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ANGIOGRAPHIC STUDY OF BOVINE FOOT DISORDERS

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ABSTRACT

Angiography was conducted on 18 diseased feet in cattle. In septic pedal arthritis and scissor claw there was narrowing and poor opacification of proper digital arteries, terminal arch and laminar vessels. These changes were observed in both claws in the case of scissor claw. An area of bone necrosis was found to be avascular in the affected digit only in case of septic pedal arthritis. In case of overgrown hooves, narrowing of proper digital arteries with illdefind laminar vessels was seen. The vascular pattern in cattle with thimbling was characterized by dilated digital arteries, terminal arch and laminar vessels. Narrowing and poor filling of digital artery were seen in claws having sole ulcer and thimbling.

دراسة شعاعية منباينة لاصابات الاظلاف في الابقار

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الخلاصة

تمت دراسة التصوير الشعاعي الوعائي لـ ١٨ قدم ابقار مصابة بتشوهات القدم . وقد بينت الدراسة بأنه في الحالات (التهاب المفصل القدمي الانتاني والضلف المقص) وجود تضيق وعدم امتلاء كامل في الشرايين الاصبعية ، القوس الانتهائي ، والاوعية الصفائحية وان هذه التغيرات وجدت في كلا الإصبعين في حالة الضلف المقص . كذلك وجد ان منطقة تنخر العظم خالية من الاوعية الدموية في حالة التهاب المفصل القدم الانتاني اما في حالة فرط النمو للحافر وجد هناك تضيق في الشرايين الإصبعية مع ضعف وضوح الاوعية الصفائحية . كما ان النمط الوعائي في حالة الشق المستعرض لجدار الضلف يتصف بتوسع الشرايين الإصبعية والقوس الإنتهائي والأوعية الصفائحية . اما في حالة تقرح الإخمص والشق المستعرض لجدار الضلف ، فقد ظهر هناك تضيق وضعف أمتلاء الشرايين الإصبعية .

INTRODUCTION

Bovine foot abnormalities are of great economic importance. The incidence, etiology, clinical and radiographical aspects of various foot diseases have been reported in various countries including Iraq (1 - 5) .

The normal arterial supply of bovine foot has been reported (6) . However, angiography of diseased bovine feet is rarely reported (7) . The present study was aimed to examine vascular pattern in some bovine foot affections .

MATERIALS AND METHODS

The present study was based on the feet of 18 cattle, collected from the slaughter house . The feet had different disorders that included septic pedal arthritis (2 animals), scissor claws (4 animals), overgrown hoof (4 animals), thimbling (5 animals) and thimbling with sole ulcer (3 animals) . The common digital (pectoral limb) or dorsal metatarsal artery (pelvic limb) were exposed in the collected limbs, and canulated after arteriotomy . The catheter was hold in position by placing a tight ligature around the vessel and catheter . The arterial channle was flushed with heparinized physiological saline solution until clear fluid started coming from the venous end . Fifteen to twenty milliliters of red lead oxide suspension (70% , w/v) were injected through the catheter, and dorsopalmar or dorsoplantar radiographs were made using 10 to 13 mAs^{-}, 70 to 75 kVp and 90 cm focal film distance .

RESULTS

Angiogram of the diseased feet demonstrated the difference in the width , opacity , filling with contrast media and disposition of vessels . Fifteen to twenty milliliters of lead suspension were found to be sufficient to visualize all the arterial channels including minute vessels of the affected feet .

Angiographic evaluation of septic pedal arthritis revealed narrowing and tortious course of dorsal metatarsal artery (Figure 1) . Narrowing and poor opacification of proper digital artery , terminal arch and laminar vessels were also seen

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The area around the arthritic joint was crowded by illdefined and poorly opacified axial and abaxial new network of minute vessels derived from multiple sites from the proper digital artery . An area of septic arthritis was practically avascular . Overall vascular opcification was poor .

In case of scissor claws (Figure 2) , the angiogram showed poorly opacified common digital artery . However , the proper digital arteries were well opacified and visualized upto the level of midpoint of middle phalanx . Vessels narrowing started at this level with resultant poor opacification and visualization of terminal arches and laminar vessels, with the evidence of reduced numbers of arteries supplying the distal phalanx .

In angiography of overgrown claws (Figure 3) , narrowing of the proper digital arteries was seen in all specimens except one . The vascular supply was reduced , which was evident by decreased number and diameter of arteries supplying the distal phalanx . In these cases , laminar vessels were poorly opacified and visualized without any apparent abnormality in the terminal arches .

