Trisomy 18 and Complex Congenital Heart Disease: Seeking the Threshold Benefit

A prenatal diagnosis of ductal-dependent, complex congenital heart disease was made in a fetus with trisomy 18. The parents requested that the genetic diagnosis be excluded from all medical and surgical decision-making and that all life-prolonging therapies be made available to their infant. There was conflict among the medical team about what threshold of neonatal benefit could outweigh maternal and neonatal treatment burdens. A prenatal ethics consultation was requested. *Pediatrics* 2013;132:161–165
A prenatal diagnosis of trisomy 18 often results in fetal demise or infant death. A small number of patients survive beyond the first year of life with profound neurodevelopmental disabilities. As parents and clinicians, we describe the process of decision-making after a prenatal diagnosis of trisomy 18 and complex congenital heart disease. The parents desired extensive obstetric, neonatal, and surgical interventions for their daughter to promote any chance of prolonging her life. Clinicians requested assistance from ethics consultants to balance parent autonomy, infant burden, and claims of conscience.

**CASE REPORT**

A couple was referred to a regional hospital after a prenatal ultrasound diagnosis of fetal cardiac anomaly. Fetal evaluation revealed a female fetus with a double-outlet right ventricle and undersized left ventricle, other minor anomalies, and growth restriction. Amniocentesis confirmed trisomy 18, and the family was offered termination of pregnancy. They declined and said that their religious beliefs would not permit that option.

A repeat fetal echocardiogram was worrisome for significant left ventricular hypoplasia and a dural-dependent anatomy. Cardiologists and cardiac surgeons were concerned that a 2-ventricle repair might be impossible. A multidisciplinary team from maternal-fetal medicine, genetics, pediatric cardiology, and neonatology met with the parents. The parents requested any maternal or neonatal interventions be performed that could extend their daughter’s life. They also indicated that, if the cardiac anomaly was deemed inoperable with 100% certainty, they would accept the withdrawal of life-sustaining therapies. They requested that the trisomy 18 diagnosis be excluded from all decision-making about their daughter, whom they named Faith.

Some clinicians did not want to participate in any maternal or neonatal interventions, believing that the growth restriction and predicted life span of days to weeks made the burdens of these interventions outweigh the benefits. The parents were informed that an ethics consultation was requested for additional guidance; the family declined to participate in the ethics consultation.

**THE FETAL MEDICINE TEAM’S RESPONSE**

There were 3 significant medical risk factors in this case: (1) a dural-dependent cardiac defect that would require at least 3 surgeries for palliation, (2) intrauterine growth restriction, and (3) the chromosomal abnormality. Taken together, these factors led some clinicians to wonder if survival was possible or if life-sustaining intervention would only prolong the dying process; they recommended palliative care only. Other clinicians, however, found the prenatal imaging inconclusive and wanted to initiate life support to perform a more rigorous postnatal evaluation. Those interventions were only justified, of course, if at least 1 complex neonatal surgery would be offered. The parents believed that surgery was in their daughter’s best interest if there was any chance of survival because they valued any chance at life. Whereas the operative risk was likely exceedingly high, certain death was impossible to predict. Some of the doctors went on to advocate that, because there was at least some chance of short-term survival, surgery was consistent with the parents’ values. All of the doctors agreed that this infant’s chance of long-term survival was very low. The parents acknowledged this but wished to proceed with any and all interventions to prolong life.

These decisions about neonatal management also had implications for obstetric care, particularly the consideration of cesarean delivery to increase the odds of a live birth. The American College of Obstetrics and Gynecology Committee cautions that proposed fetal or neonatal interventions without strong evidence of infant benefit be carefully weighed against the risks of maternal interventions. Reflecting this risk-benefit calculus, women with a fetal diagnosis of trisomy 18 have higher rates of vaginal delivery, as opposed to cesarean delivery, compared with the general population. In this case, the neonatal prognosis was extremely poor due to both trisomy 18 and a complex cardiac anomaly. Several clinicians believed that cesarean section for fetal indications would have questionable, if any, benefit while raising the risk of harm, morbidity, and mortality for the patient. Yet, other clinicians perceived a sufficient benefit only if the pediatricians and surgeons planned to offer neonatal therapies to extend life. Some clinicians were willing to consider a cesarean delivery under those circumstances, and the parents wanted this option.

