ETHICAL ISSUES IN SEVERE PERINATAL ASPHYXIA

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Abstract
Severe perinatal asphyxia represents a major source of neonatal mortality and further neurologic sequelae in survivors. The purpose of this article is to present and discuss some of the ethical issues regarding immediate treatment and long-term care of the children affected by this disease. These issues arose from a small study conducted in the Neonatal Intensive Care Unit at the Cuza-Voda Hospital of Obstetrics and Gynaecology, in Iasi. The intensive care of the newborns with severe perinatal asphyxia should not take into account the severity of the condition or hospitalization costs, due to the high regenerative capabilities and resistance to hypoxia of the neonatal central nervous system.

Key words: severe perinatal asphyxia, hypoxic-ischaemic encephalopathy, long-term outcome, neurologic sequelae

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Introduction

Neonatal intensive care has become the most expensive intervention in pediatrics. Before neonatology first emerged, it was inconceivable to spend hundreds of thousands of dollars to save a baby’s life. Today, it has become both routine and routinely disturbing. From the beginning, questions have arisen about how Neonatal Intensive Care Units (NICU) should be funded, whether they pull resources from other worthy programs and create need and dependency rather than health and whether such therapies are cost effective.

Full-term babies with acute illnesses are usually the least morally controversial. Most acute illnesses can be treated if they are accurately diagnosed. The problems that arise in decision making for such babies are similar to the problems related to other high-risk patients of any age—diagnoses and treatment must be quick. Time or need for discussion is limited. These babies generally either get better quickly or die quickly. Ethical problems arise only when treatment is partially successful and the babies survive but with severe long-term complications [1].

Two aspects of prognostication are important in the NICU. Short-term prognostication focuses on the likelihood that a baby will survive the neonatal period or during the hospital stay. Long-term prognostication includes considerations of mortality but focuses more on the chronic impairments that survivors may live with. Accurate prognostication is the basis for ethical decision making in the NICU. Decisions about whether to continue the treatment or to allow a baby to die rely first on the understanding of the likelihood that the treatment will be successful. If the treatment is known to be beneficial, then it is morally obligatory to initiate and continue the treatment. The difficult cases, then, are those that fall between those clear-cut categories—situations in which it is unclear whether the treatment will enable the baby to survive.

The aim of this paper is to emphasize some of the medical and ethical issues that a neonatologist is confronted with when facing a case of severe perinatal asphyxia.

Medical implications of perinatal asphyxia


Perinatal asphyxia is the result of hypoxia and ischemia, combined with metabolic acidosis and/or hypercapnia, which can lead to hypoxic-ischaemic encephalopathy (HIE) following oxygen deprivation and decrease of cerebral blood flow [3].

Severe perinatal asphyxia refers both to immediate survival, improved by progresses in Neonatal Intensive Care and to the neurological and intellectual outcome and development of social skills in these newborns.

Intrapartum and postpartum asphyxia can be a factor of incrimination for the medical conduct of birth and newborn supervision. This conduct is, however, limited in some
settings by resuscitation resources, poor reaction times and keeping some inherited therapeutic methods, in spite of newer, more efficient ones of minimizing postasphyxial injuries.

HIE becomes obvious a few hours after birth when the newborn becomes unresponsive to stimuli, with posture anomalies, atypical movements, seizures and is graded in three clinical stages, according to Sarnat and Sarnat [4]:

- Stage I, mild non-specific disorders of the muscle tone and reflexes, with complete recovery and no long-term consequences;
- Stage II, moderate hard to define injury. About 20% of the neonates are at risk of death or major sequelae. The other 80% seem to have a good outcome, but there is evidence of possible significant learning and behavioural issues at school age.
- Stage III, severe damage of the CNS, with major risk of severe sequelae, especially when symptoms last for more than 48 hours. In severe cases, reflexes are altered and brain growth is affected. Sequelae are athetoid or spastic cerebral palsy, learning issues, epilepsy, blindness, deafness. Usually, doctors prefer to withdraw vital support after 48-72 hours of severe HIE, unresponsiveness and lack of spontaneous respirations [5]. In this light, it becomes increasingly important to have a clear diagnosis of condition, cause and stage, including biochemical disorders, infections and congenital malformations.

