

No Need for Preoperative Antiseptics in Elective Outpatient Plastic Surgical Operations: A Prospective Study

A. J. Kalantar-Hormozi, M.D., and Babak Davami, M.D.

Tehran, Iran

Summary: The development of antiseptics in the late nineteenth and early twentieth centuries revolutionized health care. The time-honored technique of skin preparation is to scrub the entire operative area of the patient for 5 to 7 minutes with a germicidal detergent solution and then paint the region with an antimicrobial solution of either tincture of povidone-iodine (Betadine) or chlorhexidine. Although antiseptics result in lower colony counts on the skin, they have side effects and higher cost in relation to normal saline. The authors have prepared patients by showering the surgical site with soap and water and rinsing it with normal saline, in 905 cases of outpatient, clean-wound plastic surgery. In another 905 cases that served as the control group, the traditional method of preoperative shower and scrub with chlorhexidine or Betadine was used. In both groups, there was no incidence of wound infection. (*Plast. Reconstr. Surg.* 116: 529, 2005.)

The development of antiseptics in the late nineteenth and early twentieth centuries revolutionized health care.¹ Currently, “antiseptics” is the use of antimicrobial chemicals on human tissues, whereas disinfection is the use of these agents on inanimate objects.¹ The ability of a microbe to cause infection is a balance be-

tween host defenses and microbial pathogenicity.² The commonest causative organisms are *Staphylococcus aureus*, *Escherichia coli*, *Staphylococcus epidermidis*, and *Pseudomonas aeruginosa*, in order of prevalence.³

The time-honored technique of skin preparation is to scrub the entire operative area of the patient for 5 to 7 minutes with a germicidal detergent solution and then paint the region with an antimicrobial solution of either tincture of povidone-iodine (Betadine) or chlorhexidine.² Povidone-iodine is a unique compound formed by binding free iodine to polyvinyl pyrrolidone; its most common commercial form is a 10% solution in water yielding available iodine.⁴ It is an effective nonirritating bactericidal regimen for use at surgical incision sites.⁵ However; one of its disadvantages is that it reduces wound strength.⁶

Chlorhexidine gluconate is a more effective skin disinfectant than povidone-iodine, and its use results in lower mean colony counts of skin bacteria at the surgical incision site.⁷⁻⁹ The occurrence of wound infection depends on many factors, but the most important is bacterial contamination of the wound according to the site of operation. Other factors include wound contamination, site of operation, open drainage, reoperation, intraoperative radiographic examination, and postoperative hematoma of the wound, with the last factor being the most important.¹⁰

Surgeons can decrease the likelihood of postoperative infection by handling tissues

From the Department of Plastic and Maxillofacial Surgery, Shahid Beheshti University of Medical Sciences. Received for publication August 20, 2003; revised November 12, 2003.

DOI: 10.1097/01.PRS.0000142438.39280.3F

gently.² The degree of intraoperative contamination is important as a risk factor of surgical site infection and is classified into clean, clean-contaminated, contaminated, and dirty infected.¹¹ The infection rates on these sites are 5.9, 10.7, 24.3, and 25.9 percent, respectively.³ The clean wound infection rate is the most valuable reflection of surgical care in any hospital.⁵

The use of prophylactic antibiotics by plastic surgeons is increasing, especially in aesthetic procedures. A review of the literature indicates that this increase in use is not based on scientific evidence of increased incidence of infection or on increased evidence of efficacy.¹² This article is focused on clean wound surgery without use of preoperative antiseptics.

MATERIALS AND METHODS

We carried out a prospective survey during an 8-year period (1994 to 2002). The patients were all candidates for elective outpatient surgery, including excision of nevus, scar revision, Z-plasty, excision of benign cysts and tumors of skin, and dermabrasion.

We randomized the patients into two groups according to their time of admission (even or odd days). In both groups, age, sex, concomitant medical problems, and type of operation were recorded. The exclusion criteria were as follows: immunosuppression states (e.g., corticosteroid use, renal failure), incomplete follow-up, and antibiotic use at the time of surgery.

