

Perioperative Antibiotics in Cutaneous Surgery

Objective

- Review the indications and use of prophylactic oral antibiotics for cutaneous surgical procedures

A Typical Patient



Objectives

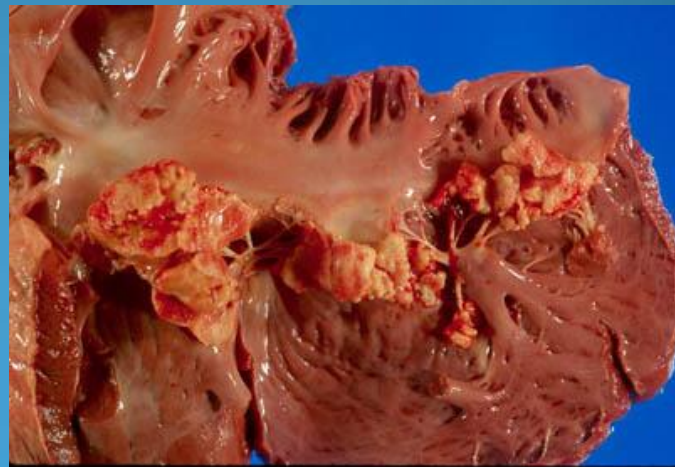
- The use of oral antibiotics both prior to and after cutaneous surgical procedures is controversial

Antibiotics

- Adverse events that could arise following the use of a prophylactic antibiotic include:
 - Dermatologic or systemic reaction to the medication
 - Development of a resistant strain of bacteria

Antibiotics

- Use of prophylactic antibiotics may be considered when:
 - A patient has a cardiac abnormality that increases his or her risk for infective endocarditis



Endocarditis Prophylaxis

- Only 15% of cases of endocarditis are thought to be related to iatrogenic procedures
- Many cases of endocarditis arise in patients without a known cardiac defect

Haas AF, Grekin RC 1995

Endocarditis Prophylaxis

- The risk of endocarditis following specific cutaneous surgical procedures is unknown
- Guidelines for the prevention of infective endocarditis from the American Heart Association (JAMA 1997) do not specifically address the management of patients undergoing cutaneous surgical procedures

Endocarditis Prophylaxis

- Studies have shown that oral antibiotics as prophylaxis against infective endocarditis are often overused in low risk patients and underused in moderate risk patients

Seto TB, Kwait D, et al, 2000

Endocarditis Prophylaxis

- During cutaneous procedures, are dermatologic patients at risk for bacteremia that could result in endocarditis?



Endocarditis Prophylaxis

- A cumulative incidence of bacteremia of 1.7% has been reported in patients undergoing procedures such as excision, Mohs micrographic surgery, and hair transplantation

Sabetta JB, Zitelli JA 1987; Halpern AC, Leyden JJ et al 1988; Zack L, Remlinger K et al 1989; Maurice PDL, Parker S et al 1991; Carmichael AJ, Flanagan PG et al 1993 in George PM 1996

Endocarditis Prophylaxis

- Only 4 cases of endocarditis following cutaneous surgical procedures (biopsy, excision, and cryotherapy) have been reported, making the development of endocarditis a very rare complication of cutaneous surgery

George PM 1996

Endocarditis Prophylaxis

- Information necessary for deciding the use of a prophylactic antibiotic to protect against endocarditis includes:
 1. What is the patient's underlying risk for the development of endocarditis?
 2. What is the condition of the skin in the area to be treated?
 3. What is the nature of the planned procedure?

Cardiac Risk

- Patients considered to be at moderate to high risk for the development of endocarditis include those with:

Dajani AS, Taubert KA, Wilson W et al
1997

- Most congenital cardiac malformations
- Prosthetic heart valves
- Mitral valve prolapse with regurgitation
- Rheumatic and other forms of acquired valvular disease
- Hypertrophic cardiomyopathy
- Prior history of endocarditis

Cardiac Risk

- Patients with negligible risk include those with:

- Previous coronary artery bypass graft surgery
- Implanted pacemakers/defibrillators
- Mitral valve prolapse without regurgitation
- Physiologic or functional (“innocent”) murmurs
- Ventricular septal defect or secundum atrial septal defect, or surgical repair of either defect
- Prior rheumatic heart disease or Kawasaki disease without valvular dysfunction

Dajani AS, Taubert KA, Wilson W et al 1997

Cardiac Risk

- In many cases, consultation with the patient's cardiologist may be helpful in determining the exact medical condition present and the specialist's recommendation regarding antibiotic prophylaxis

Skin Condition

- The incidence of bacteremia during procedures on intact, noninfected skin is thought to be very low, especially with sterile preparation
- Antibiotic prophylaxis is not advised, even in high risk patients



Skin Condition

- Procedures on intact but heavily colonized areas of skin (groin, axilla, and foot) have an unknown risk of bacteremia
- Antibiotic prophylaxis may be considered in high-risk patients



