

Characteristic on the Arterial Blood Supply of Dog Mammary Glands

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Knowing the location of the arterial blood vessels and their eventual deviations is indispensable in teaching normal morphology, carrying out surgical procedures and angiography of the dog mammary glands. The purpose of this study was arterial supplying of the mammary glands in female dog species to be examined. Three bitches with approximately 15 kg body weight in diestrus condition were used during investigation. By anatomical section and preparation of the main blood vessels and injection of hardening substances or a gypsum solution, the specific blood vessels pathways, branches and features were traced. Simultaneously in comparative aspect standard orthogonal projections by contrast radiography were performed. The circulatory trace of subclavian and external pudendal arteries and their branches which predominantly supplied the mammary complexes were established and visualized and their characteristics are described.

Key words: dog, arteries, mammary gland, blood supply, radiography.

Introduction

The bitch normally has five pairs of mammary glands. They are divided into three groups: thoracic (cranial and caudal), abdominal (cranial and caudal), and inguinal, respectively. There is a lack of morphological information about their blood supply in dog instead of productive species. In spite of this the mammary glands neoplastic processes are about 25-35% of all neoplasia which occur in dogs. According to this, knowing the location of the arterial blood vessels and their eventual deviations is indispensable in connection of carrying out surgical procedures and corresponding angiography of dog mammary glands. The investigation of mammary glands arterial supply in different dog species was the purpose of this study.

Materials and Methods

Three adult female dogs with approximately 15 kg body weight in diestrus condition were used for examination. They previously were diagnosed as disadvantageous exit of accident or exhibited aggressive behavior.

Radiography by “Eickemeyer Vet – E 7239X” was performed on a first euthanized dog with use of barium sulfate as a contrast. After that the dog was dissected and the specific blood vessels of the mammary glands were traced.

Second dog was used for a corrosion cast of a. pudenda externa sinistra and a. thoracica interna dextra. The plastic solution – “Duracryl (Spofa)” was prepared according to manufacturer’s recipe and injected with a syringe manually in the arteries.

Third dog was injected with gypsum solution through a. carotis communis and after solidification the specific blood vessels of the mammary glands were traced.

The results from dissections were compared with radiography from the first dog.

Results and Discussion

The internal thoracic artery according to Dyce et al. [1], supply ventral abdominal wall and part of the thoracic organs. It gives rami perforantes, which are branched to rami sternales, rami musculares and rami mammarii that exit through intercostal spaces. Close to diaphragm it gives musculophrenic artery and cranial epigastric artery and the last one gives a. epigastrica cranialis superficialis [1]. By radiography method we confirm that the common arterial supply of the cranial thoracic mammary glands arise from perforating branches of the a. thoracica interna, which gives mammary branches (Fig. 1).

These facts are also traced by corrosion cast and the blood vessels were presented (Fig. 2).

