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كلية الطب البيطري ـ جامعة أسيوط.

رئيس القسم : أ.د. حلمي محمد بدوي.

دراسة تشريحية جراحية على الاغماد الزلالية للعضلات القابضة في القدم الامامي للحمار

كمال الدين عبدالله ، علي عبدالقادر ، هارون يوسف، محمد علم الدين

أجري هذا البحث على عدد عشرين من الاطراف الصدرية للحمير البالغة وكذلك على أربعة حمير حية وذلك لدراسة الأغماد الزلالية للعضلات القابضة للقدم الأمامي من حيث أماكن وجودها وأبعادها وعلاقاتها بما يجاورها من أنسجة وكذلك لتحديد أنسب الأماكن التي تصلح لحقن هذه الأغماد سواء بمواد مشعة أو بعقاقير علاجية أو لسحب السائل الزلالي وفحصه بكتريولوجيا وميكروسكوبيا مما يسهل تشخيص مابها من اصابات.

وقد تم تسجيل النتائج ومناقشتها مع مثيلاتها في الحيوانات الأخرى.

Dept. of Anatomy and Histology,
Faculty of Vet. Med., Assiut University,
Head of Dept. Prof. Dr. H. Badawi.

SURGICAL ANATOMICAL STUDIES ON THE TENDON SHEATHS OF THE FLEXOR MUSCLES OF THE MANUS IN DONKEY

(With Two Figures)

By

K.E.H. ABDALLA; A.A. MANSOUR; H.A. YOUSSEF and M.A. ALAM EL-DIN

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SUMMARY

The present work was carried out on twenty thoracic limbs of adult healthy donkeys as well as four living animals. It showed that the flexor muscles of the manus have four tendon sheaths. The position, relation, length, width and the sites of injection of these sheaths were determined. This study also revealed that there is no communication between the tendon sheaths and the neighbouring synovial structures as joint cavities and bursae which are of great importance from the surgical point of view.

INTRODUCTION

Affections of the tendon sheaths are among the prevalent problems in equine lameness. Tendinitis, rupture of the tendon, penetrating wounds and ascending infections from the hoof that lead to severe tendovaginitis are the common affections in the manus region. Determination of the sites of injections of the tendon sheath aids either in aspiration of synovia for microbiological and microscopical examinations or in injecting therapeutic and diagnostic radioopaque substances. Therefore, the anatomical study of these sheaths is very important, not only for therapy and surgical intervention but also for diagnostic purposes. The available literature lack data about the anatomical features of the synovial sheaths in donkey which is the object of this work.

MATERIAL and METHODS

The present study was carried out on twenty thoracic limbs of adult healthy donkeys and four living animals. Fifteen limbs were dissected for anatomical descriptions to determine the most suitable sites of injection of the tendon sheaths. After that the latter five specimens were injected with gum milk latex to show any communication between the tendon sheath and the adjacent synovial structures.

The tendon sheaths of the living animals were injected by urographine for radiological studies and to apply the previously determined sites of injection.

The nomenclature used is that adopted by N.A.V. (1983).

RESULTS

Vag. tendinis M. flexor carpi radialis :

The tendon sheath of the M. flexor carpi radialis begins 7 cm proximal to the carpus and 1.5 cm above the junction of the tendon with the fleshy part of the muscle. It runs

distally at the medial part of the caudal surface of the radius, then it continues its course distally on the carpal joint opposite to the palmar aspect of the radial and second carpal bones to terminate at the head of the second metacarpal bone. During the coruse of the tendon sheath in the carpal region, it is coverd by the flexor retinaculum. This sheath measures 10.9 cm in length while its width is nearly equs' along its length and measures about 0.6 cm. The mesotendon is attached to the dorsal border of the tendon of the M. flexor carpi radialis.

The site of injection of the tendon sheath of the M. flexor carpi radialis is located 4 cm proximal and 1.6 cm caudal to the medial tuberosity of the distal extremity of the radius. The needle is introduced horizontally for about 1.5 cm.

Vag. tendinis M. ulnaris lateralis :

The tendon sheath enclosing the long tendon of insertion of the M. ulnaris lateralis passes distally and slightly dorsally on the lateral surface of the accessory carpal bone and partially undercover of a fibrous band connecting the accessory carpal bone with the ulnar carpal bone. The sheath measures 3.7 cm in length and terminates at the proximal extremity of the fourth metacrpal bone. Its width is nearly equal along its length and measures about 0.7 cm. The mesotendon is attached to the dorsal border of this tendon.