Skin Condition

- The incidence of bacteremia during procedures on eroded but not infected skin is low, but eroded skin can be colonized with organisms that may cause endocarditis
- Antibiotic prophylaxis is indicated in high-risk patients



Haas AF, Grekin RC 1997

Skin Condition

- Procedures performed on clinically inflamed or infected skin have an up to 35% incidence of bacteremia
- Antibiotic prophylaxis is strongly advised in high-risk patients



Planned Procedure

- If the epidermis and dermis are not significantly altered during the procedure, prophylaxis is not needed
- Examples include nonablative laser treatments and sclerotherapy

Planned Procedure

- If intact skin has been prepared in a sterile manner for a shave or punch biopsy, excision, curettage, or ablative laser procedure, antibiotic prophylaxis is not needed



Planned Procedure

- Mohs surgery may be considered differently since it is a clean rather than a sterile procedure
- The extended period during which the wound is left open may increase the risk of bacteremia
- Antibiotic prophylaxis is recommended in high risk patients

Maragh SL, Otley CC et al 2005

Planned Procedure

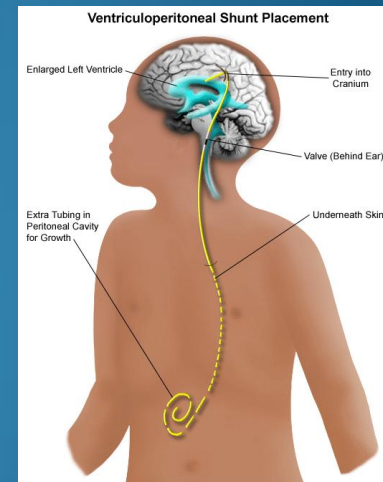
- For procedures involving the oral or nasal mucosa, antibiotic prophylaxis is recommended for high-risk patients



Joint and Neurologic Prosthesis

- A recent review has suggested that patients with joint prostheses and neurologic shunts should be considered in the high risk category, and the use of preoperative antibiotics should be considered

Maragh SL, Otley CC, et al 2005



Joint and Neurologic Prosthesis

- Another recent review advised that prosthetic joint infections due to bacteremia may be more likely in:
 - Patients who are immunocompromised or immunosuppressed
 - Patients who have diabetes or are malnourished
 - Patients whose joint replacement is less than 2 years old

Messingham MJ, Arpey CJ, 2005

Joint and Neurologic Prosthesis

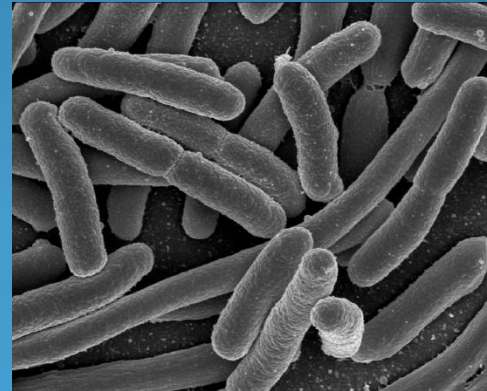
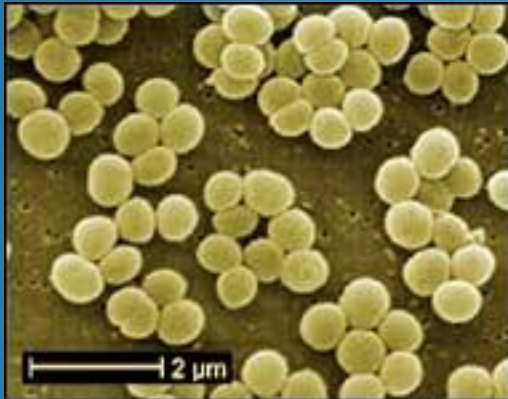
- Consultation with the patient's orthopedist or neurologic surgeon can be helpful in determining the need for prophylactic preoperative antibiotics

Antibiotic Selection

- Once the need for preoperative antibiotics to prevent infection has been decided, the appropriate antibiotic must be chosen

Antibiotic Selection

- Determined by the organism likely to be present at the treated site



Preoperative Antibiotics

- Ideally given orally as a single preoperative dose 1 hour before the start of the procedure
- A second dose may be given in procedures expected to last longer than several hours (Mohs surgery)

Antibiotic Selection: Nonoral Sites

- *Staphylococcus aureus* and *Streptococcus pyogenes* are likely pathogens
- 1st generation cephalosporin (cephalexin 2 g)
- Penicillinase-resistant penicillin (dicloxacillin 2 g)
- Clindamycin 600 mg
- Azithromycin 500 mg
- Clarithromycin 500 mg