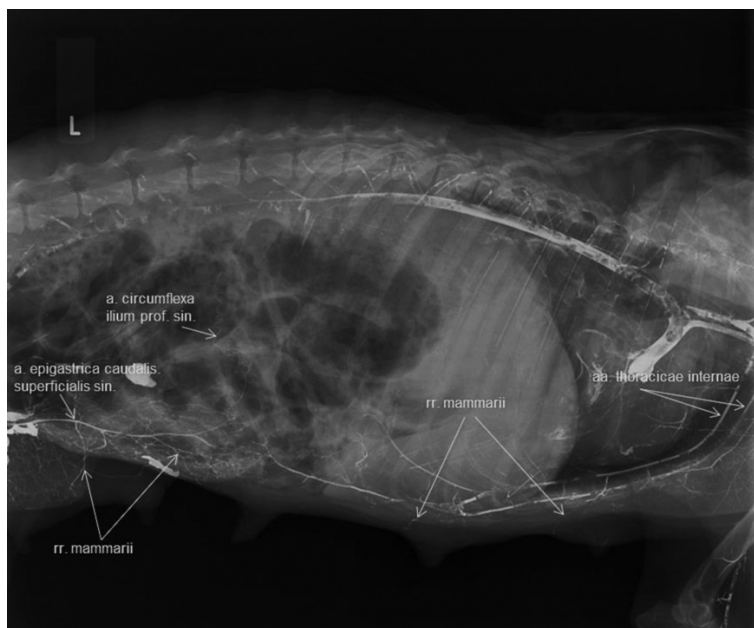


Fig. 1. Radiography of the female dog – lateral view, right side

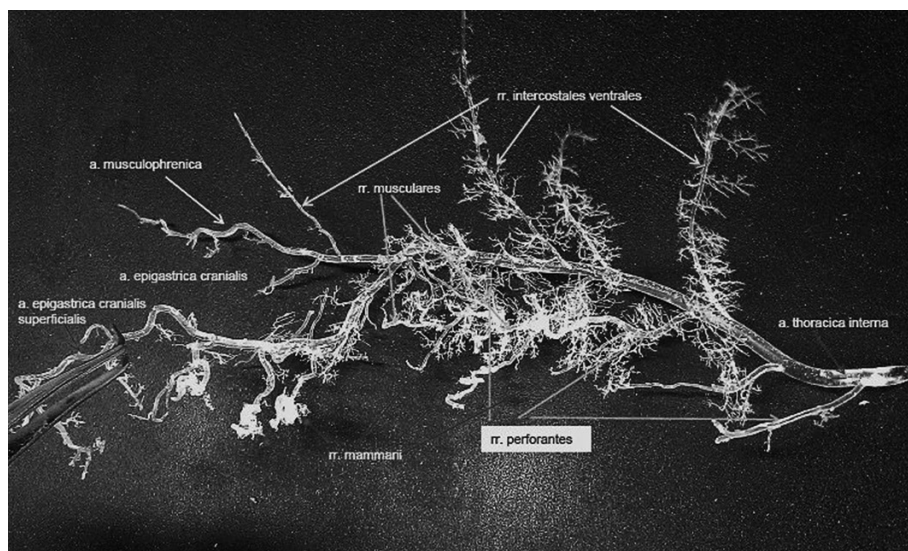


Fig. 2. Corrosion cast of a. thoracica interna dextra in dog

The lateral thoracic artery is a branch of axillar artery and supply thoracic wall distal to thoracodorsal artery. Dorsal intercostal arteries give lateral cutaneous branches for the lateral thoracic wall.

According to Silver [6], a. circumflexa ilium profunda plays important role of the caudal abdominal wall supply.

Arteria pudenda externa close to the superficial inguinal lymph nodes gives two branches, respectively a. epigastrica caudalis superficialis and ramus labialis ventralis [1, 2, 3, 4].

On the cadaver sample it is also seen that the second thoracic complex is supplied from perforating branches of the internal thoracic arteries and rami mammarii from aa. intercostales dorsales (**Fig. 3A**).

The cranial and caudal abdominal complexes are supplied from a. epigastrica cranialis superficialis, which is weak in no lactating dogs. The artery makes anastomosis [1, 6] with superficial caudal epigastric artery, as they supply both the caudal pair of abdominal mammary complexes. According to Silver [6], abdominal complexes may receive blood from phrenicoabdominal arteries. In investigated dogs we did not observed this fact.

We have confirmed that dorsal intercostal arteries (VII-XII) supply caudal thoracic and cranial abdominal complexes, thus were traced 6th, 7th and 8th dorsal intercostal arteries (**Fig. 3B**). The cranial mammary complexes are also supplied from branches from a. thoracica lateralis what is visible on the native sample (**Fig. 4**) and this artery we have seen that supply the periphery parts and skin area of the glands. We observed that lateral thoracic artery gives well distinct blood vessels towards mammary glands as seen on gross dissection. We supposed that these branches are well developed in lactating bitches because our model was previously in this condition. The lateral thoracic artery is visualized also on the radiograph.

Caudal abdominal complexes are supplied from a. epigastrica caudalis superficialis which originates from a. pudenda externa. The artery gives rr. mammarii to the caudal abdominal and inguinal glands (**Fig. 5**).



Fig. 3. **A** – Native sample, caudal abdominal mammary gland, lateral view. **B** – Native sample, caudal abdominal mammary gland, lateral view. The number of the ribs are written on small pieces of paper