The suitable site for injection of the tendon sheath of M. ulnaris lateralis is located between the accessory carpal bone and the distal extremity of the radius. The tendon can be palpated then the needle is introduced horizontally for about 1.2 cm.

Vag. synovialis communis Mm. flexorum:

The carpal tendon sheath enveloping th tendons of Mm. flexores digitorum superficialis and profundus (1/1) is the largest sheath among that of the carpal region. This sheath begins 2.8 cm proximal to the level of the accessory carpal bone and runs downward through the carpal canal. It terminates 3.4 cm distal to the carpus where the accessory ligament connects the deep digital flexor tendon. This sheath measures 9.4 cm in length, while its width being 1.9 cm at its beginning, 2.2 cm at the level of accessory carpal bone and 1.3 cm at its termination.

The parietal layer of the Vag. synovialis communis Mm. flexorum is reflected from the distal fifth of the lateral part of the caudal surface of the radius, the medial aspect of the accessory carpal bone, the plmar aspect of the fourth carpal bone and the lateral border of the accessory ligament forming the mesotendon. This mesotendon passes medially to attach the free borders of the deep digital flexor tendon forming a tube around the tendon of the superficial digital flexor muscle. Opposite to the accessory carpal bone, this tube has an opening which is elliptical in shape and measures 3.4 cm in length and 1.5 cm in width. Within the tube the mesotendon gives a short branch which attaches the medial border of the superficial digital flexor tendon.

For injection of the carpal tendon sheath of the superficial and deep digital flexor muscles, the needle is introduced dorsomedially for about 1.9 cm in the triangular area between the distal border of the accessory carpal bone proximally, the fourth metacarpal bone dorsally and the flexor tendons palmarly.

Vagg. synoviales tendinum manus :

The digital synovial sheath (2/1) is the largest and the most clinically important one in the manus. It encloses the tendons of the superficial and deep digital flexor muscles and lies opposite to he palmar aspect of the distal fourth of third metacarpal and the proximal

as well as the middle phalanges.

The digital tendon sheath extends 2.5 cm above the proximal sesamoid bones and passes distalward through a groove formed by the beforementioned bones and the intervenning palmar ligament, then it continues its course distally palmar to the superficial sesamoidean ligament till the middle of the proximal phalanx where the tendon of the superficail digital flexor divides into two branches which diverge to reach their points of insertion. Between these two branches, the tendon of the deep digital flexor muscle emerges and is the only enveloped by the digital synovial sheath. The distal end of the tendon sheath terminates palmarly opposite to the pastern joint while dorsally it extends more distally to reach the middle of the middle phalanx immediately above the coffin joint and about 0.7 cm proximal to the navicular bursa.

Proximal to the bifurcation of the superficial digital flexor tendon, the latter tendon and the parietal layer of the vaginal cavity form a tube surrounding the deep digital flexor tendon. Opposite to the proximal seasamoid bones the dorsal wall of this tube has an opening through which it communicates with the vaginal cavity.

The digital synovial sheath measures 13.6 cm in length while its width being 2 cm above the proximal sesamoid bone, 3 cm at the level of the same bone, 1.8 cm at the bifuration of the superficial digital flexor tendon and 2.5 cm at the pastern joint.

The digital tendon sheath has six pouches which are classified according to their position into one proximal, two proximal palmar, two middle palmar, and one distal palmar pouch. The proximal pouch (2/2) lies above the proximal sesamoid bone between the proximal end of the tendon sheath proximally; the palmar annular ligament distally, the middle interosseus muscle dorsally and the parietal layer of the synovial sheath palmarly. This pouch is nearly triangular in shape with its base directed distalward and is slightly concave in adaptation to the proximal border of the palmar annular ligament. The proximal palmar pouches (2/3) are situated at the level of the fetlock joint between the superficial digital flexor tendon dorsally and the palmar annular ligament palmarly. They are separated from each other by the mesotendon of the superficial digital flexor muscle. The long axis of these pouches is directed proximodistally and measures about 3.1 cm. The middle palmar pouches (2/4) lie distal to the proximal sesamoid bones between the distal border of the palmar annular ligament and the distal branch of the proximal digital annular ligament. Each of them is nearly oval in shape with long axis directed obliquely distally and dorsally and measures about 3.2 cm. The proximal branch of the proximal digital annular ligament divides each middle palmar pouch into two unequal parts, small proximal part and large distal one. The distal palmar pouch (2/5) is located subcutaneously at the level of the pastern joint, it is nearly cresentic in shape with its proximal border convex in accomodation to th distal border of the proximal digital annular ligament while the distal border is slightly concave in adaptation to the proximal border of the distal digital annular ligament. The palmar surface of this pouch is directly covered by the skin and fascia while its dorsal surface is related to the deep digital flexor tendon.

