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The Neonate with Congenital Heart Disease: What the Cardiac Surgeon Needs to Know from the Neonatologist and the Cardiologist

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A cardiac surgeon planning an operation for a neonate with congenital heart disease (CHD) is likely to be most successful if he or she is maximally informed about the patient by his or her colleagues in cardiology and neonatology. Beyond the self-evident need to have the exact anatomic diagnosis clearly outlined, there are a number of other pieces of physiologic, historic, and even social information that can help the surgeon to provide the best outcome. The information required varies with the individual patient but in all cases must include prenatal details, circumstances of birth, postnatal complications, coexistent congenital malformations, the presence of any identifiable syndromes or other genetic abnormalities, and the identification of any consequential electrolyte or hematologic abnormalities. In this article, we discuss each of these areas in more detail and then discuss some specific congenital cardiac malformations to emphasize the unique anatomic and surgical issues that each malformation presents. We also review some of the management and monitoring techniques that we believe are helpful in optimizing the preoperative condition of the neonate with CHD, which, in turn, offers the best chance for a successful postsurgical result.

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Prenatal information

With the widespread application of prenatal ultrasound and fetal echocardiography, it is increasingly the case that the neonate with surgically significant CHD has been diagnosed in utero [1]. This early diagnosis is broadly beneficial to the parents, the heath care team, and, most importantly, the baby [2]. The advantages to the parents include the opportunity for education and preparation by knowledgeable perinatologists and cardiac specialists. In many instances, the parents may be introduced to the surgeon, which allows for a relatively relaxed and thorough discussion of the upcoming surgery. The prospect of the surgery is doubtless still quite daunting for the parents, but the preparation allowed by prenatal diagnosis and discussion may return some sense of control to them.

For the health care team, prenatal diagnosis allows for the preparation of parents as described but also allows for the prevention of complications that may arise from delayed diagnosis of important CHD. This often takes the form of tailoring the circumstances of delivery in terms of timing and location. The timing of delivery is controllable by tocolytic agents to some extent if it is thought that additional pulmonary maturation may be helpful. Alternatively, if additional gestation is thought to be unnecessary or even harmful, elective cesarean section may be performed. In either case, the delivery should be arranged so as to occur in a location with a neonatal intensive care unit and the facility to perform neonatal cardiac surgery. The presence of a neonatologist in the delivery room should also be planned in case immediate intervention is required.

From the perspective of the infant with CHD, prenatal diagnosis allows for a much smoother transition to postnatal life. In particular, the immediate application of respiratory support and prostaglandin infusions, if needed, can prevent or minimize any physiologic derangements that might otherwise occur. At a minimum, if ‘‘preemptive’’ resuscitation is not necessary, appropriate and more intensive monitoring, including umbilical vascular catheter placement, can be established immediately after delivery.

Birth history

Whether the diagnosis of CHD is made in utero or later, the history of the circumstances of birth may be extremely important, particularly if the delivery is difficult or prolonged or involves significant resuscitative efforts. The newborn with a significant cardiac malformation is remarkably tolerant to extreme stress, at least in comparison to older children, but nonetheless requires time to recover from a difficult entry into the world. In the best of circumstances, this may mandate a few hours; however, much more frequently, it means delaying surgery for several days. Although this period of stabilization and recovery postpones an operation that anxious parents may have anticipated for months, it certainly makes for a better surgical candidate. Moreover, as a practical matter, it often

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