

## ANATOMICAL ASPECTS OF THE POPLITEUS LYMPHONODE IN DOGS

**Stan F., Al. Gudea, A. Damian, Ioana Chirilean, Antonia Socaciu**

University of Agricultural Sciences and Veterinary Medicine, Faculty of Veterinary Medicine,  
3-5 Mănăştur Street, 400372, Cluj-Napoca, Romania, flodvm@yahoo.com

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**Abstract:** This paper aimed to emphasize the popliteus lymphonode in dogs by using Evans Blue as intravital colouring dye; a nonionic organoiodic contrast substance called Ultravist 300; as well as monomeric resin. Upon injecting we were able to notice and pinpoint the topographic location of the popliteus lymphocenter; the number of lymphonodes it consists of; as well as the pattern of blood flow characteristic to it.

### INTRODUCTION

The lymphatic system is a particular anatomic entity which plays an important part in the local control of tumors; as well as in the spreading of tumoral cells; being; at the same time; the most common instrument favoring their metastasis. It is well-known that the lymphatic circulatory system consists of two main components: the lymphatic vessels and the lymphatic nodes. The lymphatic vessels; namely the capillaries; the venules and the veins; form a network of transparent channels which; just like veins; have valves on the inside. They are located superficially in the subcutaneous tissue; or deeply; usually between muscles; especially at the extremities. The superficial lymphatic vessels do not follow the tract of the superficial arteries or veins; instead; they follow a particular tract based on the direction of deformation; on the maximal spreading of the tegument during various movements (1; 3; 4; 6).

The lymphatic vessels have the task of leading; in the venous circulation; a part of the transsudat interstitial plasma from the sanguine capillaries; together with mononuclear cells and lymphocytes originating from the lymphatic nodes they encounter on their tract.

The vessels originate in the lymphatic capillary network situated in conjunctive areas; wherefrom they successively converge into lymphatic venules and veins; which then converge into large collecting trunks. Large collecting vessels usually accompany the superficial or deep veins; passing through the same vascular orifices.

Lymph circulation occurs centripetally; just like blood circulation in the veins; except that lymph flows much more slowly. Due to the existence of valves with centripetal opening; lymph circulation is influenced and determined by the very same factors that are involved in venous circulation (1; 3; 4; 6). The lymphatic system can be emphasized using various methods; and one such method is based on injecting coloured substances that work well with lymphatic vessels. This method has been employed by many researchers; who have used either vital or non-vital coloured substances (10).

The vital dyes cited here are: cresyl blue (14); indigo carmine (2); patent blue violet in 11% isotonic solution (9); le bleu ciel pontamine (15); Evans blue (7; 11); Alfafurine; which is a blue dye; (5); then China ink (8) or active carbon (12). In all these cases; however; substance dilution; the quantity of dye injected and the injecting frequency are of utmost importance.

## MATERIALS AND METHOD

The study was carried out on 10 mongrel dogs; some female and others male; of different ages; in which the poplitei lymphonodes were emphasized. The dyes injected were the following: Evans Blue; Ultravist 300; as well as monomeric resin. The animals were anesthetized with Acepromazina 0,5mg/kg corporal weight and Ketamina 20 mg/kg corporal weight I.M.

The Blue Evans dye (1%) was injected subcutaneously; the Ultravist 300 was injected intralymphonodally and the monomeric resin was injected intra-arterially in the caudal femoral artery. Thus; once the animals were anesthetized we proceeded to open the abdomen by median incision. We introduced a plastic catheter through a canula both in the abdominal aorta and in the caudal vena cava. The aorta was washed with heparinized Tyrode solution (5000 IU/1) at 40°C or with a solution of physiologic serum mixed with dextran until the efflux of the caudal vena cava incised at the level of the renal arteries was clear. We then inoculated monomeric resin and soon began to collect the samples; namely the popliteus lymphocenter.

## RESULTS AND DISCUSSIONS

The popliteus lymphocenter is the most representative lymphocenter in medical and semiological practice; in veterinary medicine; especially in the case of small species; pets for instance; especially dogs. Moreover; the popliteus lymphocenter is seen as a sentinel; because it always offers important data regarding the health of canines. The popliteus lymphocenter is situated in the popliteus conjunctival area; between the biceps femoris and the semitendinous muscle at the proximal insertion of the gastrocnemius muscles; being placed on the distal caudal femoral artery (Fig. 1).

Regarding the use of Ultravist 300: after the area was trimmed; shaved and disinfected with sanitary alcohol; the lymphonode was localized and then slowly injected with the contrastive dye. The contrastive dye was slowly administered directly into the lymphonode twice; in 4 ml doses. Then followed the serial radiological exposures:

- ❖ the first exposure approximately 1 minute after the first injection; followed by the second injection
- ❖ the second exposure 5 minutes after the second shot
- ❖ the third exposure one hour after the second injection
- ❖ the fourth exposure two hours after the second shot

The popliteus lymphocenter was emphasized successfully after each of the first three exposures (1 minute; 5 minutes; and one hour); but after the fourth exposure; namely after two hours; we could only notice a dimly delimited area. This diffuse spot is the result of the dissemination of the contrast dye; therefore it is of utmost importance to take into account the fact that this dye has an extremely low intravascular remanence and thus spreads very quickly into the peripheral circulation (Fig 2).

