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# SONOGRAPHY OF MEDIAL ILIAC LYMPH NODES IN DOGS

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## ABSTRACT

The medial iliac lymph nodes (MILN) are difficult to palpate unless markedly enlarged and are not routinely scanned in canine abdominal sonography. Sonographic imaging of MILN is essential for diagnosis of disease conditions or neoplasia of organs which are drained by these lymph nodes. The study was conducted on 41 healthy dogs with the objective to record the ultrasonographic features of normal MILN such as anatomic location, shape, size, echotexture, echogenicity, margin and ease of scanning. Ratio of length or height of MILN: width of aorta was calculated. The dogs were grouped based on gender, age and body weight. The length and height of left MILN (mean±S.E) was 2.88±0.08 and 0.6861±0.03 cm and right MILN was 3.02±0.09 and 0.6859±0.03 cm, respectively. A 7.5-10 MHz linear transducer was found to be most suitable for scanning MILN. Significant difference was observed in the ratio of length and height of the MILN: width of aorta between groups based on age and body weight. High positive correlation between the dimensions of MILN and the body weight of healthy dogs was also observed.

**Keywords:** Aorta, Dogs, Medial iliac lymph nodes, Ultrasonography

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Among the lymph nodes of ilio-sacral lymph centre, the medial iliac lymph node (MILN) is a large and constant lymph node located between the deep circumflex iliac and the external iliac arteries. Afferent lymph vessels that enter the MILN come from the dorsal abdominal wall's skin caudal to the last rib, the skin in the region of the pelvis, the tail root, the craniolateral aspect of the thigh and stifle, abdominal muscles, muscles and bones of the pelvic limb, pelvic and lumbar muscles, testis, vagina, vulva, colon, rectum, anus, prostate gland, ureter, urethra, bladder, epididymis, spermatic cord, vaginal tunic and cremaster muscle, aorta and spinal cord meninges, as well as efferent vessels from the deep and superficial inguinal, left colic, internal iliac and sacral lymph nodes(Bezuidenhout, 2013).

Ultrasonography is a non-invasive, valuable real time diagnostic imaging technique for examination of canine abdomen. The ultrasonographic study of regional lymph nodes can form an important means of staging neoplasia in canine patients and help in charting out treatment plan and give prognosis (Mayer *et al.*, 2010). Normal abdominal lymph nodes are usually difficult to identify sonographically, as these lymph nodes are isoechoic to adjacent surrounding tissues, however, abnormal lymph nodes are usually enlarged and hypoechoic due to neoplastic or inflammatory processes and are easily detectable (Pugh, 1994). Ultrasonographic features of abdominal lymph nodes in healthy dogs are important so that any alteration in these lymph nodes due to various diseases or neoplastic conditions can be detected (Nyman and O' Brien, 2007). Therefore, the study was planned to study sonographic features and biometry of MILN in apparently healthy dogs.

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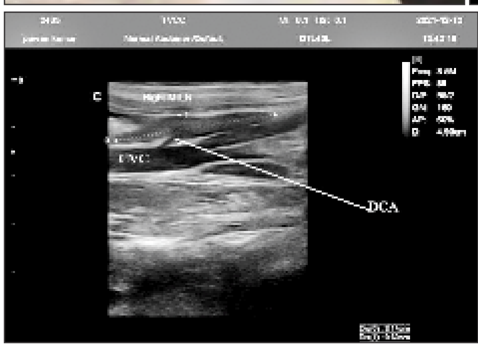
## MATERIALS AND METHODS

The study was conducted on 41apparently healthy dogs of various breeds, presented at Veterinary Clinical Complex (VCC) of SKUAST-J for routine check-up, vaccination, deworming and elective surgeries, from September, 2021 to May, 2022. Age, gender, breed and body weight of each dog was recorded. For scanning, B-mode ultrasonography was performed using 2.5-6.4 MHz micro-convex and 5-10 MHz linear transducer, of CHISON ultrasound diagnostic system (i8VET).

After appropriate preparation, the MILN were scanned usingdorsal and ventral approaches. For dorsal approach, dogs were restrained inlateral recumbency. Transducer was placed in longitudinal plane just caudal to the last rib on left side of abdomen in right lateral recumbency and on right side of abdomen in left lateral recumbency to locate the left and the right kidney, respectively (Figs. 1-2). The transducer was slid caudal to the kidney (Figs. 3-4), by slow fanning of the beam dorsally and ventrally the aorta and caudal vena cava (CVC) were identified and followed caudally up to the level of their bifurcation at approximate level of 6th-7th lumbar vertebrae and with careful fanning, left and right MILN were located just ventral and lateral to the aorta and CVC, respectively, as described by Spaulding (1997). For ventral