Antibiotic Selection: Oral and Nasal Mucosal Sites

- *Streptococcus viridans*, *Peptostreptococcus* species, *S. aureus*, *Enterococcus* species, and *Escherichia coli* are likely pathogens
- Amoxicillin 2 g is the antibiotic of choice for oral mucosal procedures
- Clindamycin 600 mg
- Cephalexin 2 g
- Azithromycin
- Clarithromycin 500 mg

Prevention of Surgical Site Infection

- Use of prophylactic antibiotics may be considered when there is a risk of developing a postoperative wound infection

Prevention of Surgical Site Infection

- Wounds on intact, noninflamed skin made using sterile technique (“clean” wounds) have a less than 5% chance of becoming infected, and postoperative antibiotics are not recommended

Maragh SL, Otley CC et al 2005 and Messingham MJ, Arpey CJ 2005



Prevention of Surgical Site Infection

- Wounds of the oral or nasal mucosa, axilla, or groin, or wounds made with minor breaks in sterile technique (“clean-contaminated” wounds) may benefit from postoperative antibiotics since the risk of infection may be as high as 10%

Maragh SL, Otley CC et al 2005 and Messingham MJ, Arpey CJ 2005



Prevention of Surgical Site Infection

- For wounds made in inflamed, traumatized, or devitalized tissue, or for wounds with major breaks in sterile technique (“contaminated” or “infected” wounds), postoperative antibiotics are considered therapeutic and should be prescribed

Maragh SL, Otley CC et al 2005 and Messingham MJ, Arpey CJ 2005

Prevention of Surgical Site Infection

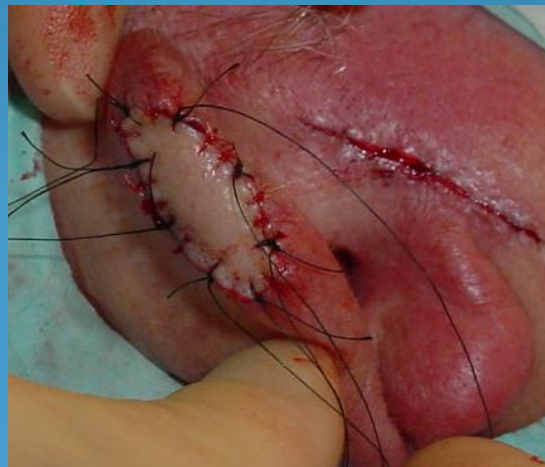
- Surgical technique
 - Maintain a sterile field
 - Ensure hemostasis to reduce the risk of hematoma
 - Employ proper reconstructive design to minimize tension on wound edges and ensure adequate blood supply for flaps and grafts

Prevention of Surgical Site Infection

- Patient factors can increase the risk of postoperative infection
 - Malnutrition, advanced age, diabetes mellitus
 - Immunosuppression
 - Renal insufficiency
 - Peripheral vascular disease
 - Tobacco or alcohol use

Prevention of Surgical Site Infection

- Flap or graft performed on the nose or ear



Prevention of Surgical Site Infection

- Surgical procedures on the hand or below the knee



Prevention of Surgical Site Infection

- Inflamed or infected tissue near the site of the procedure



Prevention of Surgical Site Infection

- Postoperative wound infections are frequently due to the predominant microorganism in the treated area, and the choice of antibiotic should be directed at that microorganism
- *S. aureus*, coagulase-negative staphylococci, *E. coli*, and *Enterococcus* species are most commonly identified

Antibiotic Selection

- Culture of the infected wound can help guide antibiotic selection



Intraincisional Antibiotics

- The use of intraincisional antibiotics for prophylaxis against postoperative wound infection has also been studied
- These antibiotics were administered in a single dose in conjunction with local anesthesia immediately before the planned procedure

Intraincisional Antibiotics

- When nafcillin was added to buffered lidocaine, significantly fewer wound infections were observed in the treated patients versus the control patients who received only buffered lidocaine

Griego RD and Zitelli JA 1998

- Similar findings were seen when intraincisional clindamycin was studied

Heuther MJ, Griego RD, et al 2002

Intraincisional Antibiotics

- In these two studies, intraincisional antibiotics were found to be inexpensive, convenient to administer, and well-tolerated by patients
- This form of administration of antibiotic prophylaxis against wound infection deserves further study

A Typical Patient



Summary

- Persons at risk for endocarditis or those with joint and neurologic prosthesis may benefit from preoperative antibiotics in certain surgical situations:
 - Inflamed, eroded, or infected skin
 - Heavily colonized skin (axilla, groin, and foot) or mucosal sites
 - Prolonged procedure (Mohs surgery)

Summary

- Antibiotics may also be given postoperatively to reduce the risk of wound infection:
 - “Clean-contaminated” or “contaminated” wounds
 - Complex repairs on the nose or ear
 - Procedures on a distal extremity
 - Underlying medical conditions

Summary

- Information regarding the prophylactic use of antibiotics is controversial
- Evidence-based guidelines with a focus on procedural dermatology need to be developed

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