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Serum pentraxin-3 levels in acute stroke: No association with stroke prognosis

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ABSTRACT

Background: Stroke is the leading cause of serious disability. Estimating severity of the disease and early risk assessment is crucial. Several studies have been carried on and several biomarkers have been proposed in the literature for risk assessment and to estimate the stroke prognosis. In this study we assessed the association of predictors such as patient age, gender, stroke volume and NIHS scores on prognosis of stroke event. We investigated whether the serum pentraxin-3 levels are linked with stroke prognosis.
Methods: Forty-four stroke patients without cardiovascular risk factors were included in this study. Initial NIHS scores, stroke volumes, serum pentraxin-3 levels and the data regarding the risk factors were collected in the first and seventh days of event. Association of predictors with final NIHS scores were investigated using multivariate regression model.
Results: Initial NIHS score, initial and final stroke volumes were independently associated with final NIHS score whereas serum pentraxin-3 levels, whether acquired at the first or seventh day of stroke, were not associated with final NIHS score.
Conclusions: In stroke patients without cardiovascular, cardiopulmonary and infectious diseases, serum pentraxin-3 levels are not associated with stroke prognosis.

1. Introduction

Stroke is the second most common cause of death worldwide and is the leading cause of serious disability [1]. For this reason, estimating severity of the disease and early risk assessment are crucial [2]. Several studies have been carried on in the literature for risk assessment and to estimate the stroke prognosis. Furthermore, several biomarkers such as pentraxin-3 (PTX-3), orexin, lipoprotein lipase and high sensitive C reactive protein (h-CRP) have been proposed as an estimator of stroke prognosis [3]. PTX-3 is one of these biomarkers which is associated with inflammatory response. It belongs to the pentraxin superfamily in which CRP is classified as one of the classical short pentraxins. PTX-3 is similar to CRP regarding the presence of C-terminal pentraxin domain but differs by having an unrelated long N-terminal domain. Releasing of PTX-3 is a part of inflammatory response and a variety of cell types can produce PTX-3 upon exposure to primary inflammatory signals and foreign bodies [4,5]. As a mediator of inflammation, its role has been investigated in cardiovascular and cerebrovascular diseases [6,7]. Higher levels of PTX-3 are associated with increased incidence of cardiovascular disease [8–10] and increased mortality after acute myocardial infarction [11].

Prognostic factors in stroke are often built on measurable attributes of the disease. Scales that measure neurological deficits or specific body functions can be used especially well for triage and to guide acute-treatment decisions. The NIHSS, is a valuable tool for initial assessments of patients with stroke and is predictive of subsequent resource use and long-term outcome [12–14].

Hereby, we aim to demonstrate the effects of risk factors along with the predictors such as patient age, gender, stroke volume and NIHS scores on prognosis of stroke event. We also aim to investigate the association of serum PTX-3 levels with NIHS scores in patients with stroke. To our knowledge this study is unique in terms of investigating association between PTX-3 and NIHS score in patients with acute stroke and establishing a connection between stroke

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prognosis and PTX-3 levels with excluded cardiovascular and infectious causes.

2. Methods

This study was approved by our institutional ethics committee, informed consent was obtained from all subjects.

2.1. Participants

Between March 2013 and December 2014, three hundred and sixty-six stroke patients who had established diagnosis of cerebral ischemia with stored imaging data were considered for enrollment in our study. From this patient population, 84 stroke patients were selected according to the inclusion criteria.

The inclusion criteria for patient group were as follows: lack of any contraindication to MR imaging; first stroke; diffusion abnormalities restricted to single anatomic location; ER referral after the first 6 h; lack of any forms of acute or chronic cardiopulmonary disease, coronary artery disease and diabetes; no drug or substance addiction/abuse; non-obese—body mass index (BMI) < 30— and lack of malign hypertension confirmed by medical reports and initial examination.

From selected patient population 40 patients were excluded according to the exclusion criteria (Fig. 1).

Exclusion criteria for selected patients group were as follows; hemorrhagic transformation within the first seven days after admission; mortality; carotid artery stenosis; peripheral arterial disease; arising infectious, cardiac and respiratory complications such as nosocomial infections, aspiration pneumonia, acute cardiac and respiratory insufficiency.