There are two mesotendons for the superficial digital flexor tendon, one of them attaching the palmar aspect of the tendon and the other attaching its dorsal aspect opposite to the middle of the proximal phalanx.

For injection of the digital tendon sheath there are two sites. The first of them (2A, 2B) is found just above the proximal sesamoid bones. The needle is introduced obliquely distomedially for about 2.5 cm in the space betwen the middle interosseus muscle and the deep digital flexor tendon. The second site of injection (2C) is employed by inserting the

needle horizontally for about 1.8 cm in the triangular area lying between the proximal sesamoid bone proximally, the proximal phalanx dorsally and the flexor tendons palmarly.

After injection of the beforementioned tendon sheaths with gum milk latex and radiopaque substance (urographine) to determine the communication between the vaginal cavities of these sheaths and the adjacent synovial bursae as well as the joint cavities, any communication in all examined cases was not observed.

DISCUSSION

In the present study the tendon sheath of M. Flexor carpi radialis begins 7 cm proximal to the carpus and 1.5 cm above the junction of the tendon with the fleshy part of the muscle. However, in pig (NIELSEN, 1968) and in camel (EREISHA, 1982) the sheath begins at the junction between the tendon and the belly of the M. flexor carpi radialis.

In agreement to that reported in horse by EICHBAUM (1883), MULLER (1936), SISSON (1975) and SEIFERLE/FREWEIN (1986) the long tendon of insertion of M. ulnaris lateralis is enveloped by a tendon sheath. EICHBAUM (1883) and MULLER (1936) added that this tendon sheath may communicate with the cavity of the intercarpal articulation, a result which was not observed in the present study.

In donkey the termination of carpal tendon sheath surrounding the superficial and deep digital flexor tendons at the junction of the accessary ligament and the deep digital flexor is similar to that reported in horse by BERG (1973) and SEIFERE/FREWEIN (1986). In this work the best site to inject the beforementioned synovial sheath is located in the triangular area between the accessory carpal bone, fourth metacarpal bone and the flexor tendons. However, WESTHUES (1934), BERGE/WESTHUES (1961), BERG (1973) and SEIFERLE/FREWEIN (1986) reported that the site for injection of this sheath in horse is situated in the proximal third of the metacarpal bone in the angle formed by the reinforcing ligament and the deep digital flexor tendon.

The present investigation shows that the digital tendon sheath terminates dorsally at the middle of the middle phalanx. This result is similar to that obtained by EICHBAUM (1883), MULLER (1936) and SISSON (1975) in horse as well as EREISHA (1982) in camel. Added to that, in the present work the distal end of this sheath ends palmarly opposite to the pastern joint, a result which is not recorded in the other domestic animals. Moreover, the distal end of the digital tendon sheath in donkey is separated from the navicular bursa by 0.7 cm. Therefore, the communication between these two vaginal cavities is absent which make the ascending infection from the bursa to the tendon sheath more difficult to take place, a result which simulates that described by IBRAHIM (1987) in the same animal.

According to WESTHUES (1934), BERGE/WESTHUES (1961), BERG (1973) and SEIFERLE/FREWEIN (1986) in horse the site for injection of the digital tendon sheath lies laterally about 5 cm above the proximal sesamoid bone between the middle interosseus muscle and the deep digital flexor tendon in which the needle is introduced horizontally. In donkey there are two sites of injection, the first is immediatly above the proximal sesamoid bone in which the needle in introduced distomedially between the middle interosseus muscle and the deep digital flexor tendon, while the second one is located distal to the proximal sesamoid bone. The latter site of injection in donkey agrees that reported in horse by TUFVESSON (1963).

