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Ultrasonographic features of medial iliac and jejunal lymph nodes in apparently healthy dogs

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Abstract: Ultrasonographic examination of medial iliac and jejunal lymph nodes were performed in 36 dogs presented to the Department of Surgery and Radiology for spaying and castration. Ultrasonographic features such as length, height in longitudinal plane, shape, ease of scanning, echotexture, and echogenicity were recorded. The medial iliac and jejunal lymph nodes were scanned consistently in all 36 dogs. However, the presence of gas in the intestines affected the ease of scanning of the lymph nodes. The majority of these lymph nodes were easy to scan, and had homogeneous and hypoechoic echogenicity. The dogs were grouped based on body weight and age, and the means of their lymph node measurements were compared; no significant difference was observed. No significant correlation was observed between age, body weight, and lymph node measurements except for a moderately significant correlation between the height of the right medial iliac lymph node and body weight.

Key words: Ultrasonography, dogs, lymph node, jejunal, medial iliac, healthy

1. Introduction

In small animals, ultrasonography is the method of choice for imaging small organs, either located within the abdomen or superficially. It is a noninvasive, inexpensive, and rapid technique that avoids the need for general anesthesia (1). The canine lymph nodes were considered too small to be detected ultrasonographically in earlier times. Currently, this is not the case due to improvements in equipment resolution and in ultrasonographer skills. Normal lymph nodes often are indistinct during ultrasound examination as they are isoechoic to surrounding tissues (2). Generally the abdominal lymph nodes are detected by vascular landmarks as they are located adjacent to their respective blood vessels (3). The medial iliac lymph nodes (MILNs) drain the reproductive organs, colon, rectum, anus, ureter, urinary bladder, and urethra in dogs. The jejunal lymph nodes (JJLNs), previously called the cranial mesenteric lymph nodes, are the largest lymph nodes of the abdomen. The JJLNs drain the jejunum, ileum, and pancreas (4). They are easier to scan in neonatal dogs (5). Jejunal lymphadenomegaly is commonly seen in conditions of gastroenteropathies in young and adult dogs (6,7). The evaluation of these regional lymph nodes is an essential part of staging canine cancer patients and can help assess prognosis, treatment plan, and response to treatment (8). Therefore, the aim of the present study was to record ultrasonographic features of MILNs and JJLNs, and to observe any effects of age and body weight on lymph node measurements.

2. Materials and methods

The present study was conducted from January 2014 to May 2015. Thirty-six apparently healthy dogs of various breeds and both sexes, presented to the Department of Surgery and Radiology for elective surgical procedures such as spaying and castration, were included in this study. The hair on the abdominal area of the dogs was clipped. The animals were scanned by Wipro GE Logiq 3 BT expert/GE Logiq F8 ultrasound machine using 7–12 MHz linear and 4–8 MHz microconvex transducers in B-mode under optimal imaging parameters. The dogs were restrained without any administration of sedatives in dorsal recumbency and scanned for the MILNs and JJLNs using aortic bifurcation/trifurcation and mesenteric vessels as a landmark, respectively (3,8–11). The images obtained in longitudinal plane were used to measure the length and maximum height/thickness of the lymph nodes in cm scale using electronic calipers.

Other ultrasonographic characteristics such as node shape, the ease of scanning, echotexture, and echogenicity

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were also recorded. The shape was described as fusiform/oval or elongated. The ease of scanning was interpreted in terms of time (in seconds) taken to scan the lymph nodes in that particular window and categorized as very easy (<10 s), easy (10–30 s), difficult (30–60 s), and very difficult (>60 s) to scan. The echotexture was described as uniform/homogeneous or nonuniform/heterogeneous, and the echogenicity was described as isoechoic, hypoechoic, or mixed in comparison with the surrounding mesenteric fat. The animals were also grouped based on body weight viz. <10 kg, 10–30 kg, and >30 kg, and age viz. <1 year, 1–6 years, and >6 years.

