

Evaluation of Liver Stiffness in a Population of Normal Dogs in a Clinical Setting: Intraobserver Reliability.

Merle Toom, Jimmy H Saunders, Luc Duchateau, Hilde De Rooster, Nausikaa Devriendt and Emmelie Stock

Department of Morphology, Imaging, Orthopedics, Rehabilitation and Nutrition, Faculty of Veterinary Medicine, Merelbeke, Belgium

INTRODUCTION

Sonoelastographic techniques can complement conventional grey-scale and Doppler ultrasonography by evaluating tissue elasticity, which has the potential to provide differentiation between malignant and benign conditions. The aim of this prospective study was to evaluate liver stiffness in a large cohort of healthy dogs in a clinical setting. Intra-observer variability and patient characteristics (sex, age, body weight, body condition score) were analyzed to study their effect on two-dimensional shear wave elastography (2D SWE) values.

MATERIALS AND METHODS

A total of 40 dogs underwent 2D SWE twice, 1-6 days apart.

Inclusion criteria were the normal bloodwork including hematology, serum biochemistry, pre- and postprandial serum bile acids, and normal abdominal ultrasound. Mean SWV were recorded, ICC (interclass correlation coefficient) for intra-observer variability calculated and correlation with patient characteristics assessed.

RESULTS

Combined mean two day values for the average, median and maximum 2D SWE velocities for the linear probe were 2.50 ± 0.067 m/s; 2.46 ± 0.067 m/s; 3.58 ± 0.13 m/s, respectively and for the convex probe were 0.99 ± 0.11 m/s; 0.98 ± 0.12 m/s and 1.34 ± 0.21 m/s, respectively. No statistically significant effect on the 2D SWVs was seen with patient characteristics. The intra-observer agreement of 2D SWE was good with the interclass correlation coefficient (ICC) for the average, median and maximum 2D SWE being 0.69; 0.71 and 0.74 respectively.

2D SWV	Average (m/s)	Median (m/s)	Maximum (m/s)
Linear probe (n=33)	2.50 ± 0.07	2.46 ± 0.07	3.57 ± 0.13
Convex probe (n=8)	0.99 ± 0.12	0.98 ± 0.12	1.34 ± 0.22
P-value	< 0.0001	< 0.0001	< 0.0001

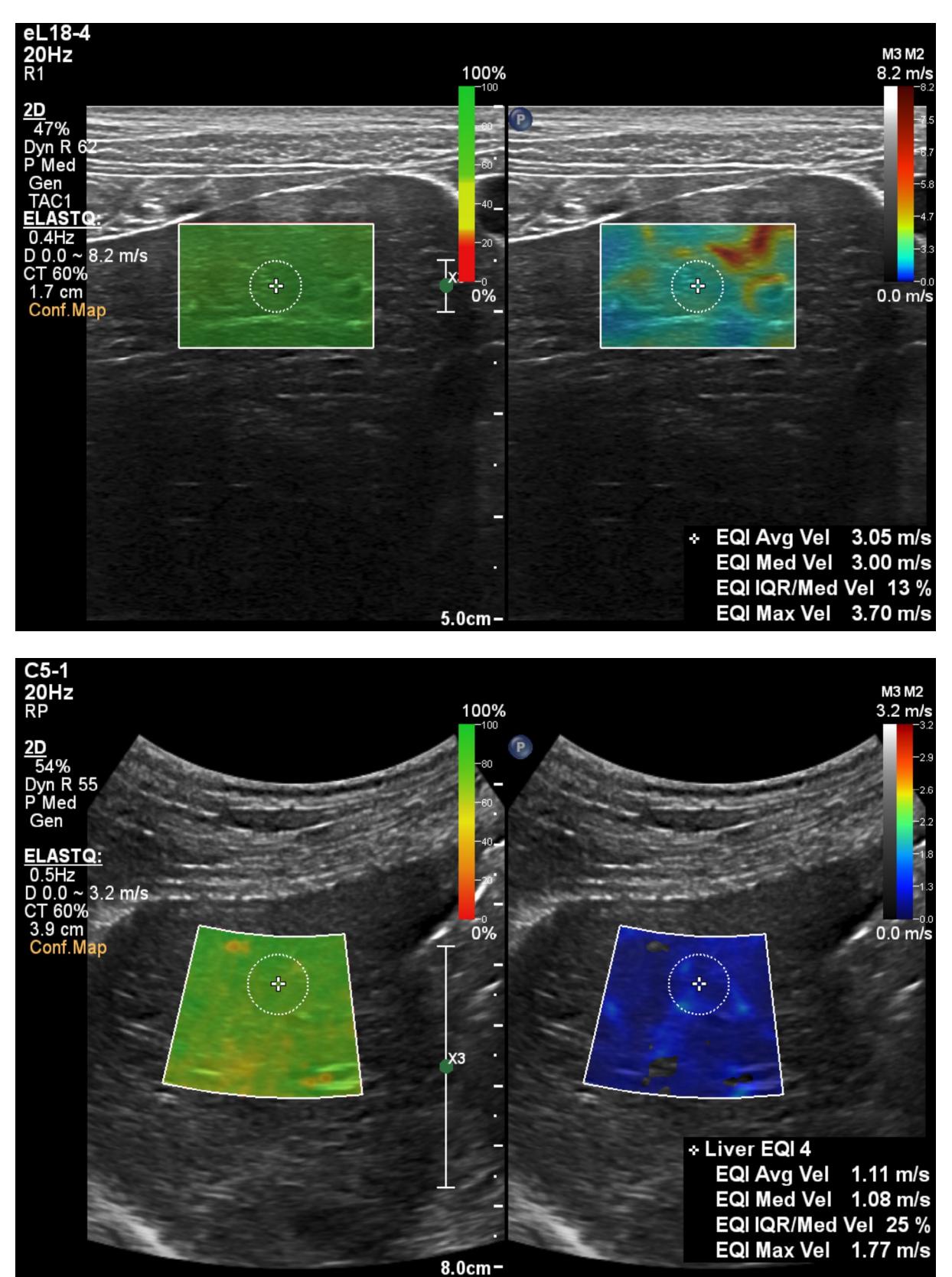
Mean (+/- standard error) of the two dimensional shear wave velocities (2D SWV) of healthy dog livers using the linear (eL18-4) or convex (C8-5) transducer.

