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EDITORIAL

The Role of Prophylactic Antibiotics in Preventing Wound Infection

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In this country, antibiotics are probably more misused than used and except for a few "enlightened" souls, most of us continue to prescribe antibiotics today as was done in many developed countries several decades ago. We seem to be stuck in a time warp as far as the rational use of antibiotics in surgery is concerned. The most charitable reason for continuing to prescribe antibiotics haphazardly post-operatively for several days is that the "apprentice" model of learning has been followed faithfully with no thought or idea that such practice may be unnecessary and may indeed cause more harm than good. For most procedures in obstetrics and gynecology, in the absence of purulent abscesses and where wounds are classified as "clean contaminated"—the surgical wound infection (SWI) risk being two to five percent—the need for administration of "prophylactic" antibiotics is advocated unlike "dirty" wounds where "curative" antibiotics are administered for a prolonged period of time post-operatively as well. *S. aureus* is the most common pathogen causing surgical site infection (SSI), accounting for 30 % of SSIs in the United States. Colonization with *S. aureus*, primarily in the nares, occurs in roughly one in four persons and increases the risk of SSI by 2- to 14-fold. **1.**

The perennial idiomatic argument is that "what is one man's meat is another man's poison" and that practices followed in developed countries may not be suitable or desirous in "developing" countries due to climactic and environmental conditions. It is yet to be proved whether this reasoning is sustainable on a scientific basis. There is no excuse for anyone to not follow certain universal procedures in order to prevent post-operative morbidity. These include adequate skin preparation, hair clipping as opposed to shaving, strict adherence to hand-washing principles prior to surgery, and maintaining sterile surgical fields. Consistent infection control surveillance should also be maintained. Besides this, a rational and well thought out antibiotic protocol should be instituted. However, where unsanitary conditions prevail, to contain any contrarian argument, the idiom "horses for courses" may be the rule to be followed.

In an article on "Antibiotic use in gynecologic procedures," **2** the authors reviewed "the evidence and provide recommendations for antibiotic prophylaxis in gynecologic surgery. Outcomes evaluated include need and effectiveness of antibiotics to prevent infections in gynecologic procedures. Medline and The Cochrane Library were searched for articles published between January 1978 and January 2011 on the topic of antibiotic prophylaxis in gynecologic procedures. Results were restricted to systematic reviews, randomized control trials/controlled clinical trials, and observational studies. Searches were updated on a regular basis and incorporated in the guideline to June 2011. Grey (unpublished) literature was identified through searching the websites of health technology assessment and health technology assessment-related agencies, clinical practice guideline collections, clinical

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trial registries, and national and international medical specialty societies. The quality of evidence obtained was rated using the criteria described in the Report of the Canadian Task Force on Preventive Health Care."

Recommendations include the following: "[1] All women undergoing an abdominal or vaginal hysterectomy should receive antibiotic prophylaxis. (I-A) [2] All women undergoing laparoscopic hysterectomy or laparoscopic assisted vaginal hysterectomy should receive prophylactic antibiotics. (III-B) [3] The choice of antibiotic for hysterectomy should be a single dose of a first-generation cephalosporin. If patients are allergic to cephalosporin, then clindamycin, erythromycin, or metronidazole should be used. (I-A) [4] Prophylactic antibiotics should be administered 15–60 min prior to skin incision. No additional doses are recommended. (I-A) [5] If an open abdominal procedure is lengthy (e.g., $>$ 3 h), or if the estimated blood loss is $>$ 1,500 mL, an additional dose of the prophylactic antibiotic may be given 3–4 h after the initial dose. (III-C) [6] Antibiotic prophylaxis is not recommended for laparoscopic procedures that involve no direct access from the abdominal cavity to the uterine cavity or vagina. (l-E) (7) All women undergoing surgery for pelvic organ prolapse and/or stress urinary incontinence should receive a single dose of first-generation cephalosporin. (III-B) (8) Antibiotic prophylaxis is not recommended for hysteroscopic surgery. (II-2D) (9) All women undergoing an induced (therapeutic) surgical abortion should receive prophylactic antibiotics to reduce the risk of post-abortal infection. (I-A) (10) Prophylactic antibiotics are not suggested to reduce infectious morbidity following surgery for a missed or incomplete abortion. (I-E) (11) Antibiotic prophylaxis is not recommended for insertion of an intrauterine device. (I-E) However, health care professionals could consider screening for sexually transmitted infections in high-risk populations. (III-C) (12) There is insufficient evidence to support the use of antibiotic prophylaxis for an endometrial biopsy. (III-L) (13) The best method to prevent infection after hysterosalpingography is unknown. Women with dilated tubes found at the time of hysterosalpingography are at highest risk, and prophylactic antibiotics (e.g., doxycycline) should be given. (II-3B) (14) Antibiotic prophylaxis is not recommended for urodynamic studies in women at low risk, unless the incidence of urinary tract infection post-urodynamics is $>$ 10 %. (1-E) (15) In patients with morbid obesity (BMI $>$ 35 kg/m^2), doubling the antibiotic dose may be considered. (III-B) (16) Administration of antibiotics solely to prevent endocarditis is not recommended for patients who undergo a genitourinary procedure. (III-E)."

