Assiut Vet. Med. J. Vol. 38 No. 76, January 1998

Dept. of Surgery & Radiology
Fac. of Vet. Medicine, Suez Canal University

SONOGRAPHIC STUDY ON SOME URINARY SURGICAL AFFECTIONS IN PET ANIMALS

(With 8 Figures)

By

*I.H. AHMED; S.M. ABU ZEID** and *M.M. HASSAN*

*Dept. of Anatomy and Embryology.

(Received at 30/12/1997)

دراسات على استخدام الموجات الصوتية فى تشخيص بعض الاصابات الجراحية للجهاز البولى فى الحيوانات الأليفة

ابراهيم حسين أحمد ، صابر شكر أبو زيد* ، محسن محمد حسن

أجريت هذه الدراسة على عدد ثلاثين كلبا وعشرة قطط لتشخيص الاصابات الجراحية الخاصة بالجهاز البولى. عند فحص هذه الحيوانات اكلينيكيا توقع اصابة أربعة عشر كلبا وثلاثة قطط منها باصابات مختلفة لجهازها البولى، ثم عرضت هذه الحيوانات للفحص بالأشعة السينية والموجات فوق الصوتية. وقد أثبت الفحص اصابة سبعة كلاب وقطة واحدة بالاصابات التالية : الالتهاب الكلوى المزمن الغير صديدى، الحويصلة حول الكلوية، الكلية المتكيسة، حصوات الكلى والمثانة والتهاب المثانة البولية. ولقد وجد أن التشخيص بالأشعة السينية بعد استخدام الصبغة الخاصة بالجهاز البولى (Excretory urography) يوضح التغيرات الموجودة فى الحالة الوظيفية للنسيج الكلوى، ولايوضح التغيرات المتعلقة بالنسيج الكلوى ذاته حيث أنها تظهر واضحة باستخدام الموجات فوق الصوتية. ومن هنا تأتى أهمية استخدام الموجات فوق الصوتية لتشخيص مثل هذه الحالات التى لاتظهر باستخدام الأشعة السينية.

SUMMARY

The present work included 30 dogs and 10 cats submitted to the faculty clinic. The animals were examined physically and the suspected urinary affected animals (14 dogs and 3 cats) were subjected to radio- and sonographic examinations. The diagnosed diseased cases (7 dogs and one cat) were chronic non-suppurative nephritis , peri-renal cyst , cystic kidney, renal calculus, urinary bladder calculus, cystitis and diffuse peritonitis. It was

concluded that, the excretory urography better defines renal parenchymal changes, but internal composition of a non-opacified kidney or renal masses remain undefined. So, nephrosonographical images have considerable values in evaluation of most functioning and non-opacifying kidneys. Moreover, contrast cystography is useful in identifying luminal or bladder wall diseases but is more invasive than bladder sonography.

Key words: *Pet animals - Sonography - Urinary affections*

INTRODUCTION

Ultrasound has been recognized as an accepted imaging modality for evaluating abdominal disorders in veterinary patients since the early 1980s. (Nyland et al., 1981). The diagnostic accuracy of ultrasound examination is dependent upon the experience of the observer, the previous history of the clinical informations, the results of other diagnostic tests and integrated knowledges of the anatomy,pathology and pathophysiolgy of different diseases (Kremkau, 1989). Although most organs, unless mineralization or gas containing, can be examined sonographically, abdominal ultrasound should not replace radiographic survey (Lamb, 1990). The present work was carried out to evaluate the use of ultrasound technique in the diagnosis of some urinary surgical affections in comparison with radiographic diagnosis.

MATERIAL and METHODS

The present Work was employed on 30 dogs (20 females and 10 males) and 10 cats (7 females and 3 males). The age of the dogs ranged between 3-6 years with body weight (10-20 kg), while the age of the cats ranged between 2-5 years with body weight (1.5-3 kg) . The health status of the animals was verified through physical examination and the suspected cases (14 dogs and 3 cats) were exposed to abdominal and pelvic radiographic and sonographic examination.

