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المدد الشرياني والتصريف الوريدي للضرع في الجاموس

حلمي بدوي ، احمد قناوي ، نبيل مسك* ، فتحي مكادي

تم في هذا البحث دراسة مسار كل من الشريان والوريد الاستحيائي
الخارجي وكذلك التفرعات الجانبية التي يعطيها كل منهما .

وقد وجد أن الشريان الاستحيائي الخارجي للجاموس يشبه تماما نفس
الشريان في الأغنام من حيث طريقة الانقسام والنهاية .

هذا وقد وجد أن الدم الوريدي يتجمع في الضرع عن طريق تفرعات
جانبية من الوريد الاستحيائي الخارجي الى جانب احد تفرعات الوريد
الاستحيائي الداخلي .

كما تم كذلك توصيف المنطقة المناسبة لاجراء العمليات الجراحية
في الحلمة .

* : قسم : الجراحة
كلية : الطب البيطري - جامعة أسيوط .

Dept. of Anatomy and Surgery,
Faculty of Vet. Med., Assiut University,
Head of Dept. Dr. A. Hifny.

**THE ARTERIAL BLOOD SUPPLY AND VENOUS DRAINAGE OF THE UDDER
IN BUFFALOES (*Bos bubalis* L)**
(With 3 Figs.)

By
H. BADAWI; A.K. AHMED; N.A. MISK and F.M. MAKADY
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SUMMARY

The course and branches of the external pudendal artery and vein were completely described and discussed. It was found that the termination and pattern of division of the external pudendal artery in buffaloes is similar to that of small ruminants and not like that of cows. The venous blood is drained by tributaries of the external pudendal vein and a collateral branch of the internal pudendal vein. The suitable position for surgical approach in case of teat affections was also described.

INTRODUCTION

The vascular system of the udder in ruminant animals except buffaloes was studied by ZIET-ZSCHMANN (1917); GLATTLI (1924); EL-HAGRI (1945); TURNER (1952), L. ROUX/WILKENS (1959) and HABERMEHL (1976). The aim of the present study is to throw some light on the arterial and venous blood supply of the udder in buffaloes in comparison with that of other ruminant animals.

MATERIAL and METHODS

This work was carried out on 25 udder of adult buffaloes, 10 specimens were injected through the A. pudenda externa with red coloured gum milk Latex, other 10 were injected through the V. pudenda externa with blue coloured Latex, the specimens were then fixed in 10% formalin solution. The method used by AKESTER (1967) and CADETE-LEITE (1973) for contrast-radiography was applied on 5 specimens. The Nomenclature used is that adopted by NOMINA ANATOMICA VETERINARIA (1973) and HABERMEHL (1976).

RESULTS

A. pudenda externa:

The external pudendal artery (1, 2/1) leaves the inguinal canal and enters the caudal third of the base of the udder to continue in a cranial direction. As it reaches a level midway between the thigh and abdominal teats, it divides into A. mammaria media and A. mammaria cranialis. It detaches R. labialis ventralis, R. basalis caudalis and A. mammaria caudalis in addition to a branch to the mammary lymph node.

The ventral labial branch (1, 2/2) courses caudomedially along the caudal border of the mammary lymph node where it joins that of the other side and receives R. labialis dorsalis et mammarius (1/13) of the internal pudendal artery. It vascularizes the parenchyma of the caudodorsal part of the thigh quarter, fat and skin of the area.

The caudal basal branch (1, 2/3) passes caudomedially along the cranial border of the mammary lymph node. It anastomoses with R. labialis ventralis, A. mammaria caudalis and R. anastomoticus of A. mammaria media to form a sort of arterial plexus around the mammary lymph nodes.

A. mammaria caudalis

The caudal mammary artery (1, 2/4) is detached at a level vertical to the thigh teat. It passes caudoventrally to terminate by joining the caudal basal branch. Along its course, it detaches 3-5 dorsal branches for the parenchyma of the dorsal part of the thigh quarter, 9-10 small Rr. laterales sinus caudalis and a large R. caudalis sinus caudalis for the ventrolateral part of the thigh quarter.