REFERENCES

Berg, R. (1973): Angewandte und Topographische Anatomie der Haustiere. I Aufl. Veb. Gustav Fischer Verlag Jena.

Berge, F. und M. Westhues (1961): Tierarztlicbe Operationslehre 28 Aufl. Verlag Paul Parey, Berlin.

Eichbaum, F. (1883): Zur Anatomie und Histologie der Schleimbeutel und Sehnenscheiden des pferdes. Arch F. Wissensch-U. Prakt. Tierheilk, Jg./Bd. 9.

Ereisha, A. (1982): Some anatomical studies on the region of the manus of the one humped camel with special reference to tendons, tendon sheaths and ligaments. M.V.Sc. (Anatomy). Thesis Faculty of Vet. Med. Cairo University.

Ibrahim, M.T. (1987): Surgical anatomical studies on some synovial bursae in donkey. M.V.Sc. (Anatomy). Thesis Faculty of Vet. Med. Assiut University.

Muller, F. (1936): Schleimbeutel und Sehnenscheiden des pferdes. Arch. Miss. Parkt. Tierheilk. No. 70, 351-370.

Nielsen, E.H. (1968): Die Schleimbeutel und Sehnenscheiden der Gliedmassen des Schweines. Zent. blatt, 15A., 562-571.

Nomina Anatomica Veterinaria (1983): Third edition, Pulished by the international committe on Veterinary Gross Anatomical Nomenclature under the financial responsiblity of the World Association of Veterinary Anatomists. Ithaca, New York.

Seiferle, E. and J. Frewein (1986): Active locomotor system in Nickel, R.; A. Schummer; E. Seiferle; J. Frewein; H. Wilkens and K.H. Wille; the locomotor system of the Domestic Mammals. Vol. 1. Verlag. Paul parey Berlin. Hamburg.

Sisson, S. (1975): Equine Myology in Sisson and Grossman's, the Anatomy of the Domestic Animals, 5th edition Rev. by R. Getty, W.B. SAUNDERS COMPANY, Philadelphia. London. toronto.

Tufvesson, G. (1963): Local Anesthesia in Veterinary Medicine. Astra International Sodertalje, Sweden.

Westhues, M. (1934): Die diagnostische Injektion in Gelenke und Schnenscheiden bei Lahmheiten DTSCH. Terarztl. Wschr. 42, 829-832.

LEGENDS

Fig. (1): Carpal tendon sheath of Mm. flexores digitorum, superficialis and profunds.

A- Dorsopalmar radiograph. **A'**- Radiographic shetch of (**A**).

1- Vagina synovialis communis Mm. flexorum.

2- Vagina tendinis M. extensoris carpi radialis.

a- Radius. b- Os carpi accessorium.

c- Os carpale III. d- Os carpale IV.

e- Os metacarpale III. f- Os metacarpale IV.

Fig. (2): Digital tendon sheath.

A- Dorsopalmar radiograph. **A'**- Radiographic sketch of (**A**).

B- Mediolateral radiograph. **B'** - Radiographic sketch of (**B**).

C- Mediolateral radiograph.

1- Vagg. synoviales tendinum digitorum manus.

2- Proximal pouch. 3- Proximal palmar pouches.

4- Middle palmar pouches. 5- Distal palmar pouch.

a- Os metacarpale III. b- Phalanx proximalis.

c- Phalanx media. d- Phalanx distalis.

e- Os sesamoideum proximale. f- Os sesamoideum distale.

