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**ANGIOGRAPHIC PICTURE OF MANUS AND PES IN GOATS**  
**1- NORMAL**  
(With two Figures)

By

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دراسة إشعاعية على الإوعية الدموية لليد والقدم في الماعز

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أجرى هذا البحث بغرض القاء الضوء على توزيع الأوعية الدموية لليد والقدم والاستفادة بهذه الدراسة في أغراض التشخيص وقد تم حقن عشرة من الماعز الحية بمادة البوروجرافين من خلال عشرة من الماعز الحية بمادة البوروجرافين من خلال الشريان الوسطاني والشريان القضيبي الأمامي وتم تصوير هذه العينات بالأشعة السينية ولكن وجد من الصعب قراءة أفلام الأشعة وذلك إما بسبب أن بعض هذه الأوعية يغطي بعضها بعضاً أو لصعوبة التفرقة بين الشرايين والأوردة لذا كان من الضروري حقن بعض العينات بمادة اللاتكس الملون لتثريتها والامتعانة بها في قراءة الأشعة والتأكد منها.

**SUMMARY**

Angiography was performed through injection of contrast media into the median and crainal tibial arteries in ten native breed goats. The description of arteries and veins was completed after dissection of latex injected specimens.

**INTRODUCTION**

The arteries and veins of the thoracic and pelvic limbs in goats were described by DE SALAMANCA and SCHWARZ (1980), BADAWI and SCHWARZ (1963) and GHOSHAL and GETTY (1967). The angiography of the digits was reported in cattle by GREENOUGH *et al.* (1981), in horse by HERTSCH (1973) and in dog by HENSCHERL (1962). The available literature are meagre about the normal angiographic picture of the limbs in small ruminants. Therefore the aim of this work is to throw a light on th normal angiographic picture of manus and pes in goat, which is very important in diagnostic purposes.

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## MATERIAL and METHODS

Ten clinically healthy native breed goats of different ages and sexes were used in the present investigation. All angiographs were performed while the animals were anaesthetized using xylazine hydrochloride 2% (Bayer) in a dose of 0.3 mg/Kg.bw. The seats of canulation of the median and cranial tibial arteries were shaved and disinfected in preparation for aseptic surgical exposure. The vessels were canulated with sterile braunula 18 G (Art. No.420753/0. luer, B. Braun Nelsungen AG, W. Germany). The urografin 58% (Fa. Schering, Berlin) 10-15 ml were injected using a record syringe. A 43 K.V./5 mAs factors were used at a 90 cm focal film distance and the angiographs were taken at the end of injections in DV. and L. projections. After withdrawal of the canula, haemorrhage was controlled by digital pressure and skin was sutured with silk No. 1 in a simple interrupted manner.

For anatomical description thoracic and pelvic limbs were collected from five slaughtered goats. These specimens were injected with gum-milk latex either through the median or the cranial tibial artery.

## RESULTS

Although injection of the specimens was carried out only through the arteries (median or cranial tibial) both the arteries and veins of manus and pes were visualized on X-ray films. These vessels sometimes superimposed each other and sometimes were difficult to be distinguish from each other. Consequently it was important to utilize the latex injected specimens to facilitate interpretation of angiographs.

The median artery (Fig. 1/1) runs distally along the radius. Above the fetlock the median artery continues as the A. digitalis communis III. In the middle of the forearm the median artery gives off the radial artery.

The radial artery crosses the medial aspect of the carpus and on the proximal fourth of the metacarpus it divides into the Ramus palmaris profundus and Ramus palmaris superficialis (Fig. 1/3). The Ramus palmaris profundus participates in the formation of the Arcus palmaris profundus from which arise the Aa. metacarpeae palmaris superficialis continues as A. digitalis palmaris communis II while the A. digitalis communis IV is the direct continuation of the Ramus palmaris. The Aa. digitales palmares communes (Fig. 1/6,7,8) give rise the Aa. digitales palmares propriae axiales and abaxiales (Fig. 1/9,10).

The cephalic vein (Fig. 1/2) proximal to the carpal joint detaches the accessory cephalic vein (Fig. 1/14). The later vessel passes on the dorsal aspect of the metacarpus where it ends about its middle.

The median vein is represented by two small vessels accompanying the median artery. At the middle of the forearm it detaches the radial vein (Fig. 1/2) which is also double formed and joins the cephalic vein proximal to the carpus. Distal to the carpus the radial vein gives the Ramus superficialis (Fig. 1/3) which terminates

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in the median vein. Above the fetlock the median vein continues as the V. digitalis palmaris communis III.

The deep palmar arch is formed like that of the arteries from the deep branches of the radial vein. It gives off the Vv.metacarpeae palmares II-IV. These vessels in the distal part of the metacarpus together with superficial branch of the radial vein form the Arcus palmaris profundus distalis from which the Vv.digitales palmares communes II & IV (Fig. 1/6,7,8) are detached. The Vv.digitales palmares communes give rise the Vv.digitales palmares propriae axiales and abaxiales (Fig. 1/11,12).