Angiograms in case of thimbling demonstrated no significant abnormalities except that of moderate dilatation of common digital artery, proper digital arteries, terminal arches and laminar vessels with their good opacification and visualization. However, in two cases the angle of the terminal arch was more acute than the angles of the normal ones. In one animal , pooling of blood was seen over both proximal phalanges (Figure 4) .

In case of thimbling with sole ulcer , the angiograms showed moderate narrowing of the common digital artery just before terminating into proper digital arteries (Figure 5) . The proper digital artery of the claw having thimbling was moderately dilated with resultant dilatation of terminal arch and laminar vessels . The proper digital artery of the claw having sole ulcer was slightly narrowed down and was poorly opacified . The terminal arch and laminar vessels were also poorly opacified and visualized . The angle of the terminal arch was acute .

DISCUSSION

Angiographic observations made in the present study revealed that many minute vessels which would be difficult to trace on gross dissection , were visualized by this method specially following the use of the lead suspension as a contrast medium . In the angiography of septic pedal arthritis and overgrown hooves , narrowing of proper digital arteries with poor arterial supply to the digits were seen . In septic pedal arthritis , microorganisms enter the joint directly through some injury or through nutrient or metaphyseal vessels and are localized in venous sinusoids . This results in ischemia and bone necrosis within due course of time . These findings correlate with similar observations made previously (5 , 8 , 9) . In cases of overgrown hooves , narrowing of the vessels could be attributed to stretching of the limb or uneven pressure of the abnormal hoof (7 , 10) . Similarly in case of scissor claw , vascular supply was poor. The increased vascular supply seen in cases of thimbling , could be attributed to the production of an abnormal amount of horn caused by an injury or crack in the claw . The narrowing of proper digital artery of the affected digit in case of sole ulcer might either be due to direct traumatic injury to the vessels or faulty infusion of contrast medium .

LEGENDS

Figure 1 : Dorsoplanter angiogram of septic pedalarthritis showing tortious dorsal metatarsal artery (arrow) , poor opacification of digital arteries, and avascular area at the arthretic joint (double arrow) .

Figure 2 : Dorsopalmer angiogram of scissor claw showing narrowing and poor opacification of digital blood vessels specially below the midpoint of middle phalanx (arrow) .

Figure 3 : Dorsopalmer angiogram of overgrown hoof . No vascular alteration was seen . Proper digital artery (arrow) , terminal arch (double arrow) .

Figure 4 : Dorsopalmer angiogram of thimbling , showing moderate dilation of common digital artery (arrow) , proper digital artries and terminal arch . Big vascular bleeding over both proximal phalanx was seen (double arrow).

Figure 5 : Dorsopalmer angiogram in case of thimbling with sole ulcer . The claw with thimbling shows dilated proper digital artery and terminal arch (arrow) , whereas the claw of sole ulcer shows narrowed and poor opacified digital artery and terminal arch (double arrow) .

