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Prophylactic antibiotics and caesarean section

Important role but not necessarily always

In Britain, as elsewhere, the caesarean section rate has increased, and in the face of pressures from litigation it is unlikely to decline.¹ Postoperative infection is an important complication, causing immediate and chronic abdominal pain, impairing fertility, and, in severe cases, threatening the mother's life. Antibiotic prophylaxis during caesarean section has been subjected to many controlled trials² but has not found widespread favour in Britain,^{3,4} though it is used more extensively in the United States.^{2,5}

The National Perinatal Epidemiology Unit in Oxford has recently carried out a meta-analysis of the randomised controlled trials of the value of antibiotic prophylaxis at the time of caesarean section.² No fewer than 16 000 patients were included, and wound infection was usually defined as either a positive bacterial culture or the presence of frank pus.⁶ In the groups given placebo or no treatment the mean incidence of this was 9%, corresponding to that of 6-14% in a recent national study.⁴ Although more difficult to measure, other indicators of postoperative infection include postoperative febrile illness⁷ and endomyometritis,⁸ and the meta-analysis found average rates in untreated mothers of 40% and 26% respectively. Serious postoperative infections, such as pelvic abscess and septicaemia, were less common but still developed in an appreciable number of patients.

In contrast to these figures, mothers who had received antibiotic prophylaxis had infection rates of about one third of those in the untreated controls. This proportionate reduction occurred for all the outcome measures studied in the meta-analysis, with the confidence intervals showing high significance. These results point strongly to the conclusion that antibiotic prophylaxis should be considered in caesarean section.

What the meta-analysis does less precisely, however, is to say how policies should be developed for individual mothers. It is not yet certain whether antibiotic prophylaxis should be given to all mothers having caesarean sections or to those at greatest risk.⁵ Several factors—such as the duration of labour⁸ and prolonged rupture of the membranes⁹—carry an increased risk of postoperative infection so that mothers having an emergency caesarean section may gain more than those having an elective procedure.^{5,10} Other important factors are the timing and route of giving antibiotics,⁵ for a central principle of prophylaxis is that peak tissue concentrations should be achieved when the bacteraemia is highest.¹¹ Nevertheless, systemic administration of the antibiotic can be

delayed until the cord has been clamped without loss of efficacy.¹² This policy, now the one most widely adopted, avoids any antibiotic reaching the neonate. Local administration of antibiotic has been tried but has little to offer over intravenous injection during surgery.⁵ Possibly multiple doses will be more effective than single ones, although multiple doses will be more complex to arrange, more costly, and more likely to cause side effects.¹³ The results of comparative studies suggest that broad spectrum penicillins and cephalosporins are equally effective,⁸ and that adding metronidazole will not increase their potency.^{2,5}

No harm should result from any prophylactic regimen, and the most immediate risk is anaphylaxis: two deaths have occurred with antibiotic prophylaxis after operations (not caesarean sections).¹⁴ Provided there is no history of allergy the risk of such tragedies is low and has to be balanced against that of death from preventable infection after caesarean section.² Another concern is the development of resistant strains of organisms in maternity hospitals,^{10,15} an important argument in limiting the use of prophylactic antibiotics.³ If antibiotic prophylaxis becomes more widespread we shall need to monitor mothers who develop infection despite prophylaxis for resistant strains as well as the patterns of resistance among the hospital flora at regular intervals.¹⁰

The Oxford group, however, has taken the argument a stage further, suggesting that prophylactic antibiotics at the time of caesarean section would be cost effective.¹⁶ They argue that the cost of prophylactic antibiotics would be more than compensated by savings in staff time, inpatient stay, and the cost of therapeutic antibiotics. Several similar hypothetical analyses of the costs of hospital acquired infection have been put forward,¹⁷⁻¹⁹ and the Oxford group's hypothesis must be tested prospectively in a controlled trial. The major cost of hospital infection is prolonged hospital stay and even the most careful case-control study leaves the possibility that the infection and the prolonged stay both result from other factors in the patient's condition. For example, in a prospective study of gynaecological surgery cephradine prophylaxis for abdominal hysterectomy reduced costs to the hospital and the community health services with measurable improvement in the patients' rate of recovery.²⁰ Nevertheless, there was no significant difference in length of hospital stay between the groups given prophylaxis or placebo. Moreover, the same study found that prophylaxis for vaginal hysterectomy did not reduce hospital stay or improve the recovery rate, despite