The role of the Apgar score in defining perinatal asphyxia

Because hypoxic-ischaemic injury is one cause of low Apgar scores and because, in turn, low Apgar scores could be a sign of occurring hypoxia-ischemia, a correlation between Apgar scores [6] and perinatal asphyxia has been searched. For a long time, perinatal asphyxia has been defined based on Apgar scores and lack of spontaneous breathing after birth. This criterion cannot be correlated with intrapartum injury as it can be caused by other events (drugs administered to the mother, airway or heart malformations, prematurity).

The Apgar score is still a convenient form of neonatal evaluation of the status and response to resuscitation. Until recently, it has been considered essential for the diagnostic of perinatal asphyxia, but it led to the incorrect definition of this condition and to the inadequate evaluation of non-specific neurologic examination. The Apgar score cannot be used for this purpose, as all its’ five components have equal importance, but the importance of each for the central nervous system differs considerably [7].

The Apgar score is an expression of the physiologic transition of the newborn, is extended over a limited period of time and includes subjective components. Also, certain parameters, such as muscle tone, skin colour and reactivity, are partially based on physiologic maturity and a healthy preterm baby can receive a low Apgar score solely based on low gestational age [8].

A 1-minute Apgar score below 3 is a screening test for severe perinatal asphyxia, but it overestimates by 8-fold its’ magnitude. The unique utility of the 1-minute Apgar score is to identify high-risk newborns, in need of neurologic follow-up [9].

Retrospective studies have
demonstrated that 5-minutes Apgar scores are valid indicators of neonatal morbidity and mortality, but are inadequate for predicting long-time outcome. The National Collaborative Perinatal Project, a study performed in California, USA, which involved 4000 normal-birth-weight infants weighing more than 2500 grams, born between 1959 and 1966, stated that less than 5% of the newborns with 5-minutes Apgar scores below 3 will develop subsequent cerebral palsy.

The Apgar score is not an adequate tool to predict long-time neurologic outcome, as it was developed to evaluate the immediate adaptation of the newborn to the extrauterine environment, although a 10-minutes Apgar score below 3 has been strongly associated with high probability of death during the neonatal period [10,11].

Long-term neurologic outcome
Neonatal neurological examination is one of the available tools in predicting the future motor and cognitive development of an infant. An abnormal result of the examination has been shown to associate with an abnormal developmental outcome. Abnormal neonatal neurological signs, even if transient, have been observed to be associated with developmental abnormalities or learning difficulties. In a study by Amiel-Tison (1983), 27% of children with transient neurological signs or symptoms during the first week of life performed abnormally (dyspraxia, fine motor problems, behavioural disturbances and developmental subnormality) at 5.6 years of age compared to 7% of controls [12].

The predictive value of neonatal neurological examination is high for later normality, but poorer for abnormality. 80-90% of the neurologically normal neonates have been considered as normal [13] and 0-7% as severely abnormal in follow-up. On the other hand, of the neurologically abnormal neonates, 4.3-50% had major impairments, whereas 35-77% were considered normal [14].

HIE is responsible for ~ 20 % of the later cases of childhood cerebral palsy. To gain insight into the long-term effects of NE on development, follow-up is required throughout the school-age period. Specific cognitive functions continue to develop throughout childhood. As it is impossible to examine a function that has not developed yet, short-term follow-up may exclude minor cognitive and behavioural difficulties at school age. Moreover, subtle functional deficits usually do not become apparent until a child faces increasing demands to master complex abilities in school.

There are numerous scales used for the neurologic examination of the asphyxiated neonate. The better used and known are the Amiel-Tison, Prechtl, Brazelton tests to be used during the neonatal period and Bayley Infant Neurodevelopment Screener for follow-up. All these scales use mostly qualitative items to evaluate motor, linguistic and cognitive development.