CONCLUSIONS

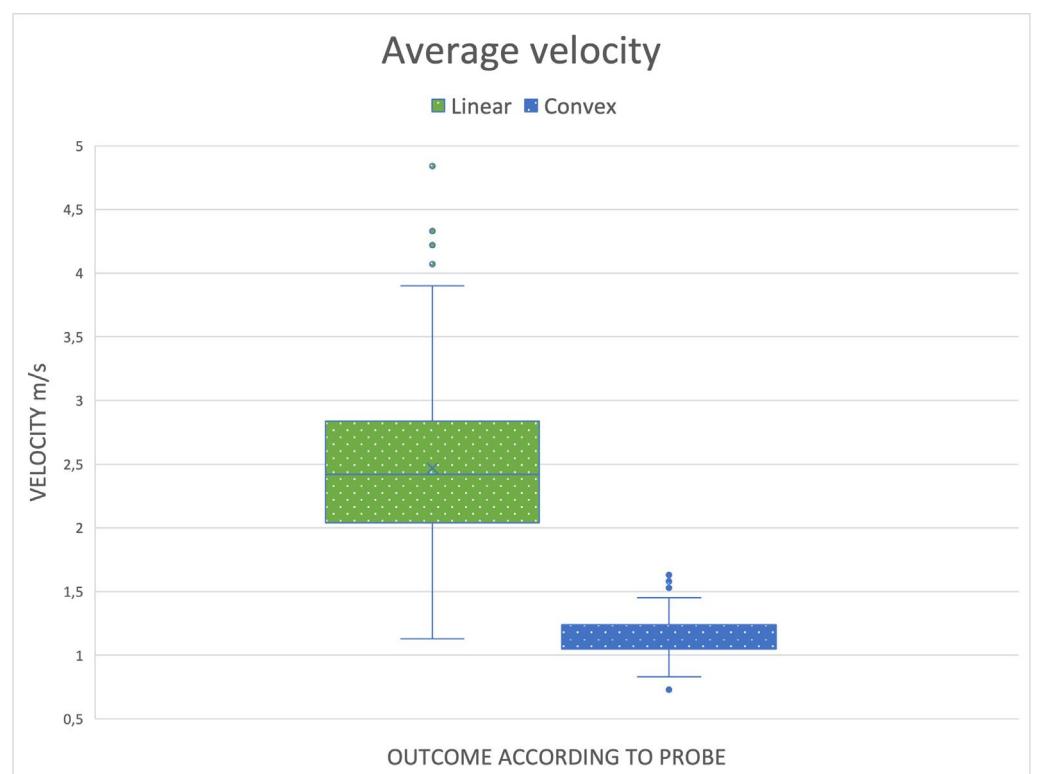
According to our results it appears mandatory to standardize the use of probe in the elastography acquisition procedure to obtain more comparable results between individual patients, however other categorical and continuous variables examined do not seem to play a statistically significant role on the results.

2D SWV	Average (m/s)	Median (m/s)	Maximum (m/s)
Female intact (n=8)	1.78 ± 0.14	1.75 ± 0.14	2.58 ± 0.26
Female neutered (n=19)	1.78 ± 0.09	1.75 ± 0.09	2.64 ± 0.17
Male intact (n=7)	1.71 ± 0.15	1.69 ± 0.15	2.30 ± 0.28
Male castrated (n=6)	1.71 ± 0.15	1.69 ± 0.15	2.31 ± 0.29
P-value	0.96	0.97	0.60

Mean (+/- standard error) of the two dimensional shear wave velocities (2D SWV) of healthy dog livers according to gender.



Representative 2D SWE images of the right lobes of the liver for a speed mode in a dog using the linear (eL18-4) and convex (C5-1) probe. The green confidence map and the elastogram image is displayed concurrently over the B-mode image.



Box and Whiskers plot for average two-dimensional shear wave velocities in a population of healthy dog livers according to probe.

2D SWV	Effect	Estimate (+/-SD)	P-value
AvgVel	Age (months)	-0.00044 (+/-0.0018)	0.81
	BCS (scale 1-9)	0.002660 (+/-0.058)	0.96
	Weight (kg)	0.002493 (+/-0.0054)	0.65
MedVel	Age (months)	-0.00040 (+/-0.0018)	0.83
	BCS (scale 1-9)	-0.00032 (+/-0.0585)	0.99
	Weight (kg)	0.002185 (+/-0.0054)	0.69
MaxVel	Age (months)	-0.00192 (+/-0.0034)	0.58
	BCS (scale 1-9)	0.05128 (+/-0.1104)	0.64
	Weight (kg)	0.005963 (+/-0.0102)	0.56

The change in the two dimensional shear wave velocities (2D SWV) for every unit increase in age, body condition score (BCS) and body weight (slope +/- standard error).

References:

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