

Prophylaxis in wound infection

Surgical wound infection. Antibiotic prophylaxis has contributed to a reduction in superficial wound infection rates. Coverage should be initiated not more than 1 hour (oral administration) or 1/2 hour (intramuscularly or intravenously) before the skin incision is made and, in the absence of gross contamination or overt infection, should not be administered beyond 24 to 48 hours after surgery. Repeat doses should be administered according to the usual dosing protocol during prolonged procedures.

Prophylactic antibiotics are indicated for class two and selected cases in class one surgeries can be given as a single intravenous dose completed 30 min before incision. For prolonged procedures, additional doses should be administered at usual dosing intervals. In general, antibiotics should not be continued postoperatively except in dirty wounds.

Wound infections are among the most common surgical complications. Their frequency ranges from less than 2% to more than 40%. The chance of developing a postoperative wound infection is dependent on many factors, including

- 1) inherent patient risks,
- 2) the type of surgery being performed, and
- 3) The patient's preparation for the procedure.

Of particular importance is preoperative preparation of the patient.

- ❖ The duration of preoperative hospitalization is important because the patient is exposed to flora that may not be present in the community setting. Such bacteria frequently have broad antibacterial resistance patterns and can become major sources of postoperative morbidity.
- ❖ Preparation of the patient and the operative site are also important.

* Because the colon is a rich source of bacteria, those undergoing elective colonic surgery should have both mechanical as well as antibacterial preparation. This begins the day before surgery when the patient drinks a polyethylene glycol solution that causes mechanical cleansing. This is followed by oral administration of erythromycin and neomycin in nonabsorbable forms. These further reduce the flora of the colon and leave a residue that reduces the number of bacteria present when the colon is subsequently resected.

* Preparation of the operative site usually requires hair removal and skin coating with an antiseptic solution. Optimal preparation now consists of hair removal, either with clipping immediately before the operation begins. After hair has been removed, the skin is scrubbed with an antiseptic solution and then painted with povidone iodine solution, which leaves an antimicrobial residue.

* The duration of the operation itself affects the incidence of wound infections, since surgery in excess of 2 hours has been shown to have an increased incidence of such infections.

* The risk of a postoperative wound infection is related to the type of surgery performed (**Table 1**).

In general, procedures are divided into four categories: clean, cleancontaminated, contaminated, and infected.

❖ Additionally, operative technique is important and includes such factors as

1. the placement of the incision,
2. shielding during the procedure to prevent contamination with flora,
3. debridement of devitalized tissue, and
4. Method of closure: Wounds should always be closed without tension and with the minimum amount of suture required to effect adequate approximation.
5. Drains should generally be routed away from wound edges and should not be placed unless there is a specific indication, because they may actually increase the wound infection rate.
6. When skin is left open because of contamination, the wound should be packed lightly with saline soaked gauze that is changed regularly. Wounds should not be inspected until the second or third day to prevent contamination.

When examined, care should be taken to change the dressing with sterile gloves and gauze sponges to prevent introducing new pathogens into the wound.

Antibiotic prophylaxis

- Prophylactic antibiotics are used to prevent infection occurring due to surgical interventions and are usually very short course (1-3 doses).
- Active antibiotic treatment for established infections encountered during surgery may be for 5 or more days.

The broad principles of prophylaxis are the following.

- It is most important to have a high circulating serum level of antibiotics at the time of potential tissue contamination, i.e. administered around the time of induction of anaesthesia.
- Prophylaxis rarely needs to continue beyond the time of the procedure unless there are high risk factors or specific indications, i.e. most prophylaxis is one or occasionally three doses on the day of surgery.
- Many clean wounds, e.g. skin lesion excision, do not require prophylaxis.
- High risk patients who may warrant an extended prophylactic course (e.g. up to 3 days) or specific prophylaxis include:
 - Neutropenic or immunosuppressed patients;
 - Severely malnourished patients;
 - Patients with prosthetic implants, e.g. heart valves.

Antibiotic administration can reduce the incidence of wound infections. The use of such drugs should be chosen by general principles and by the site involved (**Table1,2**).

