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B-type natriuretic peptide according to magnetic resonance imaging findings in surgically repaired tetralogy of Fallot

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Objective:

B-type natriuretic peptide (BNP) is an established diagnostic marker in congestive heart failure and left ventricular dysfunction.

Recent reports suggest a role for BNP to detect right ventricular dysfunction, too. In patients with surgically repaired tetralogy of Fallot we found a correlation between BNP and echocardiographic parameters reflecting right ventricular volume load [1].

The aim of this study was to evaluate the association of plasma BNP and magnetic resonance imaging (MRI) findings in this patient group.

Methods:

Plasma BNP concentration was measured (Triage BNP assay, Alere®) in all patients with repaired tetralogy of Fallot but no pulmonary valve replacement who underwent cardiac MRI evaluation in our hospital.

BNP levels were compared with age and gender-specific normal values [2], and additionally with evaluated MRI parameters.

Patients:

30 Patients:	19 males, 11 females
Age:	median 15.8 (interquartile range [IQR] 12.4–18.4) years
Time after repair:	median 13.4 (IQR 10.2–15.1) years

Results:

Plasma BNP levels were between 5 and 94 pg/ml (median 16 pg/ml; IQR 8-29 pg/ml) (fig. 1).

According to age and gender, BNP was normal in 16/30 and slightly increased in 14/30 patients (BNP standard deviation score [SDS] median 2.0; IQR 0.4-4.1).

There was no correlation between BNP and both age at corrective surgery, and time interval from surgery to MRI (fig. 2).

There was no significant correlation bewteen BNP and pulmonary regurgitation fraction (fig. 3).

BNP was significantly correlated with right ventricular end diastolic volume (146ml/m²; IQR 121-165ml/m²; r=0.46, p=0.01), and right ventricular end systolic volume (80ml/m²; IQR 57-91ml/m²; r=0.55, p<0.01). In addition, BNP was negatively correlated to right ventricular ejection fraction (48%; IQR 42-53%; r= -0.44, p=0.01) (fig 4).

Conclusions:

In the half of patients with surgically repaired tetralogy of Fallot BNP plasma concentration was slightly increased. There was a significant correlation between BNP and right ventricular volume assessed by MRI.

Therefore, MRI data support our previous echocardiographic data that elevated or increasing plasma BNP levels can indicate right ventricular volume load [1]. However, a normal BNP level does not exclude right ventricular dilatation.

