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RADIOGRAPHIC STUDIES ON PROXIMAL SESAMOID BONE FRACTURES AND SESAMOIDITIS IN DONKEYS

(With 6 Figures)

By

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دراسات اشعاعيه على كسور والتهاب العظام السمسمانيه العلويه فى الحمير

نبيل أحمد مسك ، أمل جلال أبو العلا ، بهاء الدين على عبد اللاه حسين

الهدف من هذه الدراسه هو وصف التغيرات الاشعاعيه التى تصاحب اصابات العظام السمسمانيه العلويه فى الحمير تحت الظروف المحليه وقد تم تشخيص التهابات وكسور هذه العظام فى عدد ٢١ قائمه وكانت التغيرات الاشعاعيه فى حالات التهاب هذه العظام تتراوح بين وجود مساحات غير معتمه اشعاعيا مع بعض البناءات العظميه البسيطه الى وجود تكوينات عظميه شديده على السطح الغير مفصلى لهذه العظام كما تم تشخيص انواع مختلفه من كسور العظام السمسمانيه وتشمل كسر بقاعده العظمه وكسر عرضى وكسر على السطح الوحشى للعظمه هذا وقد لوحظ انه فى معظم اصابات العظام السمسمانيه يكون هناك بناءات عظميه شديده وهى تعكس حدوث التهاب للسمحاق والاربطه فى هذه المنطقه.

SUMMARY

The objective was to describe the radiographic changes that may reflect the diseased conditions of the sesamoid bone in working donkeys under local circumstances. Sesamoditis and fractures were diagnosed by using survey radiography in 21 limbs. The radiographic appearance in case of sesamoditis, was variable, ranging from a number of lucent areas along the non-articular surface of the bone with some new bone formations, to an extensive new bone formation on the non-articular surface of the bone. Depending on their radiographic appearance sesamoid bone fractures were classified as basilar, transverse and abaxial. In most cases of sesamoid bone affections there were extensive new bone formations that may result from the associated inflammation of the periosteum and sesamoid ligaments.

Key words: *Fracture, sesamoid bone*

INTRODUCTION

The phalangeal regions in working donkeys are affected with numerous surgical affections that may affect healthiness of their limbs. Sesamiod bone affections in donkeys are given little attention till the extent that it is wrongly believed to be a disease of sporting horses. Sesamoiditis is a widely used term referred to articular and non-articular productive changes involving the proximal sesamoid bones in horses. The articular form involves periarticular osteophyte formation and has been considered a sign of degenerative joint disease in metacarpophalangeal / metatarsophalangeal (MCP/MTP) joints. The non-articular form involves primary the suspensory apparatus or distal sesamoidean desmitis and the term "sesamoiditis" has been suggested for this form. (O'Brien *et al.*, 1971 and Poulos *et al.*, 1987). Sesamoiditis is usually associated with degenerative changes in the suspensory ligament, and degenerative remodeling or fracture at the distal ends of the small metacarpals (Sande 1998).

The radiographic appearance of sesamoiditis is variable, ranging from a linear or cystic lysis that may appear to penetrate the sesamoid bones from the abaxial surface (Sande 1998) to extensive new bone on the axial and abaxial surfaces with an apparently normal internal structure to the bone (Butler *et al.*, 1996 and 2000). The non-articular new bone growth (enthetic osteophytes), appears in the form of coarse or mottled trabiculation with an increased number of the vascular channels (radiolucent defects) of the proximal sesamoid bones (O'Brien, *et al.*, 1971, and Hardy *et al.*, 1991).

On diagnosis of proximal sesamoid fracture, correlation of the radiographic findings with the history and clinical findings is important because fragmentation of the proximal sesamoid bone may represent a separate center of ossification, bipartite sesamoid (Stashak 1996), or apical fracture (O'Brien, *et al.* 1971). Dystrophic mineralization in the branches of the suspensory ligament should not be mistaken for apical fracture (Neuwirth 1998). The medial proximal sesamoid bone of the right forelimb is the most affected in Thoroughbreds (Henninger *et al.*, 1991 and Parent *et al.*, 1993) and the lateral sesamoid of the left hindlimb is most commonly affected in Standerbreds (Henninger *et al.*, 1991). Combined total proximal sesamoid bone fracture and 3rd metacarpal (MC111) condylar fractures represents 60% of all catastrophic injuries, necessitating euthanasia in horses (Theadore 2003).