Figs. 1-7. **(1)** Placement of transducer just below the 6th and 7th transverse process of lumbar vertebrae towards left side, while the dog is restrained in right lateral recumbency to locate the left MILN; **(2)** Placement of transducer just below the 6th and 7th transverse process of lumbar vertebrae towards right side, while the dog is restrained in left lateral recumbency to locate the right MILN; **(3)** Placement of transducer on left side of linea alba at the level of 6th-7th lumbar vertebrae in dorsal recumbency to locate the left MILN (ventral approach); **(4)** Placement of transducer on right side of linea alba at the level of 6th and 7th lumbar vertebrae in dorsal recumbency to locatethe right MILN (ventral approach); **(5)** Width of aorta (cm) just cranially to its bifurcation; **(6)** Longitudinal sonogram of left MILN, fusiform in shape, homogenous echotexture and isoechoic; Ao-aorta; **(7)** Longitudinal sonogram of right MILN, fusiform in shape, homogenous echotexture and hypoechoic; CVC-caudal vena cava; DCA-Deep circumflex artery

approach, the dogs were restrained in dorsal recumbency; the urinary bladder was located in longitudinal plane the transducer was moved cranially and lateral to the rectus abdominis muscle on the left or right side to identify the bifurcation of the aorta or CVC, respectively. The MILN were located just ventral and lateral to the aorta or CVC. Width of the aorta was measured just cranial to its bifurcation either in dorsal or lateral recumbency (Fig. 5). The dogs were grouped based on gender (male and female), age (group A1 of dogs under 1 year, A2: 1-7 years and A3: > 7 years) and body weight (Group W1: Dogs weighing up to 10 kg, W2: 10 to 20 kg, W3: > 20 kg). The data generated was analysed by comparing the means using independent samples t-test and one-way ANOVA (Duncan as post-hoc) at 95% and 99% level of confidence. The Pearson correlation coefficient was used to find out the relationship between dimensions of MILN with age and body weight of the dogs. The statistical analysis was carried out using SPSS version 16.0 software.

## RESULTS AND DISCUSSION

Dogs of various breeds were presented which included Labrador, Rottweiler, German shepherd, Siberian husky, Shih Tzu, American bully, Hounds, French bully, cross bred and Non-descript. Out of 41, nineteen dogs were males (46%) and 22 females (54%). The number of dogs was 17 (42%) in group A1, 19 (46%) in A2 and5 (12%) in A3. The number of dogs was 13 (32%) in group W1, 15 (36%) in W2 and 13 (32%) in W3.

MILN could be scanned in all dogs within 30 seconds (Ganesan *et al.*, 2016; Gaur *et al.*, 2020), requiring lesser time in dorsal than the ventral approach due to interference of intestinal gas in ventral approach. MILN were detected in 100% dogs under study, in agreement with Mayer et al. (2010), Ganesan *et al.* (2016) and Gaur *et al.* (2020). However, Llabres-diaz (2004) reported that 45% left and 82% right MILN were detected, whereas and Barberet *et al.* (2008) reported detection of MILN in 54% dogs. MILN were located just ventral and lateral to the aorta or CVC (Figs. 6-7), extending from the level of bifurcation cranially up to or slightly cranial to the level of deep circumflex arteries. The shape of MILN in majority of dogs was fusiform, whereas it was oval or slender in few cases. Spaulding (1997), Mayer *et al.* (2010), Ganesan *et al.* (2016) and Gaur *et al.* (2020) observed that MILN

**Table 1. Length and Height (cm) of MILN in dogs (groups based on gender, age and body weight)**

| Groups based on | Group | Length of the left MILN (mean ± S.E) | Length of the right MILN (mean ± S.E) | Height of the left MILN (mean ± S.E) | Height of the right MILN (mean ± S.E) |
|---|---|---|---|---|---|
| Gender | Male (n=19) | 2.94±0.15 | 2.97±0.14 | 0.67±0.05 | 0.65±0.04 |
| | Female (n=22) | 2.83±0.09 | 3.06±0.13 | 0.70±0.05 | 0.72±0.04 |
| Age | A1 (n=17) | 3.01±0.15 | 3.00±0.16 | 0.67±0.05 | 0.62±0.04 |
| | A2 (n=19) | 2.77±0.11 | 3.04±0.13 | 0.71±0.06 | 0.75±0.05 |
| | A3 (n=5) | 2.84±0.22 | 3.03±0.29 | 0.66±0.09 | 0.70±0.11 |
| Body weight | W1 (n=13) | 2.80±0.17 | 2.90±0.19 | 0.64±0.05 | 0.62±0.05 |
| | W2 (n=15) | 2.85±0.14 | 2.89±0.14 | 0.68±0.06 | 0.68±0.05 |
| | W3 (n=13) | 2.99±0.15 | 3.29±0.15 | 0.75±0.06 | 0.75±0.06 |
| Total | (n=41) | 2.88±0.08 | 3.02±0.09 | 0.6861±0.03 | 0.6859±0.03 |