Not all parents accept this risk-benefit calculus. Some may request an elective cesarean delivery to increase their chances of spending even minutes with a live infant. A recent survey suggests obstetricians often accommodate these requests.

For both obstetric and perinatal decisions, the parents must work with doctors to assess the potential benefits and burdens of any interventions. They have the right to make decisions unless the doctors believe that their decisions are contrary to the child’s best interest. Clinicians must evaluate the reasonableness of parents’ treatment requests. The threshold for limiting parents’ authority to request unproven or unorthodox interventions for their child is
not always clear. This is especially true in the case of conditions such as trisomy 13 or 18, which, until recently, were believed by many doctors to be incompatible with long-term survival. Not all doctors share the belief in this absolutely dire prognosis. McGraw and Perlman\(^9\) published a survey of neonatologists’ attitudes regarding the treatment of newborns with trisomy 18. The doctors were divided. Nearly half (44%) indicated willingness to resuscitate a newborn with trisomy 18 and unspecified congenital heart disease. Donohue et al\(^6\) surveyed 298 US neonatologists; 38% had no objection to resuscitating a newborn with confirmed trisomy 18. In the most recent edition of the Textbook of Neonatal Resuscitation, the American Heart Association and the American Academy of Pediatrics removed trisomy 18 from the list of diagnoses for which it is considered ethical to not initiate resuscitation at birth.\(^7\)

Practices seem to be changing along with attitudes. Bruns\(^8\) reported that as many as 10% of infants with full trisomy 18 receive surgical feeding tubes. Data from Japan suggest growing willingness to perform surgical interventions for the cardiac anomalies most common in trisomy 18, including ventriculoseptal and atrioseptal defects and patent ductus arteriosus.\(^9\) An estimated 60% to 80% of fetuses with trisomy 18 have congenital heart disease; one-third of these have complex lesions.\(^11\) Experience with cardiac repairs for infants with trisomy 18 or 13 is limited.\(^9\) The largest series of 24 operative cases was published by Graham et al\(^12\) in 2004; none involved complex single-ventricle anatomy. In a survey of 859 neonatologists, geneticists, and cardiologists, there was variability in clinician support for cardiac surgery for an infant with trisomy 13 or 18, ranging from 32% of cardiologists and 20% of geneticists to 7% of neonatologists. In the case of single-ventricle physiology, $>$90% would not recommend surgical intervention.\(^13\) The current 1-year survival rate for any infant with hypoplastic left heart syndrome is $\sim$64% to 74%, odds that diminish with chromosomal abnormalities and low birth weight.\(^14\)

In this case, the parents asked clinicians to ignore their daughter’s chromosomal diagnosis in all management decisions, stating that her life should have as much value as any other child’s life. The clinicians, by contrast, believed that the trisomy 18 diagnosis could not be separated from decisions about intensive care and surgery, because aneuploidy and growth restriction are known predictors of perioperative morbidity and mortality.\(^15\) Some clinicians thought that the infant’s chance of survival was so low that it did not outweigh the potential pain associated with cardiac surgery and multiple intensive care interventions, pain that cannot be perfectly controlled despite the best of intentions. These clinicians also were concerned about the burden of suffering for the infant who would experience cold stress, noise, perturbed sleep-wake cycles, limited holding, and impaired bonding.

**HUNTER AND THERESA MCNEE, THE PARENTS, WRITE**

The parents, Hunter and Theresa McNeel, wrote the following: “As parents, our challenge was to uphold our firm conviction that decisions regarding life and death are the sole province of our Maker while at the same time respecting the feelings and consciences of those who would be caring for our daughter (and loving those care providers as well). We believe that the knowledge and skills of the medical staff are a gift of God, and should be used in the furtherance of life, not in its destruction. We honor and appreciate that, despite the conflicts indicated by some staff members, in the end, they were willing to do all in their power to give our daughter every chance. It is our hope and prayer that the legacy of our daughter’s brief life will be to raise attention to the fact that a diagnosis of trisomy 18, or any other genetic defect, should not be immediately classified as fatal. Each case should be considered individually for the medical challenges it represents, and if intervention can result in the extension of life, all medically indicated treatment options should be offered, with final decisions left to the families involved.”

