A case against the specificity of "cardiac" troponin-T

M Mahalingam, M E Ottlinger

Abstract
A case of a spurious rise in cardiac troponin-T in an 85 year old Caucasian man with myelodysplastic syndrome and multiple malignancies but with intact cardiac and renal function is reported. The patient presented to the accident and emergency department with fever and chest pain. Inconsistent laboratory findings in biochemical markers diagnostic of myocardial infarction were observed. Discrepant findings included a rise in the concentration of the cardiac specific marker troponin-T in the absence of an increase in creatine kinase (CK) isoenzyme MB activity. Somewhat surprisingly, there was a significant and consistent increase in CK isoenzyme BB activity. Awareness of the increase in troponin-T concentrations in patients with multiple clinical non-cardiac problems may prevent an erroneous diagnosis of myocardial infarction and avert institution of unduly aggressive treatment.

Case report
An 85 year old Caucasian man, with a history of bone marrow biopsy confirmed myelodysplastic syndrome (MDS) and prostate and colon carcinoma, was brought to the accident and emergency department after his family found him "looking unwell". On admission, he complained of left sided chest pain. Physical examination revealed that he was febrile (temperature 40.6°C). The patient's pulse rate was 120/minute, respiratory rate was 28/minute and his baseline blood pressure was 120/90. He seemed to be in moderate respiratory distress. Auscultation revealed that the patient had pulmonary oedema. The following were the findings from cardiac examination: apical impulse in the sixth anterior axillary line, loud first and second heart sound, regular heart rate and rhythm, and absence of a murmur. A chest radiograph showed a normal sized heart, bilateral pleural effusion with a questionable lungular infiltrate which was obscured by the effusion. A 12-lead electrocardiogram (ECG) showed evidence of left ventricular hypertrophy, atrial fibrillation and right bundle branch block. The tracing was unchanged from that taken a month earlier.

Table 1 summarises the laboratory findings. LDH fractionation (%) indicated the following: on admission LD1 13.2, LD2 30.9, LD3 20.7, LD4 11.2, LD5 24.1; and 12 hours later LD1 11.7, LD2 32.3, LD3 22.2, LD4 11.6, LD5 23.2. CK fractionation (%) indicated the following (both by the mass assay and by electrophoresis): on admission CK-MM 92.5, CK-MB 0, CK-BB 7.5; and 12 hours later CK-MM 92, CK-MB 0, CK-BB 8.

Assay details
CARDIAC TROPOIN-T ASSAY
All measurements of cardiac troponin-T were made with a commercially available enzyme immunoassay kit (Boehringer Mannheim, Indianapolis, Indiana, USA). Briefly, the assay is based on a single step sandwich principle with streptavidin coated tubes as the solid phase and two monoclonal anti-human cardiac troponin-T antibodies. The intra-assay coefficient of variation was < 2%.

CK-MB MASS ASSAY
Creatine kinase (CK) isoenzyme MB mass was measured using a microparticle enzyme immunoassay (Abbott Systems, Chicago, Illinois, USA). The assay is based on a two site immuno-metric sandwich method with two monoclonal antibodies—a capture antibody specific for CK-MB and an enzyme labelled (alkaline phosphatase) antibody. The intra-assay coefficient of variation was < 5%.

CK-MB ELECTROPHORESIS ASSAY
The percentage of CK-MB in a given sample was measured by electrophoresis (Helena Laboratories, Beaumont, Texas, USA). Briefly, the isoforms of CK are first separated according to their electrophoretic mobility. The separated isoenzymes are then incubated with specific reagents to visualise the separated isofoms. The intra-assay coefficient of variation was < 5%.

Discussion
Troponin-T, the tropomyosin binding, cardiac specific subunit of the troponins, is one of the best known examples of a non-cytoplasmic marker of myocardial infarction. However, its specificity has not been fully delineated in non-cardiac diseases. There are published reports to indicate that elevations in troponin-T may be seen in a patients with polymyositis/dermatomyositis and also in patients with acute muscle disease, trauma patients and patients with rhabdomyolysis. Reports, including a recent one, indicate that spurious rises in troponin-T may be seen in end-stage...
High temperature antigen retrieval and loss of nuclear morphology: a comparison of microwave and autoclave techniques

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Abstract

The use of high temperature antigen retrieval methods has been of major importance in increasing the diagnostic utility of immunocytochemistry. However, these techniques are not without their problems and in this report attention is drawn to a loss of nuclear morphological detail, including mitotic figures, following microwave antigen retrieval. This was not seen with an equivalent autoclave technique. This phenomenon was quantified using image analysis in a group of B cell lymphomas stained with the antibody L26. Loss of nuclear morphological detail may lead to difficulty in identifying cells accurately, which is important in the diagnostic setting—for example, when trying to distinguish a malignant lymphoid infiltrate within a mixed cell popu-
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