Neurological disorders of the newborn essay sample

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When anyone plans on having a baby, one of the first things that comes to mind is the hope that the child will be born healthy. It is a perfectly reasonable desire, but what happens when the child is born with a neurological disorder? Neurological disorders in infants are a major concern in today's society and methods of treatment need to be developed further. This paper will discuss some of the most common neurological disorders in newborns as well as touch on some of the rarer, but just as important disorders. Intraventricular hemorrhage (IVH) is one of the most common neurological disorders in newborns. It is characterized by bleeding inside or around the ventricles. These are the spaces in the brain containing the cerebral spinal fluid. Intraventricular hemorrhage is most common in premature babies, especially very low birthweight babies weighing less than four pounds. 1 Experts are not clear as to why IVH occurs. Bleeding can occur because blood vessels in a premature baby's brain are very fragile and immature and easily rupture. Babies with respiratory problems or other complications of prematurity are more likely to have IVH.

The smaller and more premature the baby, the more likely IVH will occur. Nearly all IVH occurs within the first four days of life. Bleeding in the brain can put pressure on the nerve cells and damage them. Severe damage to cells can lead to brain injury. 2 The amount of bleeding varies, and IVH is often described in four levels. In the first level, bleeding occurs just in a small area of the ventricles. In the second level, bleeding also occurs inside the ventricles. Level three occurs when ventricles are enlarged by the blood, and level four is characterized by bleeding into the brain tissues around the ventricles. Levels one and two are most common, and often there are no

further complications. Levels three and four are the most serious and may result in long-term brain injury to the baby. 3 There are many visible signs of a baby born with an intraventricular hemorrhage. These include apnea, pale or blue coloring, poor ability to suckle, high-pitched cry, seizures, swelling or bulging of the fontanelles (the soft spots" between the bones of the baby's head), and anemia (low blood count). It may be difficult to diagnose this neurological disorder because symptoms of IVH may resemble other conditions or medical problems.

In addition to a complete medical history and a physical examination, an ultrasound of the baby's head is usually used to diagnose IVH. This test uses sound waves to create a picture of internal structures. A cranial ultrasound can view the inside of the baby's brain through the fontanelles. With the ultrasound, the amount of bleeding can be graded into one of the four levels. 1 Unfortunately, there is no highly satisfactory treatment for IVH. One of the only options is to treat any other health problems that may worsen the condition. Although care of sick and premature babies has advanced greatly, it is not possible to prevent IVH from occurring. However, giving the mother corticosteroid medications before delivery has been shown to lower the risk of IVH in the baby. Corticosteroids are a group of hormones that can be used during pregnancy to reduce the immune response in allergic or inflammatory diseases. These steroids are often given to women between 24 and 34 weeks into pregnancy who are at risk of early delivery.

Use of corticosteroid medications is somewhat controversial. Researchers found through studies of rodents and rabbits that high doses of corticosteroids consistently caused cleft palates in newborns. Human studies

show varied and conflicting results. Sometimes, surgery is necessary to stabilize the condition of the baby. This may occasionally involve placement of a catheter into the baby’s skull, although this is rarely necessary in babies because of the flexibility of their skull bones. 2 Another common neurological disease among newborns associated with intraventricular hemorrhage is periventricular leukomalacia (PVL). Periventricular leukomalacia is characterized by the death or damage and softening of the white matter, the inner part of the brain that transmits information between the nerve cells and the spinal cord, as well as from one part of the brain to another. 4 With PVL, the area of damaged brain tissue can affect the nerve cells that control motor movements. As the baby grows, the damaged nerve cells cause the muscles to become spastic, or tight, and restrain movement. Babies with PVL have a higher risk of developing cerebral palsy–a group of disorders that prevent the child from controlling their muscles normally–and may have intellectual or learning difficulties.