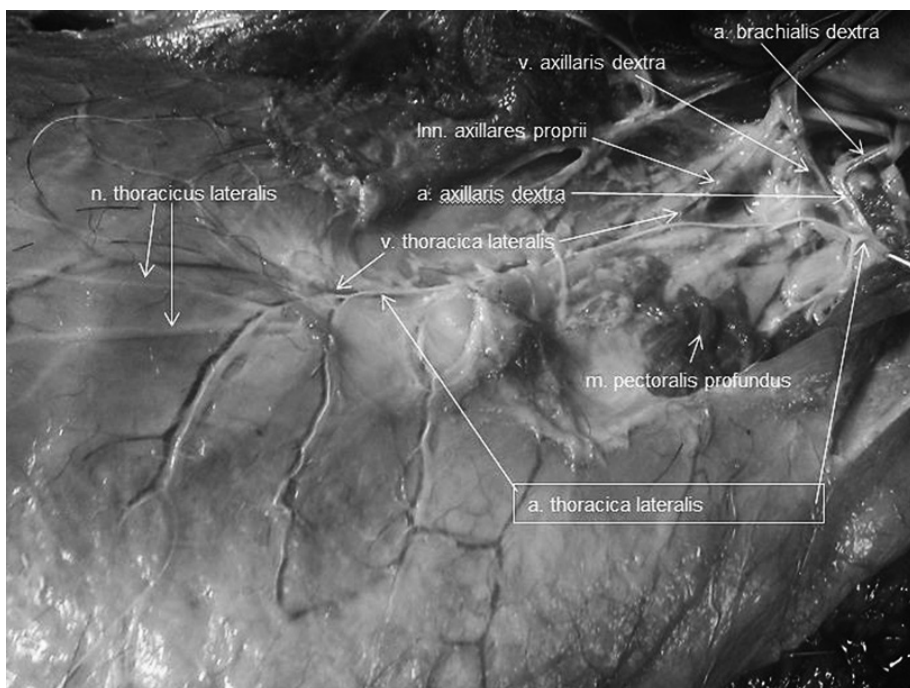


Fig. 4. Dissection of a right thoracic wall of a dog. Lateral view

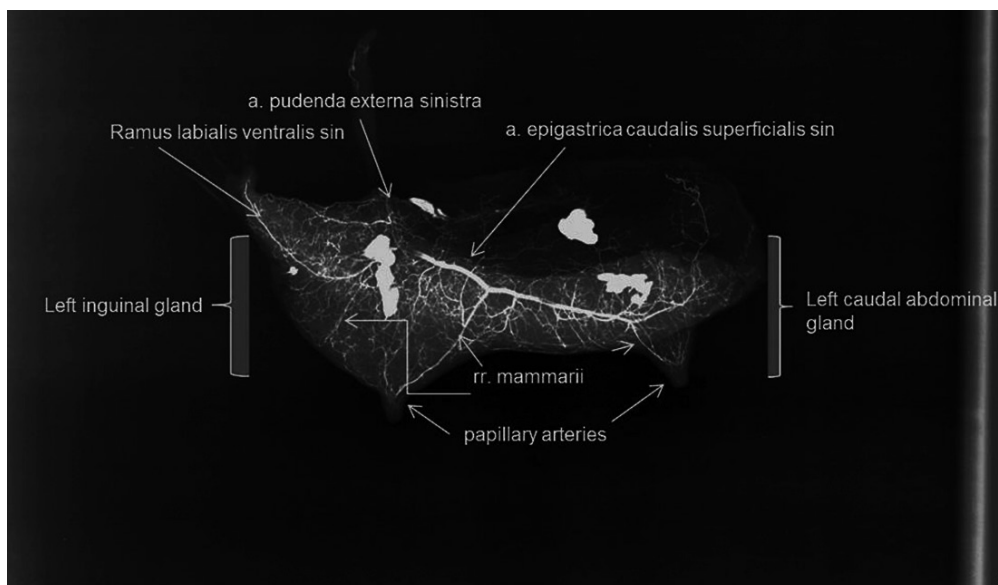


Fig. 5. Contrast radiography of mammary gland in dog (left inguinal and caudal abdominal glands). Lateral view

Silver [6] wrote that *a. circumflexa ilium profunda* contribute to the blood supply of caudal abdominal mammary complex. We confirm that this artery with its caudal branches gives subcutaneous ventral ramifications, which are visualized on the radiograph.

The arterial supply of the inguinal mammary glands is derived from branches of *a. pudenda externa* as it is seen on the radiographs (**Fig. 5**). There is a branch from *a. epigastrica caudalis superficialis* that directly goes into the inguinal mammary glands. In each part of the mammary complex it was established that there are between 5-7 main mammary branches. They converge and make vascular circle network which is arteriolar, because the diameter of these vessels is smaller. This is located on the base of the mammary teat. From that network 4-7 straight papillary arterioles are branched and directed toward the tip of the teat.

Conclusion

The parenchyma of mammary glands receives their main blood supply from perforating branches which arise from *a. thoracica interna* also from the mammary branches of *a. epigastrica cranialis superficialis* and *a. epigastrica caudalis superficialis*. The mammary complexes receive also additional blood supply from *a. thoracica lateralis*, *aa. intercostales dorsales* and *a. circumflexa ilium profunda*. Additional arterial supply is related to the skin and periphery of the glands.

The mammary teats are supplied from vascular network situated on the base of papilla mammaria and it gives several straight branches directed toward the teat apex.

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