**Table 2. Ratio of length and height of the MILN: width of aorta in dogs (groups based on gender, age and body weight)**

| Categorization of groups based on | Group | Length of the left MILN: width of aorta | Length of the right MILN: width of aorta | Height of the left MILN: width of aorta | Height of the right MILN: width of aorta |
|---|---|---|---|---|---|
| Gender | Male (n=19) | 4.18±0.32 | 4.17±0.30 | 0.94±0.09 | 0.89±0.08 |
| | Female (n=22) | 3.88±0.21 | 4.19±0.21 | 0.97±0.07 | 1.00±0.06 |
| Age | A1 (n=17) | $5.05±0.21^{x}$ | $5.08±0.24^{x}$ | $1.18±0.09^{x}$ | $1.04±0.06^{x}$ |
| | A2 (n=19) | $3.43±0.18^{y}$ | $3.76±0.16^{y}$ | $0.85±0.07^{y}$ | $0.93±0.07^{xy}$ |
| | A3 (n=5) | $2.75±0.25^{y}$ | $2.77±0.37^{z}$ | $0.62±0.07^{y}$ | $0.72±0.17^{y}$ |
| Body weight | W1 (n=13) | $5.06±0.26^{x}$ | $5.28±0.28^{x}$ | $1.15±0.08^{x}$ | $1.13±0.08^{x}$ |
| | W2 (n=15) | $3.90±0.26^{y}$ | $3.92±0.20^{y}$ | $0.97±0.11^{xy}$ | $0.91±0.07^{y}$ |
| | W3 (n=13) | $3.09±0.19^{z}$ | $3.39±0.24^{y}$ | $0.75±0.05^{y}$ | $0.81±0.08^{y}$ |
| Total | (n=41) | 4.02±0.19 | 4.19±0.18 | 0.96±0.06 | 0.95±0.05 |

**Note:** The values with the different superscript (x, y, z) between groups of the same category in a column differ significantly.

appear as fusiform, whereas Krol and O'Brien (2012); Pugliese *et al.* (2016) reported that MILN were most commonly ovoid.

The length of left and right MILN was found to be 2.88±0.08 and 3.02±0.09 cm, respectively, whereas the height of left and right MILN was 0.6861±0.03 and 0.6859±0.03 cm, respectively. The dimensions recorded in the present study are slightly towards higher side than those reported earlier (Mayer *et al.*, 2010; Krol and O'Brien, 2012; Ganesan *et al.*, 2016 and Gaur *et al.*, 2020). No significant difference was observed between the dimensions of the left and the right MILN (Llabres-diaz, 2004; Mayer *et al.*, 2010; Ganesan *et al.*, 2016 and Gaur *et al.*, 2020. However, Citi *et al.* (2020) reported significant difference between the length of left and right MILN. There was no significant difference between the length and height of left and right MILN in different groups based on sex, age or body weight (Table 1).

The echotexture of the MILN was fine and homogenous as has also been reported by Mayer *et al.* (2010) and Gaur *et al.* (2020). The echogenicity was either isoechoic or hypoechoic with respect to the surrounding tissues, as reported by Mayer *et al.* (2010), Ganesan et al. (2016) and Gaur *et al.* (2020). Majority of MILN (73% left and 68% right) were isoechoic (Fig. 6), while rest were hypoechoic (Fig. 7). The margin of the MILN was well defined and regular except in the five dogs which had irregular margin. Mayer *et al.* (2010) and Gaur *et al.* (2020) also reported that MILN had well defined margins.

**The overall ratios of length of the left and right MILN:** width of aorta were 4.02±0.19 and 4.19±0.18, respectively, with no significant difference. However, Citi *et al.* (2020) reported significant difference between the ratios of length of the left and right MILN: width of aorta. Among groups based on age, the ratio of length of left as well as right MILN: width of aorta was significantly higher in group A1 ($p<0.01$) than that of groups A2 and A3 (Table 2) and significantly higher in group A2 than A3 for right MILN. Based on body weight, the length of MILN: width of aorta ratio was significantly higher in group W1 than W2 and W3 for both left and right MILN, whereas the ratio was higher in W2 than W3 for left MILN only.