A. mammaria cranialis

The cranial mammary artery (1/11, 2/9) is one of the terminal branches of the external pudendal artery and appears as its direct continuation. It courses cranio-ventrally through the parenchyma of the mammary gland to reach its cranial border where it continues subcutaneously as the caudal superficial epigastric artery (1, 2/12). It detaches 2-3 Aa. laterales sinus caudalis and 6-9 Aa. laterales sinus cranialis (2/11). One of these branches continues distalward as A. papillaris for the abdominal teat in 80% of cases. In addition, the cranial mammary artery detaches 2-4 dorsal branches (2/10) which supply the parenchyma at the base of the abdominal quarter.

A. mammaria media

The middle mammary artery (1/6, 2/5) is the second terminal branch of the external pudendal artery. It passes ventromedially to supply the parenchyma which lies close to the median suspensory ligament. It divides after 1-5cm tortuous course into a cranial and a caudal branch.

The cranial branch (1/7; 2/6) detaches 3-4 Rr. mediales sinus cranialis for the medial aspect of the abdominal quarter. It joins the cranial branch of the other side through one or two anastomotic branches which pass ventral to the median suspensory ligament. The cranial branch continues as R. basalis cranialis (1/9) after detaching the papillary artery of the abdominal teat in 20% of dissected cases.

The caudal branch (1/8, 2/7) passes along the median suspensory ligament in a caudoventral direction. It detaches 9-11 Rr. mediales sinus caudalis and A. papillaris of the thigh teat. It terminates by joining either the caudal mammary or the ventral labial branch.

In all dissected cases, a single R. anastomoticus (1/10; 2/8) arises either from the cranial branch of the right middle mammary artery or the caudal branch of the left one. It crosses the median suspensory ligament ventrally and courses parallel to it in a caudal direction. It joins the caudal branch of the middle mammary artery of its own side and of the other side through 4-5 tortuous anastomotic branches. The single anastomotic branch terminates by joining either the ventral labial or caudal basal branch of the other side.

V. Pudenda externa

The external pudendal vein (3/1) enters the caudal third of the base of the mammary gland

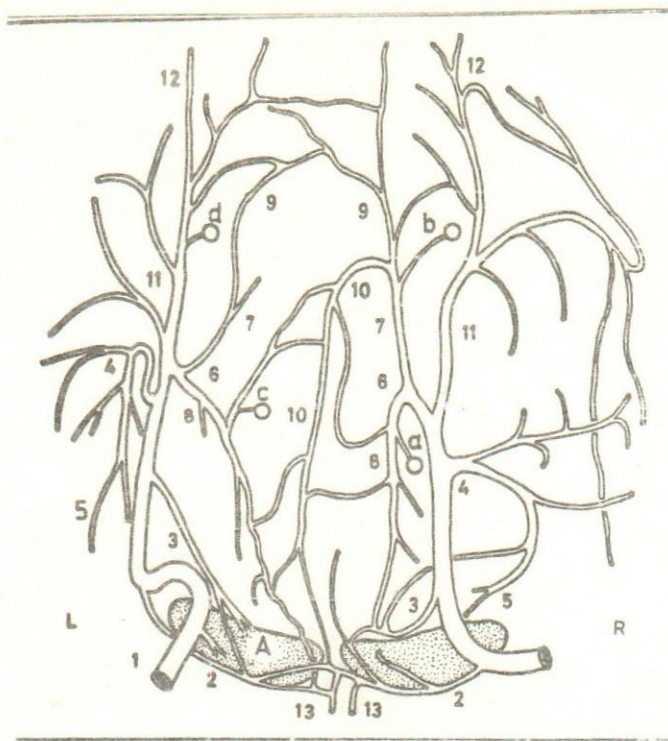


Fig. (1): Diagram showing the distribution of the the external pudendal arteries within the Udder. A mammary lymph node; a,b,c,d papillary arteries.
 1 A. pudenda externa; 2 R. labialis ventralis; 3 R.basalis caudalis; 4 A. mammaria caudalis; 5 R. caudalis sinus caudalis; 6 A. mammaria media; 7 R. cranialis of 6; 8 R. caudalis of 6; 9 R. basalis cranialis medialis; 10 R. anastomoticus; 11 A. mammaria cranialis; 12 A. epigastica caudalis superficialis; 13 R. labialis dorsalis et mammarius.

