

Evidenced based care in surgery: surgical practice and avoidance of infection in breast surgery

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The surgical treatment of breast cancer has been undergoing steady evolution for many years. The “classical” radical mastectomy of the early 20th century has been supplanted by conservative surgical procedures combined with localized radiotherapy and systemic hormonal or chemotherapy. In most countries, patients no longer stay in the hospital until drain tubes are removed, saving money and hospital resources. These shifts were occasioned by many clinical trials showing that survival and quality of life were not impaired or were even improved by less radical procedures and shorter hospitalizations. While the question of survival is, of course, critical, there are other questions pertaining to the surgical care of breast patients which remain to be definitively answered. Among these are: (I) Should the wounds be drained? (II) If so, for how long should drains be kept? (III) Do drains increase the risk of infection? (IV) If so, what can be done to decrease infection rates? (V) Should antibiotics be used routinely for these clean cases? (VI) If so, should they only be given pre-operatively, or should they be continued until drains are removed? (VII) Should perioperative antibiotics be supplemented with topical intra-operative antibiotics? (VIII) Should patients with implants be treated with antibiotics longer than those without implants? These questions are not simply academic. Surgical site infection rates after breast and axillary operations range from 1-26% and infections carry important economic ramifications for patients and medical care systems (1,2). Factors thought to increase infection include prior biopsy at the surgical site, the use of acellular dermis in reconstruction, hemorrhage requiring blood transfusion, and host factors such as age, diabetes, smoking, morbid obesity, immunosuppression, and

colonization of the nose with *S. aureus* (3). The Centers for Medicare and Medicaid Services assume that surgical site infections can be prevented and have classified them as a so-called “never event”, meaning that reimbursement will not be made if a surgical site infection occurs. Other “never events” include vascular catheter associated infections, deep venous thrombosis/pulmonary embolism, retained foreign body, falls and trauma, air embolism, deep pressure ulcers, and blood incompatibility. Some of these “never events” are associated with risk factors beyond our control such as diabetes and obesity (4). Thus, it is doubtful that all surgical site infections can be prevented, but certainly the onus is on us to do as much as we can to reduce infection rates.

Many breast surgeons use drains to prevent seroma formation on the grounds that drainage may prevent infection. Further, the accumulation of fluid under pressure may sometimes cause pain and wound healing problems. Some surgeons leave drains in place until the outputs are low (<30-60 mL/day). Others prefer to pull the drains out at a predetermined time and aspirate seromas later if they occur. Some do not use drains at all and try to eliminate “dead space” by suturing skin flaps to the muscle. Other techniques which have been suggested to prevent seromas include compression dressings, quilting sutures, and fibrin sealants to encourage skin flaps to adhere to the underlying tissues. Compression dressings and quilting sutures can interfere with early arm mobilization and there is little evidence to show that they diminish seroma formation. Similarly, fibrin sealants appear to have had little impact on the rates of seroma formation and infection (5). Closed suction drains are easy to use, relatively comfortable for patients, and generally are considered to be an improvement

over open drainage systems since they divert the fluid away from the wound into a closed container. Drains bypass the normal protective mechanisms of intact skin and can become a conduit for bacteria. The risk of colonization of the drain tract is thought to be directly related to the length of time needed for wound duration.

The Mayo Clinic group conducted a survey of breast surgeons in the USA and showed that prophylactic antibiotics were being used routinely in breast surgery; however practice patterns differed depending on whether or not reconstruction was performed (1). Most American surgeons give intravenous cephalosporins preoperatively. When no implant is placed, surgeons generally follow US national guidelines and stop antibiotics right after surgery. The situation is quite different, however, when an implant is placed. Plastic surgeons are rightfully concerned that infection can cause the operation to fail with sometimes devastating clinical consequences. The survey showed that plastic surgeons overwhelmingly support the use of prolonged antibiotic therapy (1). A recent retrospective study of patients undergoing breast reconstruction showed that switching from prolonged antibiotic use to a one time pre-operative dose increased infection rates from 18% to a staggering 34% (6). Concerns with prolonged antibiotic use include the development of resistant organisms, antibiotic associated side effects such as diarrhea, allergic reactions, organ dysfunction, and the risk of *Clostridium difficile* infection.

The recent paper by Degnim *et al.* (7) is a randomized controlled trial to determine whether local antiseptic measures can reduce drain colonization. It was designed as a proof of principle for a larger study to determine whether infection rates in mastectomy patients can be reduced by using simple local antiseptic measures including a chlorhexidine gluconate disc around the drain and irrigation of the drain bulb twice daily with 10 mL of dilute Dakin's solution (0.0125% buffered sodium hypochlorite) (7). The chlorhexidine disc was covered with a transparent sterile dressing and changed every three days. While this pilot study of 100 patients did not set out to specifically measure infection rates, it confirmed that there was a significant drop in bacterial counts in culture specimens taken from the drainage bulbs and tubing. The authors found that 66% of patients in the control arm had positive cultures from the drainage bulbs at one week, while only 21% of treated patients had positive drain bulb cultures. Although the importance of positive drain bulb cultures may be debated, the study also showed that culture of the drain

tips were negative in all treated patients and positive in 19% of controls. This was accompanied by less erythema at the drain sites and a strong trend toward fewer wound infections. There seem to be few drawbacks to this approach. The technique requires that patients learn to do a relatively simple dressing change and learn to irrigate the bulb. Those who cannot change the dressings on their own can usually be seen by a visiting nurse or come to the office for a dressing change. The materials are relatively inexpensive compared to the cost of an infection. Further, if the infection results in a loss of reimbursement to the hospital and to surgeons, the expense of the dressing becomes a minor issue. One could ask whether the Dakin's irrigation is truly necessary, but it is cheap and can even be made at home by dissolving 0.5 teaspoon (2.5 mL) of baking soda in 32 oz (946 mL) of boiled water and adding 2.5 tsp (7.5 mL) of 5.25% sodium hypochlorite (e.g., Clorox). Is this technique better than other antibacterial dressings such as silver sulfadiazine or triple antibiotic ointment? We can't tell at the moment, nor can we know if drain irrigation alone will make prolonged antibiotic treatment unnecessary for patients with implants. (One suspects that plastic surgeons will be reluctant to give up oral antibiotics, particularly if patients are non-compliant with drain irrigation.) While it is difficult and expensive to construct controlled randomized trials, it is important to transform surgical practices based on individual experience into rational decisions based on available evidence. The article by Degnim *et al.* is an important step in the right direction. For now, it seems that prophylactic pre-operative antibiotics are *de rigueur* in breast surgery. Post-operative antiseptic drain care should be considered in all breast cases where the plan is to leave drains at least one week. Further, it appears that antibiotics should be continued post-operatively for patients with implants until the drains are removed. We look forward to more studies of this kind.

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