Study was carried on and data was collected from 44 non-cardiogenic ischemic stroke patients.

2.2. Imaging procedure

All MR examinations were performed with a 1.5 T MRI scanner (Magnetom Avanto, Siemens Healthcare, Forcheim, Germany). Axial T1-weighted, axial and coronal T2-weighted, axial fluid attenuation inversion recovery (FLAIR) and diffusion weighted images (DWI) with apparent diffusion coefficient (ADC) maps were acquired. On the MR images, acute cerebral ischemia was defined as bright area separated from normal brain parenchyma with a demarcation line on diffusion weighted images with correspondent hypointensity on ADC maps. All readings were performed by a single radiologist who was blind to the patient data. Evaluation was made by patient basis in offline workstation and the stroke volumes were calculated using Analyze 11.0 software based on semi-automated method. (Analyze Direct Inc., Kansas City, USA).

2.3. Statistical analysis

Summary statistics of both groups were obtained based on the means or medians and 95% CI for the means or medians. The distribution of normality was assessed with D'Agostino-Pearson test and continuous variables with normal distribution compared with paired t test whereas variables with non-normal distribution compared with Wilcoxon test. Kruskal–Wallis one way analysis of variance was used for comparing more than two groups. Dependent variables were determined with univariate analysis. Associated variables and risk factors were selected as outcome predictors in a multivariate regression model. A two tailed p value < 0.05 was considered statistically significant. All statistical analyses were performed using Medcalc statistics software (MedCalc, version 12.2.1.0, Ostend, Belgium).

2.4. Immunoassay analysis

Fasting venous blood samples from stroke patients in the first and seventh days after event were collected to measure serum PTX-3 levels. Initial blood sampling from patients was performed within the first 12 h of the stroke event. Thirty minutes after drawing blood samples, tubes are centrifuged for 10 min at 1500 rpm. Samples were aliquoted and stored at −80 °C. Serum PTX-3 levels were measured using a commercial ELISA kit (Mybiosource, San Diego, California, USA. Catalog no: MBS2600949). PTX-3

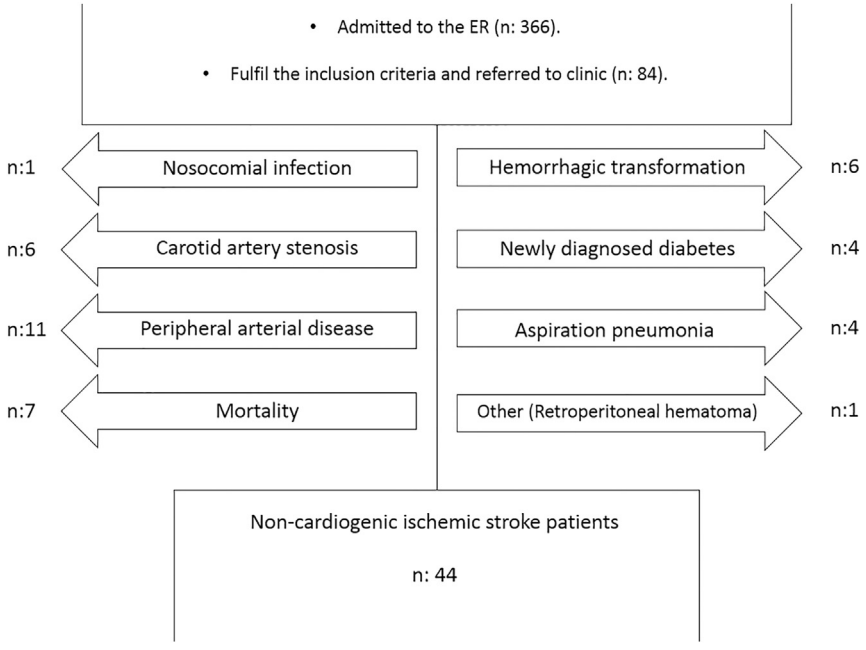

Fig. 1. Flow chart of patients who met inclusion/exclusion criteria.