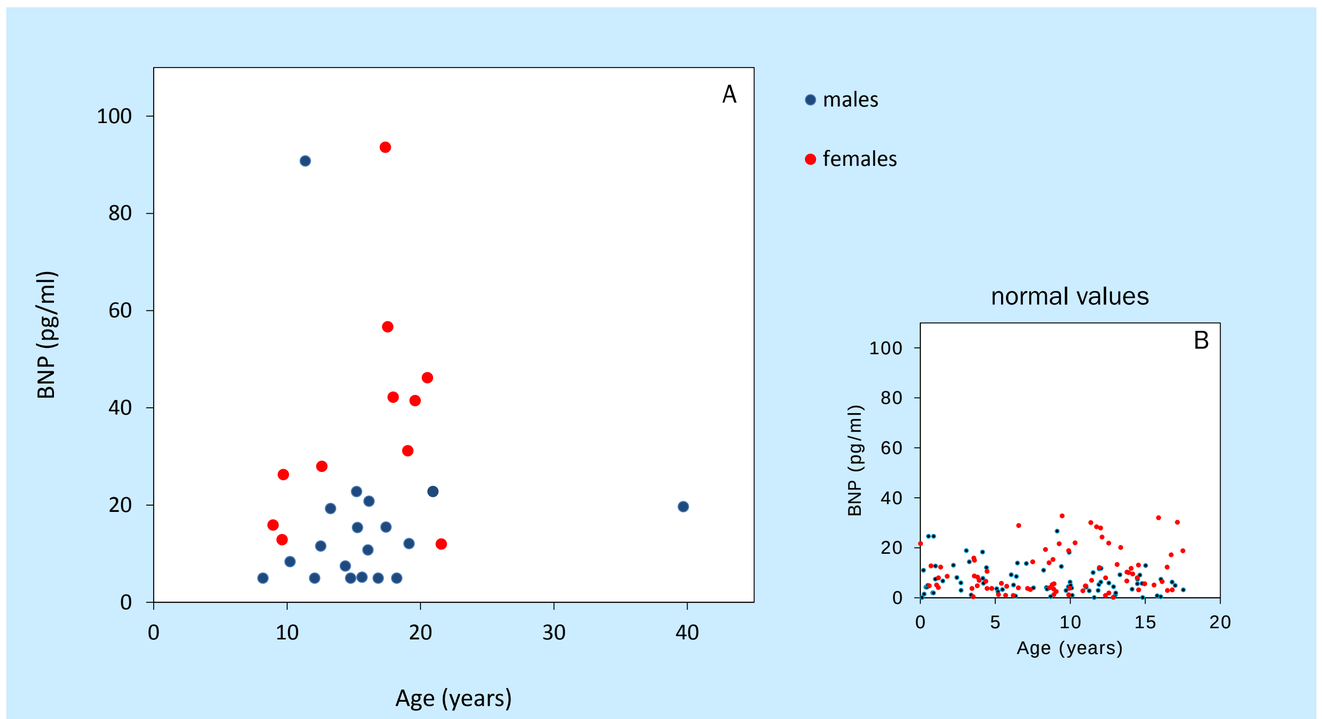

Fig. 1: BNP levels according to age and sex in
(A) 30 patients with repaired tetralogy of Fallot, and (B) in healthy controls.

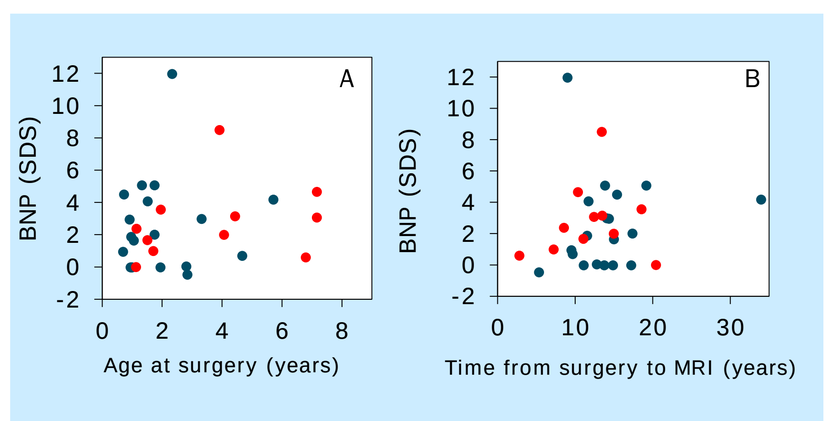

Fig. 2: BNP (z-value) according to
(A) age at surgical repair, and
(B) time interval between surgery and MRI.