For radiographic examination, the animals were fasted overnight , then exposed to V/D and lateral radiographs. Low volume-rapid intravenous pyelography was done using urografin* 76% in a dose of 825 mg iodine/kg. B.wt. (Morgan,1993). Radiographs were made immediately 3, 5 and 10 minutes after administration .

* SCHRING

Sonographic examination were performed in the ultrasonographic unit of the central lab. for medical and veterinary medical service, Suez Canal University using Acuson Computed Colored Doppler 128XP/5C. ultrasonic machine*. For renal sonography, coronal and sagittal planes were done using S 2.5 MHz and L5 MHz transducers and eor urinary bladder scanning, was employed in a transverse and sagittal planes while the animals in dorsal recumbancy. According to the diagnosis, the animals were subjected to either surgical or medical treatment and then resonographed.

RESULTS

(1) Chronic non-suppurative nephritis in a bitch:

A case of 3-year old bitch showed depression, with body temperature (39.3 °C), polyuria and emaciation.

Plain radiographical examination revealed neither abdominal nor pelvic abnormal shadows. Five minutes post intravenous pyelography showed contrast agent in the left renal pelvis and pelvic diverticula (Fig. 1-A). The right kidney did not opacify an excretory urography, however, the right ureter appeared having contrast agent.

Sonographic examination of the right kidney revealed multi-focal non-encapsulated hypoechoic areas with general increase in the echopattern of the parenchymal tissue. However, the left kidney showed normal echopattern (Fig. 1-B).

The case could be diagnosed as chronic interstitial nephritis or lymphoma in the right kidney.

Histopathological findings revealed focal subacute to chronic non-suppurative nephritis and necrosis of some renal tubules with hyaline casts in the lumen of numerous renal tubules.

(2) Peri-renal cyst in a male dog:

A case of 3-year old male dog showed depression, off food , loss of body weight and body temperature was 39.2°C.

Radiographic examination revealed neither abdominal nor pelvic lesions.

Sonographic examination revealed subcapsular anechoic area at the cranial pole of the left kidney close to the spleen (Fig. 2). Doppler examination revealed hazard motion resembling what is called flash artifact. It was suspected to be a pre-renal cyst. The diagnosis was confirmed during laparotomy.

*Acuson Corporation, 1220 Charlston Road, Mountain view. California.

(3) Cystic kidney in a bitch:

A case of 5-year old bitch showed depression, off food, emaciation and body temperature (39.6°C).

Radiographic examination revealed large homogenous shadow of the right kidney occupying the right mid-abdomen, from the last rib to the middle of the 3rd lumbar vertebra with 7x3 cm dimentions. The left kidney lied against the 1st to the 4th lumbar vertebra and measured 6x2.5 cm The right kidney did not opacify on excretory urography, while the left one exhibited an appearance of the contrast agent in the renal pelvis, pelvic diverticula and left ureter at 5 minutes post injection (Fig. 3-A). Sonographic examination revealed enlarged right kidney. Its parenchyma showed anechoic pattern with complete loss of clearity of its internal architecture and thin hyperechoic outer contour representing the renal capsule (Fig. 3-B). The left kidney showed normal echopattern. The initial part of the right ureter could be detected as dilated echoluscent tubule (Fig. 3-C&D). The case was suspected to be cystic kidney.

Laparotomy revealed enlarged cystic right kidney and dilated right ureter. (Fig. 3-E&F). Nephrectomy of cystic kidney was performed.

(4) Urinary bladder calculus in a bitch:

A case of 5-year old bitch had a palpable hard structure in the urinary bladder with abdominal tenderness during palpation. Body temperature was 39.3°C. The animal showed stranguria with frequent urination and hematuria. Plain V/D radiographic examination revealed a large radiopaque rounded mass measured 2.5 cm in the urinary bladder (Fig. 4-A).