The first group (905 cases) took a shower with soap and water 2 hours before surgery, and we used normal saline irrigation to prepare the site of operation. We did not use any antiseptics or antibiotics either preoperatively or postoperatively.

The second group of 905 cases was selected as a control group. Both groups were similar regarding sex, age, and other factors.

The second group also took a preoperative shower with soap and water. We used povidone-iodine to scrub and then paint the site of operation. No antibiotics or antiseptics were used postoperatively.

We performed all of the operations in only one hospital (15 Khordad Hospital). All the procedures and preoperative and postoperative care were performed by a single team. In both groups, tissues were handled gently and meticulously.

Follow-up was performed as visits on a regular basis weekly up to a month in both groups

to determine the incidence of wound infection. Signs of wound infection were considered redness, swelling, discharge, and wound dehiscence. The operations and visits were performed only by the authors.

RESULTS

The total number of operations was 1994 which, after exclusion, reduced to 1810; that is, 905 in each group. The type and number of operations are shown in Table I (group 1 is the control group). There is no significant statistical difference between the two groups ($p > 0.05$).

In group 1 and group 2, 352 and 297 were men, respectively. The difference is significant ($p < .05$), and in both groups, there were more women than men female. The mean age was 34.67 and 33.47 years in groups 1 and 2, respectively (with a SD of 12.48 and 14.56, respectively). There was no significant statistical difference between the two groups ($p > 0.05$). There was no incidence of wound infection noted in either group after 1-month follow-up.

DISCUSSION

Preoperative showering with chlorhexidine gluconate, Betadine, or medicated bar soaps is routinely practiced to reduce skin colonization at the site of surgical incision.^{8,9} Antiseptics have the potential to cause corneal toxicity and have adverse effects on cultures of fibroblasts and keratinocytes.^{14,15}

Although preoperative cleansing with povidone-iodine surgical scrub followed by povidone-iodine antiseptic solution is an effective, nonirritating bactericide regimen for use at surgical incision sites, it has been shown that this agent significantly reduces wound strength.^{5,6} In addition, recent nosocomial outbreaks have shown that povidone-iodine solutions can become intrinsically contaminated with mycobacteria.¹³

In our postoperative surveillance of 905 patients with elective outpatient clean wound sur-

TABLE I
Type and Number of Operations in Groups 1 and 2

Type of Operation	Group 1 (control group)	Group 2
Nevus	310	277
Scar	139	161
Z-plasty	110	122
Benign soft-tissue tumors	282	260
Dermabrasion	64	85

gery, we did not use Betadine, chlorhexidine, or medicated soap as a preoperative shower or as a surgical scrub and found no incidence of wound infection. We only advised the patients to take a shower with soap and water and prepared the site of surgery with normal saline.

The major determinants of a study's power are the number of infections that occur and the magnitude of the difference between treatments.¹⁵ Approximately 65 infections are required to have an 80 percent chance (power) of finding a 50 percent reduction in infection rate if two equalized groups of patients are studied. If the overall risk of infection is 5 percent, one must study approximately 1300 patients.¹⁶ As stated by Kaiser, many more than 900 patients would be needed to demonstrate reliably that differences do not exist.¹⁷

In our study, the incidence of infection in both groups was zero (not 5 percent), meaning that an indefinite number of patients (not 1300 or approximately that) should be studied to conclude that no difference exists, which is somewhat impossible. During the 8-year period of study (1994 to 2002), we studied 1810 patients with no incidence of wound infection. We think that the absence of wound infection in both groups might have been attributable to meticulous surgical technique. Regarding the possible disadvantages of antiseptics including side effects and the higher cost of these agents in comparison with normal saline,¹⁸ we suggest that in clean wound surgery, our method of preoperative preparation of the patient could be a good alternative.

CONCLUSION

A preoperative surgical scrub or shower with antiseptics is not an obligation in clean wound surgery; equal results can be obtained with the use of normal saline to prepare the surgical site for operation if meticulous and careful technique is used.

