

The use of NT-proBNP in clinical practice

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Abstract

Early detection of heart failure and the accurate diagnosis of heart failure remains a huge clinical challenge to family practitioners. ECGs and chest x-rays merely serve as baseline investigations and the diagnosis is eventually only confirmed by a two-dimensional echocardiogram coupled with Doppler-flow studies. Another biomarker of left ventricular dysfunction that could be added to the armamentarium of the generalist is the blood test proBNP, the precursor of brain natriuretic peptide (BNP). Studies have shown that, already in early phases of left-ventricular systolic dysfunction (asymptomatic left ventricular systolic dysfunction and diastolic dysfunction), BNP proved to be a good marker of both development of heart failure and prognosis. This article gives the generalist an approach to using proBNP in general practice for early detection of left ventricular dysfunction, exclusion of heart failure and prudent referral to the cardiologist.

(SA Fam Pract 2004;46(10): 50)

Introduction

Brain natriuretic peptide (BNP) belongs to a group of natriuretic peptides that are involved in the regulation of diuresis and which antagonises the vasoconstrictor effects of the renin-angiotensin-aldosterone system (RAAS). Myocyte stretch or left ventricular wall tension is the main stimulus (ventricular end-diastolic pressure and volume) for proBNP production by the ventricular myocytes. Causes for these conditions include left ventricular dysfunction (systolic and diastolic), valvular heart disease, atrial fibrillation and left ventricular hypertrophy. The NT-proBNP molecule contains 108 aminoacids. The first 76 aminoacids are biologically inactive and constitute the amino-terminal (N-terminal of proBNP or NT-proBNP). Aminoacids 77-108 constitute the biologically active component of the molecule, BNP.

Application of NT-proBNP-testing

I. Exclusion of heart failure:

If the level of NT-proBNP is lower than a certain value (< 125 pg/ml) the diagnosis of heart failure is unlikely. Applied to:

- New patients with suspected heart failure (not overt signs of heart failure).
- Patients presenting with acute dyspnoea in emergency room (ER).

II. Screening for left ventricular systolic dysfunction

- After an acute myocardial infarction: In these patients the level of NT-proBNP is inversely associated with ejection fraction and level determines prognosis.
- Not enough data to recommend screening of large asymptomatic populations.
- Screening may be of value for high-risk groups of patients: post-myocardial infarction, diabetes mellitus, poorly controlled hypertension (especially those with left ventricular hypertrophy).

III Prognostic marker in heart failure:

- Plasma levels of BNP are higher in more severe heart failure, with more severe damage to left ventricle, in those who will die earlier, and in those with less exercise capacity.
- NT-proBNP is a strong predictor of death over the whole spectrum of cardiovascular diseases, cardiovascular risk factors (hy-

pertension and diabetes), stable angina, unstable angina, acute coronary syndromes, myocardial infarction and heart failure.

IV In monitoring of patients with heart failure

It maybe helpful in directing therapeutic intervention in patients with heart failure.

Potential uses of NT-proBNP

- Predicts mortality in acute coronary syndrome
- Screening for diastolic dysfunction
- Prognostic marker for severe acute pulmonary embolism

Diagnostic blood levels

The NT-proBNP cut-off points in diagnosing heart failure are:

- In Europe: 100 pg/ml for males
150 pg/ml for females
- In USA: 125 pg/ml for both males and females.

Possible sources of false positive tests

- Ageing (geriatric age)
- Renal failure
- Acute stretching of the right ventricle (e.g. acute pulmonary embolism)
- NT-proBNP and BNP levels increase shortly after initiation of beta-blocker therapy
- Endocrine disease (primary hyperaldosteronism and Cushing's disease)

Approach to the use of NT-proBNP:

A. Exclude heart failure in symptomatic patients

ProBNP is a useful tool to exclude heart failure in symptomatic patients (those with dyspnoea and a suspicion of heart failure). Heart failure as a cause for dyspnoea can be excluded if proBNP levels are < 125 pg/ml in those younger than 75 years of age and < 450 pg/ml in those older than 75 years. If proBNP levels are higher than 125 pg/ml (and >450 pg/ml in those older than 75 years), then a patient should be referred for further cardiac assessment.

B. Evaluation of acute dyspnoea in ER

ProBNP can also be used in the emergency room setting and the following algorithm outlines the approach to a patients presenting with dyspnoea in casualty. (See algorithm)

See CPD Questionnaire p.53

References

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