STUDIES ON SURGICAL AFFECTIONS OF JOINTS IN SOME FARM ANIMALS.

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By

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بسم الله الرحمن الرحيم

"وقل اعملوا فسيرى الله عملكم
ورسوله والمؤمنون"

صدق الله العظيم

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INTRODUCTION

Bovines play an important role for production of meat and milk needed for human consumption. On the other hand, equine constitutes the main working animals in Egypt for transporting and riding. They are considered to be of economic value to our farmers.

There are a number of predisposing factors causing the joint affections as, genetic factors, nutrition imbalance and traumatic injuries of the joints. These factors are accused for developing arthritis, bony exostosis, dislocation, upward fixation of patella, sprain, contusions and bursitis. Such affections lead to lameness which acts as an important factor for decrease of production in cattle and less performance in equine.

Quite recently, the methods for diagnosis of different joint affections including arthroscopy and ultrasonography are still inaccessible for every veterinary practitioner because of their high cost besides the need of a well trained person for their use. On the other hand, the recent suggestive methods for the treatment of certain joint affections like arthrodesis or implantation of the diarthroidal cartilage are still quite far from technical performance especially by the field veterinarian.

The aim of the present study is to throw a light on the common surgical affections of joints in farm animals with special reference to their treatment.

Review of literature

1- Joint anatomy:

Frandson and Whitten (1981) defined synovial joints (diarthroidal) as they include the articular cartilage, articular surfaces, articular cavity, joint capsule and ligaments. Articular surfaces are layers of compact bones. Articular cartilage is a layer of hyaline cartilage covering the articular surface.

Venugopalan (1985) defined the joint as a closed cavity between the ends of bones forming the articulation. The articulating surfaces of the bones are covered with a layer of hyaline cartilage (articular cartilage). The joint is enclosed in joint capsule consists of an inner synovial membrane and an outer fibrous layer and is supported outside by ligaments, tendons and muscles. The synovial membrane secretes a fluid called synovia lubricates the articulating surfaces and increased during inflammation. Movements of joint are controlled by muscle.

Johnson (1962) mentioned that the articular cartilage consists of 3 layers as a narrow calcified base layer bound to the subchondral bone, a broad intermediate layer of great shock absorbing capacity and a very narrow superficial layer of tangential collagen that resists shear and joint motion. Articular cavity is a potential space between adjacent bones and surrounded by joint capsule. The joint capsule consists of 2 layers. The deep layer is the synovial membrane. The superficial layer is a fibrous membrane or capsular ligament.

Adams (1974) mentioned that the outer fibrous layer is strong. Ligaments are connective tissue bands extend from bone to bone and may

be intracapsular ligaments found within joints and surrounded by the joint capsule as the cruciate ligaments and extra capsular ligaments found outside the joint capsule as collateral, dorsal and palmar ligaments. Synovial joints are classified according to joint surface into simple joints which involve 2 articulating bones and compound joints involving more than 2 bones within the same joint.

El-maghraby (2004) mentioned that synovial (diarthroidal) joints consist of articular surfaces of 2 or more bones covered by a thin layer of hyaline cartilage plus the joint capsule and ligaments. There are no nerves in the articular cartilage and also in the bearing surfaces of the cartilage which depends on the nerve endings in the joint capsule, ligaments, muscle and subchondral bone for pain sensation.

Nizolek and Handwhite (1981) reported that the intra-articular therapy in equine joints should be based upon knowledge of the anatomy and physiology of normal joints, the synovial membrane, synovial fluid and the articular cartilage. The joint capsule and ligaments form a sleeve around the articular structure and are directly or indirectly attached to the bone and are composed primarily of fibrous tissue and are poorly vascularized. The synovial membrane is composed of 2 layers; the outer is more fibrous and fused with the joint capsule. The inner layer is made up of synoviocytes in a loose connective tissue stroma.

