

B-type natriuretic peptide level had reduced specificity for diagnosing heart failure in dyspnea with atrial fibrillation in the emergency department

Knudsen CW, Omland T, Clopton P, et al. Impact of atrial fibrillation on the diagnostic performance of B-type natriuretic peptide concentration in dyspneic patients: an analysis from the Breathing Not Properly Multinational Study. *J Am Coll Cardiol.* 2005;46:838-44.

Clinical impact ratings: Emergency Med ★★★★★☆☆ Hospitalists ★★★★★★☆☆ Cardiology ★★★★★★☆☆

QUESTION

In patients with acute dyspnea presenting to the emergency department (ED), is the accuracy of B-type natriuretic peptide (BNP) measurement in diagnosing heart failure (HF) affected by the presence of atrial fibrillation (AF)?

METHODS

Design: Blinded comparison of BNP measurement with case review by cardiologists after 30 days.

Setting: EDs of 7 teaching hospitals in Norway, France, and the United States.

Patients: 1431 patients \geq 18 years of age (57% men) with acute dyspnea or worsening chronic dyspnea and known AF status. 292 patients (20%) had permanent or paroxysmal AF (median age 77 y), and 1139 patients had no AF (median age 62 y). Patients with renal failure, acute myocardial infarction, or obvious reason for dyspnea (other than acute HF) were excluded.

Description of test: Serum BNP level was measured shortly after admission using the Triage BNP test. Values \geq 100 pg/mL were considered abnormal.

Diagnostic standard: 2 cardiologists reviewed case report forms from the ED, including all

clinical assessments and tests (except BNP), and classified the dyspnea as caused or not caused by acute HF.

Outcomes: Sensitivity, specificity, positive and negative likelihood ratios, and area under the receiver-operating characteristic (ROC) curve.

MAIN RESULTS

BNP levels were elevated in patients diagnosed with HF (median $>$ 500 pg/mL). There was no difference between patients with or without AF. In patients without HF, BNP levels were higher in patients with AF (median 119 pg/mL, 60% of patients over the cutpoint) than in those without AF (median 25 pg/mL)*, 21% over the cutpoint). The sensitivity of BNP measurement for diagnosing HF was higher in patients with AF than in those without AF, but the

specificity and positive likelihood ratio were lower (Table). The area under the ROC curve was 0.84 for patients with AF and 0.91 for those without AF.

CONCLUSION

In patients with dyspnea presenting to the emergency department, B-type natriuretic peptide level, at a cutpoint \geq 100 pg/mL, was more sensitive but less specific in diagnosing heart failure in the presence of atrial fibrillation than in the absence of atrial fibrillation.

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*Estimated from graph in article.

Diagnostic characteristics of B-type natriuretic peptide level (cutpoint \geq 100 pg/mL) for diagnosing heart failure in patients with dyspnea, with and without atrial fibrillation†

Atrial fibrillation	Prevalence of heart failure	Sensitivity (95% CI)	Specificity (CI)	+LR	-LR
Present	75%	95% (91 to 97)	40% (28 to 52)	1.6	0.14
Absent	39%	89% (85 to 91)	79% (76 to 82)	4.2	0.15

†Diagnostic terms defined in Glossary; CI calculated from data in article.

COMMENTARY

BNP, or N-terminal pro-brain natriuretic peptide (NT-proBNP), measurement is now widely used as an aid in the diagnosis of HF. In the ED setting where harried physicians must make clinical judgments without the benefit of longitudinal observation, a blood test that can help define therapeutic strategy is particularly valuable. As for most simple tests, however, the measurement becomes less discriminating when the clinical presentation is less clear. Levels of BNP $>$ 100 pg/mL are clearly abnormal in young, healthy persons but are often observed in older women and patients with renal failure. Thus, clinical judgment must supplement the laboratory test to optimize diagnostic precision.

AF alters cardiac function and may lead to structural changes in the atria that activate BNP release (1). Therefore, AF is one of those factors that must be considered when interpreting the accuracy of BNP levels in identifying "heart failure" as the primary cause of acute symptoms. In this study, Knudsen and colleagues appropriately suggest that a higher BNP threshold should exist for a patient with a history of AF or with AF at the time of evaluation, but the real message should be this: Use the BNP level as an aid to thorough evaluation, which should include all possible contributors to symptoms and to BNP levels, but do not slavishly use any BNP level as a simple guide to diagnosis.

BNP and NT-proBNP may provide information above and beyond their usefulness in diagnosing a clinical syndrome that has no rigorous noninvasive definition. High levels of these hormones seem to predict poor long-term outcome in patients with HF (2) as well as in patients without HF (3). As we learn more about what influences BNP release, we may find wider application of the clinical measurement of this cardiac hormone.

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References

- Inoue S, Murakami Y, Sano K, Katoh H, Shimada T. Atrium as a source of brain natriuretic polypeptide in patients with atrial fibrillation. *J Card Fail.* 2000;6:92-6.
- Latini R, Masson S, Anand I, et al. The comparative prognostic value of plasma neurohormones at baseline in patients with heart failure enrolled in Val-HeFT. *Eur Heart J.* 2004;25:292-9.
- Richards AM, Cohn JN. N-terminal pro-brain natriuretic peptide: a powerful biomarker of cardiac disease. *J Card Fail.* 2005;11:S1-2.