The effect of hypertension and metabolic syndrome on left atrial function in patients with paroxysmal atrial fibrillation undergoing catheter ablation

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Topic(s):
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Citation:
Background: Hypertension and metabolic risk factors are associated with increased risk of atrial fibrillation (AF) and heart failure. Previous studies assessing the efficacy of catheter ablation in patients with metabolic syndrome have shown conflicting data.

Purpose: We thought to assess the impact of hypertension and other metabolic risk factors on left atrial (LA) phasic function in patients with paroxysmal AF undergoing the first catheter ablation.

Methods: We prospectively enrolled 112 consecutive patients (age:63±21 years; 32% female) with symptomatic paroxysmal AF and preserved left ventricular ejection fraction (=50%) undergoing the first catheter ablation during sinus rhythm, and 23 healthy controls. Patients with valvular AF or in AF at the time of ablation were excluded. All patients underwent comprehensive echocardiography at one day pre and at one day post ablation, and after three months. The LA reservoir, conduit and contractile strain and strain rate (SR) were assessed using the two-dimensional speckle tracking echocardiography as average of segmental values in apical views.

Results: A total of 51 (45.5%) patients had history of treated hypertension while 61 (54.5%) patients had normal arterial blood pressure, and 27 (24.1 %) patients of hypertensive group and 17 (15.1%) patients of normotensive group have dyslipidemia and/or diabetes. All groups of patients had been adjusted by age and sex. Pre-ablation, hypertensive patients with metabolic risk factors showed significantly lower magnitude of reservoir and contractile strain and SR compared with other groups of patients (all p<0.05). Hypertensive patients compared with normotensive patients had significantly increase in LA volume index (39±1% vs. 34±7%, p:0.01) and decrease in LA emptying fraction (49.5±11% vs. 54.8±9.8%, p:0.02). Post-ablation, LA strain and SR significantly decreased in all patients regardless of the history of hypertension or other metabolic risk factors (all p<0.05). At three-month follow-up, LA strain and SR showed almost complete recovery to pre-ablation values in both groups of patients. Yet, LA function in groups of patients with metabolic risk factors remained lower compared with individuals without risk factors. Of note, hypertensive individuals showed similar improvement of LA contractile function to normotensive patients (p:0.4) but LA reservoir function remained to be lower (p<0.05) (figure 1,2). The intra- and the inter-observer variability for the LAS and LASR assessment were below 5% and significantly lower (p<0.05) than that of the conventional LA indices.

Conclusion: Both reservoir and contractile LA strain are simultaneously affected by dyslipidemia and/or diabetes. LA reservoir function is affected earlier in hypertensive patients than contractile function. Reservoir LA strain appears to be the most useful parameter to monitor LA function in hypertensive patients with/without metabolic risk factors.
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Figure 1: figure showing the value and time course of LA reservoir and contractile strain (pre-ca, post-ca and at 3m FU) for 4 groups of hypertensive and normotensive patients with/without metabolic risk factors:

Figure 2: figures (A,B) showing the value and time course of LA reservoir strain (pre-ca, post-ca and at 3m FU) for both groups of hypertensive and normotensive patients: