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DOUBLE CONTRAST ARTHROGRAPHY OF THE SHOULDER JOINT IN DONKEYS

(With 4 Figures)

By

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الفحص الاشعاعي لمفصل الكتف فى الحمير

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فى هذه الدراسه تم فحص مفصل الكتف أشعاعيا باستخدام صبغه السالوتراست المائيه بعد دراسه مكونات بدون صبغه. كما تم حقن ٣٠ - ٤٠ مم هواء بعد الحقن الصبغه لدراسه محفظه المفصل. تم أخذ الوضع الداخلى - الخارجى وكذلك الوضع الداخلى الخارجى بعد لوى مفصل الكتف. ولقد وجد من البحث أن الوضع الداخلى الخارجى لمفصل الكتف أفضل حيث يبين جميع أجزاء المفصل كما وجد أن استخدام الصبغه الموجهه فى تصوير المفصل يوضح حدود محفظه وغضاريف المفصل.

SUMMARY

The normal radiographic structures of the shoulder joint for plain, positive and double contrast arthrography in donkeys were evaluated. Two projections were used for identification of shoulder joint structures. The mediolateral projection produced the most information about the shoulder in plain, positive and double contrast arthrograph. The supinated mediolateral projection allowed a better profile for the head of the humerus.

keywords: Double contrast, arthrography, shoulder joint, donkeys.

INTRODUCTION

Shoulder lameness is a collective term applied to locomotor disturbances referable to pathologic processes in the shoulder region. It includes the various forms of omarthritis, osteocondritis dissecans of the shoulder joint and intertubercular bursitis (DIETZ and WIESNER, 1984).

The radiographic examination is an essential component in assessment of shoulder lameness

diagnosis. BIERY (1985) said that many of the joint tissues such as cartilage, synovial membrane, fibrous capsule and collagenous structures are not visible on survey radiographs and therefore cannot be evaluated. He added that the radiographic alterations include loss of calcification of the articular cartilage, distention of joint capsule (effusion or fibrosis), subchondral bone sclerosis or

cysts, formation of bone spurs and abnormal joint space.

The equine literatures contain considerable informations on plain radiography of specific joints but little is mentioned about arthrography. *DYSON (1986)* described the radiographic techniques and interpretation of plain radiographs of the shoulder joint. Negative, positive and double contrast arthrography for diagnosis of osteochondrosis dissecans of the equine fetlock and stifle joints were studied by *MOORE and McLLWARITH (1977)* and *DIK (1984)*.

The aim of the present study is to describe the techniques and to evaluate the plain, positive and double contrast arthrograph of the shoulder joint in donkeys.

MATERIALS and METHODS

The present study was carried out on six clinically healthy donkeys. The animals varied in sex, age and body weight. Tranquilization of the animals was performed using propionyl promazine (Combelen, Bayer) in a dose of 0.2 mg/kg.b.wts. intravenously.

Plain shoulder radiographs and arthrographs were performed while the animal is recumbant. Mediolateral radiographs were obtained with the lowermost limb adjacent to the cassette and extended forward. The animal's neck was extended to center the trachea as nearly as possible over

the shoulder joint space while the opposite thoracic limb was retracted caudally. Supinated mediolateral view of the canine shoulder was described by *CALLAHAN and ACKERMAN (1985)*. It was performed in the present study by elevating the elbow joint and distal limb with padding before radiographic exposure. The factors used were 65 KV, 25 mAs and 90 cm F.F.D.

Arthrography:-

For positive arthrography, arthrocentesis of the shoulder joint was performed under complete aseptic condition. The skin was prepared for insertion of an 18 gauge 7.5 cm spinal needle. The needle penetrated the skin 1 cm cranial to the insertion of infraspinatus tendon and 1 cm proximal to the greater tubercle of the humerus. Aspiration of about 5-7 ml of synovial fluid was carried out and injection of the same amount Iopamidol (Solutrast 250 M, BYK Gulden, Italy) in concentration of 51.03%. The joint was then flexed and extended to distribute the contrast media throughout the joint then reposition of the animal to the above mentioned views was performed. Double contrast arthrography of the shoulder was performed by injection of 30-40 ml of room air after positive arthrography. The limb was flexed and extended then returned against the cassette.

RESULTS

Mediolateral Exposure:-

The plain radiographic film of the shoulder joint in the present study showed normal structures (Fig. 1). The joint margins were bony regions at the edge of articular cartilage which coincide with the edge of the subchondral bone. This region appeared smooth and blended with the surrounding bone structures. The joint capsule meet in this area. The joint space appeared black when compared with the adjacent white subchondral bone.