A. J. Kalantar-Hormozi, M.D.
15 Khordad Medical Center
Aban St., Karim Khan Blvd.
Tehran, Iran
kalantarj@yahoo.com

REFERENCES

1. Sabiston, D. D., Jr. *Principles of Operative Surgery*, 15th Ed. Philadelphia: Saunders, 1997. Pp. 253-254.

2. Howard, R. J. Surgical infections. In S. I. Schwartz (Ed.), *Principles of Surgery*, 7th Ed. New York: McGraw-Hill, 1999. Pp. 125-126.
3. Twon-Danso, K., Grant, C., al-Suleiman, S. A., et al. Microbiology of postoperative wound infection: A prospective study of 1770 wounds. *J. Hosp. Infect.* 21: 29, 1992.
4. Dedo, D. D., Alonso, W. A., and Ogura, J. H. Povidone-iodine: An adjunct in the treatment of wound infections, dehiscences, and fistulas in head and neck surgery. *Trans. Am. Acad. Ophthalmol. Otolaryngol.* 84: 68, 1997.
5. Georgiade, G. S., Georgiade, N. G., Grandy, R. P., et al. The effect of povidone-iodine solutions used as surgical preparations on the bacterial flora of the skin. *Adv. Ther.* 7: 1, 1990.
6. Kashyap, A., Beezhold, D., Wiseman, J., et al. Effect of povidone iodine dermatologic ointment on wound healing. *Ann. Surg.* 61: 486, 1995.
7. Kaiser, A. B., Kernodle, D. S., Barg, N. L., et al. Influence of preoperative showers on staphylococcal skin colonization: A comparative trial of antiseptic skin cleansers. *Ann. Thorac. Surg.* 45: 35, 1998.
8. Garibaldi, R. A., Skolnick, D., Lerer, T., et al. The impact of preoperative skin disinfection on preventing intraoperative wound contamination. *Infect. Control Hosp. Epidemiol.* 9: 109, 1988.
9. Garibaldi, R. A. Prevention of intraoperative wound contamination with chlorhexidine shower and scrub. *J. Hosp. Infect.* 11 (Suppl. B): 5, 1988.
10. Anielski, R., and Barczynski, M. Postoperative wound infections: Risk factors related to surgery. *Przegl. Lek.* 55: 109, 1988.
11. Sumiyama, Y., and Arima, Y. Surgical site infection: SSI. *Nippon Rinsho* 60: 2204, 2002.
12. Lyle, W. G., Outlaw, K., Krizek, T. J., et al. Prophylactic antibiotics in plastic surgery: Trends of use over 25 years of an evolving specialty. *Aesthetic Surg. J.* 23: 177, 2003.
13. Jarvis, W. R. Nosocomial outbreaks: The Centers for Disease Control Hospital Infections Program experience: 1980-1990. Epidemiology Branch, Hospital Infections Program. *Am. J. Med.* 91: 101S, 1991.
14. MacRae, S. M., Brown, B., and Edelhauser, H. F. The corneal toxicity of presurgical skin antiseptics. *Am. J. Ophthalmol.* 97: 221, 1984.
15. Fabreguette, A., Zhi Hua, S., Lasne, E., and Damour, O. Evaluation of the cytotoxicity of antiseptics used in current practice on cultures of fibroblasts and keratinocytes. *Pathol. Biol. (Paris)* 42: 888, 1994.
16. Platt, R. Methodologic aspects of clinical studies of perioperative antibiotic prophylaxis. *Rev. Infect. Dis.* 13 (Suppl. 10): S810, 1991.
17. Kaiser, A. B. Medical intelligence drug therapy: Antimicrobial prophylaxis in surgery. *N. Engl. J. Med.* 315: 1129, 1986.
18. Dire, D. Y., and Welsh, A. P. A comparison of wound irrigation solutions used in the emergency department. *Ann. Emerg. Med.* 19: 704, 1990.