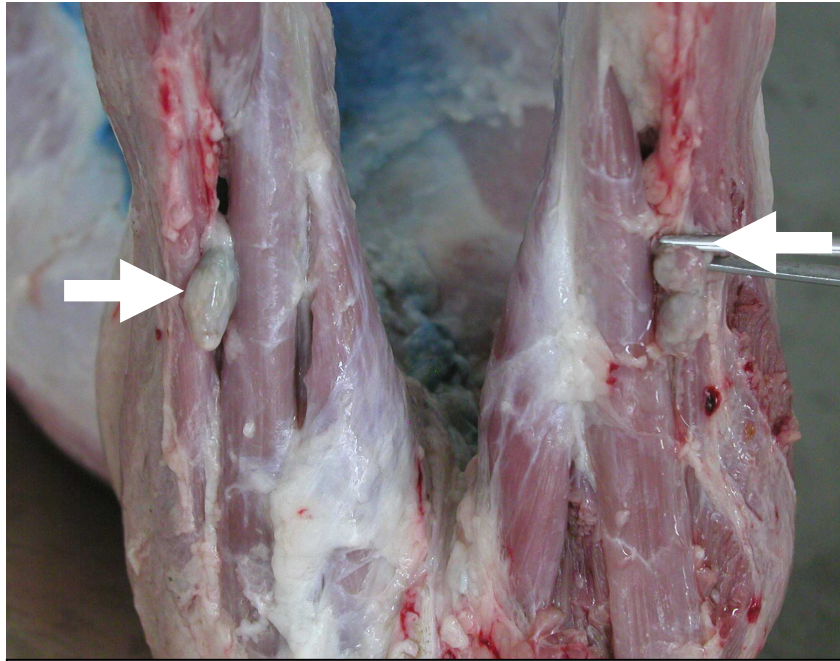


Fig. 1 The topography of the popliteus lymphocenter

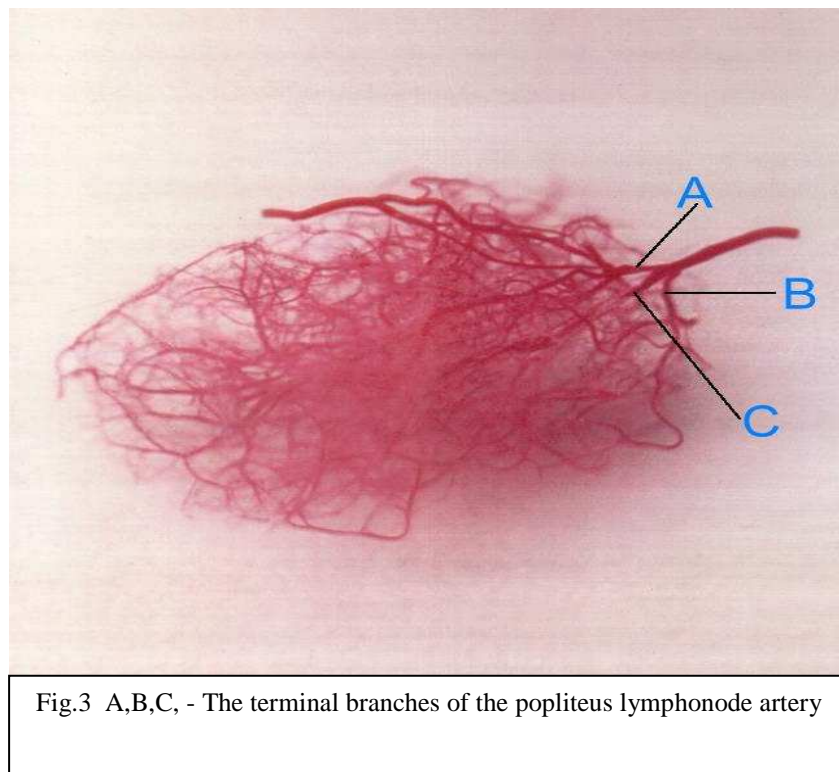


Fig. 2 The view of the lymphonode 5 minutes after Ultravist was injected

The superficial popliteus lymphonode displays a peculiar vascular pattern: the artery of the superficial popliteus lymphonode; which originates in the caudal femoral artery; enters the hilus of the lymphonode where; after 3-4 mm; it branches into three terminal arteries. Each branch irrigates 1/3 of the lymphonode's structure. The three branches advance shortly and then each of them further branches into three smaller arteries (Fig 3).

Along their tract these arteries divide again; their branches going straight into the medullar and irrigating the medullary channels. Their terminals branch into arterioles and capillaries that enter the cortical area and irrigate the germinative centers; so that; on the whole; the vascular model of the popliteus lymphocenter looks like a ball of thread.

These arterial branches end after a long sinuous bifurcated tract. The vascular model of the popliteus lymphocenter in dogs has all the necessary features required in order to allow the flow of blood; and ease its way down into the capillaries.



## CONCLUSIONS

- Based on the description of the blood flow pattern of the popliteus lymphonode in dogs; it is easy to deduce the common blood flow pattern of lymphonodes in general. This pattern begins with the artery that irrigates the lymphonode starting at the lymphonode's hilus. From this artery the blood ascends through the trabeculae and medullary channels into the core of the lymphonode. The arterioles advance through the cortical lymphonode; ending in capillaries before reaching the germinative center. The germinative center and the cortical area are irrigated by capillaries only.

- From the point of view of sanguine irrigation; the popliteus lymphonode in dogs displays a rich vascular network; which accounts for the fact that it is seen as “a clinical sentinel organ”; of utmost importance in both clinical and semiological practice; as it is well-known that in the case of dogs the popliteus lymphonode must always be examined.
- Regarding the use of Ultravist 300 in order to emphasize lymphatic tracts; we may state that; although this is a nonionic contrast substance which generally displays high tolerance (low toxicity); besides the advantage of being used intravitaly with no adverse effects; it also has a number of disadvantages; such as:
  - its remanence being low; its renal output is quite quick
  - finding a lymph vessel without using an intravital contrast substance to colour it is extremely difficult
  - Ultravist requires the use of a device that allows for slow injecting
  - also; forced leakage of lymph may result in artificial shunts leading to erroneous results

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