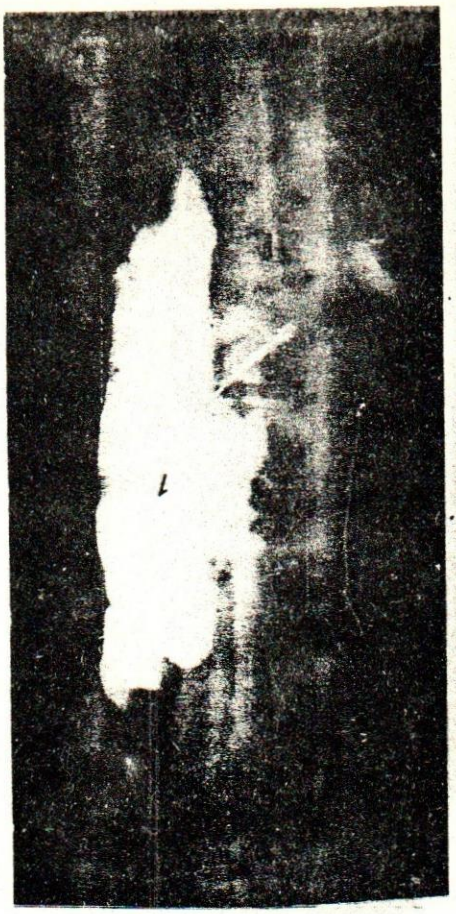


Fig. 1 (A)

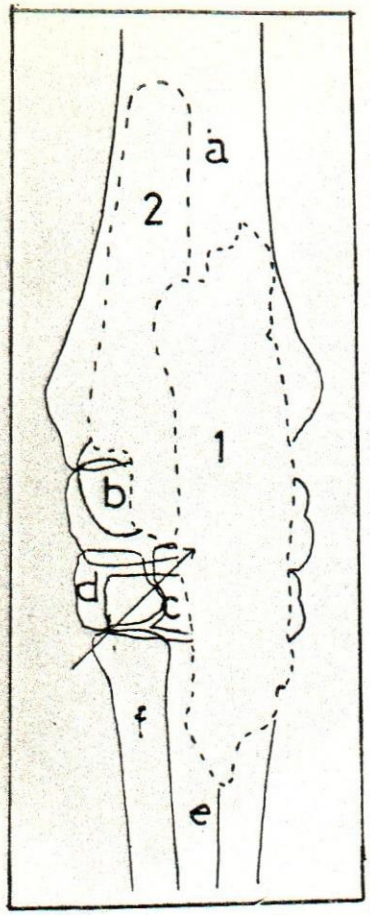


Fig. 1 (A')

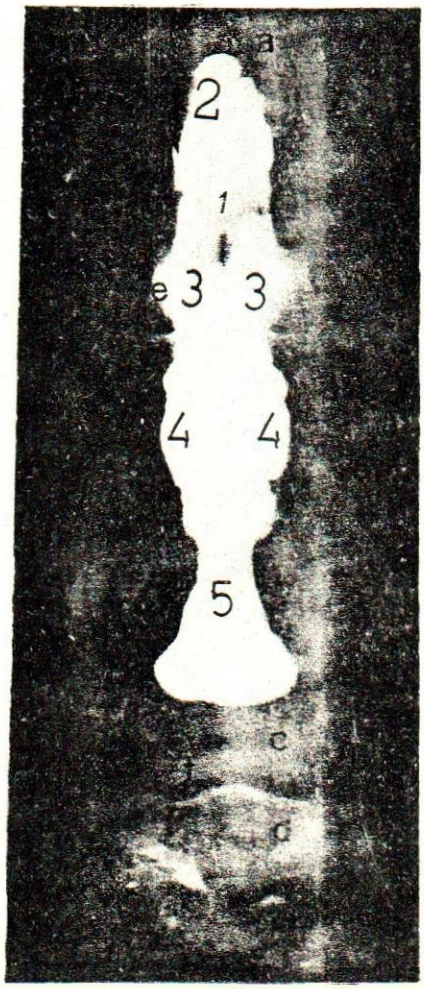
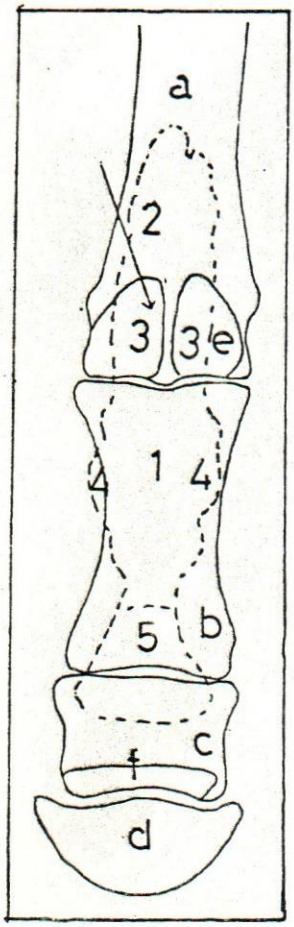


