الجامعة السورية الخاصة

كلية الطب البشري

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Surgical infection

To understand:

- The factors that determine whether a wound will become infected
- The classification of sources of infection and their severity
- The indications for and choice of prophylactic antibiotics
- The characteristics of the common surgical pathogens and their sensitivities
- The spectrum of commonly used antibiotics in surgery and the principles of therapy
- The misuse of antibiotic therapy with the risk of resistance

Continue

To learn:

- Koch's postulates
- The management of abscesses

To appreciate:

- The importance of aseptic and antiseptic techniques and delayed primary or secondary closure in contaminated wounds

To be aware of:

- The causes of reduced resistance to infection (host response)

To know:

- The definitions of infection, particularly at surgical sites
- What basic precautions to take to avoid surgically relevant health care-associated infections

Koch's postulates

Proving the agency of an infective organism

1. **It must be found in considerable numbers in the septic focus**
2. **It should be possible to culture it in a pure form from that septic focus**
3. **It should be able to produce similar lesions when injected into another host**

Natural protective mechanism against surgical infection

- Micro-organisms are normally prevented from causing infection in tissues by intact epithelial surfaces.
- In clean surgical incision contamination can't get through coagulum after closure of incision .
- **chemical factors**: *low gastric pH;*
- **humoral factors** : *antibodies, complement and opsonins;*
- **cellular factors** : *phagocytic cells, macrophages, polymorphonuclear* cells and killer lymphocytes.

Advances in the control of infection in surgery

- **Aseptic operating theatre techniques have replaced toxic antiseptic techniques**
- **Antibiotics have reduced postoperative infection rates after elective and emergency surgery**
- **Delayed primary, or secondary, closure remains useful in contaminated wounds**

Causes of reduced host resistance to infection

- **Metabolic: malnutrition (including obesity), diabetes, uraemia, jaundice .**
- **Disseminated disease: cancer and acquired immunodeficiency syndrome (AIDS).**
- **Iatrogenic: radiotherapy, chemotherapy, steroids.**

Risk factors for increased risk of wound infection

- Malnutrition (obesity, weight loss)
- Metabolic disease (diabetes, uraemia, jaundice)
- Immunosuppression (cancer, AIDS, steroids, chemotherapy and radiotherapy)
- Colonisation and translocation in the gastrointestinal tract
- Poor perfusion (systemic shock or local ischaemia)
- Foreign body material
- Poor surgical technique (dead space, haematoma)

Factors that determine whether a wound will become infected

- **Host response**
- **Virulence and inoculum of infective agent**
- **Vascularity and health of tissue being invaded (including local ischaemia as well as systemic shock)**
- **Presence of dead or foreign tissue**
- **Presence of antibiotics during the 'decisive period'**

Classification of sources of infection

- **Primary: acquired from a community or endogenous source (such as that following a perforated peptic ulcer)**
- **Secondary or exogenous (HAI): acquired from the operating theatre (such as inadequate air filtration) or the ward (e.g. poor hand-washing compliance) or from contamination at or after surgery (such as an anastomotic leak)**

Health care-associated infection (HAI)

There are four main groups:

- Respiratory infections (including ventilator-associated pneumonia)
- Urinary tract infections (mostly related to urinary catheters)
- Bacteraemia (mostly related to indwelling vascular catheters)
- Surgical site infections (SSIs)

Gas gangrene

- **Caused by *Clostridium perfringens***
- **Gas and smell are characteristic**
- **Immunocompromised patients are most at risk**
- **Antibiotic prophylaxis is essential when performing amputations to remove dead tissue**

Surgical incisions through infected or contaminated tissues

- **When possible, tissue or pus for culture should be taken before antibiotic cover is started**
- **The choice of antibiotics is empirical until sensitivities are available**
- **Wounds are best managed by delayed primary or secondary closure**

Choice of antibiotics for prophylaxis

- **Empirical cover against expected pathogens with local hospital guidelines**
- **Single-shot intravenous administration at induction of anaesthesia**
- **Repeat only in prosthetic surgery, long operations or if there is excessive blood loss**
- **Continue as therapy if there is unexpected contamination**
- **Benzylpenicillin should be used if *Clostridium gas* gangrene infection is a possibility**
- **Patients with heart valve disease or a prosthesis should be protected from bacteraemia caused by dental work, urethral instrumentation or visceral surgery**

Avoiding surgical site infections

- **Staff should always wash their hands between patients**
- **Length of patient stay should be kept to a minimum**
- **Preoperative shaving should be avoided if possible**
- **Antiseptic skin preparation should be standardised**
- **Attention to theatre technique and discipline**
- **Avoid hypothermia perioperatively and ensure supplemental oxygenation in recovery**

