

DISEASES OF THE MUSCULOSKELETAL SYSTEM

The musculoskeletal system consists of the bone, muscle, ligament and tendons. The main functions of the muscle skeletal system include:

- 1) support of body
- 2) provision of motion
- 3) protection of vital organ

Specifically the skeletal system serves mainly as storage system for calcium and phosphorus and very importantly component of the haemopoietic system.

Common terminologies for muscle disease

Myositis – This is the inflammation of voluntary muscle resulting in heat, swelling, pains and lameness (if the limbs muscles are affected). Myositis could also result from generalized systemic infections as it occurs in Black leg disease caused by *Clostridium chanvoei* in cattle. Myositis can also occur following trauma to voluntary muscles. However where there is generalized voluntary muscle inflammation it is called polymyositis.

Atrophic myositis This is a chronic progressive atrophy and fibrosis of the masticatory muscle of dogs which makes it impossible for the mouth to be open wider

Myopathy This is a non inflammatory degeneration of skeletal muscle characterized by hyaline degeneration of muscle fibers, muscle weakness, myoglobinuria and a high serum level of muscle enzyme Serum Glutamic Oxaloacetic Transferase (SGOT) also referred to as Aspartate Aminotransferase enzyme (AST), similarly Creatine kinase (C K) especially CK3 which is usually elevated in both skeletal and myocardial damage. Disease where myopathy is commonly seen includes post exertional rhabdomyolysis, enzootic nutritional muscular dystrophy, congenital myopathies, neurogenic atrophy and pale soft exudative pork.

Myotonia - Any disorder involving tonic spasm of muscle

Myotenositis – Inflammation of a muscle and tendon.

Disease of Skeletal System

Ricket

A disease of young growing animals caused by a nutritional deficiency of phosphorus or vitamin D. There is a failure of calcification of osteoid and cartilage of bone which eventually becomes bowed and with enlargement of the epiphyses and the joint appeared swollen. Radiography examinations show a wider and thicker growth plate.

Osteomyelitis

This is the inflammation of bone, which may be localized or generalized due to a pyogenic infection or systemic infection. It may result in bone destruction; stiffening of joint if it spreads to the joint occasionally effect of disease causes shortening of limbs if growth centre is destroyed especially if it occurred before the end of growth period.

Osteoarthritis

This is a non inflammatory degenerative joint disease marked by degeneration of articular cartilage, hypertrophy of bone at the margins and changes in the synovial membrane also called degenerative joint disease.

Rheumatic arthritis

This is a rare erosive immune mediated disorder of the joint manifesting as progressive polysynovitis resulting in polyarthritis painful and swollen joint, lameness, periarticular swelling, fever and malaise.

Osteochondritis

Inflammation of bone and cartilage

Osteodystrophy

Disease of bone in which there is failure of normal development or abnormal metabolism in bone which is already matured. Principal clinical signs are distortion and enlargement of bones, susceptibility to fracture and abnormalities of gait and posture.

Osteo dystrophia Fibrosa

A lesion of bone in which fibro-osseous tissue replaces resorbed bone. An increase in resorption of bone calcium and an increase in secretion of phosphorus. This resorption is caused by hyperthyroidism which may be primary or more commonly secondary to nutritional error or to renal insufficiency.

Osteoporosis (Decalcification of bone)

A pathological loss of bone but the remaining bone is structurally normal. The bone becomes light and porous and fragile which makes it susceptible to fracture. The causes of osteoporosis include disease that result in slowed down of normal lay down of bone. Other causes are senility weightlessness, lactation, disease in blood caused by neurogenic insults.

Osteomalacia

Softening of the bone of adult animal resulting from impaired mineralization, with excess accumulation of osteoid caused by a nutritional deficiency of vitamin D or phosphorus. Clinical signs are those of a painful condition of the bone and joint, including stiff gait, lameness, restlessness when standing, cracking sounds in joint when walking.

Tendons

This act as bridging and attachment structure of the muscle. Some tendon bridge long gaps between the muscle bellies and target bones and therefore are prone to injuries themselves especially because they are often loaded to the extreme and are only capable of limited elastic elongation.

Tendons are therefore prone to injuries leading to tearing and resultant tendonitis e. g superficial flexor tendon of horses. As a result of poor vascularization of both tendon and ligaments, healing is usually delayed and very poor therefore management of there injuries requires patience and prudent and careful long term rehabilitation.

Disease of muscle skeletal system

Disease of muscle skeletal system usually result from the following

- 1) Traumatic injuries
- 2) Infectious disease/parasitic infection
- 3) Neurological deficits
- 4) Nutritional imbalance
- 5) Congenital defects

(1) Traumatic injuries

This is commonest cause of muscle skeletal disease. Typical examples are injuries following road traffic accidents, penetrating foreign bodies such as bullet wounds, breakage of needle during intramuscular administration of drugs. Infliction of traumatic injuries eg cutlass wounds. In this type of muscle skeletal disease there is visible point of penetration or protruding foreign body, hemorrhages or laceration. Following this there is interaction with bacteria leading to inflammation.