Sonographic examination revealed a large highly echogenic mobile structure of 23.0 mm diameter in the urinary bladder (Fig. 4-B). It produced an acoustic shadow that obscure the underlying bladder wall. The latter was thick, oedematous and measured 7.7 mm . It was suspected to be urinary bladder calculus. Cystotomy was performed, and the calculus was picked out (Fig. 4-C). Sonographic measurement of the bladder wall, three weeks after calculus removal, revealed 2.6 : 4.3 mm thickness (Fig. D).

(5) Renel calculus in a bitch:

A case of 4-year old bitch showed arched back, dysuria, abdominal tenderness during palpation and body temperature 39.1°C.

Abdominal radiography revealed a radiopaque mass measuring about 7x6 mm at the right renal tissues. Sonographic examination revealed hyperechoic mass, measuring 6.6x5.1 mm in the renal recess of the right kidney. An acoustic shadow deep to the mass characterized it as a calculus (Fig. 5-A). Nephrotomy was done for surgical removal of the calculus (Fig. 5-B).

(6) Renal calculus in a tom cat:

A case of 3-year-old tom cat showed arched back, dysuria and 39.2°C body temperature.

Abdominal radiography revealed a radiopaque mass measuring about 1cm. Sonographic examination revealed hyperechoic mass measuring about 7-8 mm in the renal pelvis of the left kidney. An acoustic shadow deep to that mass characterized it as a renal calculus (Fig.6). Nephrotomy was done for surgical removal of the calculus.

(7) Cystitis in a bitch:

A case of 4-year old bitch showed dysuria, depression, off food and 40.1°C body temperature.

Plain radiography and excretory urography revealed no abdominal or pelvic abnormal shadows. Sonographic examinatian of the patient revealed hyperechoic irregular soft tissue mass (no acoustic shadow was datected) in the interior of the bladder wall. It measured 62.5 mm^2 area (Fig. 7-A). The bladder wall appeared thick and oedematous. It was suspected to be a case of cystitis with recent blood clot or neoplasia. The patient was treated as a case of cystitis, two weeks later, sonographic re-examinatian revealed the disappearance of the mass, while the wall was still thickaned and oedematous (Fig. 7-B).

(8) General peritonitis in a bitch:

A case of 5-year old bitch showed painful abdominal reaction, weakness, constipation and 39.6°C body temperature.

Radiographic examination revealed radiopaque abdominal mass without demarcation between abdominal viscera (Fig. 8-A). Transabdominal sonography revealed hyperechogenic connection between the spleen and left kidney. The spleen and kidney were coated with hyperechoic coat obscuring their echo pattern (Fig. 8-B).

Laparotomy revealed fibrinous adhesion between abdominal viscera and enlarged spleen (Fig. 8-C).

DISCUSSION

Sonography in case of diffuse renal parenchymal lesions revealed multifocal non-encapsulated hypoechoic areas with general hyperecho - pattern of the renal cortex. The non-opacification of the multifocal hypoechoic areas in the renal parenchyma of the affected kidney, on excretory urography, may be due to the necrosis of numerous renal tubules

Walter, P.A.; Johnston, G.R.and Feeney, D.A. (1988): Applications of ultrasonography in the diagnosis of parenchymal kidney disease in cats: 24 cases (1981-1986). JAVMA.192: 92-98.

LEGENDS

Fig. (1-A): Ventro-dorsal radiograph on the abdomen of 3-year-old, bitch 5 minutes post i/v pyelography. The left renal pelvis and renal pelvic recesses (thin arrows) are visualized. The right kidney not opacify, while the right ureter (thick arrows) is cleared.

Fig. (1-B): Transabdominal renal scan of 3-year-old bitch, showing increased medullary echopattern with presence of multifocal hypoechoic to anechoic areas (question marks) with the renal parenchyma.

