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RESEARCH ARTICLE

ULTRASONOGRAPHY OF ADRENAL GLANDS IN NORMAL AND HYPERADRENOCORTICOID DOGS

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ABSTRACT

Ultrasonography has become an important imaging modality for the evaluation of small structures, such as adrenal glands, because it is relatively inexpensive, it is non-invasive and it does not require general anesthesia. Both normal and abnormal small structures can be seen, though this depends to a great extent on the quality of the equipment and the operator skills. Adrenal glands of normal and hyperadrenocorticoid dogs were examined ultrasonographically and results discussed.

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INTRODUCTION

In small animals, ultrasonography is the method of choice for imaging adrenal glands. Adrenal glands cannot be detected with radiography, unless severely enlarged or mineralized. It is a non-invasive, inexpensive and rapid technique which avoids the need for general anesthesia. Different parameters such as size, shape, margins, echogenicity and structure can be evaluated with ultrasonography. However, ultrasonography is equipment and user-dependent and multiple influencing factors may disturb the examination (Tidwell *et al*., 1997). The aim of this study was to record the usefulness of ultrasonography for the evaluation of the adrenal glands in normal and hyperadrenocorticoid dogs.

MATERIALS AND METHODS

Clinical cases

Present study consisted of twenty apparently healthy dogs and twenty four clinical cases. Dogs with spontaneous and iatrogenic hyperadrenocorticism brought to Small Animal Clinic Outpatient Unit and Dermatology Unit of Madras Veterinary College Teaching Hospital were selected for the study. All the animals were subjected to ultrasonographic examination of adrenal glands to assess the size and shape with ultrasound scanner (Esaote, Italy) using high frequency probe (7.5- 10MHz) as per standard procedure by Hoffmann (2003).

Procedure With the dog in right lateral recumbency, the left adrenal gland was imaged by placing the transducer in the paralumbar fossa in the dorsal plane (along the body length parallel to the dorsum of the dog) and locating the aorta and caudal vena cava in long axis. The transducer was then slided cranially along to the level of the left kidney keeping the aorta in view and the left renal artery and vein were located. The transducer was rotated 45 degrees clockwise and gently swept cranial to the renal artery and vein to locate the left adrenal gland in long axis. The aorta and kidney were usually not in the field of view when the adrenal gland was imaged. For locating of the right adrenal gland the dog was placed in left lateral recumbency. The transducer was placed over the paralumbar fossa and the greater vessels were again located in long axis in the dorsal plane. The transducer was then slided cranially, keeping the caudal vena cava in view. The adrenal gland was located along side and dorsal to the caudal vena cava. To view the gland in long axis the transducer was rotated 30 to 45 degrees anticlockwise. Selected animals were divided into

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three groups as Group I (Control, n= 20), Group II (PDH, n=16), Group III (IHAC, n=8)

RESULTS AND DISCUSSION

In control group left and right adrenal glands were observed in 70 per cent and 50 per cent of cases respectively. In PDH dogs the visualization of left and right adrenal glands were 90 per cent and 75 per cent respectively and in IHAC group visualisation of 37.5 per cent and 25 per cent respectively was observed. The visualisation percentage in the present study was lesser when compared to Nyland and Mattoon (1995) who reported that currently normal adrenal glands of 85 to 90 per cent are visualized by an experienced sonologist.

Feldman and Nelson (2004) stated that limitations in viewing the adrenal gland include the need of experience in interpreting the ultrasonography and the fact that only about 50 per cent of adrenal tumour are detectable, bilateral hyperplasia and metastases of any tumour may be poorly identified, and the quality of images can be hampered by the presence of intestinal gas. Right adrenal gland was not imaged frequently when the abdominal pressure was elevated or when large amounts of pyloric, duodenal or colonic gas were superimposed over it (Cho *et al*., 2012). The adrenal glands were hypoechoic (compared to adjacent kidney and spleen) and homogenous in all the three groups. In control dogs the shape of left and right adrenal glands were bilobed peanut and triangular or comma shaped respectively.

