

Biomarker release after different single shot technologies - CRYO vs PFA

INTRODUCTION



Pulsed-field ablation (PFA) has shown promising data in terms of safety and procedural efficiency for pulmonary vein isolation (PVI), with similar long-term outcomes compared to cryoballoon ablation (CBA) in patients with atrial fibrillation (AF)). Each modality induces distinct biological responses, resulting in varying degrees of tissue injury and inflammation but. (1) This study aimed to determine the extent of myocardial injury and systemic inflammation following PFA and cryoballoon ablation using established biomarker : lactate dehydrogenase (LDH), C-reactive protein (CRP), and high- sensitivity troponin T (hs-cTnT).

METHODS



The study included two groups of patients: group undergoing CBA (N=57) and PFA (N=57). Serum levels of LDH, CRP, and hs-cTnT were measured at baseline and 18-24 hours after the ablation. In addition, NTproBNP levels were measured before and 3 months after the procedure to evaluate indirectly the atrial remodeling and left atrial stiffness.

RESULTS

In both groups, serum levels increased significantly 18-24h after the PVI. In the PFA group the increase was significantly higher when compared to the CBA group for LDH levels (59% vs 16.7%, $p < 0.001$) and CRP (1015 vs. 114%, $p < 0.001$), however there was a lower increase of hs-cTnT (44114 vs. 53505%, $p < 0.001$) in the PFA group. 3 months after the PVI, NTproBNP levels decreased in the PFA group by 10.9% ($p < 0.001$), yet an increase by 25.7% ($p < 0.001$) in the CBA group was observed. Also, differences in pre-post changes between the two groups were statistically significant ($p < 0.001$). The change (Δ) determined as [(post-pre value)/pre value] and presented as % is presented in Figure 1.

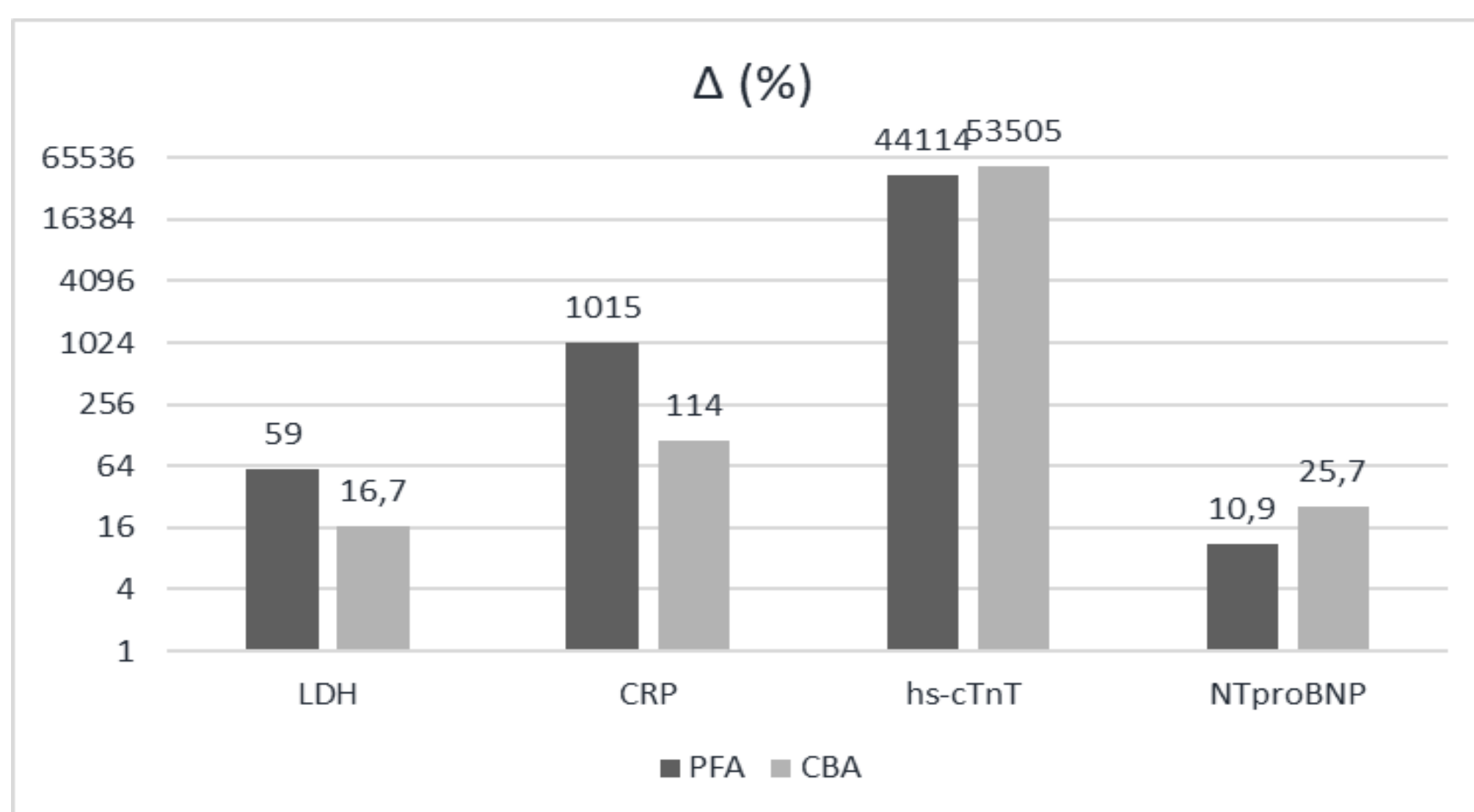


Figure 1. Pre-post changes (%) for a given parameter in the PFA and the CBA group

DISCUSSION

The data demonstrate that both cryoablation and PFA result in significant increases in LDH, CRP, and troponin levels, indicating tissue damage and inflammation. However, PFA leads to a larger increase in LDH and CRP, suggesting a stronger inflammatory and cellular damage response compared to cryoablation. Conversely, both procedures cause profound elevations in troponin, indicative of cardiac injury, but the relative increase is higher in the cryoablation group which can be explained by gradual cell death in cryo group and wider affected area during ablation. Despite signs of higher tissue damage and inflammation in PFA group, the NT-proBNP showed a significant reduction after three months. Further studies are needed to fully understand the clinical implications of these biomarker changes.