The observed data were subjected to statistical analyses to obtain means, 95% confidence intervals of the mean, standard errors of the mean, ranges, and correlations. Log transformation of the observed numerical data was done to normally distribute the values as the number of animals in each group was not equal. ANOVA was then computed to compare the means of the lymph node measurements between the different groups categorized based on age and body weight. The statistical analysis was done using IBM SPSS version 21.0.

3. Results

Among the 36 dogs included in the present study, 19 were female and 17 were male. The subjects consisted of the following breeds: Labrador retriever (N = 10), mongrel (N = 9), Pug (N = 4), Spitz (N = 4), German shepherd (N = 3), and Boxer, Cocker spaniel, Golden retriever, Rottweiler, Saint Bernard, and Pomeranian (N = 1 each). The age and body weight of the dogs included in this study ranged from 0.5 to 13.0 years and from 5.2 to 60.0 kg, with a mean ± standard error (S.E.) value of 4.31 ± 0.45 years and 20.12 ± 1.60 kg, respectively.

The MILNs were detected consistently in all 36 dogs using the aortic bifurcation/trifurcation as a landmark. The length of the left and right MILN ranged from 0.69 to 2.15 cm and from 0.61 to 3.19 cm, with a mean ± S.E. of 1.58 ± 0.08 and 1.69 ± 0.09 cm, respectively. The height of the left and right MILN ranged from 0.15 to 0.77 and from 0.18 to 1.09 cm, with a mean ± S.E. of 0.46 ± 0.03 and 0.49 ± 0.03 cm, respectively. There was no significant difference between the dimensions of the left and right MILN, but there was a significant ($P \leq 0.01$) moderately positive correlation between the length and height of the left and right MILN ($r = 0.62$ and $r = 0.65$, respectively). The body weight had a significant ($P \leq 0.05$) moderately positive correlation ($r = 0.38$) with the height of right MILN. The age had no effect on the MILN dimensions.

All MILNs were fusiform/oval (as shown in Figure 1). The MILNs were easy to scan in most of the dogs (N = 33, 92%) and they were scanned within 10–30 s, while they were difficult in the remaining 3 dogs (8%), but they too could be found after persistent scanning for 30–60 s. The presence of gas and contents in the colon and distended urinary bladder hindered the visualization of the MILNs in dorsal recumbency. Under such circumstances the MILNs were adequately scanned in lateral recumbency. In 27 (75%) animals the MILNs were hypoechoic, while in 9 (25%) animals they isoechoic (as shown in Figure 2) to the surrounding abdominal fat. In 29 (82%) dogs, a hyperechoic capsule was also seen surrounding the MILNs.

The JJLNs were adjacent to the sides of the mesenteric vascular trunk and they could be scanned in all 36 dogs.

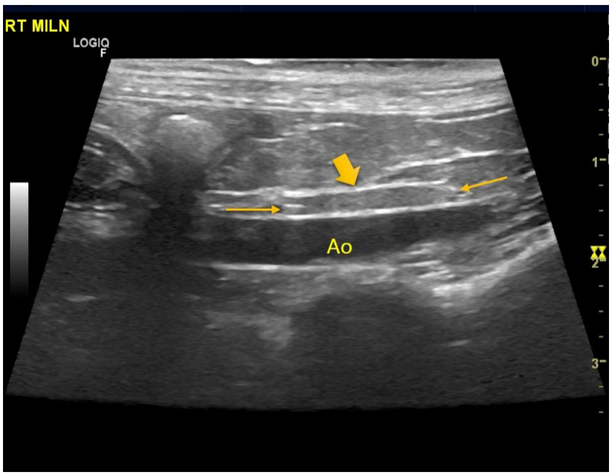

Figure 1. Longitudinal sonogram of right MILN (thin arrows): fusiform, homogeneous echotexture with hypoechoic echogenicity. Hyperechoic capsule could be seen (block arrow). Ao: aorta (10 MHz linear transducer).