Arthrography was a relatively simple procedure. In mediolateral projection using positive contrast arthrography, the lateral glenoid rim was projected distal to the medial glenoid rim. The joint capsule cul-de-sac arising from the medial joint capsule immediately cranial to glenoid notch and extending up to the coracoid process of the scapule. Another cul-de-sac arising from the lateral joint was differentiated from cranial cul-de-sac by its caudal location. Extensive lateral joint pouch extended in an even border on the caudolateral humeral head (Fig. 2).

Mediolateral projection of the shoulder joint using double contrast arthrography revealed more details of the joint capsule cul-de-sacs. The lateral and medial borders of the glenoid cavity includ-

ing the glenoid notch were clearly seen (Fig. 3).

Supinated Mediolateral Projection:-

The supinated position resulted in slight adduction of the limb with outward rotation of the humeral head within the glenoid, thereby projecting a more medial portion of the central humeral head (Fig. 4). This view occasionally allowed a better profile of humeral head.

DISCUSSION

Radiographic evaluation of the shoulder joint is an important part of the diagnostic examination for lameness. The joint structures evaluated radiographically in the present study are the articular surfaces of the scapular glenoid cavity and the head of the humerus. The bony margin at the edge of the articular cartilage and also the continuation of the subchondral bone are seen radiographically smooth. The joint space appears black or radiolucent on the plain radiograph composed of opposing articular cartilages and a thin layer of synovial fluid. These results are similarly described on plain radiographs of the joints by *DYSON (1986)*. and *PARK and LEBEL (1987)*.

The normal joint capsule distention, synovial membrane proliferation and the condition of the articular cartilage are easily identified by positive contrast

arthrography of shoulder joint (Fig. 2).

Arthrography is indicated in selected cases with chronic joint distention with or without lameness and where a more complete evaluation of suspected articular cartilage, subchondral bone and synovial membrane is needed (SWANSTROM and LEWIS, 1969; TROTTER and McLLWARITH, 1981 and PARK and LEBEL, 1987).

Double contrast arthrography produced the best definition and the details of the joint capsule cul-de-sacs rather than positive contrast arthrograph.

Similar to the findings in the present study, double contrast produced good identification of soft tissue structures within the fetlock (SWANSTROM and LE-

WIS, 1969). NICKELS and SANDE (1982) considered double contrast more useful in identification of structures in stifle joint. However, DIK (1984) has indicated that double contrast arthrography can be misleading in smaller joints such as fetlock and carpus due to the formation of air bubbles. PARK and LEBEL (1987) stated that the negative contrast is inferior to positive contrast arthrograph.

The mediolateral projections of the shoulder joint provided the most information during arthrography, although the supinated mediolateral view (CALLAHAN and ACKERMAN, 1985) occasionally allowed better definition of the cartilage surfaces on the medial aspects of the humeral head.

LEGENDS

Fig. 1: Mediolateral plain radiograph of normal shoulder joint in donkey (left limb)

- 1- The joint space appears as a radiolucent line.
- 2- Medial and lateral borders of the scapular glenoid cavity.
- 3- Cranial border of the humeral head.
- 4- Compact subchondral bone on the concave surface of the glenoid cavity.
- 5- Neck of the humerus.
- 6- Coracoid process of the scapula.
- 7- Medial, intermediate and lateral tubercle of the humerus.
- 8- Fossa between the tubercles and humeral head.

Fig. 2: Mediolateral positive arthrograph of the normal shoulder joint.

- 1- Cranial cul-de-sac of the joint capsule.

- 2- Expansion of the cul-de-sac to the coracoid process of the scapula.
- 3- Lateral cul-de-sac of the joint capsule.
- 4- Caudal cul-de-sac.
- 5 & 6- Medial and lateral border of the glenoid cavity.

Fig. 3: Mediolateral double contrast arthrograph of the shoulder joint.

- 1 & 2- Accumulation of the negative contrast in the cranial and caudal cul-de-sac of the joint capsule.
- 3 & 4- Smooth articular surface of scapular glenoid cavity and the head of humerus.

Fig. 4: Supinated mediolateral plain radiograph of the shoulder joint revealed some rotation of the humeral head.

- 1- The fossa between the tubercle and the humeral head was more clear.
- 2- The medial and lateral tubercle of the humerus were deviated.
- 3- Deltoid process was centrally situated.

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