Archives of Gerontology and Geriatrics 65 (2016) 111–115

Contents lists available at ScienceDirect

Archives of Gerontology and Geriatrics

journal homepage: www.elsevier.com/locate/archger

High-sensitivity cardiac troponin T in geriatric inpatients

Shao-Jing Zhang, Qing Wang*, Yun-Jing Cui, Wei Wu, Qing-Hua Zhao, Ying Xu, Jie-Ping Wang

Department of Geriatrics, Fuxing Hospital Affiliated to Capital Medical University, Beijing, China

ARTICLE INFO

Article history:
Received 21 January 2015
Received in revised form 10 March 2016
Accepted 11 March 2016
Available online 17 March 2016

Keywords:
High-sensitivity cardiac troponin T
Geriatric inpatients
ACS
Related factors

ABSTRACT

Background: High-sensitivity cardiac troponin T (hs-cTnT) is detectable in elderly patients without clinical diagnosed cardiovascular disease. Elevated hs-cTnT levels predict increased cardiovascular risks and poor prognosis. The aim of this study was to determine the distribution and associated factors of hs-cTnT in geriatric inpatients without acute coronary syndrome (ACS).
Methods: Hs-cTnT was measured with a highly sensitive assay in 679 geriatric inpatients without ACS. Patients were further divided into 3 groups according to the tertile of hs-cTnT levels and single and multiple variable analyses were performed to assess the association of hs-cTnT to cardiovascular risk factors, biochemical measurements and echocardiographic abnormalities.
Results: Hs-cTnT was detectable (≥3 ng/L) in 98.4% of the subjects and 52.0% of the subjects had hs-cTnT levels ≥14 ng/L, which is at the 99th percentile Upper Reference Limit (URL). The levels of hs-cTnT were independently associated with N-terminal pro-brain natriuretic peptide (NT-proBNP), male gender, older age, estimated glomerular filtration rate (eGFR), left ventricular mass index (LVMI), diabetes mellitus (DM) and left ventricular ejection fraction (LVEF). There were no significant differences in hs-cTnT levels between geriatrics patients with stable coronary artery disease (SCAD) and those without SCAD.
Conclusion: Hs-cTnT elevation caused by non-ischemic acute conditions was very common in geriatric hospitalized patients. Due to increases in baseline hs-cTnT in the elderly, detection of a rise and/or fall in hs-cTnT levels is essential for determining a diagnosis of ACS or AMI in geriatric patients. Further studies are needed to establish age-specific 99th percentile values of hs-cTnT for elderly individuals.

1. Introduction

Cardiac troponin T (cTnT) is the preferred biomarker for the diagnosis and risk stratification of acute coronary syndrome (ACS) (Morrow, Cannon, & Jesse, 2007). A recently developed highly sensitive assay for cTnT has enhanced early diagnosis of ACS, identification of minor myocardial ischemia and prognosis of cardiovascular events (Reichlin, Hochholzer, & Bassetti, 2009; Daniels, Laughlin, & Clopton, 2008; Blankenberg, Zeller, & Saarela, 2010).

The hs-cTnT assay has an analytical range from 3 to 10,000 ng/L which can detect cTnT levels approximately 10-fold lower than the conventional assay. The guidelines recommend 14 ng/L, the 99th percentile URL, as the diagnostic cut-off for acute myocardial infarction (AMI) (Bax, Baumgartner, & Ceconi, 2012).

Elevated hs-cTnT have previously been detected in patients without ACS as well as in healthy individuals from the general population (Otsuka, Kawada, & Ibuki, 2010). Older age is an independently associated factor with high hs-cTnT and the prevalence of detectable hs-cTnT is higher in elderly individuals than in the general population. Therefore, the use of a uniform 14 ng/L cutoff of hs-cTnT may lead to over diagnosis of myocardial infarction in the elderly (Gore, Seliger, & Nambi, 2014).

We conducted this study in order to investigate the prevalence and associated factors of hs-cTnT in an unselected group of geriatric inpatients without ACS.

2. Methods

2.1. Study population

Cross-sectional study was performed on 679 patients (all ≥65 years) hospitalized in the department of geriatrics at Fuxing Hospital, Capital Medical University, Beijing, China between April 2012 and October 2013. The patients most frequently presented with cardiovascular disease without ACS, cardiovascular risk factors, cerebrovascular disease or lung disease. Patients with ACS, acute heart failure (HF), malignant tumors, bedridden status,

* Corresponding author.
E-mail addresses: wq1122@medmail.com.cn, shjingzh@163.com (Q. Wang).

http://dx.doi.org/10.1016/j.archger.2016.03.010
0167-4943/

mental illnesses and those received hemodialysis were excluded. The collected data included age, gender, height, body weight, smoking habits, clinical history including stable coronary artery disease (SCAD), hypertension, diabetes mellitus (DM), atrial fibrillation (AF), cerebrovascular disease, lung disease, chronic kidney disease (CKD) and the use of prescribed drugs. The study was approved by the local Ethics Committee.

All blood samples were obtained from a forearm vein after overnight fasting on the second morning after hospitalization. Hs-cTnT levels were measured using the Roche electrochemiluminescence method (Roche Diagnostics GmbH, Mannheim, Germany) on a combas e601 autoanalyzer (Roche Diagnostics). Total cholesterol (TC), triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), high density lipid cholesterol (HDL-C), high sensitive C reactive protein (hs-CRP), and NT-proBNP levels were measured. The estimated glomerular filtration rate (eGFR) was calculated with the Chinese modified Modification of Diet in Renal Disease (C-MDRD) equation (Ma, Zuo, & Chen, 2006). Echocardiographic parameters including left atrium diameter (LAD), left ventricular end-diastolic diameter (LVEDD), left ventricular end-systolic diameter (LVEDS), interventricular septal thickness (IVST), left ventricular post-wall depth (LVPWD), left ventricular mass index (LVMI), left ventricular ejection fraction(LVEF), valvular lesion and wall motion abnormality were recorded.

