

Dummy foals

Article: Kim Anderson
Emergency Vet Nurse & Journalist

Don't let the name fool you, HIE Hypoxic Ischemic Encephalopathy or HIE is just the relatively new buzz word that vets are using to describe what has previously been known as 'dummy foal' or Neonatal Maladjustment Syndrome. To further confuse the issue, some scientific types also call it NE (neonatal encephalopathy).

As scary as these hard to pronounce words are, the outcome of a well-cared for dummy foal (which may also be termed barkers, wanderers or convulsive syndrome) is over 90% positive, with most foals recovering to mature normally and perform just as well as their non-afflicted stable mates.

It's important to note that all of the above terms are used to describe a set of circumstances that may be affecting a newborn foal and not all foals will have all of the conditions associated with the syndrome. Cases range from very mild to extremely serious and reduced oxygen to the brain (either before or after birth) is almost always present as an underlying cause.

Although it is often possible to care for the HIE foal 'in house' without the need for hospitalization, if you are in a position to do so (both financially and conveniently) it is best practice to have the foal cared for in hospital due to the risk of unforeseen and life threatening complications.

So, what is HIE exactly?

Well, even the experts can't answer that definitively yet, but while the exact cause of the condition is not fully understood, essentially trauma before, during or immediately following birth can result in any or all of the following situations being present –

- Raised foetal blood pressure during delivery
- Umbilical cord severage immediately after delivery, resulting in the foal being deprived of up to 1/3 of it's circulating blood flow
- Compression of the thorax during delivery, resulting in increased cranial pressure
- Haemorrhage or swelling due to extra pressure exerted on the head during delivery
- Asphyxia (suffocation or inhaling toxins) causing impeded blood flow
- Hypoxia (lack of oxygen to the tissues) caused by any of the above conditions

The presence of any/all of the above situations creates a systemic



reaction in the body which is why Neonatal Maladjustment Syndrome may better describe the way the condition manifests itself as a range of problems that effectively lead onto other problems.

Regardless of the initiating cause, the result sets a string of events in motion which almost always results in distressing convulsions – which then leads to metabolic disturbances (e.g. insulin deficits) – in turn setting up another range of systemic disorders.

HIE has been recognized as one of the most common diseases of the foal for decades and treatment frequently involves a systemic and multi-faceted approach to try and 'head off' some of the resultant manifesting syndromes.

What should you look for?

Hypoxic Ischemic Encephalopathy when literally translated means lack of oxygen and blood supply, resulting in brain dysfunction. So, the first signs in the dummy foal are generally neurological or behavioural.

A foal can be quite normal at birth and develop signs, or the signs can be present from delivery.

- Convulsions of a jerky nature coupled with the complete loss of ability to nurse (although previously able to do so) may be the first signs that something is wrong.
- Convulsions are usually followed by a period of coma.

- The foal may not be able to stand, and while lying down, shows violent galloping motions and bangs its head against the floor.
- Muscle rigidity – stiff limbs and tail preventing it from standing.
- If the foal can stand, it may wander aimlessly in circles, or press its head up against walls and objects and move around as if blind.
- Incessant grinding or chewing is a sign of cerebral lesions.
- Exaggerated response to handling or touching.
- Abnormal vocalization can be common (hence Barkers Syndrome) – characterized by grunting, barking or frantic whinnying.
- Abnormal pupil constriction and dilation – different on both sides.

Importantly, not all of these signs are seen at the same time – one may pass and another, different sign may develop, but there will always be one or more of these neurological disturbances present.

Signs may continue for several hours, or up to 30 days before the foal is completely capable of feeding from the mare and bonding with her.

Convulsing foals recover in steps. First there is a period of coma immediately following a convulsion, then the ability to stand and walk returns, followed soon after by the return of sight and hearing – before the ability to nurse comes back.

If recovery occurs, it is usually complete and with no continuing effects.

Diagnosis

While the diagnosis may seem to be obvious to owners that have experienced this in their newborns before, investigations into blood gas levels and cardio-pulmonary functions are usually undertaken to give vets a better idea of what they are dealing with.

HIE is one presentation of a broader syndrome known as Perinatal Asphyxia Syndrome (PAS) and can sometimes involve the gastrointestinal tract and the kidneys. Endocrine disorders are also not uncommon, so your vet may elect to order blood tests to check on the health of those systems.

Diagnosis is most often achieved by careful observation and assessment of the behavioural signs as they appear – along with examining the foal's history. An owner's input in the diagnosis process is invaluable and relies heavily on anecdotal evidence.

Treatment & what to expect

As stated earlier – although foals often recover on their own and



A foal with uncomplicated hypoxic ischemic encephalopathy (HIE). This foal is receiving intranasal oxygen insufflation & intravenous fluids, including parenteral nutrition. It is partially covered by a circulating warm air blanket. The mattress is covered with a synthetic "sheepskin" to protect against skin abrasions. It is wearing a soft cloth halter with loop-and-hook closures.