Proximal sesamoid fractures are consistently of three types, apical, mid-body and basilar (Copelan 1983). Fractures of the mid-body portion of one proximal sesamoid bone occur less commonly than apical fractures. They occur chiefly in racing breeds and appear in equal frequency in Standerdbreds and Thoroughbreds. Fractures of the basilar portion of the proximal sesamoid bone are more common in Thoroughbred than in Standardbred (Ruggles and Gabel 1998). Fractures through the mid-body of the sesamoid bone may have a narrow cleavage line indicating that the suspensory apparatus remains intact while the presence of wide separation of sesamoid fragments usually indicates bilateral sesamoid fractures with separations of the fibers of the suspensory ligament. Incomplete mid-body fracture may not be evident on initial radiographs (Ruggles and Gabel 1998 and Thrall 1998). The abaxial sesamoid fractures are typically thin fragments of the sesamoid bone "with or without articular component" that are avulsed by the suspensory ligament, while axial sesamoid fractures are uncommon and generally occur in conjunction with the displaced lateral condylar fracture of MC III (Ruggles and Gabel 1998).

MATERIALS and METHODS

Twenty-one fresh cadaver limbs of mature donkey were collected from training surgical rooms of the Faculty of Veterinary Medicine Meinofiya University, Faculty of Veterinary Medicine, Cairo University, and Brooke Hospitals Society for Animals. The metcarpophalangeal/metatarsophalangeal regions (MC/MT) of all specimens were evaluated by radiography {Lateromedial (LM) and dorsopalmar/dorsoplantar (DP)} using a Siemens X-ray Machine (German industry), at the Teaching Hospital of the Faculty of Vet. Med. at Sadat City; Meinofyia University. The parameters applied for imaging were 52 KV, 100 MA, 12 MA/sec and 90 cm FFD. The selection of the cadaver digit was done on the basis of gross pathological examination and imaging finding.

RESULTS

Sesamoiditis was identified by plain radiography in 10 limbs (8 forelimbs and 2 hindlimbs). The radiographic findings was variable, ranging from a number of lucent areas along the body of the bone with some periosteal proliferation (Fig.1 A&B) to extensive opaque new bone formations on the non-articular surface of the sesamoid bone (Figs. 2 A&B and Fig.3 A&B).

Fracture of the sesamoid bones was recorded in 11 cases (7 fore limbs and 4 hindlimbs). Radiographically the recorded cases of sesamoid bone fractures were classified into transverse form in two cases (Figs. 4 A&B and Fig. 5 A), the abaxial form in one case (Fig. 5B) and the basilar form in 8 cases (Fig. 6 A&B). The latter one was identified separately or in association with fractures in the MC III and P I.