**The ratios of the height of left and right MILN:** width of aorta were 0.96±0.06 and 0.95±0.05, respectively, with no significant difference in agreement with Citi *et al.* (2020). Among groups, the height of MILN: width of aorta ratio was significantly higher in group A1 ($p<0.01$) than A2 and A3 for left and significantly higher in A1 than A3 for right MILN. No significant difference in any ratio was observed between males and females. The ratio of height of MILN: width of aorta was significantly higher in group W1 ($p<0.01$) than group W3 for left and higher in W1 ($p<0.01$) when compared with that of groups W2 and W3 for right MILN. No significant difference in any ratio was observed between males and females or between left and right side of in any group.

**The significantly higher ratio of the height or length of the MILN:** width of aorta in young animals under 1 year of age and those weighing < 10 kg might be due to the fact that the dimensions of MILN do not change significantly as the dogs grow in age or body weight, whereas the diameter of aorta increases consistently with the age or weight of the dogs. There was low positive correlation between the dimensions of the MILN and the age, and high positive correlation between the dimensions of MILN and body weight of the apparently healthy dogs.

## CONCLUSION

The MILN could be scanned in less than 30 seconds in majority of the dogs, taking lesser time through the dorsal approach than the ventral, using 7.5-10 MHz linear transducer. Majority of MILN were fusiform in shape with regular margin, fine homogenous echotexture and isoechoic echogenicity. Ratio of length or height of the MILN: width of aorta was higher in younger dogs under 1 year age and dogs weighing less than 10kg.

## REFERENCES


Barberet, V., Schreurs, E., Rademacher, N., Nitzl, D., Taeymans, O., Duchateau, L. and Saunders, J.H. (2008). Quantification of the effect of various patient and image factors on ultrasonographic detection of select canine abdominal organs. *Vet. Radiol. Ultrasound.* **49(3)**: 273-276.

Bezuidenhout, A.J. (2013). The lymphatic system. In: Evans, H.E. and de Lahunta, A. (Eds). Miller's Anatomy of the Dog. (4th Edn.), St. Louis, Missouri: Elsevier Saunders. pp. 535-562.

Citi, S., Oranges, M., Arrighi, E., Meucci, V., Santa, D.D. and Tommaso, M. (2020). Sonographic evaluation of medial iliac lymph nodes to aorta ratio in dogs. *Vet. Sci.* **7**: 22 (doi:10.3390/vetsci7010022).

Ganesan, S., Mohindroo, J., Verma, P. and Saini, N.S. (2016). Ultrasonographic features of medial iliac and jejunal lymph nodes in apparently healthy dogs. *Turkish J. Vet. Anim. Sci.* **40**: 225-228.

Gaur, R., Mohindroo, J., Kashyap, N., Mahajan, S. and Udehiya, R. (2020). Ultrasonographic biometry of medial iliac and jejunal lymph nodes in apparently healthy dogs. *Indian J. Vet. Surg.* **41(2)**: 125-129.

Krol, L. and O'Brien, R. (2012). Ultrasonographic assessment of abdominal lymph nodes in puppies. *Vet. Radiol. Ultrasound.* **53(4)**: 455-8.

Llabres-Diaz, F.J. (2004). Ultrasonography of the medial iliac lymph nodes in the dog. *Vet. Radiol. Ultrasound.* **45(2)**: 156-165.

Mayer, M.N., Lawson, J.A. and Silver, T.I. (2010). Sonographic characteristics of Presumptively normal canine medial iliac and superficial inguinal lymph nodes. *Vet. Radiol. Ultrasound.* **51(6)**: 638-641.

Nyman, H.T. and O'Brien, R.T. (2007). The sonographic evaluation of lymph nodes. *Clin. Tech. Small Anim. Pract.* **22(3)**: 128-137.

Pugh, C.R. (1994). Ultrasonographic examination of abdominal lymph nodes in the dog. *Vet. Radiol. Ultrasound.* **35(2)**: 110-115.

Pugliese, M., La Pietra, A., Liotta, L., Macri, F., Piccionello, A.P. and De Majo, M. (2016). Ultrsonographic measurements of abdominal lymph nodes in growing puppies. *Vet. Med.* **61(7)**: 389-393.

Spaulding, K.A. (1997). A review of sonographic identification of abdominal blood vessels and juxtavascular organs. *Vet. Radiol. Ultrasound.* **38(1)**: 4-23.


# RETRACTION OF ARTICLE

This article earlier available at https://www.luvas.edu.in/haryana-veterinarian/download/harvet2016-dec/1.pdf entitled *"Occurrence of some organochlorine pesticide residues in poultry feed and meat"* has been retracted by the authors because of some error made during the data analysis process of the experimental observations due to counting the number of samples showing the concentration of pesticide below its corresponding Limit of Detection. All authors take full responsibility for this mistake and sincerely apologize for any inconvenience it may cause.

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