

Infectious complications have a great influence on the outcome of surgery. They not only increase the work load for health care workers, the need for additional surgery medication and costs but just as important are an additional source of morbidity and sometimes mortality for our patients. Infectious complications prolong hospital stays and certainly decrease success rates in surgery considerably.

There is therefore no doubt that the prevention of postoperative infections is of the paramount importance. The surgeon's skill and knowledge are the most important factors in preventing post operative wound infections and antimicrobials are no substitute for surgical expertise. Antibiotic prophylaxis cannot correct fundamental surgical errors.

However when expertly carried out, antibiotic prophylaxis in surgery has saved more lives than any other improvement in surgery over the last two decades. A proper regimen of antibiotics decreases the total amount of antimicrobials needed and smoothens the burden on the hospital antibiotic budget. The choice of antibiotics should be based on fact rather than fiction and made according to available data on pharmacology, microbiology, clinical experience and economy.

The goal of prophylaxis is to achieve sufficient antimicrobial tissue concentrations before possible contamination and ensure that adequate levels persist throughout the operation to prevent subsequent bacterial colonisation and growth. For this reason the timing of the initial

administration is crucial. It has been clearly shown that optimum results are achieved when prophylaxis is started approximately 30 minutes before the surgical intervention. A notable exception is Caesarean section where fears of drug toxicity to the foetus preclude this practice. Trials have however shown that equal efficacy is obtained when antibiotic administration is initiated immediately after clamping of the cord. The practice of starting antibiotic cover after the operation has ended is frankly ineffective because by the time tissue levels have been reached the bacteria would have had enough time to colonise and multiply at the wound site. Antibiotic concentration could subsequently be insufficient to stop bacteria division in the log phase whereas the same antibiotic concentration would have been enough, if given earlier, to abort an infection in the lag phase of bacterial growth.

Ideally antibiotics should be used for as short a time span as possible. This not only decreases the risk of resistance developing in the hospital bacterial population but also lessens the frequency of side-effects. The older 5-day regimens have given way to a 3-dose protocol covering the perioperative period and the first 24 hours post-operatively. Single shot surgical prophylaxis is a fairly recent development and has been shown to be highly cost effective resulting in considerable savings in time and money. If such therapy is adopted the choice of antibiotics is crucial as besides a suitable spectrum of activity, the antimicrobial chosen should have a sufficiently long half-life to cover the at risk pe-

riod. The actual length of this "at risk" interval is a matter of debate. The work by Khan and colleagues would indicate a time period of approximately 12 hours<sup>1</sup>.

Not all gynaecological operations require antibiotic prophylaxis; it is only in a few that convincing evidence favouring prophylaxis is available. Prophylaxis is certainly indicated in operations involving the vagina when microbial contamination by the vaginal commensal flora is often unavoidable and increasing evidence indicates a use also in abdominal hysterectomy. The use of antibiotics in Caesarean Section has been extensively reviewed by Enkin<sup>2</sup>. It is evident that over-enthusiastic use of antibiotics for all women undergoing this operation could be counterproductive – its possible benefit outweighed by drug toxicity to mother and infant and the emergence of resistance. It is therefore reasonable to select patients at higher risk namely those undergoing non-elective section particularly after prolonged labour or rupture of membranes, women who have experienced many vaginal examinations or attempts at delivery, the presence of meconium, maternal anaemia and possibly low socio-economic status. It is interesting to note that whilst antibiotic prophylaxis in Caesarean sections has resulted in a significant reduction in post-partum endometritis and septicaemia, it has not been shown to be equally effective in reducing post-operative wound and urinary infection rates<sup>3</sup>.

The choice of the antimicrobial to be used is obviously a

crucial one, whether single or multiple dose prophylaxis is to be adopted. They should be chosen in the light of local antibiotic sensitivity patterns to the more likely pathogens. It is essential that the antibiotic chosen should provide good cover against *Staphylococcus aureus* – by far the most common cause of post-operative wound infections. Furthermore the vagina constitutes a rich microbial environment with Streptococci, Gram Negative aerobes and Gram positive and Gram negative anaerobes abundant. The importance of adequate cover for both aerobes as well as anaerobes has been highlighted by the work of Brown and colleagues. It is unnecessary to cover the whole of the potential range of infecting organisms but aim to cover the more important pathogens namely Staphylococci, Streptococci, Enterobacteriaceae and Bacteroides.

Monotherapy, as in any other antibiotic application, is always preferable but this is not always possible with all antibiotics in all occasions. Any drug chosen should have a track record of excellent tolerance and a wide safety margin.

#### **In conclusion:**

- 1 Antibiotic prophylaxis should be regarded as an adjunct to surgical skill and infection control principles.
- 2 Prophylaxis is mainly indicated in operations with known high rates of post-operative infections.
- 3 Effective tissue levels are mandatory from start to end of surgery.
- 4 The “at risk” period usually extends to 12-24 hours post-operatively after which continued antibiotic administration is cost-ineffective.

- 5 The antibiotic or antibiotic combination used should have an antimicrobial spectrum that covers both aerobes and anaerobes.

#### **References:**

- 1 Khan MS, Begg HB, Frampton J, Hughes TB (1980) A comparative study of the prophylactic effect of one dose and two dose intravenous metronidazole therapy in gynaecological surgery. *Scan. J. Inf. Dis. suppl.* 26:115-117.
- 2 Enkin M, Enkin E, Chalmers I, Hemminki E (1989) Prophylactic antibiotics in association with Caesarean section. In: Chalmers I, Enkin M, Keirse MJN (eds) *Effective care in pregnancy and childhood*, vol 2, part VIII, chap 73 Oxford University Press, Oxford.
3. Swartz MN, Grolle K (1981) The use of prophylactic antibiotics in Caesarean section. A review of the literature. *J. of Rep. Med.* 26:595-609.