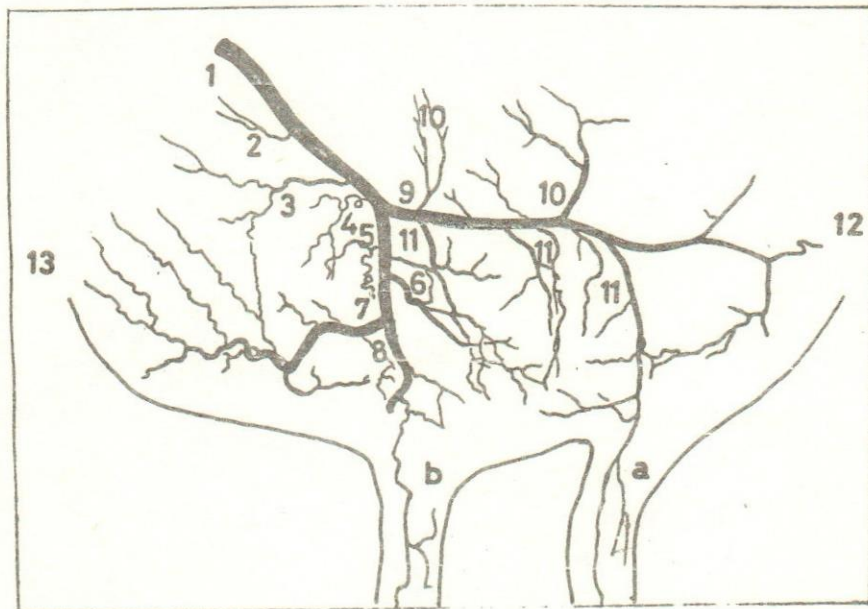


Fig. (2): Diagram showing the picture of the radiograph of the arteries of the Udder. a,b papillary arteries.
 1 A. pudenda externa; 2 R. labialis ventralis; 3 R. basalis caudalis; 4 A. mammaria caudalis; 5 A. mammaria media; 6 R. cranialis of 5; 7 R. caudalis of 5; 8 R. anastomoticus; 9 A. mammaria cranialis; 10 Rr. dorsales of 9; 11 Rr. laterales sinus craniales of 9; 12 A. epigastica caudalis superficialis; 13 R. labialis dorsalis et mammarius of A. pudenda interna.