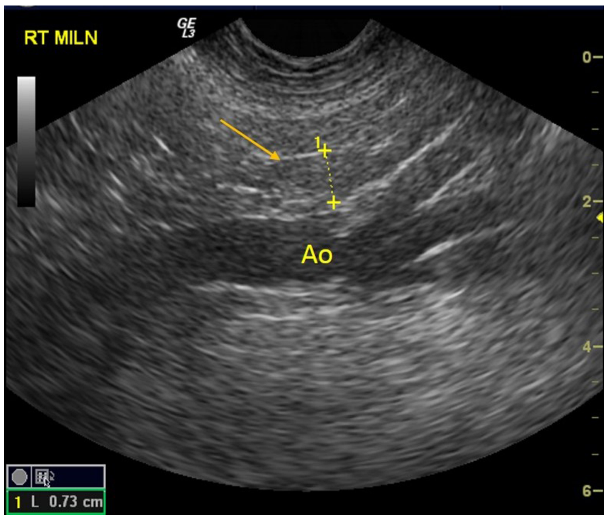

Figure 2. Longitudinal sonogram of right MILN (thin arrow and dotted line): fusiform shaped, homogeneous echotexture and isoechoic echogenicity. Ao: aortic trifurcation (6 MHz microconvex transducer).

They comprised a paired structure present on both sides of the mesenteric vessel and were the largest of all lymph nodes in dogs. In 3 (8%) dogs, only one JJLN could be found. The thickness or height was measured at more than one point, and the highest value in longitudinal plane was recorded as the true thickness or height. The length of the JJLNs, however, was not measured in 20 (56%) dogs because the length could not be measured completely in a single image. Thus, the length mentioned below might not be the true representative of all scanned JJLNs. The length and height of JJLNs ranged from 0.42 to 3.05 cm and from 0.38 to 0.99 cm, with mean ± S.E. values of 1.96 ± 0.25 and 0.60 ± 0.05 cm, respectively.

The JJLNs had a characteristic elongated shape (as shown in Figure 3) in 34 dogs (94%), while 2 (6%) pups (as shown in Figure 4) had fusiform or oval JJLNs. In 27 dogs (75%) scanning of the JJLNs was easy and it could be achieved within 10–30 s, while in the remaining 9 dogs (25%) it was difficult and could be achieved in 30–60 s. The difficulty experienced while scanning the JJLNs was due to the presence of gas in the intestines and the freely movable nature of the lymph nodes. In 25 dogs (69%) the JJLNs had homogeneous echotexture with hypoechoic echogenicity, while in 11 dogs (31%) a heterogeneous echotexture with mixed echogenicity (isoechoic area with peripheral irregular hypoechoic rim) was observed.

The 95% confidence intervals of the means of the lymph nodes are presented in the Table. There was no significant difference between the means of the lymph nodes among the different body weight groups and age groups.

4. Discussion

The MILNs in dogs could be detected on either side of the aortic bifurcation (3,8,9). The MILNs could be detected in all the dogs included in this study, and the detection rate was similar to that reported in a recent study (8). In contrast, the right MILN was detected in 82% and the left MILN in 45% of the dogs in a different study (9), while in another one the MILNs were detected in 54% of the dogs (12). The height or thickness observed in the present study was similar, and the length was slightly higher than the findings reported in a recent study (8). All the MILNs had

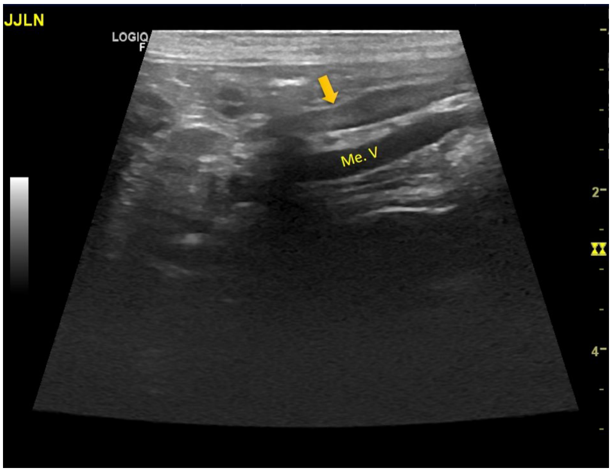

Figure 3. Longitudinal sonogram of JJLN (block arrow): elongated, homogeneous with hypoechoic echogenicity. Me.V: mesenteric vessel (10 MHz linear transducer).