The most commonly reported technique for injection and or synovial fluid aspiration of the femoropatellar joint involves entering the pouch on either side of the middle patellar ligament or between the lateral and middle patellar ligament. (Van kruiningen, 1963, Wheat and Jones, 1981, Moyer, 1986, Stashak, 1987 and Reeves and Trotter, 1991)

2- Joint affections:

2.1-Arthritis:

Adams (1974) defined arthritis as inflammation of a joint which may involve any or all of the components of a joint, which include the bone forming the joint, the articular cartilage, the joint capsule and the associated ligaments. Arthritis is classified according to its activity into acute form causing severe inflammation of the joint and may resolve or develop into a chronic form which consists of a low grade joint inflammation and leaves the horse with permanent damage to the joint. According to the type and the etiology arthritis is classified into serous arthritis, fibrinous arthritis and haemorrhagic arthritis.

Venugopalan (1985) classified arthritis into acute, chronic and serous arthritis characterized by increased secretion of synovia and distension of joint capsule due to trauma.

2.1.1- Aseptic arthritis (non infectious):

El-maghraby (2004) classified arthritis primary or secondary at which primary arthritis is the disease of joint itself (traumatic arthritis and open joint). Secondary arthritis results from localization of a metabolic disease (rickets).

Mcilwraith (1987) reported that serous arthritis was associated with a direct injury but the joint capsule was intact.

Petterson (1993) stated that serous arthritis was the most common cause of lameness in the horse. Conformation, the way of training,

competing status of ground and shoeing technique may be contributory causes of the development of serous arthritis. The joint injury may include one or all the following; synovitis and capsulitis, ligament sprain and intra-articular fracture and degenerative joint disease.

Morgan (1968) stated that arthrography used for diagnosis of joint diseases had largely been limited to examination of extremities.

Firth (1980) mentioned that in some cases, the radiographic changes are evident early in the course of the condition. When there is no radiographic evidence of the osteomyelitis, the condition fails to resolve and radiography should be repeated.

Venugopalan (1985) reported that the differential diagnosis of different types of arthritis based on laboratory examination of synovial fluid. Differentiation of traumatic arthritis from infective arthritis is possible. In case of traumatic arthritis, the physical appearance of synovial fluid is clear, leucocytes number per cubic mm is up to 1000, neutrophils number is up to 500 and protein level is 4 gm %. However, infective arthritis is characterized by the physical appearance of synovial fluid is clear to turbid and usually coagulates, leucocytes number per cubic mm is up to 3000, neutrophils number is up to 1000 and protein level is 4-9 gm %.

Roydillon (1956) found that aspiration of synovial fluid followed by injection of 75 mg /kg bwt of hydrocortisone into carpal joint and 50 mg/kg bwt in fetlock joint gives best results.

Miller (1961) mentioned that intra-articular and / or systemic injection of steroids reduces pain and swelling resulted from different types of arthritis, periostitis, bursitis and tenosynovitis.

Schlichting (1965) stated that the local application of penicillin or acromycin in treatment of arthritis and synovitis was safe and had a slight joint reaction.

Fahmy, Hegazy, Abd El-Hamid, Shamaa and Schimke (1994) treated serous arthritis by complete rest and bandage and intra-articular injection of dimethyl sulphoxide (DMSO) 40 % weekly for 3 successive weeks followed by complete rest and bandage for 4 weeks then intramuscular injection of long acting cortisone (15-20 ml / animal) with long acting penicillin weekly for 2 successive weeks.

Venugopalan (1985) treated fibrinous arthritis by local anesthetic and sedative to reduce pain. Supporting bandages were used and hydrocortisone (50-100 mg) may be injected into the joint and corticosteroids may also be given systemically.

Vanpelt (1963) reported that intra-articular injection of adrenocortical steroids was needed for suppress the inflammation in peripheral arthritic joints for treatment of haemorrhagic arthritis.

Morris (1980) treated haemorrhagic arthritis with joint lavage using polyionic solution via two needles on opposite sides of joint (one needle serves as inflow tract and the other as outflow tract).