General intellectual, educational and neuropsychological outcomes are consistently positive for children with mild NE (st.I HIE) [15] and negative for severely affected children (st. III HIE). However, children with moderate neonatal encephalopathy (st. II HIE) form a more heterogeneous group with respect to outcome. On average, intelligence scores are below those of children with mild neonatal encephalopathy and age-matched
peers, but within the normal range [16,17]. A few studies suggest elevated rates of hyperactivity in children with moderate encephalopathy and autism in children with moderate and severe neonatal encephalopathy [18-20].

The duration of neurological abnormalities - especially disturbances of consciousness, poor sucking and absent Moro reflex, the time of appearance and quality of the seizures, the neurological condition of the newborn after the second week of life or at discharge, EEG abnormalities as well as neuro-imaging abnormalities, and delayed potentials in evoked potentials, have been associated with adverse outcome.

Neonatal encephalopathy has been reported to be a valuable marker of a CNS injury and also an important predictor of subsequent neurological deficits. A relationship between the grade of neonatal encephalopathy and the outcome of the infants has been observed by many authors. No child with mild neonatal neurological disturbance and recovery within one to five days had an adverse outcome or even minor motor or cognitive deficits at 3-8 years of age [4,21]. Their later motor coordination and school performance were similar to those of their peers. However, infants with severe HIE either died or had significant neurological impairments. The outcome of infants with moderate HIE was more difficult to predict [22]. Those whose neurological examination and EEG remained abnormal for more than a week, had a significant risk for an adverse outcome. At the age of eight, intellectual, visual motor integration and receptive vocabulary scores for those with moderate encephalopathy were significantly below those in the group of mild encephalopathy or in the peer comparison group [21].

Long-term neurologic follow-up is indicative for the bond between HIE stages and the outcome of the infant and also for the crucial role of the family for the well-being and normal development of such children. Families can have an important contribution to the rehabilitation of the infant through motor and cognitive stimulation after discharge or can worsen the outcome of the baby through lack of interest.

In a study performed in the Cuza-Voda Maternity Hospital’s NICU over 21 months (01.01.2010-30.09.2011), 34 babies were diagnosed with severe perinatal asphyxia. Seven of them (20.6%) died (5 before discharge and 2 during their first year of life). Out of the surviving infants which were included in the neurologic follow-up programme, 9 (33.3%) had full recovery and other 9 finished the programme with moderate neurologic disorders that can be fully recovered during preschool years. Following this study, the authors agree that although the sums invested in these children for their hospitalization and neurologic recovery are a great financial burden for the state health system, their use is well justified. The seven deaths that occurred during our study were predictable for newborns with severe HIE. In this context, non-initiation or withdrawal of vital support is unacceptable, due to the high plasticity and regenerative capabilities of the neonatal brain.

Ethical decision-making in perinatal asphyxia

The clinical evaluation in the first five minutes is not enough to identify infants who survive with or without
sequelae, whereas the 5-minute Apgar score may reflect the subjectivity of the evaluator or exogenous interventions. Although the Apgar score was not designed to predict long-term neurologic sequelae, a 10 minutes score below 3 is associated with an increased probability of death or severe neurological sequelae, as there is a directly proportional relationship between the degree of impairment and long-term sequelae of the neonatal [23].

The survival of newborns with severe perinatal asphyxia with major vital and impairment risk is greatly dependent on the parents’ decision for continuation of vital support (surrogate decision) [24]. Their decision should be free, autonomously-made, based on objective information provided by health professionals and in the best interest of their child. Parents’ and doctors’ attitude differs substantially when continuation of treatment is considered: doctors believe that any risk for neurologic sequelae is unacceptable (quality of life approach), whereas parents and children with cerebral palsy easily accept a lower quality of life (sanctity of life approach). Also, neonatologists place more emphasis on patient-linked prognostic variables (futility, viability and morbidity) and ignore social and personal issues, such as finances or religion. This approach was mostly observed in males, more experienced practitioners, research-oriented professionals and persons without children. Although it is considered that parents are the most appropriate decision-makers for their own children, health professionals have the legal and moral obligation to provide the best care, based on current medical information and accurate clinical evaluation [25].