PVL may occur alone or in addition to intraventricular hemorrhage. 5 Along with IVH, there is no obvious reason why PVL occurs. This area of the brain is very susceptible to injury, especially in premature babies whose brain tissues are fragile. PVL may happen when the brain receives too little oxygen. However, it is not clear when the “ trigger” for PVL occurs–before, during, or after birth. Like IVH, most babies who develop PVL are premature, especially those born before 30 weeks. Other factors that may be associated with PVL include early rupture of membranes and infection inside the uterus. 6 PVL may not be apparent until later months. Individuals with PVL often exhibit motor problems, but since healthy newborns also are not able to perform

many specific motor tasks anyway, it can be difficult to diagnose. Each baby may also experience symptoms differently. The most common symptom of PVL is spastic diplegia, a form of cerebral palsy characterized by tight contracted muscles, especially in the legs. The symptoms of PVL may resemble other conditions or medical problems. 4 There are a few different ways to diagnose PVL.

Diagnostic procedures for PVL may include a cranial ultrasound. As stated before, a cranial ultrasound uses sound waves to view the baby's brain through the fontanelles. With PVL, the ultrasound will show cysts or hollow places in the brain tissue. Another way to diagnose this neurological disease is through magnetic resonance imaging, or MRI. This test uses a combination of a large magnet, radio frequencies, and a computer to produce detailed images of internal structures. MRI may show some of the early changes in the brain tissue that occur with PVL. 6 There are no treatments for PVL. Management of the problems that can result from PVL will be determined based on the baby's time from conception to birth, overall health, and medical history, extent of the condition, the baby's tolerance for specific medications, procedures, or therapies, expectations for the course of the condition, and the parent's opinion or preference. Babies at risk for PVL may need special care after discharge from the hospital.

This special care may include physical therapy, occupational therapy, and speech therapy. 7 Risk of both intraventricular hemorrhage and periventricular leukomalacia can be reduced greatest by prevention or delaying of premature birth. Avoiding premature birth allows the fetus to develop further, strengthening the systems affected during the development

of IVH and PVL. Some common ways to prevent a premature birth include adequate bed rest, making positive diet and lifestyle decisions, and taking prescribed anti-contraction medications. Regular medical exams and an emphasis on prenatal health can also lower the risk of these diseases. 3 The next disorder that will be discussed is neurofibromatosis. Neurofibromatosis (NF) can affect many parts of the body, including the brain, spinal cord, nerves, and skin. NF can cause growth of non-cancerous tumors–called neurofibromas–on nerve tissue, producing skin and bone abnormalities. As the tumors increase in size, they can press on vital areas of the body, causing problems in the way the body functions. 8 Some children can become severely disabled by NF, while others live almost completely normal lives.

NF can be diagnosed in infancy, and the first noticeable sign is almost always the presence of brown spots on the infant’s skin. They can be found anywhere on the body, though not usually on the face. There is no specific cure for NF, but most neurofibromas can be removed because they are non-cancerous. Because learning disabilities occur in about half the children with NF, some might need extra help in the classroom. 9 There are two different types of neurofibromatosis. This paper will focus on the first type, NF1, because it is more common in infancy and early childhood. NF1 is also more common in general, occurring in 1 of every 3, 000 births and affecting an estimated 100, 000 Americans. About half of all cases of NF1 are inherited, and the other half are due to spontaneous genetic mutation. 9 As stated previously, one key to early diagnosis of mild NF is the appearance of brown spots on the skin. Many people who do not have NF have a few brown spots

on their skin, but if a young child has five or more of at least ½ inch in size, that is an indicator that the child may have NF. A doctor will look for other clues that indicate NF, including neurofibromas. Neurofibromas often become evident on various parts of the body, beginning in the arms.

A child may also develop freckling in the folds of the skin of the armpit or groin or on other parts of the body where the skin creases. Abnormalities of the skeleton, such as the thinning or overgrowth of the bones in the arms or lower leg, curvature of the spine (scoliosis), and other bone deformities also may be features of NF1. 8 Tests like MRI's and X-rays may be used to screen for tumors or evidence of skeletal problems. A child's head circumference will be measured, as kids with symptoms of NF can have a circumference that's larger than normal for their age. As there is no specific cure for NF, the goal of treatment is to relieve symptoms. Treatments include removal of the neurofibromas for cosmetic purposes, treating the complications, and getting intervention for children with learning disabilities. Some developmental programs include referral to appropriate medical specialists to monitor and treat complications, including seizures (up to 40% of children with NF1 have them), high blood pressure, scoliosis, speech impairment, optic nerve tumors (which can cause vision problems leading to blindness), and early or delayed onset of puberty.