The aim of the usage of prophylactic antibiotics in surgery is not to eradicate all possible pathogens, but to achieve a tissue level to ward off infection from a potential microorganism without any effect on microbial flora and without adverse side effects and to be used for a short duration. First-generation cephalosporins—cefazolin—seem to be the drug of choice which fit the criteria listed earlier. Use of third-generation cephalosporins may be unnecessary, may have a spectrum of activity against organisms not encountered at routine surgery, and indeed may have less action against staphylococci when compared to cefazolin. The threat of the emergence of resistant organisms persists.

In a prospective cohort study to investigate the opportunity of prophylactic antibiotics to prevent early post-operative infections and febrile morbidity in elective laparoscopic surgery for benign gynecological conditions, Litta et al. **3** studied 300 patients who underwent laparoscopic surgery for benign gynecological conditions. 150 patients received 2 g of cefazolin 30 min prior to surgery and the rest received no antibiotics. No post-operative infections were found in any patient.

The optimum effect of antibiotics is obtained when it is administered 15 min to an hour prior to surgery. Additional doses may be given when the duration of the procedure goes beyond 3 h or when there is blood loss of more than 1,500 ml. Post-operative antibiotics should be kept to the minimum and should be administered only when deemed absolutely necessary in the presence of existing infection at the time of surgery when a "curative" effect is desired. The Society of Obstetricians and Gynecologists of Canada recommends this protocol for all cases of elective and emergency Cesarean sections with a high level of evidence (1-A).The choice of antibiotic is deemed to be a single dose of first-generation cephalosporin. According to Hopkins et al., **4** both ampicillin and first-generation cephalosporins have similar efficacy in reducing post-operative endometritis. There does not appear to be added benefit in utilizing a more broad-spectrum agent or a multiple dose regimen. The post-operative duration of antimicrobial prophylaxis should be limited to less than 24 h, regardless of the presence of indwelling catheters or drains according to the American Society of Health System—Pharma **5.**

Appropriate prophylaxis for women undergoing surgery that may involve the bowel includes a mechanical bowel preparation without oral antibiotics and the use of a broad-spectrum parenteral antibiotic administered immediately before surgery**. 6** The post-operative duration of antimicrobial prophylaxis should be limited to less than 24 h, regardless of the presence of indwelling catheters or drains.

There seems to be a consensus in the world literature about the need and the benefits of a preferably single antibiotic being administered just prior to surgery and a top up if need be in case of excessive bleeding or if the surgery is prolonged in order to prevent SWI and thereby achieve a "prophylactic" effect. There also seems to be an agreement

about the use of post-operative antibiotic in such cases being an "overkill" which may cause more harm than good to the patient. This excessive use of antibiotics needs questioning and hospital infection committees may need to institute inquiries to curb rampant misuse of these drugs.

It may take deliberation and debate, may involve further reading about protocols established by other august bodies, it may mean taking baby steps in the right direction, but ultimately it means taking an informed leap of faith in prescribing antibiotics for prophylaxis in the correct manner.

It may be business as usual for the pharmaceutical industry to introduce antibiotics of all hues, qualities, properties, of successively higher generations, and in all sorts of combinations even for prophylaxis. Some of the drug combinations, however, are so irrational that they not only defy belief but also defy sound pharmacology as enunciated by Goodman and Gilman. It is not business as usual, however, to be uninformed, remain uninitiated in sound prescribing principles, or be taught the fine art of prescribing by pharmaceutical company representatives. Our business is healing, not commerce.

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