Table 1 Risk groups for developing wound infection

CLASS	CHARACTERISTICS	INCIDENCE (%)
Clean	Nontraumatic; no inflammation encountered; no break in technique; respiratory, alimentary, or genitourinary tracts not entered	<2
Clean-contaminated	Gastrointestinal or respiratory tract entered without significant spillage; appendectomy; oropharynx or vagina entered; genitourinary or biliary tract entered in absence of infected urine or bile; minor break in technique	2–8
Contaminated	Major break in technique; gross spillage from gastrointestinal tract	8–15
Dirty and infected	Acute bacterial inflammation encountered; transection of “clean” tissue for the purpose of surgical access to a collection of pus; traumatic wound with retained devitalized tissue, foreign bodies, fecal contamination, or delayed treatment.	12–40

Table 2 antibiotic selected according to the possible microorganism

NATURE OF OPERATION	LIKELY PATHOGENS	RECOMMENDED DRUGS
Cardiac		
Noncardiac thoracic	<i>S. aureus</i> , <i>S. epidermidis</i> , streptococci, enteric gram-negative bacilli	Cefazolin or cefuroxime 1–2 g IV OR vancomycin 1 g IV
Vascular Arterial surgery involving the abdominal aorta, a prosthesis, or a groin incision	<i>S. aureus</i> , <i>S. epidermidis</i> , enteric gram-negative bacilli	Cefazolin 1–2 g IV OR vancomycin 1 g IV

Arterial surgery involving the abdominal aorta, a prosthesis, or a groin incision	S. aureus, S. epidermidis, enteric gram- negative bacilli	Cefazolin 1–2 g IV OR vancomycinc 1 g IV
Lower extremity amputation for ischemia Arterial surgery involving the abdominal aorta, a prosthesis, or a groin incision	S. aureus, S. epidermidis, enteric gram- negative bacilli, clostridia S. aureus, S. epidermidis, enteric gram- negative bacilli	Cefazolin 1–2 g IV OR vancomycinc 1 g IV Cefazolin 1–2 g IV OR vancomycinc 1 g IV

Neurosurgery Craniotomy	S. aureus, S. epidermidis	Cefazolin 1–2 g IV OR vancomycinc 1 g IV
Orthopaedic Total joint replacement, internal fixation of fractures	S. aureus, S. epidermidis	Cefazolin 1–2 g IV OR vancomycinc 1 g IV
Ophthalmic	S. aureus, S. epidermidis, streptococci, gram-negative bacilli, Pseudomonas	Gentamicin or tobramycin Multiple drops topi- enteric or neomycin-gramicidin- cally over 2–24 hr polymyxin B Cefazolin 100 mg subconjunctivally at the end of the procedure

<p>Clean contaminated</p> <p><i>Head and neck</i> Entering oral cavity or pharynx</p>	<p>S. aureus, streptococci, oral anaerobes</p>	<p>Cefazolin 1–2 g IV OR clindamycin □□600–900 mg IV gentamicin 1.5 mg/kg IV</p>
<p>Abdominal Gastroduodenal</p>	<p>Enteric gram-negative bacilli, gram positive cocci</p>	<p>High risk only: cefazolin 1–2 g IV</p>
<p>Biliary tract</p>	<p>Enteric gram-negative bacilli, enterococci, clostridia</p>	<p>High risk only: cefazolin 1–2 g IV</p>
<p>Colorectal</p>	<p>Enteric gram-negative bacilli, anaerobes</p>	<p>Oral: neomycin + erythromycin based Parenteral: cefoxitin or 1–2 g IV cefotetan</p>
<p>Appendectomy</p>	<p>Enteric gram-negative bacilli, anaerobes</p>	<p>Cefoxitin or cefotetan 1–2 g IV</p>
<p>Gynecologic and obstetric Vaginal or abdominal hysterectomy</p>	<p>Enteric gram-negatives, anaerobes, group B streptococci, enterococci</p>	<p>Cefazolin or cefotetan or 1 g IV cefoxitin</p>
<p>Cesarean section</p>	<p>Same as for hysterectomy</p>	<p>High risk only: cefazolin 1 g IV after cord clamping</p>
<p>Abortion</p>	<p>Same as for hysterectomy</p>	<p>First trimester, high risk 1 million units IV only: aqueous penicillin G OR doxycycline 300 mg Second trimester: cefazolin 1 g IV</p>

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