A foal with HIE complicated by effects of asphyxia on other body systems. This foal is receiving parenteral nutrition, inpressor support, intravenous fluid support supplemented with thiamine, intravenous plasma, intravenous magnesium constant rate infusion & is being mechanically ventilated.

without being hospitalized, the best practice is to have them in the full time care of a vet and support staff.

Keep in mind that the window of opportunity for the best response from treatment is usually five to seven days from birth – so action needs to be taken as soon as possible.

By the time the foal is showing clinical signs, the damage has already been done. Therefore, treatment becomes purely supportive and is aimed at treating signs and symptoms as they appear, while hopefully preventing any further damage or complications to other organs within the body. However, complications are common and the reason why the syndrome can be fatal. Continued convulsions, in particular, have the potential to severely disrupt the metabolic balance in the body, as does the continued ischemic response in the brain.

In HIE, it's a case of one thing leading to another and impacting on several body systems at the same time.

Convulsions occur because the initial lack of oxygen to the tissues is thought to cause some degree of brain tissue damage, so it is imperative that convulsions are kept under control – which means sedation, and perhaps complete anaesthesia for several days while the brain attempts to recover.

Artificial warmth and supplemented nutrition are important – a foal trying to keep itself warm is drawing blood supply away from vital areas (such as the brain) that are already suffering from a deficit.

For those foals unable to suck, a naso-gastric tube will provide nutrition and intranasal oxygen coupled with intravenous fluids (IV drip) are basic treatment necessities.

There are many different types of artificial warmth but if the foal is in hospital, it is likely to be enjoying the benefit of new high-tech devices such as a circulating warm air blanket or a convective patient warming system – a daunting contraption that provides a temperature-controlled enclosed environment around a patient, keeping the body temperature constant.

Controlling seizures, increasing warmth and boosting the circulating blood flow with IV fluids actually allows the body to return to a normalized state, where it can then begin to heal itself.

Then, it becomes time that is the best treatment.

Complications can arise from injuries during convulsive episodes, so it is important that the foal is housed in a safe area with soft bedding so it cannot harm itself. It is even better to have someone with it at all times and hold the newborn during a convulsion so that no injuries can occur.

Eyes are particularly susceptible to injury, as is head trauma associated with the head striking hard objects during a fit.

Asphyxiation (the lack of physical oxygen during the initial stages of developing HIE) triggers the body to protectively redistribute blood flow from less vital organs (lungs, kidney, skin and bowel) to the more vital organs – brain, heart and adrenals.

As a result, multiple organs are at risk of sustaining injury. The severity depends on how long the foal has been deprived of oxygen – either in the tissues (hypoxia) or physical (asphyxia). Some foals will have been fighting hypoxia in-utero, and will be born with more severe signs than a foal suffering hypoxia as a direct result of the birth process.

Apart from the behavioural signs that have been described, foals can develop colic, have collapsed lungs, require metabolic support (e.g. glucose, calcium), or even develop septicaemia due to lower immune system responses and the incomplete neonate blood/brain barrier – allowing toxins to easily cross into the Central Nervous System.

Although not common, some clinics use a Hyperbaric chamber as part of their routine treatment of HIE – which delivers 100% oxygen under pressure to the patient. This treatment is helpful in reducing oedema in the brain tissue and increasing oxygen to the damaged cells and tissues in the body.

The vet is likely to administer a myriad of drugs – all aimed at supporting the body's vital organs and blocking some of the biochemical reactors known to occur following oxygen deprivation.

Sedation and anaesthetics are vital for preventing seizures, but there has been some research over the past few years suggesting that the early administration of magnesium sulphate may help prevent convulsions and improve or even speed up the recovery.

It's use is still controversial due to side effects, but highly regarded specialist clinics in the UK use it routinely in their HIE cases. Be guided by your own vet but be sure to ask their opinion!

Glucose is also an important addition to the drug regime, along with anti-inflammatory agents, antibiotics, thiamine, vitamin C (ascorbic acid), vitamin E, DMSO (anti-oxidant) and/or glutamate (amino-acids). Confusing? Of course. Let your vet use what he or she is comfortable with. Not all of these drugs will be used, and your vet may advocate the use of other drugs or treatments.

As with the treatment of any of your precious equines, it is imperative that you build a relationship of trust with your vet and allow them to make informed decisions according to their own experience.

How can it be prevented?



HIE foal being mechanically ventilated secondary to central respiratory depression.



Foal with HIE receiving a blood transfusion to maintain oxygen carrying capacity. This foal is also receiving intranasal oxygen insufflation and having its ECG monitored; note intranasal oxygen cannula & ECG leads attached to foal.

Photos courtesy of International Veterinary Information Service

Quite simply – it can't be. However, there are several things you can do to at least lessen the chances of your foal being born with or developing HIE.

Firstly, ensure the mare has optimum health throughout her pregnancy – although I'm sure we don't need to tell you that.

Avoid fescue as a hay or pasture source during pregnancy, because this can cause a thickened placenta and difficult birth.

Monitor the mare for any placental changes via routine ultrasound exams, particularly if she has had prior problems.