The cranial tibial artery (Fig. 2/1) with its to very small satellite veins pass on the cranial surface of the tibia. On the flexor aspect of the tarsal joint they continue as the dorsal pedal blood vessels which after detaching the A. or V.tarsea perforans continues as the A. or V.metatarsea dorsalis III (Fig. 2/4).

The Ramus caudalis of the A. saphena forks proximal to the sustentaculum tali into the A. plantaris medialis and A. plantaris lateralis each of which divides into Ramus profundus and Ramus superficialis. The deep branches constitute the deep planter arch from which arise the Aa.metatarsee plantares II-IV. At the distal half of the metatarsus the superficial branch of the medial plantar artery divides into Aa.digitales plantares communes II and III while the superficial branch of the lateral plantar artery continue as the A.digitalis plantaris communis IV. These common digital arteries detache the axial or abaxial proper planter arteries of the digitis (Fig. 2/8).

The caudal branch of the V.saphena medialis at the tarsal joint gives off the V.plantris medialis which in turn detaches the Ramus profundus. The Ramus profundus with the Ramus caudalis of V.saphena lateralis (Fig. 2/2) form the deep plantar arch. From this arch arise the Vv.metatarsee plantares which at the distal part of the metatarsus made up the distal deep plantar arch. This arch gives rise the Vv.digitales plantares communes II-IV which inturn detaches the Vv.digitales plantares propriae.

## DISCUSSION

The present study revealed that the Aa.digitales palmares communes II and IV are the direct continuation of the Ramus superficialis of the A.radialis and Ramus palmaris respectively. However, GHOSHAL and GETTY (1967) in the same animal and GOHSHAL (1975) in sheep mentioned that these two arteries arise from the A.digitalis palmaris communis III which is the direct continuation of the median artery.

NICKEL *et al.* (1981) stated that the Ramus superficialis of the radial vein terminates either in the median vein or its communicating branch to the Arcus palmaris profundus. Similar findings were given in the present work. Moreover, the formation of the deep palmar arch and the origin of the common digital palmar arteries are corresponding to those in ruminant as described by the above mentioned author.

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GHOSHAL and GETTY (1970) in domestic animals and GHOSHAL (1975) in goat mentioned that the medial and lateral plantar arteries arise from the saphenous artery. However, NICKEL *et al.* (1981) as well as the present investigation showed that these two arteries are detached from the Ramus caudalis of the saphenous artery. The present study revealed also that the Ramus superficialis of the lateral plantar artery continues as the A. digitalis plantaris communis IV. This finding disagree that described by GHOSHAL (1975) who mentioned that the A. digitalis communis IV in goat arises from the superficial plantar arch.

In accordance to that given in the present work, BADWI and SCHWARZ (1963) in the same animal stated that the digital veins (Vv. digitales plantaris propriae axialis and abaxialis) arise from the Arcus plantaris distalis.

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## LEGENDS

Fig. (1): Angiographic picture of the arteries and veins of the manus in goat.

## A) Dorsopalmar view.

## B) Mediolateral view.

- 1- A.mediana (accompanied by two satellite veins).
- 2- V.Cephalica.
- 3- Ramus palmaris superficialis of V. radialis.
- 4- Ramus superficialis of A. radialis.
- 5- A.metacarpa dorsalis III.
- 6- A.digitalis palmaris communis III.
- 7- A.digitalis palmaris communis IV.
- 8- A.digitalis palmaris communis II.
- 9- A.digitalis palmaris propria IV axialis.
- 10- A.digitalis palmaris propria III axialis.
- 11,12- Vv. digitales palmares propriae III & IV abaxiales.
- 13- V.digitalis dorsalis communis III.
- 14- V.cephalica accessoria.

Fig. (2): Angiographic picture of the arteries and veins of the pes in goat.

## A) Dorsoplantar view.

## B) Mediolateral view.

- 1- A.tibialis cranialis.
- 2- Ramus caudalis of V.saphena lateralis.
- 3- Ramus superficialis of V.plantarum medialis of V.saphena medialis of the V.femoralis.
- 4- A.metatarsa dorsalis III.
- 5- V.digitalis dorsalis communis IV. of Ramus cranialis of V.saphena lateralis of V.circumflex femoris medialis.
- 6- V.digitalis dorsalis communis III of Ramus cranialis of V.saphena lateralis of V.circumflex femoris medialis.
- 7- Vv.digitalis dorsales propriae III & IV axiales of 6.
- 8- Aa.digitales plantares propriae III & IV axiales.