The physician’s role is to provide parents with all therapeutic options in a non-directional manner and to offer assistance as it is asked for or becomes necessary. The parents’ role is to actively participate in decision making. The decision to continue, stop or withdraw vital support must be made solely based on the newborn’s best interest [26], not taking into account financial considerations of any kind.

Both the obstetrician and the neonatologist should talk to the parents as soon as possible after the birth of an asphyxiated infant which is an opportunity to establish a relationship based on trust, to exchange important information, to establish realistic goals and help parents make informed decisions regarding their baby [27,28]. Before this conversation occurs, doctors should be familiar with the hospital’s statistics regarding both the short-term and long-term outcome of such infants. Also, doctors should inform the parents that in spite all efforts, their capability to offer assurances regarding the outcome of the baby is limited. In most cases, more than one conversation is necessary to insure that parents truly understand what they are being told. Doctors often mistake the parents’ silence or lack of immediate reaction with understanding and often what parents understand is different from what doctors told them. This happens as most newborns with perinatal asphyxia are term babies, appropriate for gestational age and in poor socio-economic environments, weight gain is probably the most important marker of outcome for desperate, uneducated parents. In addition, parents should be aware that there are differences of practice among medical institutions.
and these differences can affect the outcome of their baby.

The global concept of “quality of life” can be broken down into four ethically relevant subcomponents, each of which must be considered in these cases. These subcomponents include the anticipated cognitive or cerebral function, the anticipated physical disabilities, the pain and suffering that is associated with the disease, and the burdens of future treatments [1,29].

Morally, the non-initiation and withdrawal of resuscitation are equivalent. However, in the NICU, not providing chest compressions or epinephrine during resuscitation to a bradycardic, hypotensive newborn is not morally equivalent to extubation, neither for the doctors nor for the parents. There are also ethical differences between the “passive” withdrawal of vital support in a dying preterm baby, due to the futility of the treatment, and the “active” withdrawal in a vitally stable term newborn with severe neurologic injuries, taking into account the quality of life following discharge and treatment [30,31].

Doctors generally find it emotionally less disturbing to withhold therapy than to withdraw it [32]. Furthermore, doctors prefer scenarios in which treatment withdrawal will lead to death relatively quickly to those in which the death process is more drawn out. Thus, they would rather withdraw ventilators or vasopressors than fluids or antibiotics [33]. In general, parents seem much more willing to opt for withholding treatment in the delivery room than they are to request or accede to withdrawal of life support in the NICU. This may reflect the growing emotional bond that forms between parents and their baby, especially when the newborn is critically ill and greatly vulnerable.

Most parents do not wish withdrawal of vital support if there is a minimum chance of survival and many of them are willing to accept the continuation of treatment, even when faced with a high prediction of morbidity. This tendency does not stop at discharge and some parents can embark on an “odyssey” for their child’s health. This is an issue that can ultimately affect their relationship and their financial status, mainly because children with perinatal neurologic damage are children with special needs on the educational and social level and their parents have lower chances of keeping stable jobs and having a constant income. The financial aspect becomes an issue difficult to neglect. Most professionals involved in neonatal care agree that one should not consider costs of any kind, including health care system, educational or social when treating a newborn infant. However, the costs of the first admission, which usually expands over a large period of time, can be a burden both for the health care system and for the parents [34].

Conclusions

Despite the enormous progress achieved by neonatology, perinatal asphyxia represents an important cause of infant and neonatal morbidity and mortality. The costs of care should not represent an important issue when coming to a medical decision with regard to vital support. Severe perinatal asphyxia needs further studies regarding the decision of vital support initiation/withdrawal by the medical staff and the parents. Continuation of follow-up programme
is necessary after 2 years of age, due to the further development of neurologic functions during the preschool period. Moreover, the infant’s family is extremely important during the neurologic recovery period. Appropriate medical conduct, which mainly includes complete and complex resuscitation, according to the National Guidelines for Neonatal Resuscitation, can minimise the unwanted long-term consequences and improve the neurologic outcome for these children.

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