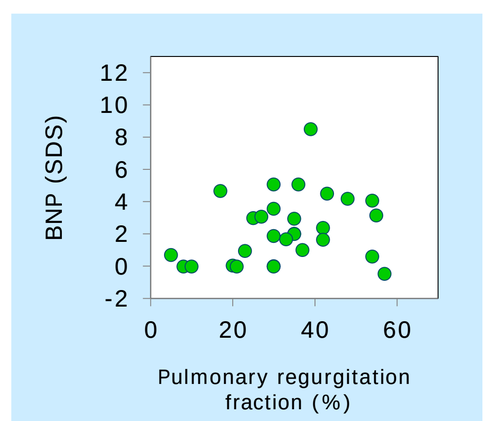

Fig. 3: BNP (z-value) according to pulmonary regurgitation

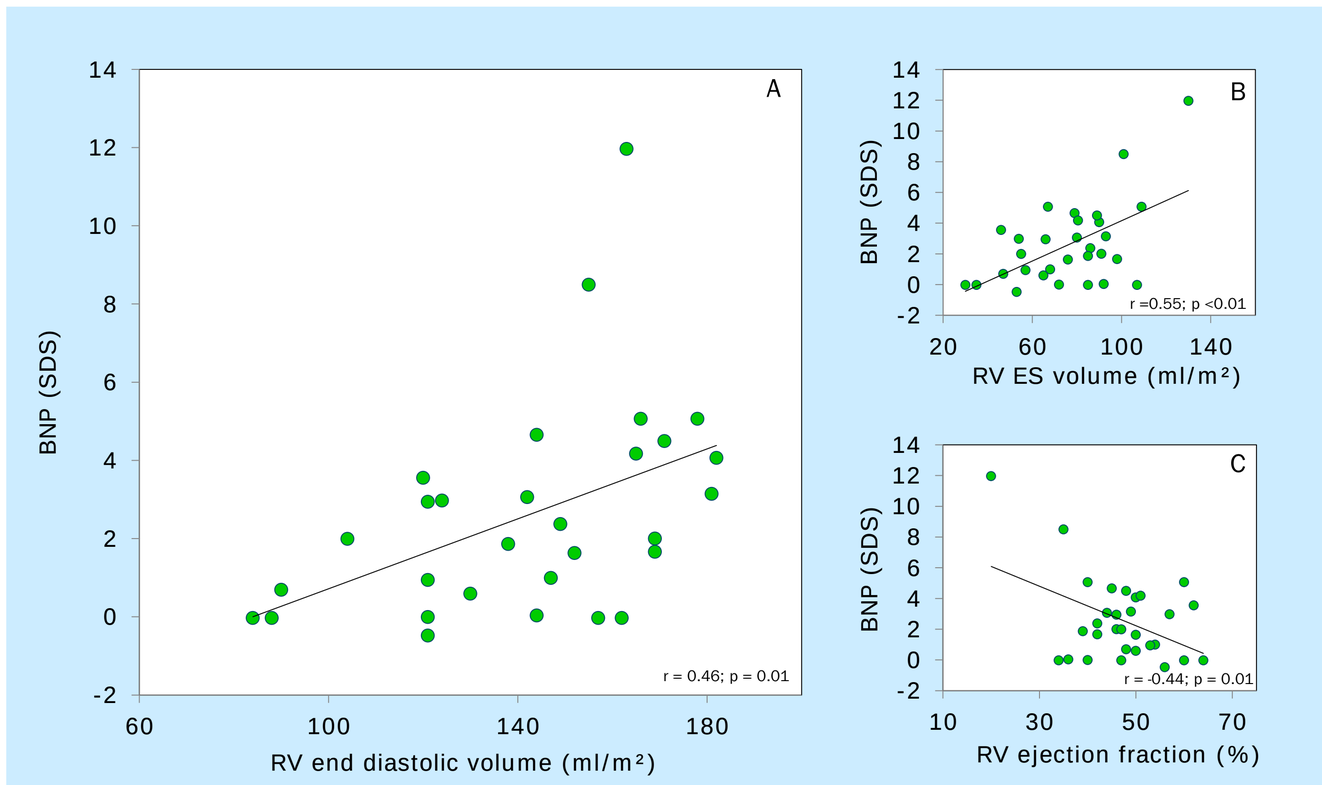

Fig. 4: Correlation between BNP (z-value) and MRI parameters:
RV (A) end diastolic volume, (B) end systolic volume, (C) ejection fraction.

References:
[1] Koch et al., "Plasma levels of B-type natriuretic peptide in patients with tetralogy of Fallot after surgical repair", *Int J Cardiol 2010;143:130-4.* [2] Koch et al., "Normal values of B-type natriuretic peptide in infants, children and adolescents", *Heart 2003;89:875-8.*

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