

The role of NT-proBNP in clinical follow-up of patients with repaired Tetralogy of Fallot

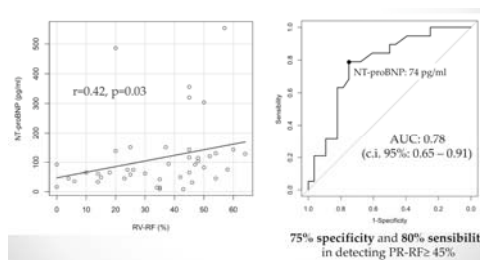
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Introduction: Patients with repaired TOF often develop right ventricle (RV) dilation and dysfunction due to pulmonary regurgitation (PR) or RV outflow tract (RVOT) obstruction and later need pulmonary valve replacement (PVR).

Methods: In order to demonstrate a correlation of NT-proBNP concentrations with clinical status and exercise capacity, we consecutively enrolled repaired TOF patients at the time of a scheduled periodic follow-up visit. All patients underwent complete physical examination, blood testing including NT-proBNP, 12-lead ECG, ambulatory ECG, cardiopulmonary exercise test (CPET) and echocardiography. R statistical software was used for analysis. Since numeric variables were not normally distributed, non-parametric tests were performed.

Results: From September 2017 to October 2018, a total of 51 patients were enrolled. Baseline characteristics of study population are shown in Table 1. NYHA functional class was associated with residual intra-cardiac defects (χ^2 , $p=0.002$), mitral regurgitation (χ^2 , $p=0.008$), and the occurrence of bradyarrhythmias (χ^2 , $p=0.0001$), polymorphic PVCs (χ^2 , $p=0.04$) and non-sustained ventricular tachycardia (χ^2 , $p<0.0001$) at 24h ambulatory ECG. Median NT-proBNP value was 74.0 pg/ml (IQR 44.25 – 130.75; range 8.09 – 2224.0). It showed a significant association with NYHA functional class (Kruskal-Wallis, $p=0.002$). NT-proBNP levels were associated with signs of right chambers enlargement, as they were positively correlated with distal RVOT diameter ($r=0.27$, $p=0.05$) and to RA area z-score ($r=0.65$, $p=0.0001$). Patients with significant PR had significantly higher NT-proBNP values (Mann-Whitney, $p=0.004$). A positive significant correlation was found between NT-proBNP and PR regurgitant fraction (PR-RF) ($r=0.42$, $p=0.03$). NT-proBNP demonstrated good accuracy in predicting the presence of a severe PR (PR-RF $\geq 45\%$): area under the ROC curve was 0.78 (c.i. 95%: 0.65 – 0.91). The best cut-off value was 74.5 pg/ml (75% specificity and 80% sensibility). None of the main CPET parameters had a significant correlation to NT-proBNP. However, the biomarker was positively correlated to the level of desaturation (basal SpO₂ – peak SpO₂) during CPET ($r=-0.35$, $p=0.02$)

Conclusions: NYHA class was associated to the occurrence of bradyarrhythmias and ventricular tachyarrhythmias and with NT-proBNP levels, which were strongly correlated to right chambers enlargement and consistently to PR severity. NT-proBNP determination could contribute to establish the timing of PVR in repaired TOF patients with severe PR.



Age –y	15.1 (10.9 – 21.65)
Male sex – no. (%)	32 (62)
mBT shunt before repair – no. (%)	18 (35.3)
Age at repair - mo	13 (6 – 24)
Type of repair – no. (%)	
Trans-annular patch	30 (58.8)
Infundibular patch	15 (29.4)
RV-to-PA conduit	5 (9.8)
Conservative (trans-pulmonary)	1 (2)
NYHA class – no. (%)	
I	34 (66.7)
II	16 (31.3)
III	1 (2)