In rare cases, neurofibromas can become cancerous (about 3%-5%). In these occurrences, surgery, chemotherapy, or radiation may be necessary. 8 One of the most important things a parent can do is get early intervention if the child has learning disabilities. Most infants (about 60%) diagnosed with NF1 have only relatively mild signs of the disorder, like brown spots and few

neurofibromas on the surface of the skin, which require little or no treatment. 8 Kids diagnosed with mild NF who remain fairly healthy into early adulthood are less likely to develop more serious complications later in life. Kids diagnosed with more serious forms often have correctable complications and with appropriate help and support can lead happy and productive lives. 9 There are a few rare neurological disorders pertaining to infants worth mentioning. Although they are rare, they are still a major concern and need to be addressed. The first rare disorder that will be discussed is galactosemia.

Galactosemia is an inherited disorder that inhibits breakdown of the simple sugar galactose. Galactosemia occurs in approximately 1 of every 60, 000 births. 10 Newborns with galactosemia who are given lactose, the sugar found in milk, have a buildup of substances from galactose. Symptoms occur within a few days after birth, and include convulsions, irritability, poor feeding, poor weight gain, lethargy (a lack of energy), and vomiting. Continued buildup of galactose can even cause brain damage, and in some cases, death. 11 Galactosemia can be treated by removing foods that contain galactose from the diet, so that means babies with galactosemia cannot ingest any milk products, including breast milk. Substituting soy milk, meat-based formulas, and other lactose-free formulas reduces brain, liver, kidney and eye damage, although some mental deficiencies may still develop. 10 Maple Syrup Urine Disease is another interestingly rare disorder that can occur in infants. MSUD is an inherited genetic metabolism disorder that interferes with breakdown of three amino acids. The name of the

disorder comes from the fact that urine of affected persons can smell like maple syrup.

MSUD affects around 1 in 180, 000 pregnancies. 12 Another group of six amino acids normally breaks down the three amino acids, leucine, isoleucine and valine, but a mutation in any one of the six amino acids allows amino acids to build up in the brain cells. Symptoms appear three or four days after birth and include poor appetite, irritability and sweet-smelling urine. 13 In the most severe cases, MSUD can damage the brain during times of physical stress, such as infection, fever, or not eating for an extended period. Seizures, coma and death may also occur if the disease isn’t diagnosed and treated. 13 Treatment for MSUD is highly diet-related. This diet includes avoiding protein and avoiding the amino acids leucine, isoleucine, and valine. This diet must be followed consistently to prevent neurological damage and possibly death. 12 Menkes disease is mostly found in males and affects the gene that regulates the mineral copper in the body. The disease causes low copper levels in the brain and liver and high levels in the intestines and kidneys.

Although babies with the disorder may be born prematurely, they appear to develop normally for six to eight weeks before failure to gain weight, poor feeding, seizures and poor muscle tone appear. Temperature runs lower than normal and the baby’s hair is oddly colorless or steel-colored. Furthermore, the hair breaks easily. Gray matter in the brain degenerates and arteries in the brain rupture or become blocked. Early treatment with copper injections can improve the condition, but will not cure it. Unfortunately, most children die within 10 years. In conclusion, neurological disorders in infants continue

to be a problem in today’s society. The disorders covered in this paper are only a small representation of the many disorders an infant could be diagnosed with. Overall, it seems the best method of prevention is to screen and monitor for symptoms as well as get tested for any hereditary dispositions that may cause the disease. Hopefully treatment methods can be improved in the near future as well as the discovery of a cure.

Endnotes

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