Fig. (1-C): Trans abdominal renal scan of the same bitch, showing normal echopattern of the left kidney.

Fig. (2):Trans abdominal renal scan of 3-year male dog showing subcapsular pre-renal anechoic area (question marks), at the cranial pole of the left kidney.

Fig. (3-A): Ventro-dorsal abdominal radiograph of 5-year bitch, 5 minutes excretory urogram indicated an enlarged but functional left kidney (thin arrows). Notice contrast medium in renal pelvis and ureter and enlarged apparently non-functional right kidney (thick arrows).

Fig. (3-B): Trans-abdominal sonography of 5-year bitch showing enlargment, loss of internal architecture with anechoic parenchymal pattern and thin hyperechoic capsule (hydronephrosis).

Fig. (3-C): Trans-abdominal sonography of both left (L.K) and right (R.K) kidneys. The left kidney showed normal echopattern, whenever, the right kidney showed anechoic pattern with loss of internal architecture.

Fig. (3-D): Trans-abdominal sonography of the right kidney (R.K). And initial part of the right ureter (R.U). The latter showing a dilated, tortous anechoic pattern.

Fig. (3-E): Intra-operative photograph of the enlarged right kidney with a dilated tortous right ureter.

Fig. (3-F): Sagittal section of the nephrectomized cystic kidney showing sever dilated, thin-walled renal pelvis and dilated ureter.

Fig. (4-A): Ventro-dorsal radiograph of the pelvis of 5-year-old bitch showing a large rounded urinary bladder mass.

Fig. (4-B): Trans-pelvic ultrasound image of the urinary bladder of a bitch showing a hyperechoic mass with underlying acoustic shadow obscure the bladder wall.

Fig. (4-C): Intra-operative photograph of the urinary bladder calculus.

Fig. (4-D): Trans-pelvic sonography of the urinary bladder at three weeks post-operative. Note the decrease of the wall thickening (2.6:4.3mm).

Fig. (5-A): Trans-abdominal scan of the right kidney of a bitch representing hyperechogenic mass (C) lodged in a slightly dilated renal pelvis.Note : the underlying acoustic shadow.

Fig. (5-B) :Intra-operative photograph of the right kidney of the same bitch showing a calculus (arrow).

Fig. (6): Trans-abdominal sonography of a tom cat showing hyperechogenic mass (RC) in the pelvis of the kidney (LK). An acoustic shadow deep to that mass characterized it as a renal calculus.

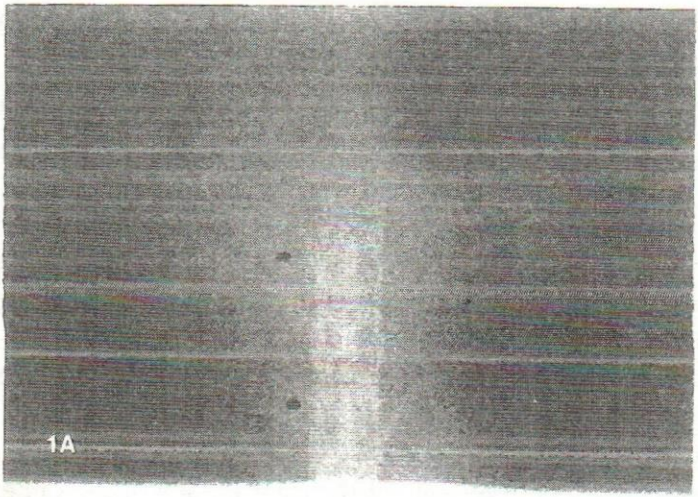
Fig. (7-A): Trans-pelvic scan of the urinary bladder of a bitch showing thickened oedematous wall is hyperechoic irregular soft mass (BC) in the interior of the bladder wall closs to its neck.

