DIAGNOSIS AND MANAGEMENT OF CAROTID STENOSIS IN DOG

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Introduction

Carotid stenosis is the narrowing of carotid artery that carries oxygen rich blood to brain and face caused by the built-up of plaque inside the artery wall. The process of plaque built-up is called atherosclerosis. Carotid stenosis is a major risk factor for stroke and brain damage. The incidence of heart disease increases to more than 60% in aged dogs. About, 30-35% of dogs of more than 13 years are affected with different cardiovascular diseases (Nyland and Mattoon. 2000). The majority of the cardiovascular diseases remain undiagnosed and untreated in dog. Due to paucity of the study and dearth of databank related to normal haemodynamics, the use of Doppler ultrasound in veterinary practice is yet in infancy, though it may help to diagnose many conditions, including: blood clots, venous insufficiency, arterial occlusion, aneurysms, carotid artery stenosis and many more (Szatmari *et al*.2001).

Material and Methods

The present study is an record on diagnosis of carotid artery stenosis and it's medical management of three dogs. The three bitches (2 German shepherd and 1 Labrador retriever), of 10 to 12 years of age, weighing 36-42 kg presented to the clinics with complains of in-coordination of movement, hyperesthesia, shivering of head, drooping of face and exercise intolerance for variable time (2-5 months). The bitches were obese; two of them were hand fed. The temperature and respiration were normal but with bradycardia. Basis on the clinical signs the bitches were suspected for some cardiovascular pathology and were advised for routine ECG, Chest X ray, whole abdomen USG and Doppler study of common carotid (CCA)and abdominal artery(AA) ,liver function test, complete blood count, serum lipid profile, serum creatinine kinase, kidney function test.

Results and Discussion

On the basis of different laboratory investigation reports mainly elevated Vertebral heart score(VHS), increased Resistive Index(RI),Peak systolic Velocity(PS) in carotid Doppler study, raised serum triglyceride, cholesterol, serum creatinine kinase and clinical findings the bitches were diagnosed as stenosis of carotid artery. As a treatment all the bitches were medicated orally with Clopidogrel 75mg once daily, atorvastatin 10mg once daily, and enalapril 5mg once daily for 3 months. Subsequent investigation of serum lipid profile, ECG, Doppler study of CCA and AA, serum creatinine kinase were evaluated in every six months interval which showed normal ranges in corresponding parameters. The animals were feed on low fat diet and medicines were continued for two years of observation period without any event.

Table: Results of different investigations report in three Bitches

RESULT OF INVESTIGATIONS	Dog no 1 (German shepherd)	Dog no 2 (German shepherd	Dog no 3 Labrador retriever
CHEST X - RAY Vertebral Heart Score(VHS)	VHS 11 vertebrae	Cardiac hypertrophy, VHS 12.2 vertebrae	VHS 10.21 vertebrae
ECG	ST elevation	ST elevation	Normal
USG ABDOMEN	Normal	normal	Normal
DOPPLER STUDY OF CCA Lumen diameter (LD): Intima-media thickness (IMT): Peak systolic velocity (PS): End diastolic velocity(ED) Pulsatility index (PI): Resistive index (RI).	LD 3.14 mm: IMT 1.90mm: PS77.21 cm/ s: ED 11.46 cm/s:PI 1.94: RI 0.99,	LD 2.893 mm: IMT2.02mm: PS 87.21 cm/ s: ED 19.43 cm/s: PI 2.14: RI 1.02	LD 3.22 mm: IMT 1.950mm: PS 92.21 cm/ s: ED 21.46 cm/s: PI 2.04, RI 1.13
DOPPLER STUDY OF AA	LD 4.92mm: IMT	LD 4.77mm: IMT	LD 4.12mm: IMT

Lumen diameter (LD): Intima-media thickness (*IMT):* Peak systolic velocity (PS): End diastolic velocity(ED): Pulsatility index (PI): Resistive index (RI).	1.50mm: PS 107.95 cm/s: ED 24.54 cm/s: PI 1.99 and RI 0.78	1.63mm: PS 104.12cm/s: ED, 21.17 cm/s: PI 1.91 and RI 0.87	1.52mm: PS 99.98 cm/s: ED, 22.04 cm/s: PI 1.76 and RI 0.88
COMPLETE BLOOD COUNT Haemoglobin(Hb): Total leukocytes count(TLC): Packed cell volume(PCV): Erythrocytes sedimentation Rate(ESR)	Hb 13.86 gm/dl: TLC 7.57(x10^3/µL), PCV 38.05, ESR 3.26 mm/h	Hb 12.56 gm/dl: TLC 9.48(x10^3/µL), PCV 36.15, ESR 6.06 mm/h	Hb 13.31 gm/dl: TLC 8.01(x10^3/µL), PCV 34.84, ESR 4.02 mm/h
LIVER FUNCTION TEST Total bilirubin(TB) Alkaline phosphatase(ALKP)	TB 1.21.0 mg/dl: ALKP 44 U/L	TB 1.32.0 mg/dl ALKP 42 U/L	TB 0.95 mg/dl ALKP 52.3U/L
KIDNEY FUNCTION TEST	serum creatinine 0.61mg/dl: urea nitrogen9.21 mg/dl: Serum glucose 112mcg/dl	serum creatinine 0.45mg/dl: urea nitrogen10.2 mg/dl: Serum glucose99.2mcg/dl	serum creatinine 0.72 mg/dl: urea nitrogen9.21 mg/dl: Serum glucose 110mcg/dl
SERUM ELECTROLYTES	Calcium 8.66 mg/dl: sodium 145.6 mEq/L: potassium 4.09 mEq/L,	Calcium, 9.21 mg/dl: sodium, 146.31 mEq/L, potassium, , 4.15 mEq/L,	Calcium 9.02 mg/dl: sodium 141.6 mEq/L: potassium, 4.33 mEq/L,
SERUM LIPID PROFILE	Triglyceride 425 mg/dl ; cholesterol 322.28mg/dl	Triglyceride 395.13 mg/dl ; cholesterol 341.20mg/dl	Triglyceride 392.30mg/dl ; cholesterol 365.22mg/dl
SERUM CREATININE KINASE	101.21 u/L,	99.1 u/L,	106.8 u/L,