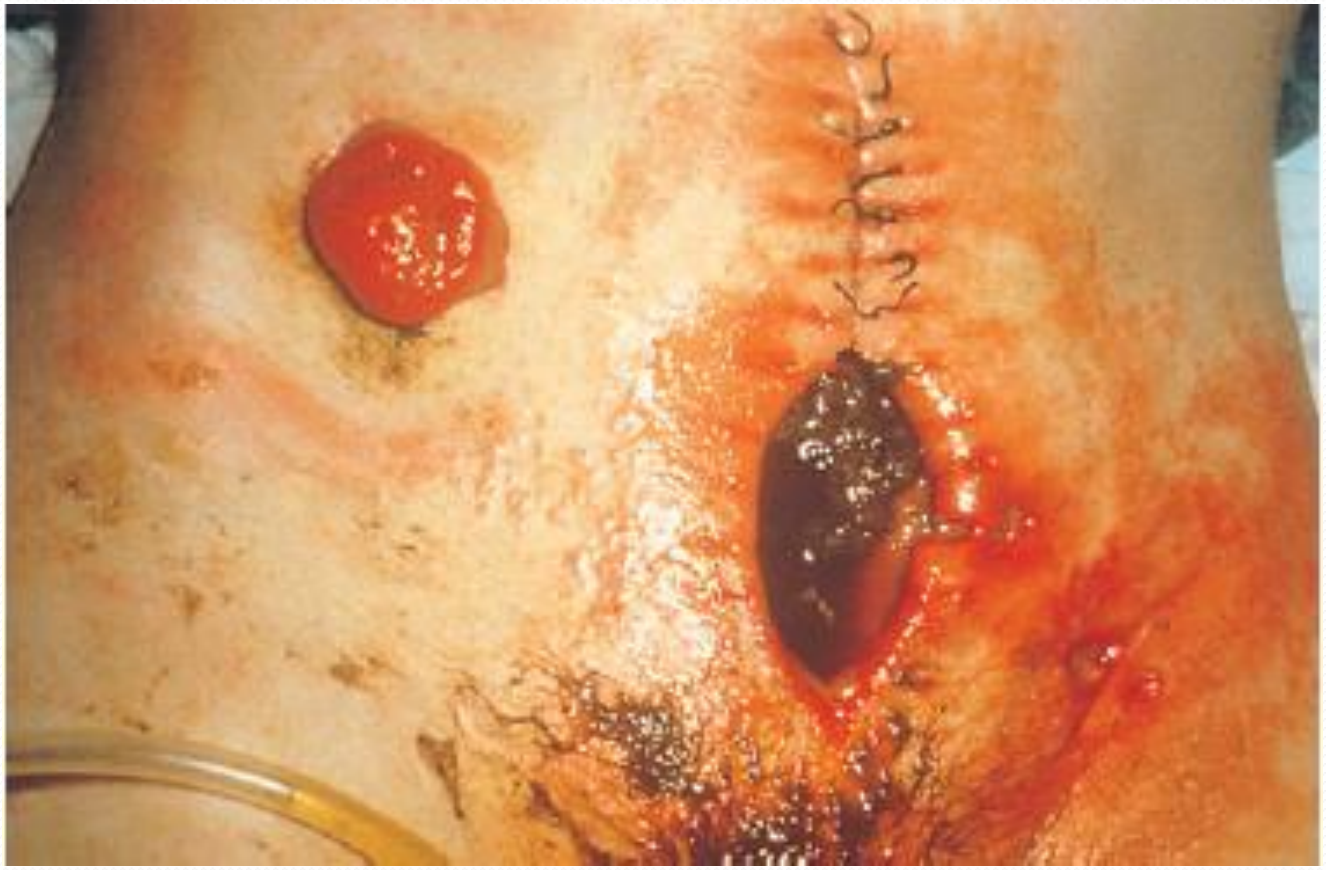
Principles for the use of antibiotic therapy

- **Antibiotics do not replace surgical drainage of infection**
- **Only spreading infection or signs of systemic infection justifies the use of antibiotics**
- **Whenever possible, the organism and sensitivity should be determined**

Treatment of commensals that have become opportunist pathogens

- They are likely to have multiple antibiotic resistance
- It may be necessary to rotate antibiotics

Delayed healing relating to infection in a patient on high dose steroids.



Major wound infection and delayed healing presenting as a faecal fistula in a patient with Crohn's disease.

Major wound infection with superficial skin dehiscence.

Minor wound infection that settled spontaneously without antibiotics.

Streptococcal cellulitis of the leg following a minor puncture wound.

Mixed streptococcal infection of a skin graft with very poor 'take'.

After 5–6 days of antibiotics, the infection is under control, and the skin grafts are clearly viable.

Secondary closure of wound.

Skin layers left open to granulate after laparotomy for faecal peritonitis. The wound is clean and ready for closure.