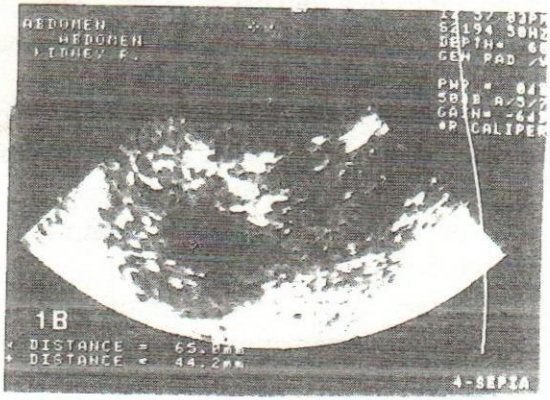
Fig. (7-B): Trans-pelvic scan of the bladder wall after treatment showing a thick, oedematous hyperechoic wall.

Fig. (8-A): Ventro-dorsal radiograph of the abdomen of a bitch, showing radiopaque network without demarcation between all the abdominal viscera.

Fig. (8-B): Trans-abdominal scan of a bitch showing hyperechogenic area (PER) between the spleen (SP) and the left kidney (LK) with loss of demarcation between them. The renal and splenic parenchyma had lost their normal echopattern. The spleen seemed to be enlarged.

Fig. (8-C): Intra-operative photograph of the same bitch showing fibrinous adhesions between the abdominal viscera (arrow).


1A


ABDOMEN
1B
4-SEPIA

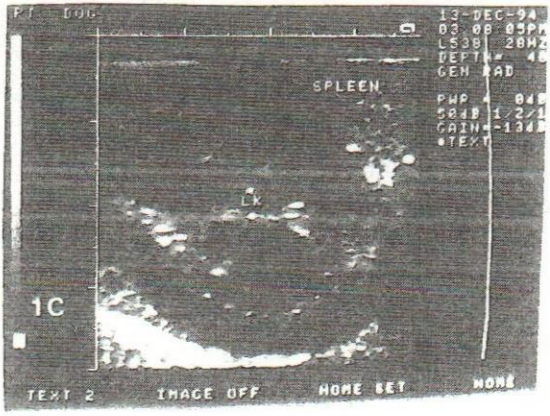

SPLEEN
Lk
1C
TEXT 2
IMAGE OFF
HOME SET
HOME

Fig. (1)

