# prophylaxis of surgical infection

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Antimicrobials may be produced by living organisms (anti - - biotics) or by synthetic methods. Some are bactericidal, e.g. penicillins and aminoglycosides, and others are bacteriostatic, e.g. tetracycline and erythromycin. In general, penicillins act upon the bacterial cell wall and are most e ff ective against bacteria tha t are multiplying and synthesising new cell wall materials. The aminoglycosides act at the ribosomal level, preventing or distorting the production of proteins required to maintain the integrity of the enzymes in the bacterial cell. Hospital and formulary guidelines should be consulted for doses and monitoring of antibiotic therapy . Penicillin Benzylpenicillin has proved most e ff ective against Gram- positive pathogens, including most streptococci, the clostridia and some of the staphylococci that do not produce β -lactamase. It is still e ff ective against Actinomyces, which is a rare cause of chronic wound infection. It may be used specifically to treat spreading streptococcal infections. Penicillin is valuable even if other antibiotics are required as part of multiple therapy for a mixed infection. Some serious infections, e.g. gas gangrene, - require high-dose intravenous benzylpenicillin. Flucloxacillin Flucloxacillin is resistant to β -lactamases, and is therefore of use in treating infections with penicillinase-producing staph - - ylococci that are resistant to benzylpenicillin, but it has poor activity against other pathogens. It has good tissue penetration - and therefore is useful in treating soft-tissue infections and osteomyelitis. - Ampicillin, amoxicillin and co-amoxiclav e Ampicillin and amoxicillin are β - lactam penicillins and can be taken orally or may be given parenterally . Both are e ff ec - tive against Enterobacteriaceae, Enterococcus faecalis and the majority of group D streptococci, but not species of Klebsiella or Pseudomonas. Clavulanic acid has no antibacterial activity itself, but it does inactivate β -lactamases, so can be used in - conjunction with amoxicillin. The combination is known as co-amoxiclav and is useful against β -lactamase-producing bacteria that are resistant to amoxicillin on its own. These include resistant strains of Staphylococcus aureus, Escherichia coli, Haemophilus influenzae, Bacteroides and Klebsiella. - Piperacillin and ticarcillin These are ureidopenicillins with a broad spectrum of activity against a broad range of Gram-positive, Gram-negative and anaerobic bacteria. Both are used in combination with β -lactamase inhibitors (tazobactam with piperacillin and clavulanic acid with ticarcillin). They are not active against - MRSA but are used in the treatment of septicaemia, hospital- acquired pneumonia and complex urinary tract infections, where they are active against Pseudomonas and Proteus spp. and have a synergistic e ff ect when used with aminoglycosides such as gentamicin. There are several β - lactamase-susceptible cephalosporins that are of value in surgical practice: cefuroxime, cefotaxime and ceftazidime are widely used. The first two are most e ff ective in intra-abdominal skin and soft-tissue infections, being active against Staphylococcus aureus and most Enterobacteriaceae. As a group, the enterococci ( Streptococcus faecalis ) are not sensitive to the cephalosporins. Ceftazidime, although active against the Gram-negative organisms and Staphylococcus aureus e ff

ective against Pseudomonas aeruginosa . These cephalosporins may be combined with an aminoglycoside, such as gentamicin, if Gram-negative cover is needed, and an imidazole, such as metronidazole, if anaerobic cover is needed. Aminoglycosides Gentamicin and tobramycin have similar activity and are e ff ec tive against Gram-negative Enterobacteriaceae. Gentamicin is e ff ective against many strains of Pseudomonas , although resis tance has been recognised. All aminoglycosides are inactive against anaerobes and streptococci. Serum levels immediately before and 1 hour after intramuscular injection must be taken and repeated at 48 hours after the start of therapy , and dosage should be modified to satisfy peak and trough levels. Ototox icity and nephrotoxicity may follow sustained high toxic levels and therefore single, large doses may be safer. Vancomycin and teicoplanin These glycopeptide antibiotics are most active against Gram-positive aerobic and anaerobic bacteria and have proved to be e ff ective against MRSA, so are often used as prophylactic antibiotics when there is a high risk of MRSA. They are ototoxic and nephrotoxic, so serum levels should be monitored. They are e ff ective against C. di ff . in cases of pseudomembranous colitis. Meropenem, ertapenem and imipenem are members of the carbapenems. They are stable to β -lactamase, have useful broad-spectrum anaerobic as well as Gram-positive activity and are e ff ective for the treatment of resistant organisms, such as ESBL-resistant urinary tract infections or serious mixed-spectrum abdominal infections (peritonitis). Metronidazole , is also Metronidazole is the most widely used member of the imid - azole group and is active against all anaerobic bacteria. It is particularly safe and may be administered orally , rectally or intravenously . Infections caused by anaerobic cocci and strains of Bacteroides and Clostridia can be treated, or prevented, by its use. Metronidazole is useful for the prophylaxis and treatment - of anaerobic infections after abdominal, colorectal and pelvic surgery and in the treatment of C. di ff . pseudomembranous - colitis. Ciprofloxacin Quinolones, such as ciprofloxacin, have a broad spectrum of activity against both Gram-positive and Gram-negative bacte - - ria but are particularly useful against Pseudomonas infections. Many UK and European hospitals have restricted their use as a preventive measure against the development of C. di ff . enterocolitis. prophylaxis of surgical infection

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