SCAD was defined as patients with prior history of chronic stabled angina, unstable angina or acute myocardial infarction and previous surgical or percutaneous coronary revascularization. Hypertension was defined as a mean systolic blood pressure ≥140 mmHg, and/or mean diastolic blood pressure ≥90 mmHg, and/or use of antihypertensive medication (Mancia, Fagard, & Narkiewicz, 2013). Diabetes mellitus was defined as A1C ≥6.5%, fasting blood glucose (FBG) ≥7.0 mmol/L, 2-h plasma glucose ≥11.1 mmol/L an OGTT, a patient with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥11.1 mmol/L or receiving antihyperglycemic medication (American Diabetes Association, 2013). Chronic kidney disease (CKD) was evaluated by the estimated glomerular filtration rate (Levey, Eckardt, & Tsukamoto, 2005). Lung disease consisted of chronic obstructive pulmonary disease and pneumonia.

2.2. Statistical analysis

Participants were divided into 3 categories according to the tertile of hs-cTnT concentration with tertile 1 (≤10 ng/L), tertile 2 (11–17 ng/L) and tertile 3 (≥18 ng/L).

All statistical tests were performed using the SPSS software program version 18.0. Continuous variables were expressed as the mean ± SD or the median [interquartile range (IQR)]. Statistical comparison of groups was undertaken by one-way ANOVA, student's *t*-test or nonparametric Kruskal–Wallis tests. Chi-square analysis was performed for categorical variables which were reported as the percent of the total. Linear regression analysis was used to examine the association between hs-cTnT and baseline characteristics. Variables that were significant in the single variable analysis were included in the multiple variable model. A multiple linear regression analysis was used to examine the independent association of the log transformed hs-cTnT levels with variables that were significant in the single variable analysis. A P-value of $p < 0.05$ was considered statistically significant, and all tests were two-sided.

3. Results

The mean (±SD) age of the patients was 82.4 ± 5.8 years with 467 male patients (68.8%). Total of 189 (53.4%) patients with SCAD and 165 (46.6%) patients without SCAD had hs-cTnT levels ≥14 ng/L. Only 11 subjects (1.6%) had undetectable hs-cTnT levels and 668 subjects (98.4%) had detectable hs-cTnT (≥3 ng/L). The distribution of hs-cTnT concentration was shown in Fig. 1. Of the total, 52.0% (353 subjects) ≥ 14 ng/L(the 99th percentile URL), while 58.7% ≥gender specific cutoff.

The characteristics of the study patients, according to the tertile of hs-cTnT levels are shown in Table 1. Risk factors including age, male, inflammation markers (e.g., white blood cell, neutral classification, hs-CRP), NT-proBNP, eGFR, LDL-C, and echocardiography abnormalities (LAD, LVEDD, LVEDS, IVST, LVPWD, LVMI, LVEF, valvular lesion and wall motion abnormality) were significantly different when tertile 2 and tertile 3 compared with tertile 1. Above all, the markers were the worst in tertile 3.

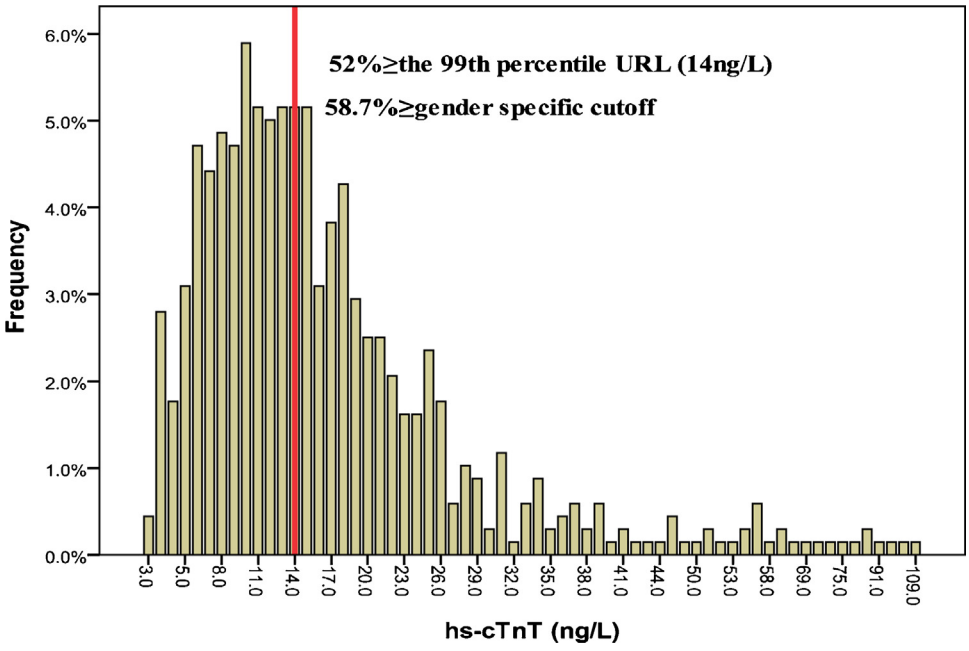

Fig. 1. Distribution of high-sensitivity cardiac troponin T.