

Delivery Room and Early Postnatal Management of Neonates Who Have Prenatally Diagnosed Congenital Heart Disease

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Advances in fetal echocardiography have led to increasing numbers of infants being diagnosed prenatally as having congenital heart disease (CHD). Consequently, neonatologists are more commonly asked to attend the deliveries of infants who have prenatally diagnosed CHD. Optimal care of infants who have significant CHD begins before delivery with in utero management by perinatologists and continues with skilled resuscitation in the delivery room and subsequent timely admission to an intensive care unit. Prenatal diagnosis allows for coordination of care surrounding delivery and during the early postnatal hours. Knowledge of the expected transitional circulation occurring with birth and the pathophysiologic implications of CHD increases the likelihood of providing efficient and effective therapies anticipating improved neonatal care and outcomes.

Fetal echocardiography

Because the prenatal diagnosis can have a profound impact on decisions surrounding pregnancy, delivery, and postnatal management, accuracy in diagnosis is important. Several studies have evaluated the accuracy of prenatal echocardiographic diagnoses. In a study by Forbus and colleagues [1] published

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in 2004, the prenatal diagnosis of 133 infants was accurate in 119 (89.5%). In only 5 of the 14 patients who had postnatal discrepancies would the initial neonatal management have been different had the prenatal diagnosis been more accurate. Continuing to support the high accuracy of prenatal diagnosis, a 2001 series by Perolo and colleagues [2] calculated prenatal diagnostic accuracy to be 91% (236 of 260 cases). Of the fifteen discrepancies reported in this series, in 6 cases the lesion was different than the prenatal diagnosis and in 9 cases the infant had normal intracardiac anatomy. Rychik and colleagues [3] investigated the accuracy of fetal echocardiography specifically in regards to the fetus diagnosed as having single-ventricle anatomy. They reviewed 57 fetuses that had been identified on multiple prenatal scans to have single-ventricle anatomy between 1990 and 1995. Of the 43 fetuses carried to term, the prenatal diagnosis of single-ventricle heart was accurate in 93% (40 of 43); and in 70% of the neonates (30 of 43), the postnatal diagnosis was identical to the prenatal prediction. The initial management or surgical strategy did not change in 9 of the 13 newborns in this series in whom the postnatal diagnosis differed from prenatal diagnosis. Based on the literature discussed above, a prenatal diagnosis of CHD is accurate approximately 90% of the time; and the discrepancies that do occur rarely have a significant impact on the initial neonatal management. Despite some forms of CHD being difficult to visualize in utero, such as coarctation of the aorta [4–6], and despite other factors that complicate fetal echocardiography, such as maternal obesity, multiple gestations, and fetal lie or movements [6–9], prenatal diagnoses of CHD are highly accurate.

Prenatal diagnosis: impact on preoperative condition

Ideally, a prenatal diagnosis of complex CHD improves the preoperative condition and the clinical and neurodevelopmental outcomes of infants requiring neonatal cardiac surgery by preventing postnatal hemodynamic instability and hypoxemia. In theory, the hypoxemia, hypoperfusion, and acidosis associated with the cardiogenic shock that may accompany postnatally diagnosed CHD could be avoided and outcomes accordingly improved. Many investigators have studied the impact of a prenatal diagnosis on outcome variables. Despite similar surgical mortality, overall hospital mortality, duration of mechanical support, or length of hospital stay between infants diagnosed prenatally and infants diagnosed postnatally, decreased preoperative morbidity has been reported in infants diagnosed prenatally [10–13]. Between 1991 and 2000, Verheijen and colleagues [13] compared preoperative variables of 21 infants who had prenatally diagnosed CHD to those of 188 patients diagnosed postnatally. Those diagnosed prenatally had significantly lower lactate levels compared with infants diagnosed postnatally. The investigators suggested that the elevated lactate levels in the postnatally diagnosed group may contribute to an increased incidence of neurodevelopmental impairment and neuronal damage. They concluded that prenatal diagnosis may have an important role in the prevention of neurologic sequelae

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