Advances in Perinatology

REGINALD C. TSANG, MBBS

Although there have been major advances in neonatology in the last two decades, one of the more distressing statistics is that the rate of low birthweight infants has not decreased accordingly. In fact, there are indications that the rate of premature deliveries has actually increased, and at present in the United States, low birthweight infants are a major contributor to neonatal mortality. As other countries continue to pass us by in terms of low infant mortality, it has become increasingly apparent that our inability to affect our low birthweight rate remains as one of our “national disgraces.” The pediatrician who is in practice and faced with the challenge of lowering infant mortality and morbidity must sooner or later be struck with the fact that much of what we could do to improve neonatal and infant mortality resides in the hands of our colleagues, the obstetricians, and perinatologists. It is increasingly apparent that our destinies are linked and that it is important for us to understand each other’s expertise to make a significant impact for the future.

In this issue of Pediatric Annals, we have invited noted perinatologists to discuss some of the major

Despite major advances in neonatology in the last two decades, the rate of low birthweight infants has not decreased accordingly.

issues in obstetrics and perinatology that have significant impact on the neonate and infant. In particular, the authors have been asked to write their sections in a discussion mode that would provide relevant information to practicing pediatricians. Most of the authors have adopted the question and answer format that we recently used in the series on advances in neonatal care.

Dr Calvin Hobel poses the question of why preterm birth prevention is a health-care priority and reminds us that preterm births account for more than 70% of neonatal morbidity and 35% to 40% of infant deaths. That preterm labor with prematurity is an important social and environmental issue is emphasized, and the marked difference between “private and public” patients, white and black populations, is stressed, as reflecting an environmental and not necessarily a biologic issue. Infection is now considered a key cause of premature rupture of membranes and one of the major causes of preterm labor and prematurity. A recent randomized trial of antibiotics in high-risk

Dr Tsang is from the Perinatal Research Institute, Children’s Hospital, University of Cincinnati, Cincinnati, Ohio. Address reprint requests to Reginald Tsang, MBBS, Executive Director, The Perinatal Research Institute, Children’s Hospital Medical Ctr, University of Cincinnati Medical Ctr, 231 Bethesda Ave, Cincinnati, OH 45267-0541.
pregnancies has demonstrated markedly reduced preterm labor rates with antibiotic therapy. Dr Hobel reminds us that once preterm labor is initiated, it is difficult to stop it, and it is far more productive to consider ways of preventing preterm labor. Dr Hobel reports on the West Los Angeles clinic preterm labor prevention experience, showing that there was a reduction in preterm birth using bed rest and a progestational agent. The primary care physician also can help, especially in preconception counseling of women, which has assumed an increasingly important role in being aggressive in advising young women to refrain from smoking and to receive folic acid supplementation for prevention of neural tube defects.

Dr James Clapp reports on the concepts of asymmetric intrauterine growth retardation and reminds us that from a physiologic viewpoint, this growth retardation is a down regulation of the genetic growth potential, i.e., in response to a decrease in substrate availability. In other words, the reduction in growth is a "defensive" posture of the fetus to conserve resources that would have been necessary for growth. While many environmental maternal and placental factors can lead to growth restriction, the final common pathway is reduction of nutrient availability. The understanding of growth suppressive factors and alterations in growth factors and their binding proteins (such as insulin-like growth factors and their binding proteins) offers a biochemical mechanism for growth restriction. Dr Clapp emphasizes the importance of a single examiner using a longitudinal approach to detect growth alterations, rather than multiple examiners using a cross-sectional approach. Serial abdominal palpation and fetal height measurements by a single examiner is a significant clinical import. Dr Clapp also gives us a word of caution that bed rest, while often recommended to improve uterine perfusion, may have an opposite effect if it is used for longer than a week.

Drs Mercer and Briggs discuss group B streptococcal infections and pregnancy, reminding us that there are 8000 to 12,000 cases of neonatal sepsis from group B streptococcus annually in the United States and that although prevention is the key, there is actually no available program that is highly productive and efficacious. Group B streptococcus now accounts for one third of neonatal sepsis and is the most common pathogen in septic infants. Disease is primarily related to vertical transmission from the mother; neonatal colonization occurs in 50% of untreated carrier mothers, and the attack rate for neonatal sepsis is 1.5% of colonized infants. Specific risk factors for early onset neonatal sepsis include low birthweight, maternal fever and labor, and long duration of membrane rupture. Intrapartum prophylaxis is the current approach, resulting in reduced vertical transmission. Significant concerns include the possibility of reducing the frequency of diagnosis of group B streptococcal sepsis without actually reducing the number of sick infants, and that another organism may replace the streptococcus as the cause of sepsis. Drs Mercer and Briggs suggest that active immunization offers promise for prevention of this disease.