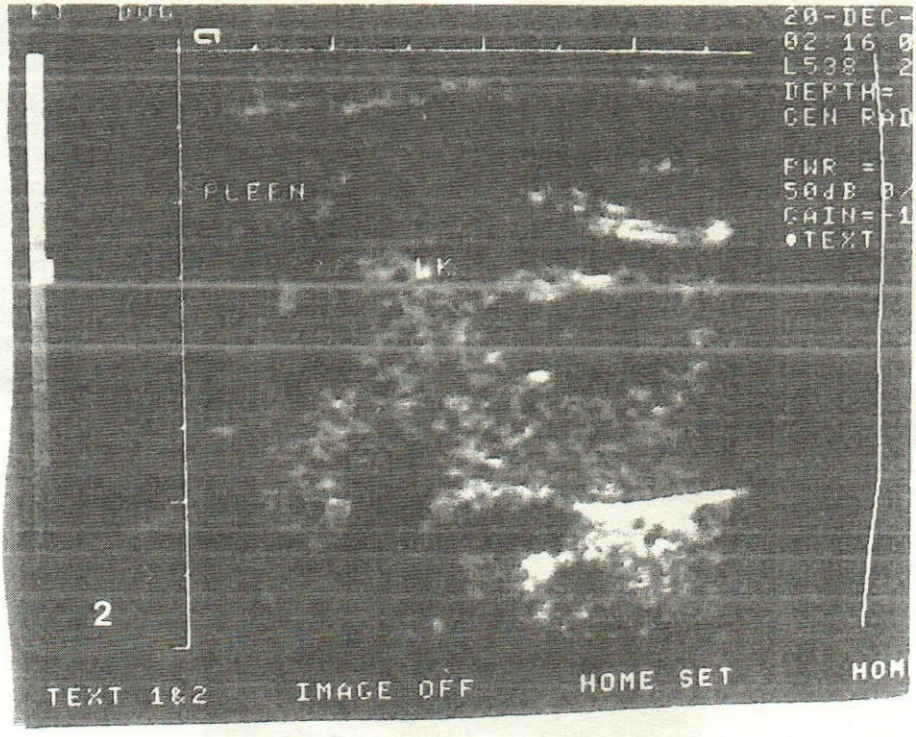
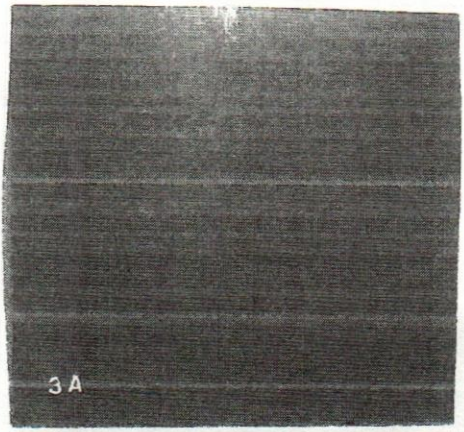
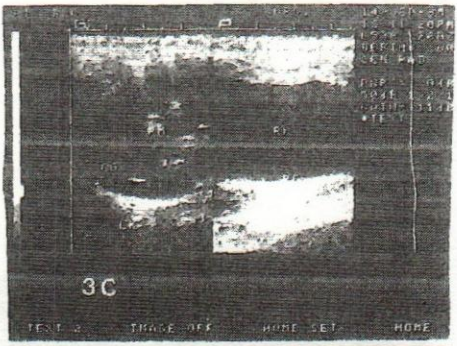
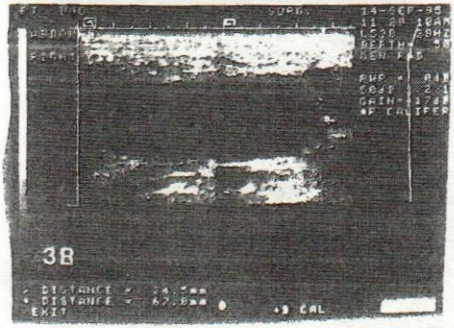
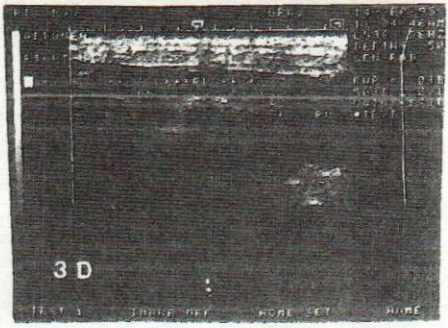

20-DEC-
02 16
L538
DEPTH=
PWR =
50dB
GAIN=
•TEXT
PLEEN
LK
2
TEXT 1&2
IMAGE OFF
HOME SET
HOM

Fig. (2)









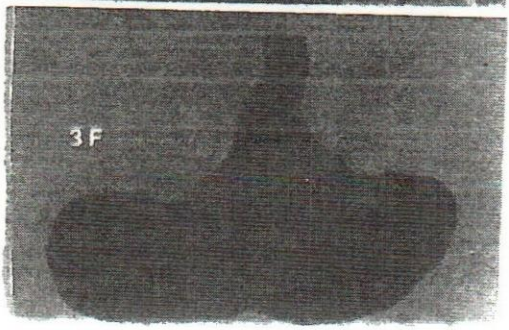


Fig. (3)

