

Diseases of muscles

MYASTHENIA (SKELETAL MUSCLE ASTHENIA)

- The common causes of myasthenia in farm animals are :
 - 1- **Ischemia** in iliac thrombosis in the horse and after recumbency in cows with parturient paresis. The end stage is myonecrosis and not reversible
 - 2- **Metabolic effect on muscle fibers causes** include hypokalemia, hypocalcemia and possibly hypophosphatemia (in parturient paresis of dairy cows), hypomagnesemia (in lactation tetany), hypoglycemia of newborn pigs and lactic acidemia after engorgement on grain
 - 3- **Toxins - general toxemia** is a cause.

MYOPATHY

- The term myopathy describes the noninflammatory degeneration of skeletal muscle that is characterized clinically by muscle weakness and pathologically by hyaline degeneration of the muscle fibers.
- The serum levels of some muscle enzymes are elevated and myoglobinuria is a common accompaniment.

ETIOLOGY AND EPIDEMIOLOGY

- The most important myopathies in farm animals are due to nutritional deficiencies of vitamin E and selenium and the effects of unaccustomed exercise.

- In humans, in contrast, the muscular dystrophies occur as inherited defects of muscle or degenerative lesions caused by interruption of their nerve supply.
- The skeletal myopathies can be classified into primary and secondary myopathies.
- A retrospective analysis of the case records in a veterinary teaching hospital over a 9-year period revealed that the most common myopathy in horses was exercise-associated muscle disorder (69 %).
- The remainder were postexhaustion syndrome (9%), infectious myopathies (10.5 %), immunological myopathy (6.0%), nutritional myopathy (4.5%) and hyperkalemic periodic paralysis (1.5%).¹
- The major causes of myopathy in farm animals and their epidemiological determinants are as follows.
 - Enzootic nutritional muscular dystrophy
 - Exertional or postexercise rhabdomyolysis
 - Metabolic : Hyperkalemic periodic paralysis occurs in certain pedigree lines of North American
 - Degenerative myopathy : This occurs in newborn calves, sheep and goats affected by Akabane virus infected in utero.
 - Inherited myopathies
 - Congenital myopathy of Braunvieh Brown Swiss calves.
 - Toxic agents : This is caused by poisonous plants,
 - Ischemia : Ischemic myonecrosis occurs in the thigh muscles of cattle recumbent for about 48 hours or more e. Downer cow syndrome. Iliac thrombosis in horses is an important cause of ischemic myopathy and has been reported in calves.

PATHOGENESIS

A - Primary myopathy

- The characteristic change in most cases of primary myopathy varies from hyaline degeneration to coagulative necrosis affecting particularly the heavy thigh muscles and the muscles of the diaphragm.
- Myocardial lesions are also commonly associated with the degeneration of skeletal muscle and when severe will cause rapid death within a few hours or days.
- The visible effects of the lesions are varying degrees of muscle weakness, muscle pain, recumbency, stiff gait, inability to move the limbs and the development of respiratory and circulatory insufficiency.
- In primary nutritional muscular dystrophy associated with a deficiency 'of vitamin E and or selenium there is lipoperoxidation of the cellular membranes of muscle fibers resulting in degeneration and necrosis.

B - Muscle enzymes

- An important biochemical manifestation of myopathy is the increased release of muscle cell enzymes that occurs during muscle cell destruction.
- CPK and serum glutamic oxaloacetate transaminase are both elevated in myopathy and CPK, particularly, is a more specific and reliable indication of acute muscle damage.
- Increased amounts of creatinine are also released into the urine following myopathy.

CLINICAL FINDINGS

- The nutritional myopathies associated with a deficiency of vitamin E and/or selenium occur most commonly in young growing animals and may occur in outbreak form, particularly in calves and lambs.