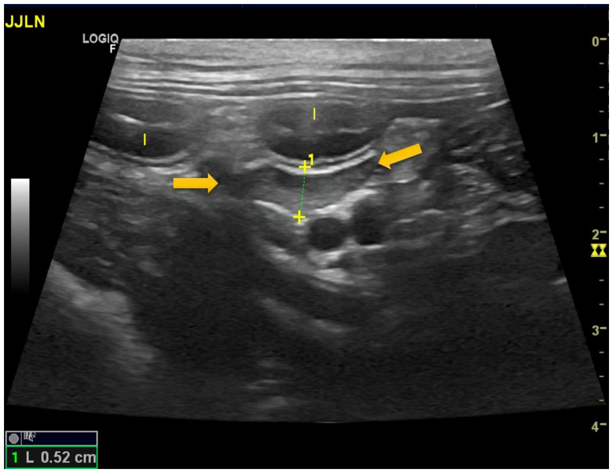

Figure 4. Longitudinal sonogram of JJLN (block arrows and dotted line): fusiform, homogeneous with mixed echogenicity. Me.V: mesenteric vessel (10 MHz linear transducer).

Table. Measurements of medial iliac and jejunal lymph nodes in apparently healthy animals.

Lymph node	Side	Mean ± S.E. (range) in cm		95% confidence interval of mean in cm	
		Length	Height	Length	Height
MILN (N = 36)	Left	1.58 ± 0.08 (0.69–2.19)	0.46 ± 0.03 (0.15–0.77)	1.42–1.74	0.40–0.51
	Right	1.69 ± 0.09 (0.61–3.19)	0.49 ± 0.04 (0.18–1.09)	1.52–1.87	0.41–0.56
Jejunal (N = 36)	Paired	1.96 ± 0.25 (0.42–3.05)	0.60 ± 0.05 (0.38–0.99)	1.36–2.55	0.50–0.70

a fusiform shape and homogeneous echotexture, which was consistent with the findings of other studies (8,9). The ease of scanning of MILNs was not described in this study as it was similar to the findings of a recent study (8). In the present study, the ventral approach (in dorsal recumbency) was not found to be difficult for scanning the MILNs, but in some studies (8,9) the dorsal approach (in lateral recumbency) was found to be much easier to scan the MILNs as compared with the ventral approach. In most of the dogs, a hyperechoic capsule was seen surrounding the MILNs, and that corroborated an earlier finding reported in the literature (3). With the exception of the height of the right MILN, no association was found between the body weight and lymph node measurements, which contradicted previous findings (8).

As reported previously, the JJLNs were found as a paired structure present on either side of the mesenteric vessel and were the largest of all lymph nodes in dogs (4,10). The JJLNs could be consistently detected in all the dogs as reported in one study (10), but in another study they were detected in 51% of the dogs (12). The length of the JJLNs in most of the dogs could not be measured completely in a single image, which corroborated the results of an earlier study (10). The range of height/thickness of the JJLNs was similar to the range reported in a previous study (10). All the JJLNs were of elongated shape in adult dogs (10), while the JJLNs were found to be fusiform/oval in puppies (5,13), which supported our findings in two of the pups. The ease of JJLN scanning was affected by the presence of gas in the intestines and the movable nature of the JJLNs (10). The echotexture and echogenicity of the JJLNs were similar to the findings reported in an earlier study (10). No significant difference was found between the JJLN measurements in the different age and body weight groups, which corroborated findings of a previous study (10).

In conclusion, the MILNs and JJLNs can be routinely scanned in canine patients. However, the presence of gas in the intestines will affect the ease of scanning. The mean height of the left and right MILN was 0.46 cm and 0.49 cm, respectively, and the mean height of the JJLN was 0.60 cm. The MILNs and JJLNs had hypoechoic/isoechoic and hypoechoic/mixed echogenic structures, respectively. There was no effect of age and body weight on the JJLN and MILN measurements except for a moderate correlation of body weight with the height of the right MILN.

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