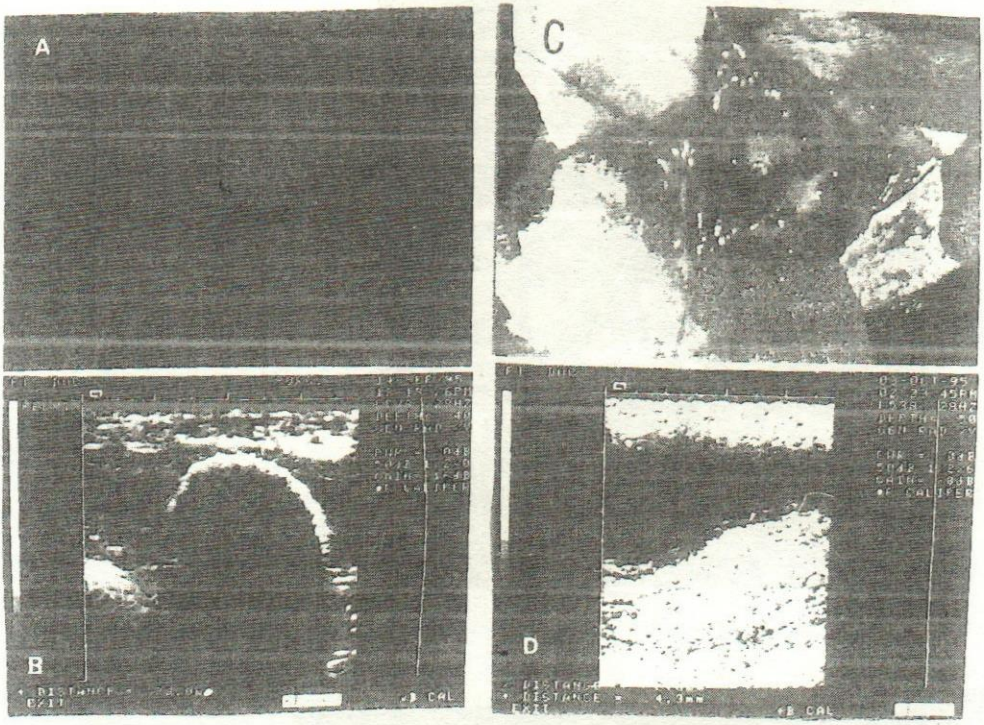


Fig. (4)

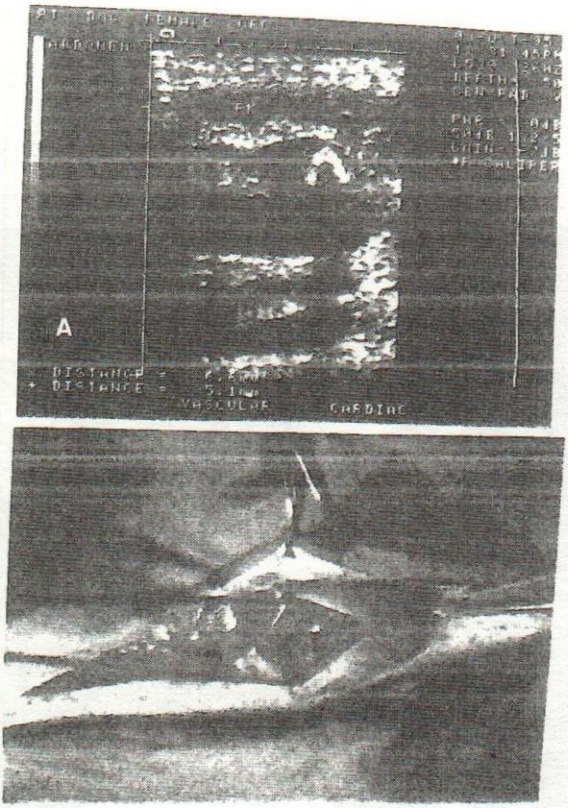

A
B

Fig. (5)