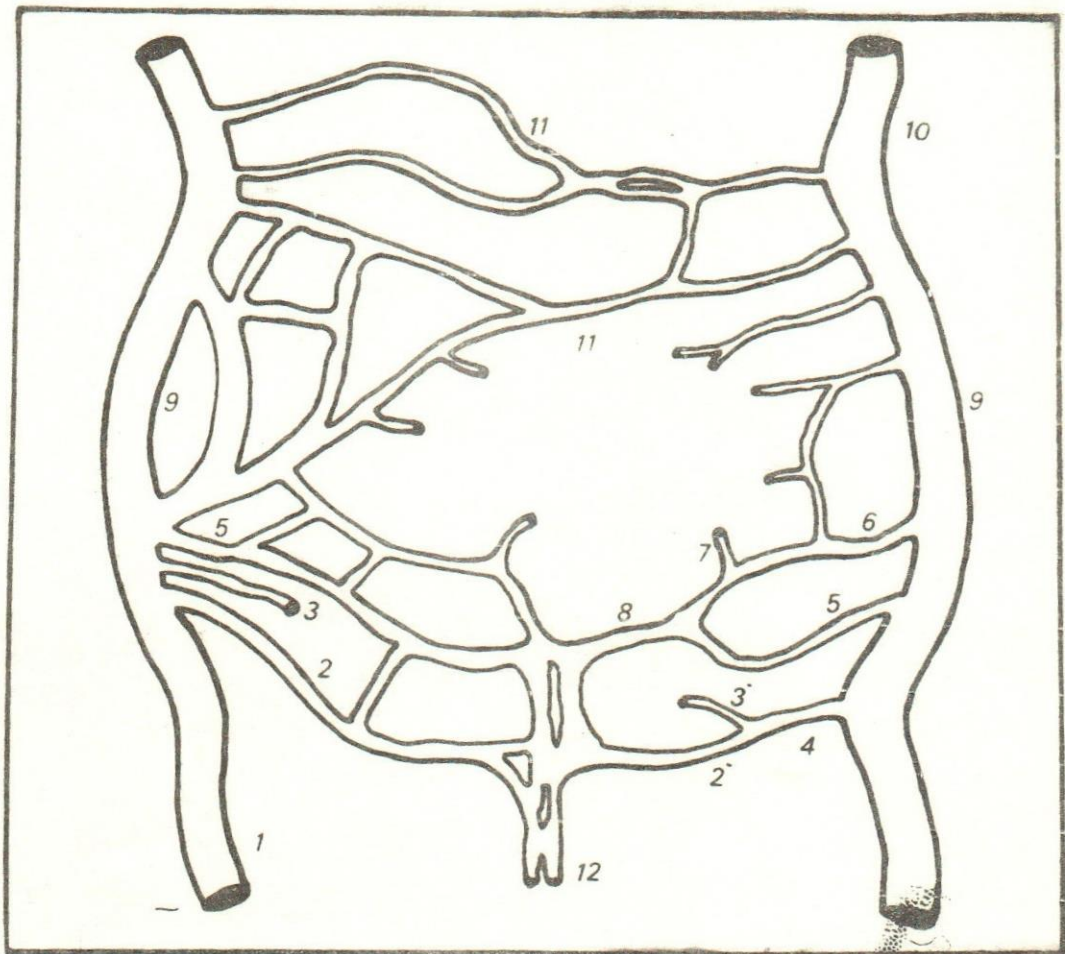


Fig. (3): Diagram showing the veins at the base of the udder.
 1 V. pudenda externa; 2 R. labialis ventralis sin.; 3 R. basalis caudalis sin.; 4 Stem vessel for R. labialis ventralis dex.(2') and R. basalis caudalis dex. (3'); 5 V. mammae caudalis; 6 V. mammae media; 7 R. cranialis of 6; 8 R. caudalis of 6; 9 V. mammae cranialis; 10 V. epigastrica caudalis superficialis; 11 Anastomotic branches; 12 Rr. labiales dorsales et mammarius. (Note the island formed in the course of V. mammae cranialis sinistra).

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together with the artery. It detaches R. labialis ventralis, R. basalis caudalis and V. mammaria caudalis then terminates by dividing into V. mammaria media and V. mammaria cranialis.

The ventral labial branch (3/2) arises by a stem vessel with the caudal basal branch in 50% of cases and separately in the rest. It courses caudomedially along the dorsal border of the mammary lymph node to join both of R. labialis ventralis and R. basalis caudalis of the other side. It anastomoses also with R. labialis dorsalis et mammarious (3/12).

The caudal basal branch (3/3) originates either separately or by a stem vessel with the ventral labial branch. It drains the caudodorsal part of the thigh quarter and joins R. labialis ventralis and V. mammaria caudalis.

V. mammaria caudalis:

The caudal mammary vein (3/5) arises at a level with the thigh teat. It courses caudoventrally detaching several Rr. laterales sinus caudalis and a R. caudalis sinus caudalis. It joins the caudal basal branch, the caudal branch of the middle mammary vein and the caudal mammary vein of the other side.