Drs Rosen, Miodownik, and Tsang discuss the newborn infant of the diabetic mother and review some of the latest concepts in this field. Congenital malformations still exist as a high risk for infants of diabetic mothers. Because the teratogenic influences of the diabetic pregnancy occur in early gestation (as early as 3 to 6 weeks after conception or 5 to 8 weeks of gestation), any intervention for the diabetic pregnancy needs to be early in pregnancy and preferably preconceptional. Thus, the young diabetic subject should be counseled to prepare for stricter management of her diabetes than conventional if she is contemplating a pregnancy. Most studies appear to indicate that with early and preconceptional management of diabetes, malformations appear to be markedly reduced; however, infants of diabetic mothers continue to be macrosomic despite stringent glycemic control during pregnancy, and the pediatrician may have to deal with the results of excess size (shoulder dystocia, asphyxia, brachial plexus injuries, and facial nerve palsies). Neonatal hypoglycemia and hypocalcemia still occur but with modern management appear to be much reduced compared to the past. Reductions in perinatal asphyxia and respiratory distress have been highly significant with improvements in management of diabetes during pregnancy, and in several studies, these incidences have approached those of the normal population. Long-term growth of the infant of the diabetic mother is still an issue, with some reports that half of such infants are obese at age 8 years, implying that the intrauterine exposure to a diabetic milieu does have long-term implications.

Drs Abramowicz and Jaffe summarize the latest advances in ultrasound detection of fetal abnormalities. We now have the ability to anticipate abnormalities in the fetus prior to birth, and ultrasonography has played a major role in this equation. Neural tube defects such as anencephaly and spina bifida are especially important to detect prior to delivery since major intervention needs to be done right at delivery or soon after delivery, and mothers need to be transferred to a high-risk facility. Congenital heart defects are now often detected in utero, including the usual valvar and chamber defects; cardiac tumors and cardiomyopathy can even be detected in utero. Pulmonary conditions such as sequestration and cystic adenomatoid malformation, hitherto postnatal diagnoses, can now be moved to fetal detection. Because fetal pleural effusion is associated with pulmonary hypoplasia and poor outcome, fetal aspiration has been done, but with variable results. Gastrointestinal anomalies such as omphalocele and
gestoschisis are extremely important to diagnose
prior to birth, because surgical intervention and pedi-
atriac care at delivery needs to be coordinated careful-
ly, especially in view of the fluid and electrolyte
imbalance and heat losses from potentially exposed
bowels. Similarly, intestinal obstruction can be
detected in utero and result in earlier alert for sub-
sequent intervention. Fifty percent of fetal abnormali-
ties detected by ultrasonography are renal in origin
and include renal agenesis, renal cystic disease, and
obstructive uropathy. In the case of posterior urethral
valve-related uropathy, surgical intervention will be
needed soon after birth. Drs. Abramowicz and Jaffe
have prepared major lists of conditions, and risk fac-
tors and indications plus figures that will illustrate
these various intrauterine conditions.

Drs. Berkes and Langer give a “reappraisal” of the
status (pros and cons) of intrapartum fetal surveil-
ance. Understanding of fetal physiology and
enhanced fetal surveillance techniques have resulted
in marked increases in cesarean section rates and dra-
matic reductions of perinatal mortality rate. How-
ever, there has been no prospective randomized
study to show that electronic fetal monitoring is bet-
ter than traditional methods of fetal surveillance.
The authors conclude that traditional auscultation is
equivalent to electronic fetal monitoring for low-risk
patients. Where abnormal fetal heart rate patterns
accompany passage of meconium, there is a high per-
cent of neonatal mortality and morbidity. Risk for
adverse neonatal outcome in moderate or thick
meconium in the amniotic fluid is threefold. The
majority of infants with low Apgar scores have no
neurologic sequelae, even though they may be
labeled as “asphyxiated” babies. The authors define
and describe the various fetal heart rate patterns and
come to a helpful clinical conclusion that “reassur-
ing” heart rate patterns include fetal heart rate accel-
erations and/or normal baseline weight and/or mild
bradycardia and/or mild variable decelerations.
Nonreassuring fetal heart rate patterns include the
absence of fetal heart rate accelerations with severe
variables, late decelerations, and tachycardia. This
section reminds us that despite of major advances in
understanding of fetal heart rate patterns and
responses during pregnancy and delivery, there are
still many unanswered questions, and modern tech-
ology brings with it also modern complications,
such as inappropriate operative intervention and
increased legal liabilities.

REFERENCES
1. Haath JC, Goldenberg RL, Andrews WW, Dillard MS, Cooper RL. Reduce inci-
dence of pre-term delivery with metronidazole and erythromycin in women with