Adhere strictly to 'aseptic' techniques during and after the birth. All studs and their staff should now be familiar with this term (probably the one good thing that came out of EI). Asepsis is using handling techniques to prevent cross contamination and the spread of bacteria or toxins.

Wash your hands before and after handling the animal, use clean instruments and equipment - sterile where possible - be aware of bodily fluids from the mare and foal and ensure your clothing/boots do not carry any of these fluids to other parts of the farm or cross contaminate from mare to foal (where possible). The same is true in reverse – do not bring staff in from other areas of the farm unless clothes are changed and boots/hands/face and hair have been washed down with a suitable disinfectant.

Leave the umbilical cord in place as long as possible after delivery. Try not to stress the foal when it first tries to stand. Don't have a crowd standing around (i.e. make it an essential staff only event).

Keep the placenta (frozen if need be) for examination by a vet, but have a quick look yourself to see if you notice anything abnormal.

Colostrum, colostrum and more colostrum – although it won't stop HIE from developing, it may help the foal recover more quickly and protect against complications down the track by boosting the immune system.

facts to note

- The cost of keeping the HIE foal in hospital (Neonatal ICU) is in the vicinity of \$1000 a day. One less day to recover becomes very significant in those terms – so preventio measures become well worth the effort.
- Foals require 5 to 10% of their bodyweight in milk each day. Ensure they are getting adequate nutrition. Supplementary feeding needs to be given every 1 to 2 hours. Do not overfeed the recumbent foal.
- Be aware that IV fluids need to be given with care – over hydration can cause brain swelling.
- In 30% of cases, premature placental separation was the cause of HIE, while in another 30% of cases, placental insufficiency contributed

Homozygous Frozen Semen from the USA

QTS Gold Mastercard

2003 American Paint Horse
Buckskin Homozygous Tobiano Stallion
Sire: Q Ton of Gold (APHA) Dam: QCs Odd Socks (APHA)
owned by Secret Hills Ranch in the US,
for more information visit their website www.secrethillsranch.com
Available in 2011 Service Fee \$1,650 (incl GST) LCFG

FERNLEIGH
PAINT HORSE STUD

Contact Fernleigh Paint Horse Stud for bookings or more information
Avoid disappointment and don't delay ~ Limited services available and places are filling fast!

0427 284 003 kyla@fernleighpaints.com.au www.fernleighpaints.com.au

to HIE (Bernard, 2003).

• Prognosis depends on the severity of the initial insult, the amount of brain swelling and cell damage that has occurred. If the foal has not responded to treatment within two weeks – another reason for the problem to be investigated.

• Euthanasia, if suggested, is not something that your vet will mention lightly and be assured that he/she has considered all possible choices. Although a distressing decision, the suffering by, and affects on the foal are the most important factors to consider.

bibliography

Equine Medicine and Surgery - Patrick T. Colahan, Alfred M. Merritt, James N. Moore, Ian G. Mayhew.

Differential Diagnosis of Diseases of Horses - TG Hungerford

Perinatal Asphyxia Syndrome - Nathan M Slovis DVM Dipl ACVIM

Hypoxic Ischemic Encephalopathy: Neonatal Encephalopathy - PA Wilkins

Dealing with Dummy Foals - Marcia King 2006

Jump-starting the Dummy Foal - Sarah L Evers 2004

Table 1. Causes of hypoxia in the fetus and neonate*.

Maternal Causes

Reduced maternal oxygen delivery - Maternal anemia, maternal pulmonary disease with hypoxemia, maternal cardiovascular disease

Reduced uterine blood flow - Maternal hypotension (endotoxemia/colic), maternal hypertension (laminitis/painful conditions), abnormal uterine contractions, anything that increases uterine vascular resistance

Placental Causes

Premature placental separation

Placental insufficiency e.g., twins

Placental dysfunction - Fescue toxicity, postmaturity placentitis, placental oedema

Reduced umbilical blood flow - General anesthesia of the dam, congenital cardiovascular disease, inappropriate fetal blood distribution, fetal hypovolemia,

excessive length of umbilical cord

Intrapartum Causes

Dystocia

Premature placental separation

Uterine inertia

Oxytocin induction of labor

Caesarian section - General anaesthesia, poor uterine blood flow due to maternal positioning, decreased maternal cardiac output, reduced umbilical blood flow, effects of anesthetic drugs on fetus

Anything that prolongs Stage 2 labor

Neonatal Period Causes

Recumbency - Musculoskeletal disease, sepsis, prematurity, mild HIE,

pulmonary disease - meconium aspiration, milk aspiration, persistent pulmonary hypertension, septic pneumonia, acute respiratory distress syndrome or acute lung injury

Severe disturbance in breathing pattern

Septic shock

Anemia - Neonatal isoerythrolysis, excessive umbilical bleeding, fractured ribs (haemothorax) or long bone fracture

Congenital cardiovascular disease

* Adapted from: JE Palmer, *Perinatal Hypoxic-Ischemic Disease*, Proceedings IVECCS VI, 1998; pp717-718.