations for foot and ankle surgery. However, the studies included high-risk procedures such as spinal surgery and 2

Table
Summary of findings from selected studies

Investigators	Patients (n)	Interval before Washing a Wound in Control Group	Interval before Washing a Wound in Intervention Group	Infections in Control Group (n)	Infections in Intervention Group (n)	Material Used to Close Wounds	Evidence Level
Sticha et al (3)	100	NA	4 d (n = 100)	NA	1 (1%)	4-0 Absorbable 5-0 Nonabsorbable	4
Merei (5)	451	NS (n = 216)	Immediately (n = 235)	3 (1.4%)	4 (1.7%)	NS	2
Sollitto and Napoli (6)	60	NA	1 wk (n = 60)	NA	0	Polypropylene sutures	4
Carragee and Vittum (7)	200	Once staples removed (n = 100)	2–5 d (n = 100)	1 (1%)	0	Stainless steel staples	3
Goldberg et al (8)	200	Once sutures removed (n = 100)	24 h (n = 100)	0	0	Nylon sutures	2
Ireland et al (9)	100	Once sutures removed (n = 52)	72 h (n = 48)	NA (18%)	NA (11%)	Sutures and clips	2
Voorhees et al (10)	82	Once sutures removed (n = 43)	48 h (n = 39)	8	4	Monofilament nylon	2
Noe and Keller (11)	100	NA	1 d (n = 100)	NA	0	Monofilament nylon	4
Heal et al (12)	857	48 h (n = 442)	12 h (n = 415)	40 (9%)	35 (8.4%)	Nylon	2

Abbreviations: NA, not available; NS, not stated.

studies with foot and ankle surgeries, which, we believe, can be extrapolated to typical foot and ankle practice. Additional research is needed to clarify the role showering, bathing, and water contact has with regard to postoperative surgical site infection in the foot and ankle.

In conclusion, in the present study, a systematic review of reports to determine the scientific or evidence basis for the recommendation to keep sutured surgical incisions dry during the course of healing was performed. A total of 9 reports were included in the present review after the inclusion criteria were applied. The results of these studies showed that no basis exists for recommending that a patient avoid showering or bathing a surgical incision site as a part of their normal daily hygiene during the healing process. This might be useful in the development of future prospective cohort studies and randomized controlled trials that focus on surgical wound healing.

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