V. mammaria media:

The middle mammary vein (3/6) is one of the terminal branches of the external pudendal vein. It originates about 10 cm cranial to the level of origin of the caudal mammary vein. It passes ventromedially and divides into a cranial and a caudal branch. The two branches were seen to arise separately from the external pudendal vein in one specimen.

The cranial branch (3/7) gives off Rr. mediales sinus cranialis and ends as R. basalis cranialis medialis which joins V. epigastrica caudalis superficialis. The caudal branch (3/8) joins the caudal basal branch and the caudal mammary vein.

A strong anastomotic branch is detached either from the right or the left cranial branch of the middle mammary vein. It passes ventral to the median suspensory ligament to join the caudal basal branch and the caudal mammary vein of the other side.

V. mammaria cranialis:

The cranial mammary vein (3/9) is the second terminal branch of the external pudendal vein and forms its direct continuation. It detaches Rr. laterales sinus caudalis et cranialis then continues as V. epigastrica caudalis superficialis.

Circulus venosus mammae:

The venous circle of the base of the mammary gland is formed caudally by the union of Rr. labiales ventrales and basales caudales of both sides, in addition to Rr. labiales dorsales et mammarious of the internal pudendal veins. The lateral side and the caudolateral angles of the circle are formed by the external pudendal veins and their direct continuation; the cranial mammary veins i.e. the caudal superficial epigastric veins. The cranial boundary of the venous circle is formed by the anastomotic branches between Vv. epigastricae caudales superficiales at the cranial border of the mammary gland.

Vv. papillares:

The venous blood of each teat is drained through a venous ring, circulus venosus papillae,

which is situated at the base of the teat. The venous ring is formed by the converged lateral side-branches of the caudal, middle and cranial mammary veins. From each venous ring, two or three, sometimes four papillary veins of considerable size descend subcutaneously along the cranio-medial and caudal walls of the teat. It is important to notice that only one papillary artery supplies each teat in comparison to two to four papillary veins which drain the same teat.

It was found that the cranio-lateral wall of each teat is free from any papillary vessel (artery or vein) and this place, therefore, is the most suitable place for surgical approach in case of teat affections. It was also proved by the open teat surgery operation.

DISCUSSION

The caudal basal branch arises from the caudal mammary artery in ruminants as stated by HABERMEHL (1976). The same branch was named by EL-HAGRI (1945) as the artery of the suprammary group of lymph nodes.

The caudal mammary artery was described by EL-HAGRI (1945) and TURNER (1952) as the descending mammary artery. The cranial mammary artery is similar to the common basal artery of EL-HAGRI (1945). He added that the artery divides into a lateral and medial basal branches in which the lateral one represents the subcutaneous abdominal artery of EMMERSON (1929) and the cranial mammary artery of ZIETZSCHMANN (1917).

The branches and termination of the cranial mammary artery in buffaloes are similar to that mentioned by HABERMEHL (1976) in cow.

The middle mammary artery is similar to the deep mammary artery described by EL-HAGRI (1945). However, HABERMEHL (1976) mentioned that the middle mammary artery originates in cattle from the angle of division of the external pudendal artery or either from the cranial or the caudal mammary arteries. He added that the middle mammary artery forms one of the terminal branches of the external pudendal artery in small ruminants as the case found in buffaloes. The artery is absent in she-camel as stated by SABER (1979).

EL-HAGRI (1945) stated that there was no evidence of anastomosis between the side-or terminal branches of the external pudendal artery in either one or both quarters of the same side in cow. HABERMEHL (1976) described cross anastomotic branches between the two halves of the mammary gland in small ruminants. He added that these anastomoses occur between branches of Aa. mammariae mediae of both sides and also the twigs of Rr. labiales ventrales. A single R. anastomoticus as that found in buffalo was not described in any animal.

The middle mammary vein resembles the furstenber's vein which was described in cattle. However, HABERMEHL (1976) mentioned only a cranial and a caudal mammary veins in ruminant animals.

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