

ANTIBIOTICS FOR CHILDREN

Pages with reference to book, From 285 To 285

Saleem Hafiz (Institute of Urology and Transplantation, Civil Hospital, Karachi.)

Antibiotics are extremely dangerous and harmful substances but when used properly they help in saving lives and reduce periods of suffering. Hence the usage of antibiotics is an art practiced by many but perfected by extremely few. Prescribing antibiotics is a very difficult task and warrants extra consideration. In pediatric patients one has to consider the fact that the mechanism of child growth is different and antibiotics may have varying effects on the growth and development of mental and sensory faculties. Therefore age is a major factor to be considered in the choice of antimicrobial agents. Gastric acidity also varies with age. The pH of gastric secretions is higher in young children and does not reach adult levels until approximately the age of three¹. The absorption of a number of antimicrobials via oral route depends on their acid stability and on the pH of gastric secretions. Penicillin G absorption is markedly reduced by gastric acid but in young children the absorption of this drug is markedly enhanced. Various orally administered penicillins produce high serum levels in young children hence it makes no sense to give children the more expensive acid resistant forms of penicillin such as phenoxymethyl penicillin (penicillin V) since these drugs will not be absorbed any better than the less expensive penicillin G². Renal functions, likewise vary with age. It is relatively diminished in premature and newborn children reaching "adult levels" between 2 and 12 months of age¹. Serum half-lives of drugs that are primarily excreted by the kidneys may be considerably increased in neonates; hence doses of antimicrobial agents such as penicillin G and its various semisynthetic derivatives as well as the aminoglycosides must be altered in neonates. Hepatic functions in the neonates are underdeveloped, this can result in difficulties if drugs that are normally excreted or inactivated by liver are given. Chioramphenicol is inactivated by conjugation to the glucuronide from the liver. However, in the neonate hepatic levels of glucuronyl transferase are relatively insufficient, thus when neonates are given large doses of chioramphenicol, high serum level of unconjugated chioramphenicol results which is toxic and can result in shock, cardiovascular collapse and death, the so called gray syndrome¹. For this reason chloramphenicol should be avoided in neonates but if necessary the dosage should be properly tailored and monitored. Sulfonamides compete with bilirubin for binding sites on serum albumin; given to neonates they produce increased serum levels of unbound bilirubin that predispose the child to kernicterus³. Tetracyclines have a number of adverse effects on bones and developing teeth ranging from purplish to brownish discolouration to actual enamel hypoplasia¹. Tetracyclines readily cross the placenta⁴. Thus, when given during the later half of the pregnancy or from birth to the age of 6 months, they may affect the deciduous teeth of the infant. From the age of 6 months to 8 years, damage to the permanent teeth may occur. Irreversible cartilage erosions and skeletal abnormalities have been observed in young dogs and rabbits receiving quinolones^{5,6}. When selecting an antibiotic one must be aware of the suitability of the antimicrobial agent, its safety margins and estimating the exact dosage. It is a normal practice to use weight as the basis for determining the dosage of antibiotics. It is the easy way out but even this is not generally practiced. Ideal way to determine the dosage is based on the surface area which should be determined accurately whenever possible. Remember a well planned strategy for prescribing antimicrobial agents would mean a happy prosperous and long life while, ill planned strategy would mean permanent disability, unhappiness, misery or death.

REFERENCES

1. Weinstein, L. and Dalton, A.C. Host determinants of response to antimicrobial agents. *N.Engl. J. Med.*, 1968;279:467-71.
2. Moelkring, R.C. Jr. Factors influencing the clinical of antimicrobial agents in elderly patients. *Geriatrics*, 1978;33:83- 85.
3. McGracken, G.H. Jr. Pharmacologic basis for antimicrobial therapy in newborn infants. *Am.J.Dis.Child.*, 1974; 128:407-10.
4. Kline, A.H., Blattner, R.J. and Lunin, M. Transplacental effect of tetracyclines on teeth. *JAMA*. 1964;11:178-80.
5. Christ, W., Lehnert, T. and Ulbrich, B. Specific toxicologic aspects of quinolones, *Rev. Infect. Dis.*, 1988;10 (suppl. 1):S141. 46.
6. Schluter, G. Ciprofloxacin Review of potential toxicologic effect. *Am.J.Med.*, 1987;82 (suppl.4A):91-93.