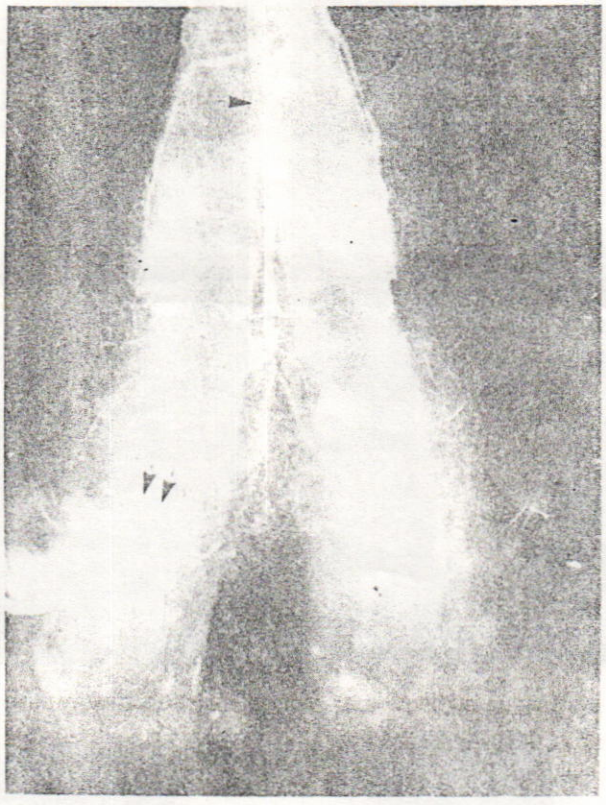

Figure 1

Figure 2

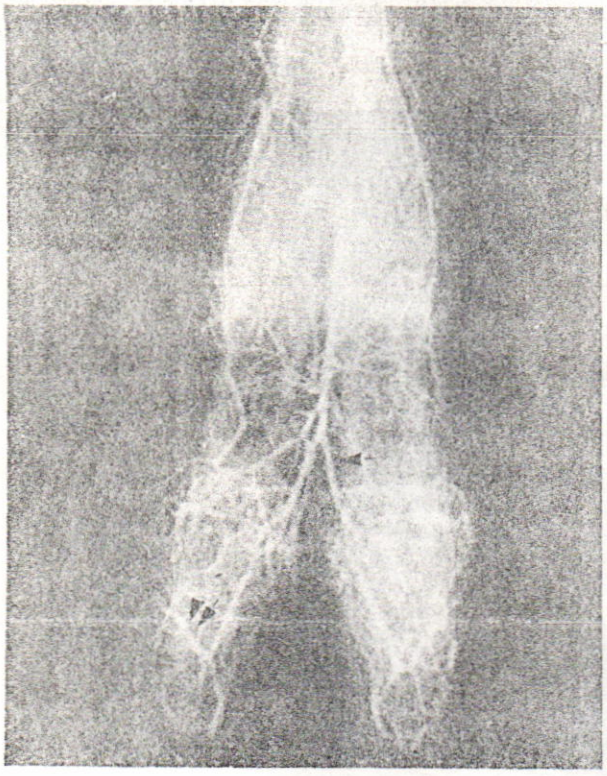

Figure 3

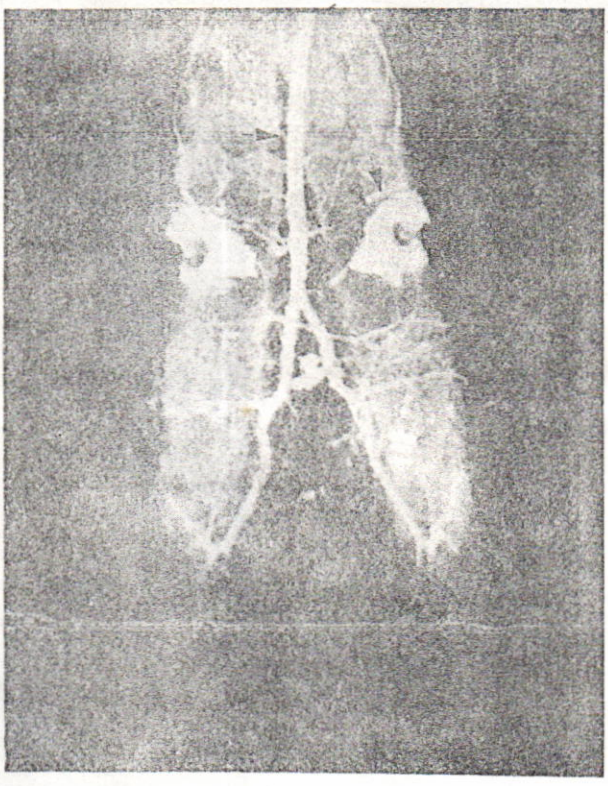

Figure 4

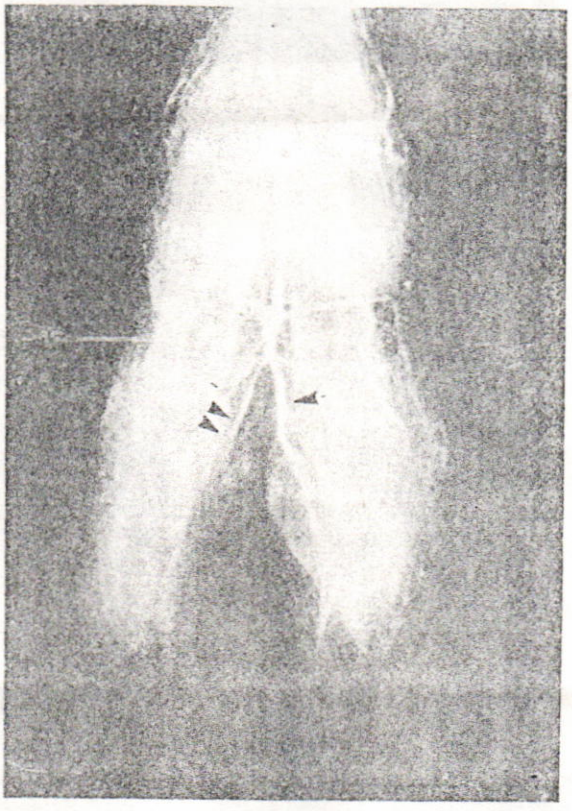

Figure 5

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