Fig. 2 (A)



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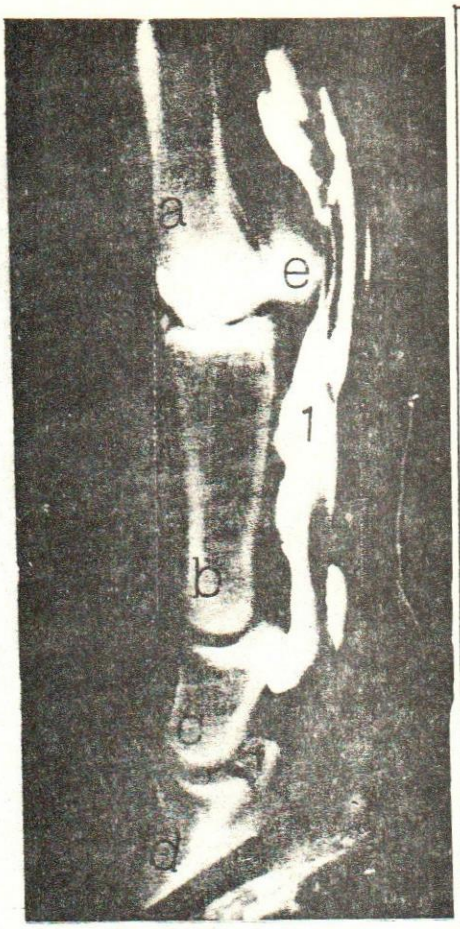

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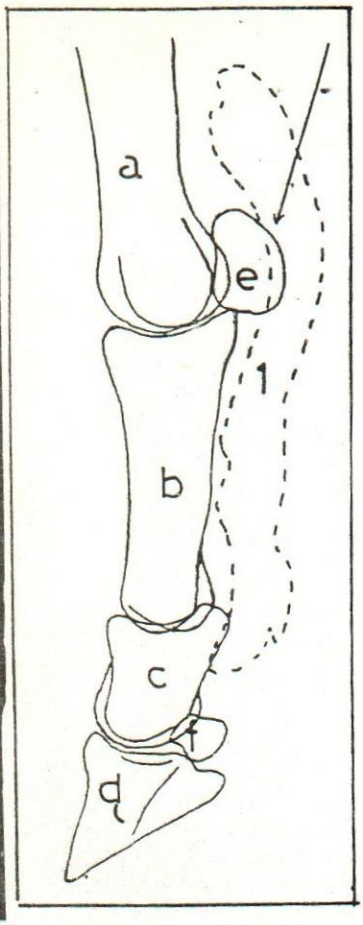

Fig. 2 (B')

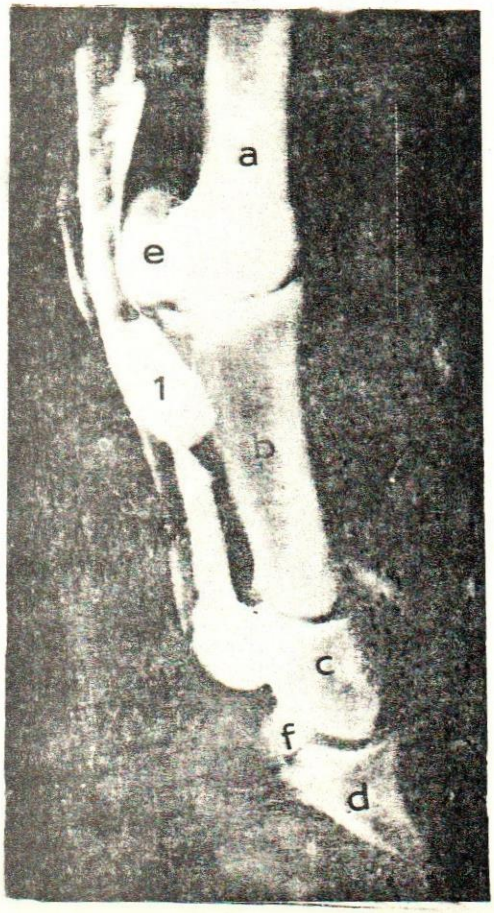

Fig. 2 (C)