Clinically what is seen are severe swelling and inflammation of the affected part. Followed by disease and fadwing

To Diagnose

Clinical examination and radiograph to determine the extent of damage and this will give an idea the appropriate treatment and correction to be effected.

Rx –

Cleaning, irrigation debridement and surgical correction of Fracture bones or removal of foreign body (Bullets/Needles) and Antibiotic treatment against infection.

(2) Infectious disease/ Parasitic muscle disease

Muscle disease could also result from generalized systemic infections as it occurs in Black leg disease caused by *Clostridium chanvoei* in cattle. The lesion arises without the need for any external injury. The animal is profoundly toxemic with high fever and usually a very swollen painful thigh. The skin is gangrenous, and emphysema can be palpated in the sub-cutis. In affected cattle death occurs in 12-36 hours.

Parasitic infection of the muscular system usually result from the presence of larvae of some parasites in muscle tissue viz – *Trichinella spiralis* or cyst of cysticercus,

sarcocystic and *Toxoplasma* spp. The presence of the larvae cause weakness with or without pain in the affected muscle. Usually surgical exploration and identification of the cyst as well as the diagnosis of the primary cause via faecal examination for oocyst.

Rx Treatment of the primary cause.

(3) Neurological disturbances/deficits

The transmission of nerve impulses at the neuromuscular junction involves massive release of acetylcholine fills the synaptic cleft between the nerve terminal and the muscle fiber membrane, this short duration or period of action/ activity is sufficient to excite the muscle fiber after which must of it is destroyed by cholinesterase. Any disease which affect this process above especially at the neuromuscular junction will result in muscle fatigue example of such disease are *Myasthenia gravis* which causes acetylcholine inhibition. The effects of *Myasthenia gravis* can be reversed by anticholinesterase drug administration.

Similarly; Na^+ ion elicit electrical current that spread and cause release at Ca^{++} ion which in turn initiate chemical event so that all muscle fibre innervated by motor nerve will contract. In cases of hypocalcemia and hypermagnesomia there is muscle fatigue, weakness and paralysis.

Also, the neuromuscular junction can also be affected by muscle relaxing drugs e.g curare (d-tubocurarine) obtained from plant it is very toxic and it causes muscle relaxation succinylcholina also short acting depolarizing neuromuscular blocking agent.

Other agents that causes blockage of neuromuscular impulses are antibiotic, toxins (Botulism, tetanus, venoms).

(4) Nutritional base muscle Disease

Exeitional Rhabdomyolysis also call Azoturia. This is a disease of horses characterized by red-brown urine due to myoglobinuria, acute myopathy with muscle weakness, often to the point of being unable to get up. It occurs in horses fed with high energy ration for several day of inaction and suddenly the horse subjected to a strenuous exercise, this results in degenerative change in muscle causing weakness, profuse sweating, stiff gait, in co-ordination, trembling, tremor of muscle, hardness of thigh and gluteal muscles and increase in water intake.

Rx

Discontinue exercise and rest animal, decrease carbon hydrate intake and administer sodium bicarbonate. Thiamine administration has been reported to be very useful. Antihistamine and analgesic are also very beneficial and massaging affected muscle.

Dx

Based on demonstration of abnormal elevation in serum of creatine kinase especially CK3, SGOT (Aspirate aminotransferase).

Differential Diagnosis

Infectious and immune mediated Mopathies,
Vitamin E or selenium deficiency.

(5) Congenital / Hereditary skeletal disease

Hip dysplasia – This is usually a hereditary and a bilateral coxo-femoral joint disorder leading to incomplete penetrans and usually large breeds are affected with Alstians (German shepherd) being the most affected in Nigeria.

Radiographic manifestation showed shallow acetabulum, a small misshapen femoral head and some times osteophytes clinical examination show a lax joint, weak rump muscles with or without lameness.

Radiography is absolutely necessary for definite diagnosis.

This condition hip dysplasia has classified into grades based on the severity.

Grade 1 – Changes are minimal, some sub luxation and remodeling of femoral head may be apparent upon radiography

Grade II

Lameness is obvious, sub-luxation of the femoral head and sclerosis of the neck, some flattening of the femoral head and acetabulum are also evident radiographically.

Grade III

Marked lameness, femoral head is about half to three quarter sub luxated, flattening of the femoral head and acetabulum, crepitation is felt upon rotation of the limbs.

Grade IV

Severe lameness, femoral head is luxated and flattened, acetabulum is filled crepitation is evident.

Clinical Signs

There is rear limb weakness, coxofemoral joint laxity with possible crepitation and progressive atrophy of gluteal and thigh muscles has been the major features of hip dysplasia.

Diagnosis – Base on history. Clinical signs and radiography is absolutely necessary for a definite diagnosis. An alteration in the Nubergi index (Femoral capito acetabular rim angle $< 105^{\circ}$ C)

Treatment

- Limit and restrict exercise and work
- Give an analgesics e.g Aspirin daily or Butazolidin to reduce rate of degeneration and to reduce or decrease associated pain in hip dysplasia

Operation Management

- Excision arthroplasty
- Pectineal muscle resection
- Prosthetic hip and or femoral head replacement
- If all the above management have been effected and the condition of patient still not satisfactory then Euthanasia is the left option.

