

Prognostic value of BNP in newborns with congenital heart defects

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Introduction

B-type natriuretic peptide (BNP) is elevated during ventricular strain.¹ BNP is released from the ventricular myocardium in response to stretching of the ventricular wall.² BNP is elevated under conditions of increased wall stress, such as with increased preload or afterload and decreased systolic or diastolic ventricular function.³ Data are lacking on whether the use of BNP improves the prognosis in newborns with congenital heart defects (CHD).

Aim

We aimed to evaluate the diagnostic and prognostic value of BNP in newborns with CHD.

Methods

A prospective study of a cohort of newborns with CHD admitted at a NICU in a tertiary hospital was performed between August 2012 and December 2013. Participants had BNP evaluated in the cord blood or at the first biochemical sample collected for clinical purposes within the first 48 hours of life.

Continuous variables, presented as median, were compared using the Mann-Whitney U test, and proportions using Fisher exact test.

The sensitivity and specificity of BNP to predict surgery was assessed using Receiver Operator Characteristic (ROC) curves and logistic regression was performed in order to estimate the association between cardiac biomarkers levels and cardiac surgery.

Results

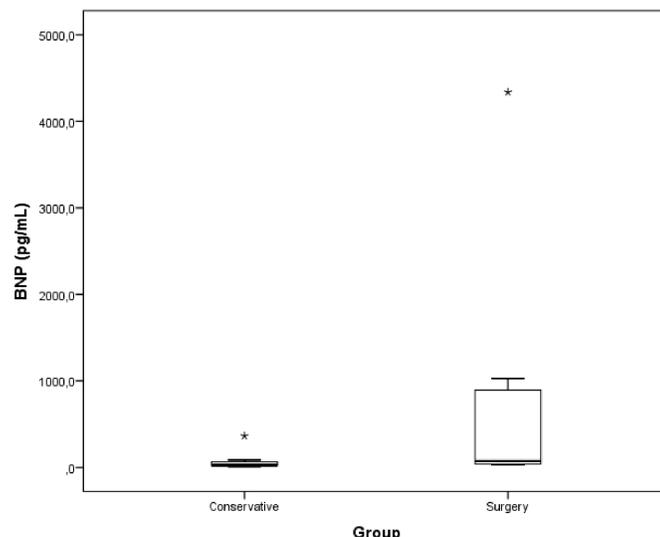
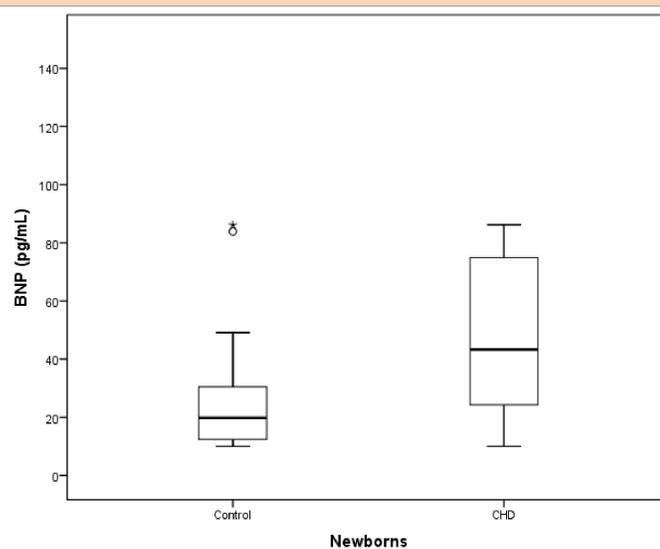


Figure 1A. BNP levels in congenital heart disease group (CHD) vs. control (Ctrl); 1B. BNP levels in surgical group (Surgical) vs. conservative treatment (Conservative)

From the 26 patients with CHD amenable to surgery and with BNP determined within the first 48 hours of life, 10 had cardiac surgery in the newborn period: systemic to pulmonary shunts (n=3); arterial switch (n=2); Norwood (n=1); aortic valvuloplasty (n=1); pulmonary banding (n=1); correction of coarctation of aorta (n=1); correction of interruption of aortic arch (n=1). Patients that needed cardiac surgery in the first month of life had statistically significant higher BNP levels (73.7 pg/mL) in the first 48h of life than patients that were able to go home without surgery (27.6 pg/mL) (p=0.011). BNP exceeded our pre-specified threshold of $\geq 75\%$ area contained by the ROC curve. The sensitivity was 90.0% and specificity 64.3% to predict early surgery using a BNP cut point of 35.85 pg/mL.

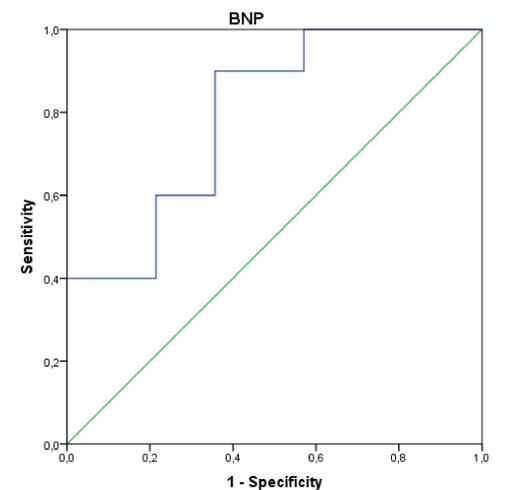


Figure 2. Receiver Operator Characteristic curves for BNP. Area under the curve (AUC) was 0.793 (p=0.016). A test for which the AUC (c-statistic) is ≥ 0.75 was defined as a useful test.

Conclusions

Newborns with CHD had higher BNP levels than healthy newborns. BNP levels in first hours of life seem to have a prognostic value for early cardiac surgery. However, BNP is not a stand-alone test, it should be a complement of history, physical examination, echocardiography and clinical judgment.

References

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