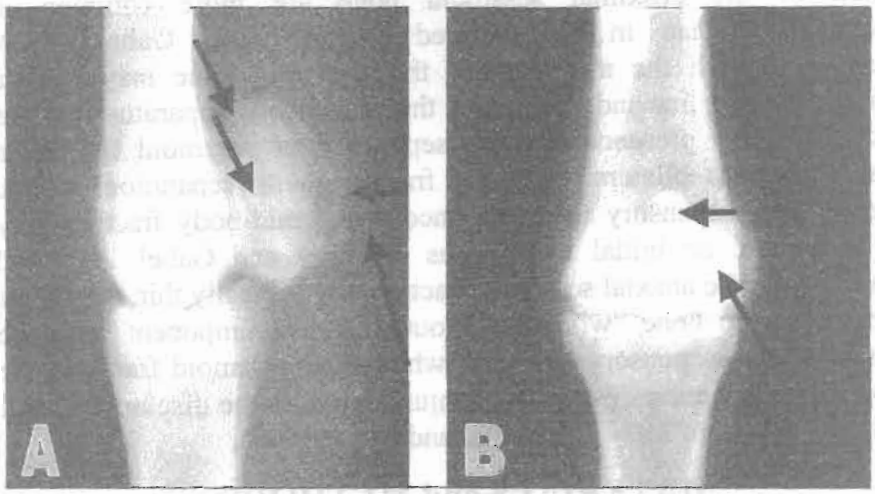

Fig. 1: Sesamoiditis, (A) lateromedial oblique, and (B) dorsopalmar views of left MCP joint showing irregular palmer margin (short arrow) and lucent zones at the apical and middle regions of the lateral sesamoid bone (long arrows).

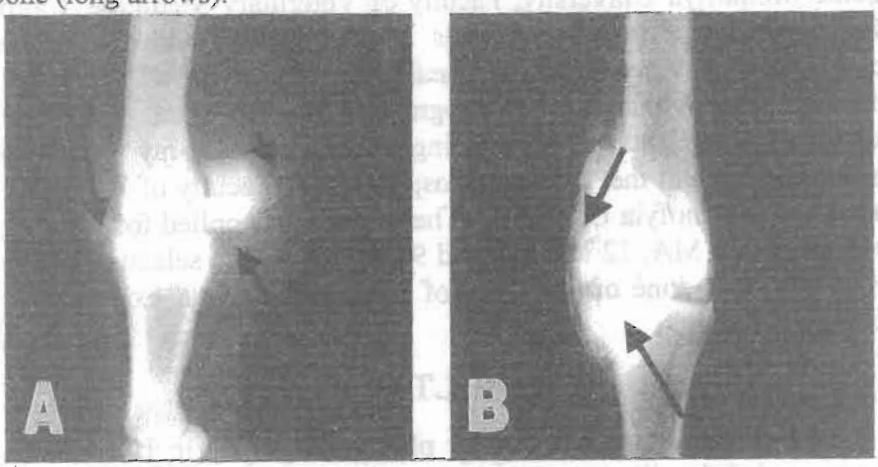

Fig. 2: Sesamoiditis; (A) lateromedial (B) dorsopalmar views of left MCP joint showing a mild opaque new bone formation on the non articular surface of the sesamoid bones (short arrow). Note mineralization of the distal sesamoidean ligaments with degenerative changes of the MCP joint (long arrows).

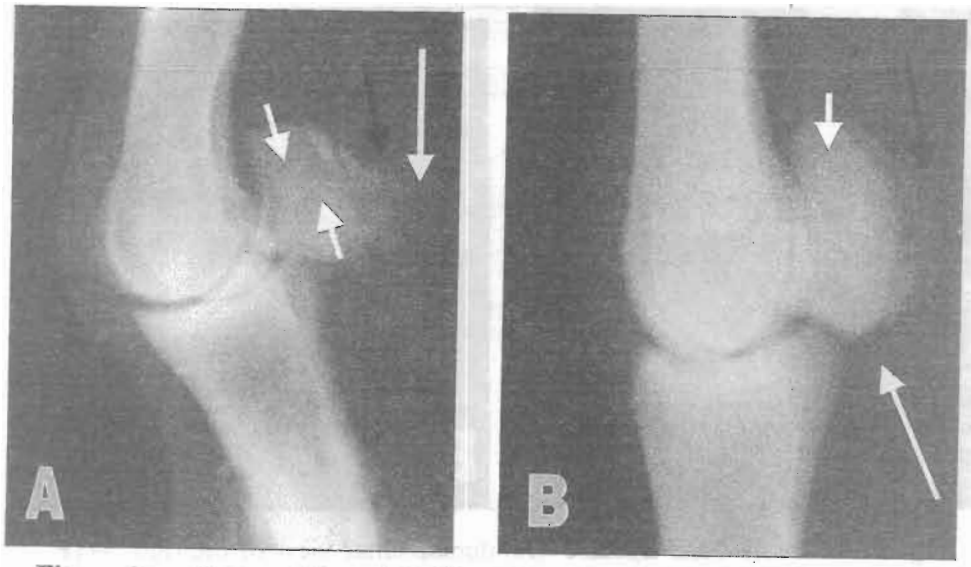

Fig. 3: Sesamoditis (A&B) Lateromedial views of the metacarpophalangeal joint regions showing a mild opaque new bone formation (short arrows) on the non-articular surface associated with lucent areas in the sesamoid bones (Long arrows).