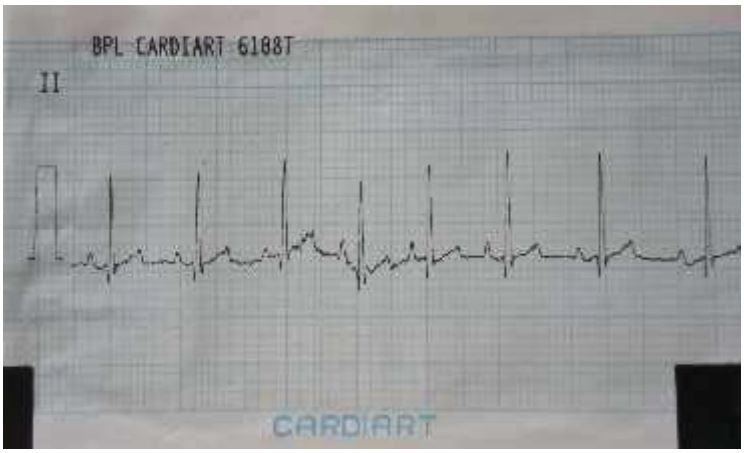

Fig.1: ECG of dog No3 with Elevated ST segment

Fig.2: Colour Doppler of CCA of Dog no.2.
Note; Bradycardia,Elevated PD and RI

The intima-media thickness of the carotid arteries is a measurable index of the presence of atherosclerosis (O'Leary and Polak, 2002). The intima-media thickness of the CCA is thought to be associated with risk factors for stroke. The increased intima-media thickness and the presence of plaque are more directly associated with risk factors for ischemic heart disease (Ebrahim *et al.*, 1999). The intima-media thickness in human is of less than 1 mm but data pertaining to dog is not available but ascertainable that the same would be less than human being to the reason of lesser size of animal than man. Measuring Peak Systolic velocity (PS) is the most important component of the carotid Doppler examination. As a function of the area of the residual lumen, PS increases with the narrowing of an artery, implying its usefulness for grading carotid stenosis. PS data remain the best single velocity parameter for detecting an operable carotid stenosis by ultrasound (Staikovet. *et al*.2000). In occlusion of lumen due to aneurism, stenosis or any other pathology, there is increase of impedance thereby resulting to elevated RI, preferably more than 1.0. However angiography is gold standard which may not be feasible in every time due to the inherent difficulties in canine practice. The normal VHS in dog is 11vertebra beyond which indicates cardiomegaly and similarly the dogs with triglyceride and cholesterol more than360 mg/dl and 350 mg/dl respectively is considered to hyperlipedemic.

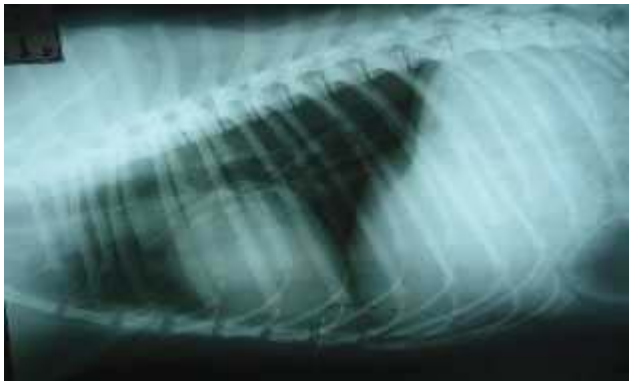

Fig.3:X-ray of chest showing increased VHS, Dog.2

The stenosis of carotid artery is mostly due to the hyperlipedemia that results to plaque formation , thickening of arterial wall and finally arterioscleroses; can be prevented by atilipedemic drug like atorvastatin which works by inhibiting HMG-CoA reductase, an enzyme found in liver tissue that plays a key role in production of cholesterol in the body as it also stabilizes plaque and prevents strokes through anti-inflammation and other mechanisms. Clopidogrel , a thienopyridine class antiplatelet agent is used to inhibit blood clots in coronary artery disease, peripheral vascular disease works by irreversibly inhibiting a receptor called P2Y an adenosine diphosphate (ADP) chemoreceptor on platelet cell membranes. The antihypertensive drug enalapril an ACE inhibitor drugs inhibits the conversion of renin angiotensin – a biologically active substance, which leads to a reduction in increase blood pressure.

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