A - Primary myopathy

- In general terms, in acute primary myopathy there is a sudden onset of weakness and pseudoparalysis of the affected muscles, causing paresis and recumbency and, in many cases, accompanying respiratory and circulatory insufficiency.
- The affected animals will usually remain bright and alert but may appear to be in pain. The temperature is usually normal but may be slightly elevated in severe cases of primary myopathy.
- Cardiac irregularity and tachycardia may be evident, and myoglobinuria occurs in adult horses and yearling cattle.
- The affected skeletal muscles in acute cases may feel swollen, hard and rubbery but in most cases it is difficult to detect significant abnormality by palpation.
- Acute cases of primary myopathy may die within 24 hours after the onset of signs.

B - Acute nutritional myopathy

- While acute nutritional myopathy in horses occurs most commonly in foals from birth to 7 months of age, acute dystrophic myodegeneration also occurs in adult horses.

- There is muscle stiffness and pain, myoglobinuria, edema of the head and neck, recumbency and death in , a few days.
- A special occurrence of myopathy has been recorded in suckling Thoroughbred foals up to 5 months of age.
- The disease occurs in the spring and summer in foals running at pasture with their dams and is un associated with excessive exercise.

C - Tying-up

- In tying-up in horses there is a very sudden onset of muscle soreness 10-20 minutes following exercise.
- There is profuse sweating and the degree of soreness varies from mild, in which the horse moves with a short, shuffling gait, to acute, in which there is a great disinclination to move at all.
- In severe cases, horses are unable to move their hindlegs, and swelling and rigidity of the croup muscles develops.
- Myoglobinuria is common.

D - Exertional rhabdomyolysis.

CLINICAL PATHOLOGY

- Muscle-derived serum enzymes include CK, AST , LDH .
- Muscle biopsy.

DIFFERENTIAL DIAGNOSIS

- Most myopathies in farm animals occur in rapidly growing, young animals and are characterized clinically by a sudden onset of acute muscular weakness, and pain often precipitated by unaccustomed exercise.
- There may be evidence of a dietary deficiency of vitamin and selenium in the case of nutritional muscular dystrophy.
- A sudden onset of recumbency or stiffness in young farm animals that are bright and alert should arouse suspicion of acute muscular dystrophy.
- Primary myopathies are not common in adult cattle, sheep or pigs but myopathy secondary to recumbency for other reasons does occur.
- Secondary myopathy due to aortic and iliac thrombosis in calves must be differentiated from other common causes of hindlimb paresis including traumatic injury to the spinal cord, spinal cord compression due to vertebral body abscess, nutritional muscular dystrophy, myositis and nerve damage due to trauma of intramuscular injections, and clostridial myositis.
- The exertional myopathies in the horse in training are usually readily obvious. The CK levels are valuable aids to diagnosis. In special circumstances, such as neurogenic myopathy, muscle biopsy and electromyography may be useful additional diagnostic aids. The histological and histochemical staining characteristics of equine muscle have been described and serve as a standard for comparison with abnormal muscle.
- Myositis may present a similar syndrome but is usually present as a secondary lesion in a clinically distinguishable primary disease or is accompanied by obvious trauma or toxemia .
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TREATMENT

- Vitamin E and selenium are indicated for the treatment of nutritional muscular dystrophy and the details are provided under that heading.
- The treatment of exertional rhabdomyolysis in horses has not been well defined because of the uncertain etiology, but enforced rest and the relief of pain, if necessary, seems logical.
- Supportive therapy for any case of myopathy, particularly severe cases in which there is persistent recumbency, consists of :
 - Liberal quantities of thick bedding
 - Removal from solid floors to softer ground
 - Frequent turning from side to side to minimize secondary myopathy
 - Provision of fluid therapy to prevent myoglobinuric nephroSis
 - A palatable, nutritious diet.

CONTROL

- The nutritional myopathies in farm animals can be satisfactorily prevented by the provision of adequate quantities of dietary vitamin E and selenium in the maternal diet during pregnancy or at the strategic times in postnatal life.
- The prevention of exertional myopathy in the horse depends on a progressive training program and avoidance of sudden unaccustomed exercise in animals that are in good body condition and have been inactive.
- Similarly, in general terms, the prevention of the porcine stress syndrome will depend on careful handling and transportation techniques combined with genetic selection of resistant pigs.