Changes in FGF-23 Plasma-levels before and after successful electric cardioversion in patients with persistent atrial fibrillation

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Introduction

The phosphaturic hormone Fibroblast Growth Factor 23 (FGF-23) is a central regulator of phosphate metabolism. Circulating FGF-23 plasma levels, which rise in the course of chronic kidney disease, are associated with an increased risk for cardiovascular disease and mortality. Recent post-hoc analyses of large-scale cohort studies suggest an association between FGF-23 and atrial fibrillation. However, data from prospective trials which are a priori designed to investigate the relationship between FGF-23 and atrial fibrillation are pending. Furthermore, it is presently unknown whether FGF-23 plasma levels decrease after cardioversion from AF into sinus rhythm.

Methods

40 patients admitted for persistent atrial fibrillation were recruited before electric cardioversion into sinus rhythm. Blood samples were taken on the morning before electric cardioversion, three hours after electric cardioversion and on the next morning after electric cardioversion to determine FGF-23 and pro-brain natriuretic peptide (pro-BNP) plasma levels. Additionally, urine samples were attained to measure urinary fractional phosphate excretion on the morning before and on the morning after electric cardioversion.

Results

35 out of 40 patients were converted into sinus rhythm successfully. The remaining five patients who were not successfully converted from AF into sinus rhythm were excluded from further analyses.

Baseline FGF-23 plasma levels were above reference values in the majority of patients.

Three hours after successful electric cardioversion FGF-23 plasma levels tended to decrease, which was succeeded by a return to the baseline levels on the next morning after successful electric cardioversion (**Figure 1**).

In contrast, pro-BNP plasma levels showed a significant decline three hours after successful electric cardioversion, which was even more pronounced on the next morning (**Figure 2**).

Urinary phosphate excretion rose from 19 ± 11 % on the morning before electric cardioversion to 27 ± 26 % on the morning after successful electric cardioversion, but the difference failed to reach statistical significance (p=0.1).

Results

Baseline-characteristics

	N=35
Age (years)	69 ± 12
Sex (male)	26 (74 %)
eGFR (ml/min/1.73 m²)	61 ± 22
BMI (kg/m²)	30 ± 6
Systolic blood pressure (mmHg)	125 ± 20
Diastolic blood pressure (mmHg)	76 ± 11
EF (%)	43 ± 14
LVMI (g/m²)	117 ± 45
LA (mm)	48 ± 6
Calcium (mmol/l)	2.3 ± 0.1
Phosphate (mg/dl)	3.3 ± 0.7
Creatinine (mg/dl)	1.2 ± 0.4
Urea (mg/dl)	46 ± 23
FePi (%)	19 ± 11
C-terminal FGF-23 (rU/ml)	126 [76-331)
NT-proBNP (pg/ml)	2246 (1149-4019)
Current smoker	2 (6)
Diabetes mellitus (%)	11 (31)
Coronary artery disease /%)	15 (43)

Variables are depicted as numbers of patients (percentage), as mean ± SD, or as median (interquartile-range), as appropriate. eGFR: estimated glomerular filtration rate; BMI: body mass index; EF: ejection fraction; LVMI: left-ventricular mass index; LA: left-atrial; FePi: urinary fractional phosphate excretion; NT-proBNP: N-terminal propeptide Brain type natriuretic peptide.

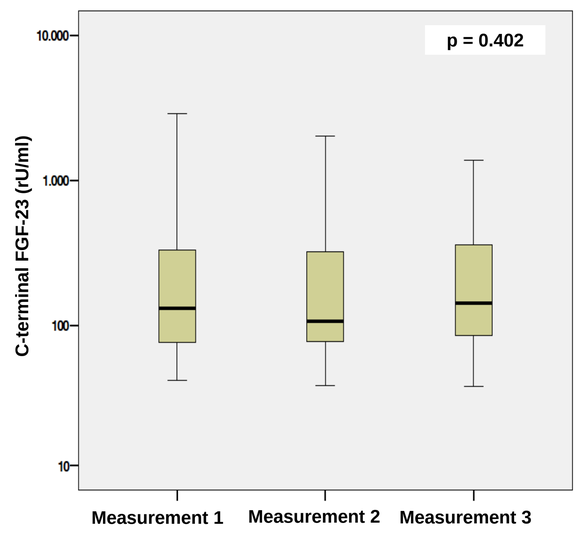

Figure 1: *FGF-23 plasma levels depicted on a logarithmic scale before (measurement 1), three hours after (measurement 2) and on the next morning (measurement 3) after electric cardioversion.*

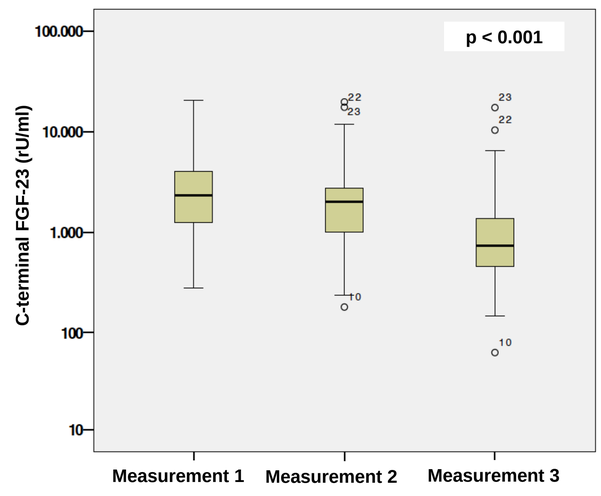

Figure 2: *pro-BNP plasma levels depicted on a logarithmic scale before (measurement 1), three hours after (measurement 2) and on the next morning (measurement 3) after electric cardioversion.*

Conclusions

In contrast to pro-BNP plasma levels, there was no decrease in FGF-23 plasma levels after successful electric cardioversion into sinus rhythm. Interestingly, an opposing increase in urinary fractional phosphate excretion was observed.

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