Obstetric Interventions Beneficial to Prematurely Delivering Newborn Babies: Antenatal Corticostetroids, Progesterone, Magnesium Sulfate

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• Prematurity • Antenatal corticosteroids • Magnesium sulfate
• Progesterone

Although improvements in neonatal care have continued to result in reduced mortality and morbidity of prematurely delivering newborns for decades, the results of a myriad of obstetric efforts and interventions have failed to reduce the overall rate of prematurity or prolong pregnancy at any gestational age. Efforts to prolong pregnancy, including tocolysis, cervical cerclage, bed rest, antibiotics, and comprehensive prematurity prevention programs, have proved to be failures. Thus, the prematurity rate since the time data began to be collected on the subject has not declined whatsoever and, in recent years, has actually been on the rise, increasing by 36% since the 1980s reaching a high of 12.7% of all births in 2007.[1] This recent increase has largely been caused by the increase in multiple gestations associated with assisted

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reproduction technologies, such as in vitro fertilization, and iatrogenic prematurity caused by early labor inductions and cesarean sections; however, these two factors do not account for the entire increase. It is estimated that at least 50% of all spontaneous deliveries (not indicated for maternal or fetal concerns) are caused by an infectious process, but no real inroads beyond increased understanding, have been made into altering prematurity rates and associated complications caused by infection. Despite this dismal record, a few new developments or refinements of established interventions give increased hope for an improved obstetric contribution to the problem of prematurity. These include a better understanding of how best to use antenatal corticosteroids (ACSs) and the newer options of magnesium sulfate to ameliorate or avoid cerebral palsy (CP) associated with prematurity and maternal progesterone administration to selected at-risk populations to decrease the likelihood of premature delivery.

ANTENATAL CORTICOSTEROIDS

Since Liggins and Howie[2] while investigating the mechanisms of the onset of labor serendipitously discovered that maternally administered corticosteroids improved lung compliance in prematurely delivered lambs, a large number of randomized controlled trials (RCT) have consistently substantiated the beneficial effects of ACSs.[3] Although this approach was, for some time, the only clearly beneficial obstetric intervention for prematurely delivering babies, only a minority of patients at risk actually received ACS before delivering prematurely. Leviton and colleagues,[4] fully 25 years after Liggins' initial RCT and many confirming RCT's,[3] found that only 15% of babies who delivered at less than 34 weeks had actually received ACS before delivery. This finding compelled the National Institute of Child Health and Human Development (NICHD) to hold its first consensus conference on ACS in 1994.[5] This conference concluded the following:

- The benefits of ACS vastly outweigh the potential risks
- The benefits include a reduction in respiratory distress syndrome (RDS), intraventricular hemorrhage (IVH), and neonatal death
- All fetuses from 24 to 34 weeks should be considered candidates for ACS
- The decision for ACS should not be altered by fetal gender, race, or availability of surfactant therapy
- Treatment should be either:
  - Betamethasone, 12 mg intramuscularly, two doses 24 hours apart, or
  - Dexamethasone, 6 mg intramuscularly, four doses 12 hours apart
- Optimal benefit begins 24 hours after the first dose and lasts 7 days
- Because there is benefit within even less than 24 hours, ACS should still be given unless delivery is immediate
- In premature rupture of membranes (PROM) less than 30 to 32 weeks, ACS is recommended because of the high risk of IVH
- In complicated pregnancies less than 34 weeks, ACS should be given unless corticosteroids will have an adverse effect or delivery is imminent.

The most important question that remained after this conference was what to do with the patient who received a course of ACS but did not deliver and still remained at risk for premature delivery. The dramatic 50% reduction in RDS in babies who receive ACS at least 24 hours before delivery seems to disappear in patients who remain undelivered for a week or more but still deliver before 34 weeks.[2,6–11] Furthermore, most patients who do actually receive ACS do not deliver within 1 week