2.1.2- Septic arthritis (infectious):

Maccallum and Weaver (1981) mentioned that infectious arthritis is a contamination of joint by bacterial, viral, mycotic or mycoplasma and it is termed as a septic or pyogenic arthritis due to presence of pus. Infectious arthritis may occur in young animals (calves) as joint ill or neonatal polyarthritis.

Stoneham (1997) mentioned that septic arthritis is a common problem in the horse, however haematogenous spread of bacteria to the bone and joints is seen in foals and rarely in mature horses.

Adams (1974) mentioned that infectious arthritis caused by direct wound to the joint, blood borne infection (metastatic), extension from neighboring areas of infection or injection of corticosteroids into a joint. Infectious arthritis included suppurative and nonsuppurative form depending on the organism involved .The infected joint was characterized by distension of joint capsule with pus or infected fluid, heat, pain, abnormal synovia and acute lameness. Joint ill and open joint are examples of infectious arthritis.

Firth (1980) classified septic arthritis / osteomyelitis on the basis of clinical, radiological and pathological findings into S-type characterized by presence of serofibrinous or fibrinopurulent arthritis in one or more joints with no macroscopic osteomyelitis, E-type characterized by presence of osteomyelitis of epiphysis at subchondral bone /cartilage junction , P-type characterized by presence of osteomyelitis adjacent to the physis and T-type which is characterized by presence of osteomylitis involving small bones (tarsal bones). The most

common route of infection in foals was by haematogenous spread of bacteria following septicemia or focal infection (e.g. omphalophlebitis).

The clinical signs of S-type septic arthritis in foals (30 days age) were acute-moderate-severe lameness, synovial distension, hotness, pain and periarticular edema (Firth, 1980, Platt, 1977 and Robinson, 1993).

Vanpelt, Longham and Sleight (1966) classified infectious arthritis according to its cause into primary type caused by direct penetration of joint, secondary type caused by extension from area adjacent to joint and tertiary type caused by septicemia.

Messow (1963) found that infectious arthritis occurred in calves due to umbilical or parental infection.

Stashak (1987) stated that septic arthritis resulted from sequestration of bacterial infection in the joint. Septic arthritis may be arised from three sources as hematogenous infection, traumatic injuries and iatrogenic infection.

Schneider (1992) mentioned that septicemia was the second most cause of death in foals and hematogenous spread was the most common cause of infectious arthritis. The most common cause of joint sheath infection was traumatic wounds followed by intrasynovial infection.

Moore (1992) observed that the most common causal organisms of septic arthritis in foals were enterobacteriacae, streptococci and staphylococci.

Cohen (1994) reported in a recent study that the musculoskeletal infection was the cause of 2-5% of foal deaths.

Madison (1995) recorded that the fungal organisms were a rare cause of infectious arthritis but should be diagnosed if identified in pure culture more than once.

Frank (1982) mentioned that the symptoms of the purulent arthritis were marked general disturbances as marked increase in respirations, temperature increased to 39- 40 c, in-appetite and sweating was usually observed and constant movement of the affected limb and animal exhaustion. Diagnosis was depending upon discharge of synovia which increases when the joint is moved.

Stoneham (1997) stated that increased blood flow to the rapidly growing bone allows spread of bacteria in a septicemic foal. Infection resulted in severe joint inflammation and encouraged local thrombosis which impaired normal synovial fluid production and drainage leading to accumulation of exudates and influx of WBCs within joint space.

Diagnosis of septic (infectious) arthritis based on clinical signs and aspirated synovial fluid. Radiographic picture was negative in early cases, but in advanced cases, it revealed soft tissue swelling, joint capsule distension and early widening of joint space due to highly synovial fluid then narrowing due to destruction of articular cartilage and subchondral bone.(Verschooten and Demoor, 1974).

Mcilwraith (1987) mentioned that the most important method for diagnosis of septic arthritis was synovial fluid analysis. Streptococcus