**THE ETHICS COMMITTEE RESPONSE**

The ethics committee interpreted the conflict in this case as one between a desire to respect the parents’ wishes and the individual clinician’s duty to act on his or her conscience. In this case, the conflict was even more complicated because the clinical decisions of 1 group of physicians would impose obligations on others. For instance, if the surgeons would offer neonatal cardiac surgery, would this obligate the obstetrician to offer cesarean delivery for fetal distress? Some clinicians suggested that the family transfer care to a facility where staff might have greater consensus about life-sustaining interventions. Given the complex care that the infant would need and the parents’ geographic and insurance limitations, however, this was not thought to be a reasonable or a realistic option. In addition, honoring conscientious objections would have been difficult because the care of this infant would require assembling a team of physicians, nurses, respiratory therapists, and support staff who did not have conscientious objections. The American Academy of Pediatrics policy statement regarding claims of
This case highlights the challenges of incorporating accurate data regarding outcomes, quality of life, and suffering into the ethical analysis. Despite their strong desire to provide “nondirective” counseling, physicians and nurses had strong beliefs about the effect that various disabilities have on an infant’s quality of life. One challenge for the ethical consultants was to examine how those beliefs may or may not have influenced treatment recommendations in the specialties. With a goal of minimizing this bias, the ethics committee supported multiple intra- and intersubspecialty forums for clinicians to share their views frankly before presenting a consensus recommendation to the family.

Another concern for bias in this case arose from the conflicting roles that some clinicians had as both direct caregivers and ethics committee members. One neonatologist and 1 obstetrician who engaged in the prenatal clinical evaluations were also members of the ethics committee. On one hand, their intimate understanding of the medical details assisted the ethics committee in navigating these complexities. On the other hand, these clinicians’ relationships with ethics committee members could influence the process toward their own value systems and world views. Procedural safeguards are needed in situations in which the roles and boundaries are blurred. In this case, these physicians recused themselves from the decision-making process during the ethics consult.

Given the paucity of professional dialogue about medical management in trisomy 18, families are likely offered different fetal and neonatal management recommendations on the basis of variable clinician perspectives. Families who have experienced a fetal diagnosis of trisomy 18 describe how inconsistent information creates a sense that clinicians are biased or untruthful. This case illustrates the process by which that happens, the problems that arise for a health care team faced with such a situation, and the role of the ethics committee in trying to facilitate communication and good decisions.

JOHN D. LANTOS COMMENTS

Two aspects of this case are unique. First, the case highlights the new dilemmas that arise as a result of better prenatal diagnosis. In this case, parents and doctors discussed options long before the infant was born. Decisions had to be made about termination of pregnancy, about obstetric management, and about postnatal care for the infant.

Second, the case highlights the ways in which treatment options are changing for infants with trisomies. Many clinicians object to life-sustaining treatment of infants with trisomy 13 and 18. These views are based on 2 ideas. First, that these trisomies are uniformly fatal conditions. Second, that the burdens of treatment under these circumstances outweigh the benefits. These views are no longer tenable. Many infants with these trisomies survive for years. Many parents report that infants with trisomies have an acceptable quality of life and are valued members of families. Given the data, decisions about whether to terminate pregnancy, to pursue life-sustaining treatment, or to choose palliative care after birth for infants with trisomy 13 or 18 should clearly be made by fully informed parents.

The case illustrates profound shifts in the ways that parents respond to prenatal diagnoses. A few decades ago, the only goal of prenatal diagnosis was to allow decisions to terminate pregnancy when a fetus was diagnosed with a serious condition. Today, prenatal diagnosis is used to diagnose, monitor, and, in some cases, treat serious conditions of the fetus. It allows doctors and parents to make better decisions about obstetric and perinatal management.
The fetus has become a patient. There is a continuum of care between intrauterine and extrauterine life. Dilemmas like the one illustrated by this case will become more common as more centers develop fetal medicine programs. Such programs will need expertise in clinical ethics and in pediatric palliative care if they are to serve the needs of parents who face decisions about treatable but potentially life-threatening conditions of the fetus.

REFERENCES

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