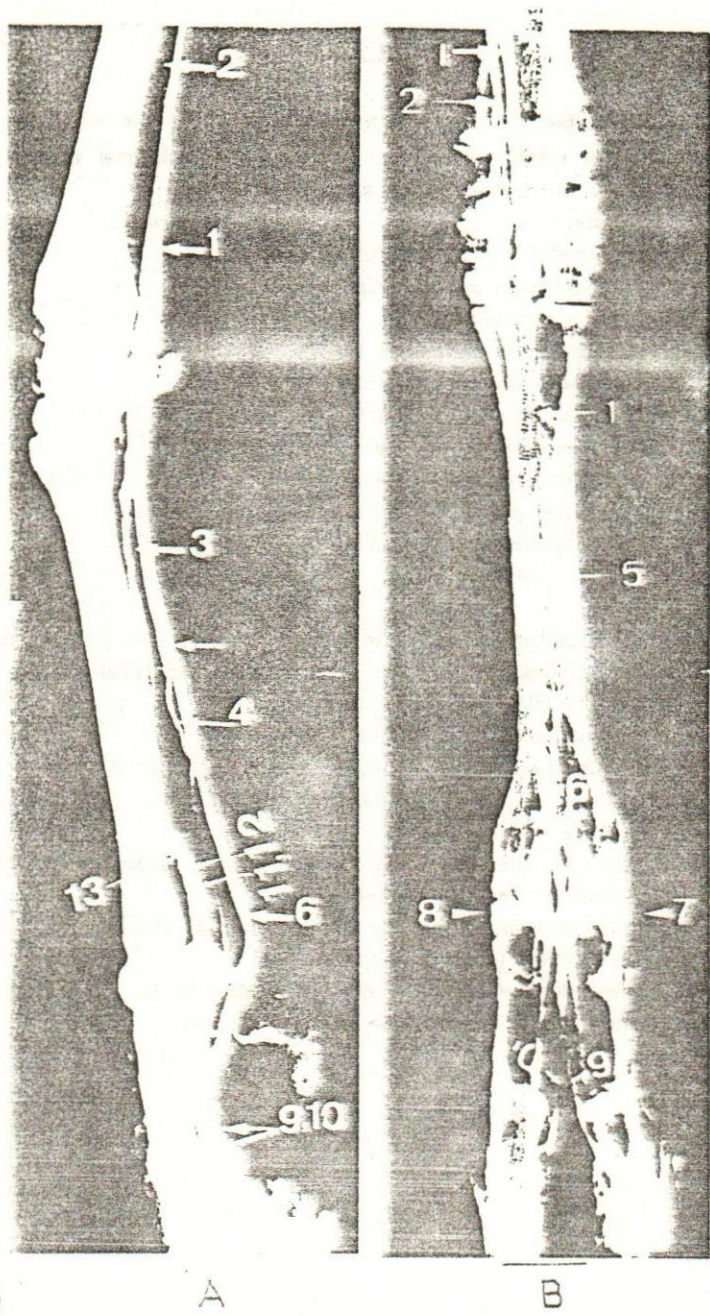
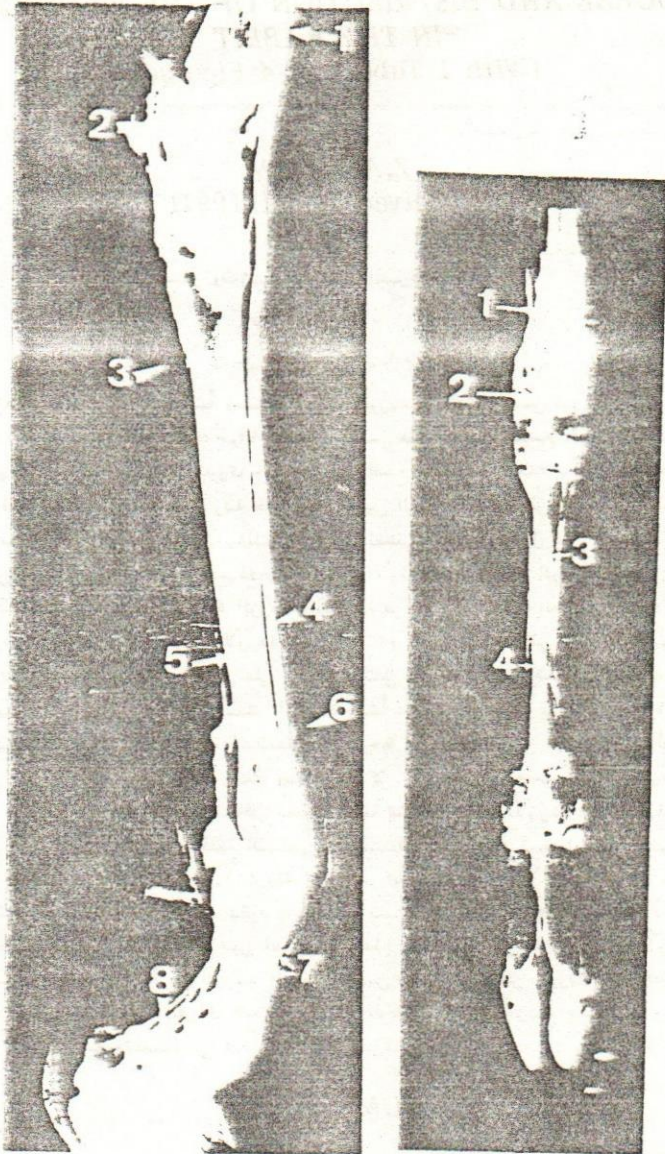


Fig. (1)

A

B

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Fig(2)

A

B