Should prophylactic antibiotics during caesarean section be given before or after cord clamping?

The National Collaborating Centre for Women's and Children's Health (2004) guidelines state that all women who are undergoing caesarean section, whether emergency or elective, should be offered a single dose of a first generation cephalosporin or ampicillin. However, the guidelines do not specify the time at which to administer the antibiotic.

Preventing surgical site infection

The benefits of prophylactic antibiotics for preventing surgical site infections in patients undergoing surgery are widely accepted. The optimal timing for antimicrobial prophylaxis to prevent surgical site infections is within the 2 hours preceding skin incision (Classen et al, 1992). This is a key part of surgical antimicrobial prophylaxis.

Prophylactic antimicrobial therapy in caesarean section

During caesarean section, it is commonplace to administer prophylactic antibiotics after the umbilical cord has been clamped. This is to avoid fetal exposure to antimicrobial therapy, which is thought to mask the signs of neonatal infection and increase the rate of neonatal necrotizing enterocolitis (Kenyon et al, 2001).

Multiple prospective studies have considered the optimal timing of antimicrobial prophylaxis to prevent surgical site infections in caesarean sections. Costantine et al's (2008) meta-analysis concluded that preoperative administration of prophylactic antibiotics (n=883) significantly reduced the risk of postpartum endometritis (relative risk=0.47; 95% confidence interval (CI)=0.26–0.85; P=0.012) and total infectious morbidities (relative risk = 0.50; 95% CI=0.33–0.78; P=0.002) compared with antibiotic prophylaxis given post-cord clamping (n=628). There was no difference in episodes of suspected neonatal sepsis, confirmed neonatal sepsis or neonatal intensive care admissions between the two groups. The prophylactic antibiotics used were a cephalosporin (cefazolin, ceftriaxone or cefonicid) or penicillin plus gentamicin.

Following a change in hospital policy, Owens et al (2009) carried out a single centre retrospective analysis of the timing of antimicrobial prophylaxis (single dose cefazolin) in 9010 women undergoing caesarean section. Those receiving cefazolin before skin incision (n=4781) had significantly lower rates of endometritis (odds ratio=0.61; 95% CI=0.47–0.79) and wound infections (odds ratio=0.70; 95% CI=0.55–0.90) than women receiving cefazolin after umbilical cord clamping (n=4229). The authors commented that antimicrobial prophylaxis before skin incision had no effect on neonatal infections.

Neonatal outcome

It has been postulated that maternal transfer of antibiotics to the neonate may mask features of neonatal sepsis and lead to either increased incidence of neonatal infections or increased use of empirical antibiotics. Costantine et al (2008) and Owens et al (2009) found no relationship between neonatal outcomes (infection rates, use of antibiotics or hospital length of stay) and the timing of the maternal antimicrobial prophylaxis. The incidence of necrotizing enterocolitis in the two groups was not specifically mentioned.

Choice of antibiotic

Co-amoxiclav (325 mg four times per day for up to 10 days) given to mothers for preterm, pre-labour rupture of fetal membranes has been linked with a higher incidence of necrotizing enterocolitis in neonates (Kenyon et al, 2001). The differing dosing regimen and population group in this study means that these results should not be extrapolated to suggest that a single dose of prophylactic co-amoxiclav at caesarean section is associated with an increased incidence of necrotizing enterocolitis.

Co-amoxiclav, cephalosporins or penicillin plus gentamicin are routinely used for antimicrobial prophylaxis for caesarean section. Precipitated by hospital-wide concerns over *Clostridium difficile*, the authors' institution now recommends co-amoxiclav rather than cefuroxime for antimicrobial prophylaxis during caesarean sections.

Time for a change in practice?

Prophylactic antimicrobial therapy for caesarean section should be administered before skin incision in order to minimize the maternal infection rate.

The literature suggests that cephalosporins and penicillin with gentamicin administered before skin incision have no detrimental effects on the newborn. There is currently no evidence that specifically reviews neonatal outcome after single dose co-amoxiclav administered before skin incision. Clinicians need to balance the risks of *C. difficile* infection with the available evidence relating to maternal and neonatal outcomes when deciding which antimicrobial to administer. BJHM

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