Cardiac Injury Detected by Troponin is Associated with Pancreatitis Detected by DGGR-lipase in Dogs and Cats

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Abstract

We studied the relationship between pancreatitis and cardiac injury in dogs and cats. Moreover, we evaluated a cardiac troponin I (cTnI, Vet J 180: 32-37, 2010) assay for sensitive and specific detection of cardiac injury in animals. We found unusual non-cardiac diseases of dogs and cats were associated with cardiac injury detected by serum cardiac troponin I, including some cases of pancreatitis. Also, we validated the DGGR-lipase assay for cost-effective, sensitive and specific detection of pancreatitis in dogs and cats (Vet Clin N Am Small Anim Pract 41:1-10, 2011; 42:141-15, 2012). Herein, we tested the hypothesis that pancreatitis was associated with cardiac injury. cTnI was measured by Advia Centaur TnI-Ultra assay. DGGR-lipase by the Random colorimetric assay. We retrospectively analysed data from dogs and cats admitted to UCD veterinary hospital in which both cTnI and lipase had been measured. Upper limit of reference range for lipase in dogs is 150 U/L, we consider 80-150 indicative of mild pancreatitis, 100-200 moderate, and >200 as marked. Upper limit of reference range for lipase in cats is 25. Reference range for cTnI is 0.054 ng/ml for dogs and cats. We consider 0.054-0.15 indicative of mild cardiac injury, 0.15-1 as moderate, and >1 as marked. 145 dogs and 19 cats had both lipase and cTnI measured. 89 dogs had normal troponin, 113 had normal lipase and 43 had normal lipase and normal cTnI. 32 dogs (22%) had pancreatitis as indicated by elevated lipase. In 26/32 (81%), pancreatitis was mild. 11 of 13 (86%) were moderate, and in 9/13 (69%) it was marked. 67 of 145 dogs had normal cTnI, mild in 36/67 (54%), moderate in 22/32 (33%) and marked in 12/13 (92%). Cardiac injury in dogs with pancreatitis was absent in 20%, mild in 34%, moderate in 20%, and marked in 12%. In 75% cats had normal cTnI, 10 had normal lipase and 8 of 19 cats had pancreatitis, severity in 5. Lipase and cTnI was correlated in both dogs and cats. We conclude that both pancreatitis and cardiac injury, as indicated by high sensitivity and high specificity of the Advia Centaur TnI-Ultra assay (which is a three-site sandwich immunoassay that uses direct chemiluminescent technology). The reference range for cTnI (ng/mL) in dogs and cats was 0.054. Myocardial injury was considered mild in the range of 0.054 - 0.15, moderate for 0.15 - 1, and marked as >1.01.

Introduction

Cardiac troponin (cTnI) is the platinum-standard biomarker for cardiac injury in man and laboratory animals.

- Its use in domestic animals is exponentially growing since the late 1990s.
- A number of non-cardiac diseases associated with cardiac injury, in mostly dogs and cats were identified in a 2010 study.
- 8 dogs with pancreatitis which had an increase in lipase and cTnI were found.
- From this data we identified an additional 24 dogs to have pancreatitis and 6 cats with pancreatitis.
- For the first time, the relationship between pancreatitis and cardiac injury will be quantitatively defined in these species.
- Lipase measured by the DGGR method is sensitive and specific for pancreatitis.

- cTnI measured by the Advia Centaur TnI-Ultra assay is also extremely sensitive and has a high degree of specificity for cardiac injury.

What is Cardiac Troponin?

- Gold standard biomarker of myocardial injury in man.
- Myofilament protein in regulating contraction that telescopes out of cardiac cells when they are injured.
- Applicability in companion animal medicine rapidly becoming recognised.

Methods

We retrospectively analysed data from dogs and cats admitted to the UCD veterinary hospital in which both cTnI and lipase had been measured. Lipase was measured using the DGGR method. The lipase assay consists of an automated colorimetric enzyme rate assay that can measure lipase activity in serum or heparinized plasma.

- Upper limit for the reference range for lipase (U/L) in dogs was 80. Pancreatitis was considered mild in the range 80 - 150, moderate for 150 - 500, and marked as >500. Upper limit of the reference range in cats was 25.
- cTnI was measured by the Advia Centaur TnI-Ultra assay which is a three-site sandwich immunoassay that uses direct chemiluminescent technology.

- The reference range for cTnI (ug/mL) in dogs and cats was <0.054. Myocardial injury was considered mild in the range of 0.054 - 0.15, moderate for 0.15 - 1, and marked as >1.01.

Results

- Animals Studied: 145 dogs and 19 cats had both lipase and cTnI measured.
- Reference Range Values: Dogs - 75 (54%) dogs had normal lipase and 43 (30%) had normal lipase and normal cTnI. Cats - 13 (68%) cat had normal troponin; 10 (53%) had normal lipase.

- Pancreatitis: Dogs - 32 (22%) dogs had pancreatitis, as indicated by increased lipase. Severity of pancreatitis was mild for 58 cases, moderate for 28%, and marked for 18%. Cats: 6 (32%) had pancreatitis, with 2 values just above the upper limit of normal, 2 with twice this value and 2 with thrice this value.

- Myocardial Injury: Dogs: 67 (46%) dogs had myocardial injury as indicated by increased cTnI. In 49% it was mild, in 33% it was moderate, and in 18% it was marked. Cats: 4 (21%) cats had myocardial injury. It was mild in one case, moderate in 2 and marked in 1.

- There was good (r = 0.7) correlation between lipase and cTnI for both dogs (top right figure) and cats (middle right figure).

Conclusions

- Pancreatitis in dogs and cats is typically associated with cardiac injury.
- Severity of pancreatitis and cardiac injury are correlated. For >40% of dogs and cats with pancreatitis, cardiac injury is moderate to marked.

References