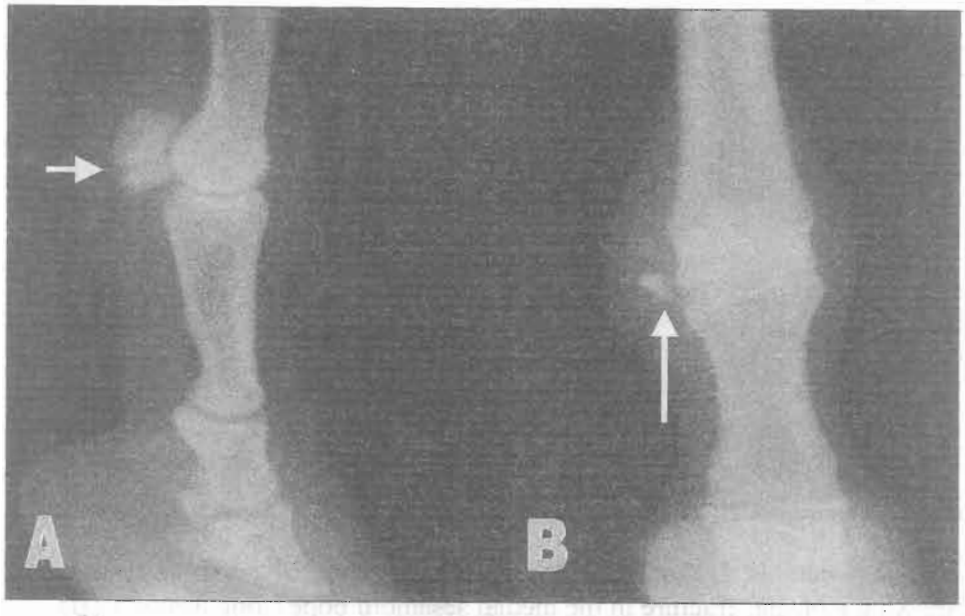

Fig. 4: Sesamoid bone fracture; (A) Lateromedial and (B) dorsoplantar views of the left MTP phalangeal joint showing a basilar fracture of the lateral sesamoid bone (short arrow) associated with chip fracture of the dorsal proximolateral aspect of the proximal phalanx (long arrow).

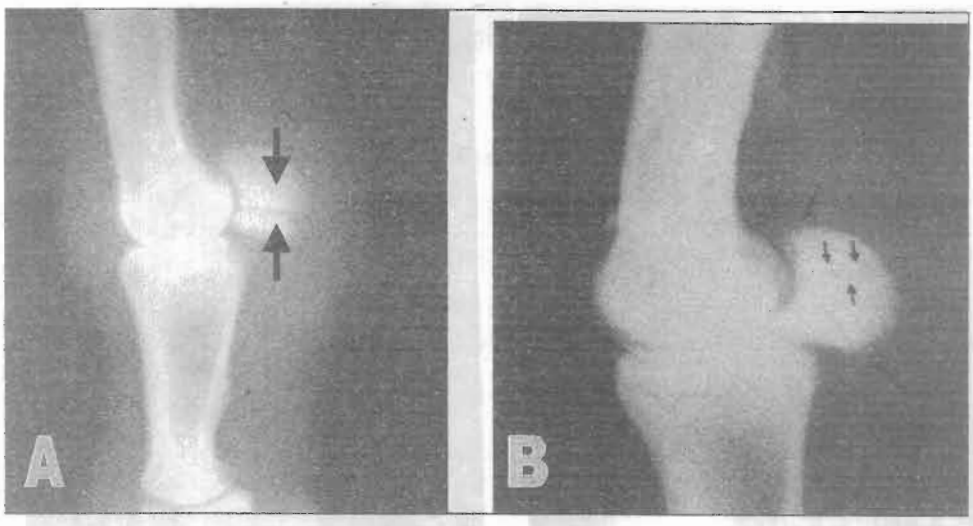

Fig. 5: Sesamoid bone fracture (A) dorsoplantar view of the right MTP joint showing a basilar fracture of the medial sesamoid bone associated with chip fracture of the medial proximoplantar aspect of P I (long arrow). (B) Dorsopalmar view of left MCP joint showing a transverse fracture through both sesamoid bones (short arrow).

