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## PERINATAL ASPHYXIA SYNDROME

### Summary

Predisposing factors are dystocia, requiring resuscitation at birth, birth by C-section, premature placental separation and illness of the mare prior to parturition. However, many cases occur without any of these predisposing factors being present.

There is a range of clinical signs, and foals may show any or all of them as they progress through the disease. In the mildest forms, there is reduced nursing activity and/or poor affinity for the mare. Incoordination of the suck response and “tongue-lolling” is also very common. General poor coordination, which can lead to inability to get up and down, and inability to walk can also be seen. The most severely affected foals are unable to rise, with either extensor rigidity or coma.

Seizure activity can occur with perinatal asphyxia syndrome, and is not always accompanied by other severe signs. A foal that is able to walk and nurse can show seizure activity. It is important to remember that, although it is the most common cause of seizures, it is not the only one. Head trauma, low plasma sodium concentrations (typically less than 108-110mmol/L) and kernicterus can all result in seizures or seizure-like activity.

Previously called Neonatal Maladjustment Syndrome or Hypoxic Ischaemic Encephalopathy

### Causes

Thought to be primarily due to hypoxia and ischaemia during the birthing process. The syndrome is very common in foals resuscitated at birth, from emergency Caesarian sections and from premature placental separation (‘red bag’) deliveries. Other maternal conditions associated with perinatal asphyxia are endotoxaemia, anaemia, severe pulmonary disease and induced parturition. Other placental conditions associated with the syndrome are placentitis, hydrops and fescue-induced placental disease. Twinning, congenital cardiac defects, persistent foetal circulation, dystocia and meconium aspiration may also be causes.

### Typical History

Two forms of perinatal asphyxia syndrome are recognised. In the first, the foal is obtunded from birth. In the second, the foal is apparently normal for a period of time and then starts to show clinical signs.

Clinical experience suggests that a foal will usually seizure within 72 hours of a hypoxic event, usually in the window between 18 and 36 hours after the event.

### Clinical Signs

Central nervous system: Generalized weakness, wandering away from mare, loss of suckle (tongue lolling is a typical sign), abnormal phonation (‘barking’), seizures, head tilt, coma, apnoea, blindness. Cardiovascular: Vasodilation, hypotension, capillary leak. Renal: Oliguria, anuria. Respiratory: Tachypnoea, dyspnoea, apnoea. Gastrointestinal: Colic, ileus, diarrhoea, necrotising enterocolitis. Hepatic: Icterus. Haematological: Coagulopathy, disseminated intravascular coagulation, anaemia, polycythaemia.

### Laboratory signs

There are no specific laboratory signs of PAS. In some foals there may be laboratory evidence of placental insufficiency (markedly increased creatinine concentration, which can be as high as 1800 umol/L (normal range 35-185 umol/L)) and of asphyxial injury (markedly high calcium concentration; we recorded an ionized calcium of 3.71 mmol/L in one survivor (normal range 1.2-1.7 mmol/L)).

### Treatment

Supportive care is the key for PAS. Mildly affected foals may need to be kept in a box with the mother, allowing them to be closely observed and to be helped to find the teat and nurse, if necessary. More severely affected foals will require nutritional support. In moderately affected foals, this can be by placing a feeding tube and giving milk. In severely affected foals, the intestine is also affected, and nutrition needs to be given intravenously as partial or total parenteral nutrition. Severely affected foals also require fluid therapy and sometimes inotrope or vasopressor support of the circulation.

## NEONATOLOGY AND DISEASES IN FOALS

Several treatments aimed at specifically treating PAS have been advocated for the foal, but there is no evidence that any of them are efficacious. These include vitamin E, vitamin C, selenium, dimethyl sulphoxide (DMSO), magnesium infusion, thiamine, allopurinol and naloxone. Of these, I use vitamin E and selenium in foals immediately after birth if there has been a dystocia, to try and prevent oxidative tissue damage. A relatively new technique, the squeeze method, has been advocated as a treatment for perinatal asphyxia syndrome. This technique involves placing ropes around the foal's chest and applying pressure to mimic the pressure applied in the birth canal. Different hospitals report different experiences with the technique, and there have been no rigorous clinical trials to date.

### **Prognosis**

The prognosis varies with the severity of clinical signs. 138/180 foals (84.5%) with primary perinatal asphyxia syndrome that I have treated, survived to hospital discharge. In one long term study of referred race horses, race earnings of survivors were less than control horses in the first year of racing, but not different over two years of racing. Since only severe cases are typically referred, the prognosis for the syndrome as a whole is probably excellent.