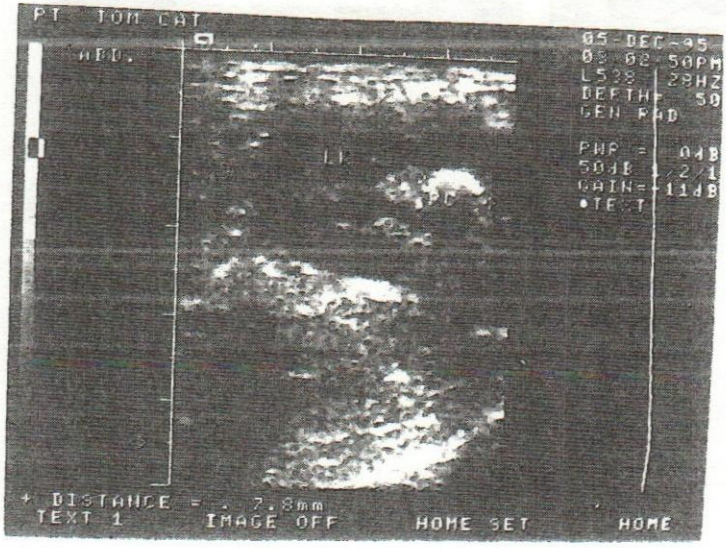

PT TOM CAT
ABD.
05-DEC-95
02:50PM
28HZ
50
LI
PC
+ DISTANCE = 7.8mm
TEXT 1
IMAGE OFF
HOME SET
HOME

Fig. (6)

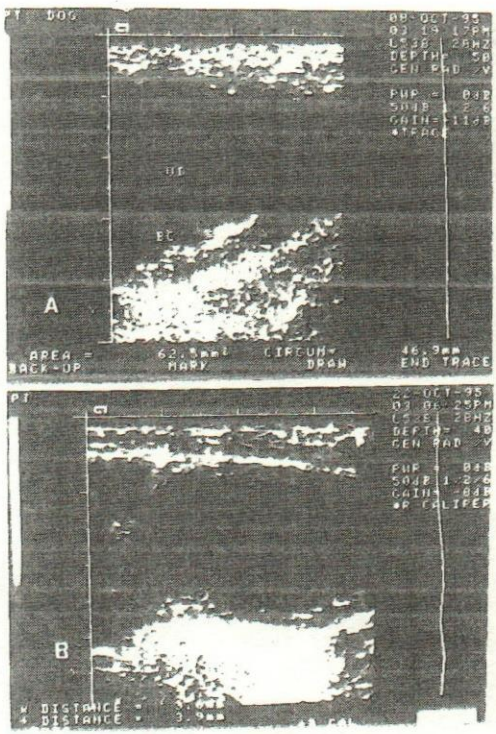


Fig. (7)

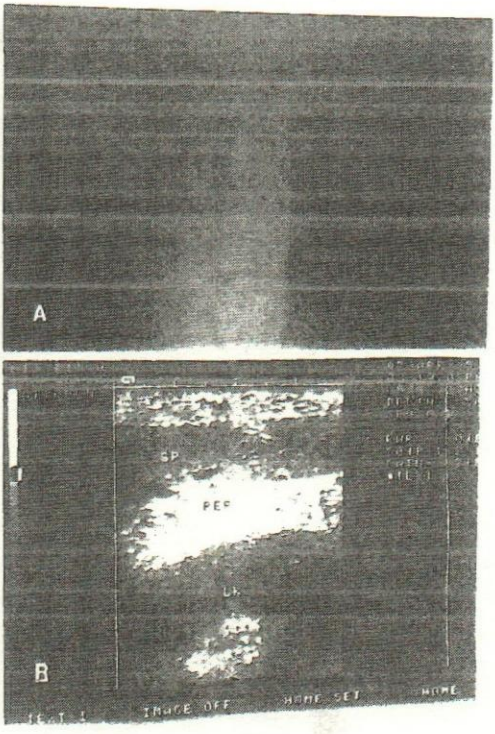


Fig. (8)

Fig. (8)