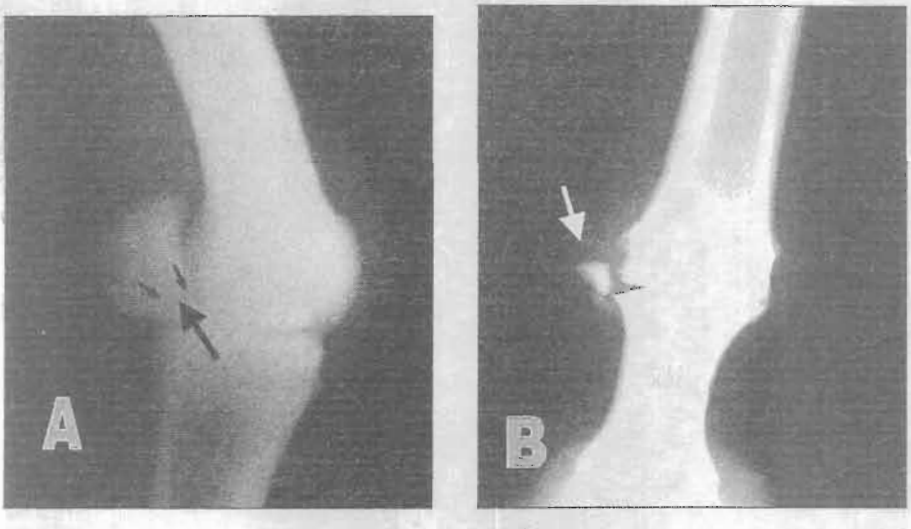

Fig. 6: Sesamoid fracture (A): Lateromedial view of the left MCP joint showing a basilar fracture in the medial sesamoid bone (long arrows). (B) Lateromedial view of right MCP joint showing a basilar fracture of medial sesamoid bone (small arrows).

DISCUSSION

It was found that sesamoditis and sesamoid bones fracture are more common in the forelimbs. Sesamoiditis was recorded in eight forelimbs and two hindlimbs, while sesamoid bone fracture was recorded in 7 forlimbs and 4 hindlimbs. Page and Hagen 2002 and Kummer *et al.* (2006) stated that malalignment of the digital bones is responsible for 72.8% of forelimb lameness in horses.

The radiographic appearance of sesamoiditis was variable, ranging from a number of lucent areas along the non-articular surface of the bone with some new bone formation, to extensive new bone on the non-articular surface with an apparently normal internal structure of the bone. These findings are resemble to those reported by Butler *et al.* (1996 and 2000) in horses.

The lucent areas are sometimes referred to as vascular channels. The lucent zones adjacent to the vascular channels, but outside the normal bone, are areas of fibrous tissue around nutrient vessels. The fibrous tissue resists encroachment of entheseophytes and gives a radiographic appearance of enlarged vascular channels. The new bone on the abaxial and distal surfaces of the bone is often associated with strain of the suspensory ligament, and distal sesamoidean ligaments (Butler *et al.* 1996 and 2000).

Concerning fractures of the sesamoid bones, the basilar form was the most commen one and was usually associated with chip fractures of the third MT/MC and/or the proximal phalanx. On the other hand from our findings Ruggles and Gabel (1998) recorded that the apical sesamoid fractures are the most common fracture in horses.

It can conclude that, unlike horses, there is no special activity can judge the prevalence of sesamoid bone affections in donkeys. The difference in prevalence of sesamoid bones affections between donkeys and race horses could be explained by the nature of work between them. Unlike donkeys, race horses are subjected to more and stronger traumas from racing field.

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