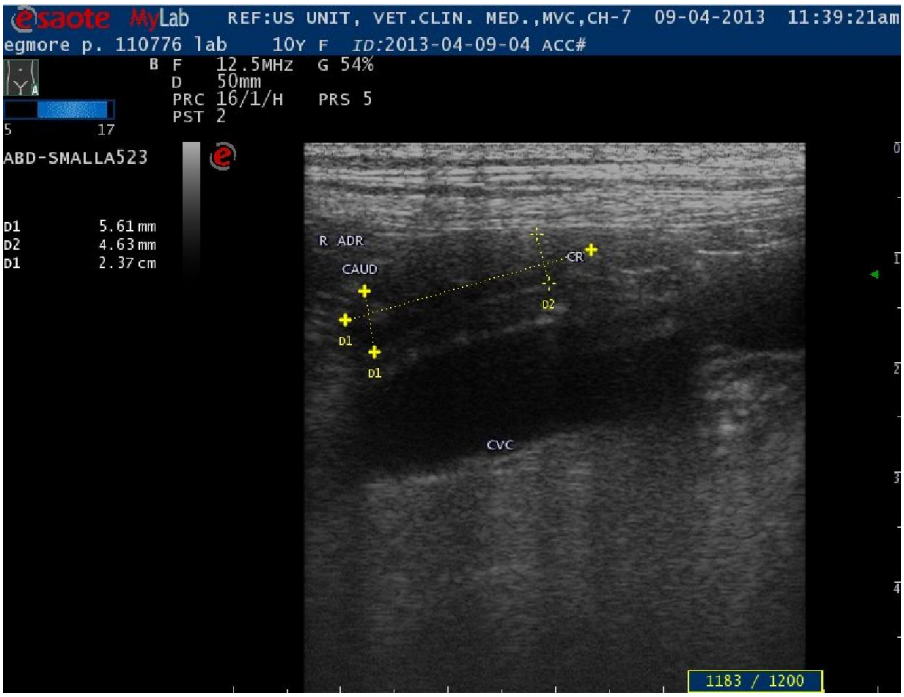

Figure 1. Normal right adrenal gland

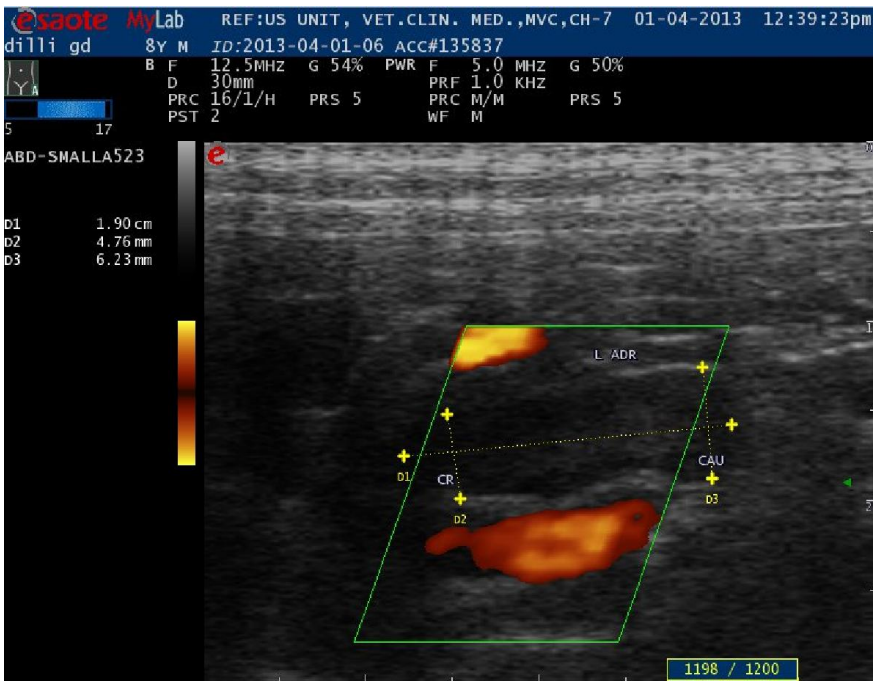

Figure 2. Normal left adrenal gland

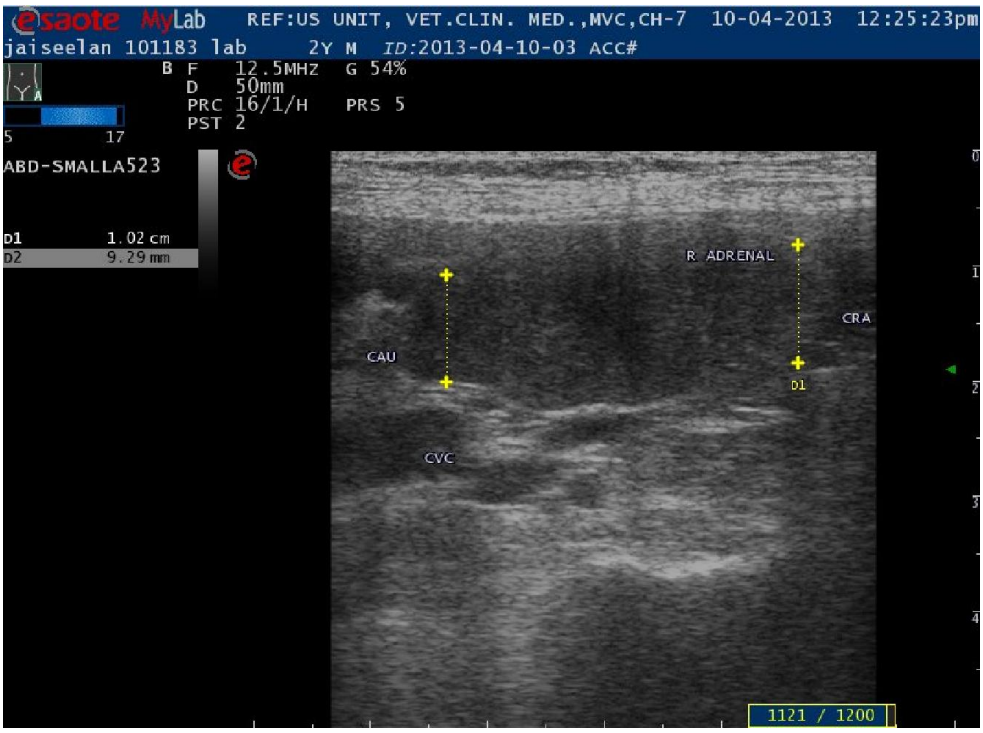

Figure 3. Hyperplastic right adrenal gland in PDH

Figure 4. Hyperplastic left adrenal gland in PDH

In PDH dogs, the shape was maintained as in normal dogs despite increased thickness. The shape of adrenal glands of PDH and IHAC dogs were similar to that of control dogs. Results of the present study were in accordance with Hoeuraff and Reusch (1999) and Gould *et al*. (2001) who reported that PDH and IHAC dogs the adrenal glands maintained its shape and were homogenous.

The width of left and right adrenal glands in control dogs ranged from 2.9-7.69 mm and 2.3- 5.2 mm respectively (Figure 1 and 2). The normal glands range in thickness from 3 to 5 mm, upto 7 mm in large dogs (Hoffmann, 2003). In PDH dogs the range was found to be 8.2-12 mm and 8-9.9 mm respectively (Figure 3 and 4) and in IHAC group it ranged from 2.4- 4 mm and 1.5 – 3mm respectively.In the present study adrenal glands

were bilaterally enlarged in PDH dogs and atrophied in IHAC dogs. Barthez *et al*. (1995) reported that in PDH dogs bilaterally enlarged adrenal glands were frequent finding which was due to the constant stimulation by ACTH. He further stated that a thickness of more than 7.5 mm for the left adrenal gland was considered to provide the best sensitivity and specificity as a diagnostic test for PDH. Glucocorticoid administration resulted in the atrophy of adrenal glands (Pey *et al*., 2012). In the present study ultrasonography was considered a useful diagnostic tool in diagnosing PDH.

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