Editorial

What can we use to predict late recurrence after catheter ablation of atrial fibrillation?

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Catheter ablation (CA) is much more effective in reducing symptoms and rhythm control compared to anti-arrhythmic drugs and recommended as a first-line treatment for patients with symptomatic atrial fibrillation (AF) [1]. In spite of the ever-increasing evidences on benefits of CA, AF recurrence is common post CA and fewer AF patients are willing to accept ablation treatment in the clinical practice, which need to be taken consideration by the physicians before making the decision. Many clinical diseases or factors such as hypertension, type 2 diabetes mellitus, untreated obstructive sleep apnea, metabolic syndrome, chronic kidney disease, AF type, enlarged left atrium, early recurrence post ablation even female sex, have been identified as risk factors for AF recurrence post CA [2]. As reported by different studies, which risk factor should be used to make the clinical decision remains hard choice.

Up to nine clinical scoring systems, which combining with several risk factors have been derived or validated with mild or modest predictive value for AF recurrence post CA. Among these scoring systems, the CHA_2DS_2-VASc, $CHADS_2$, HATCH and DR-FLASH [3] score were firstly derived to predict stoke, AF progression or low voltage area of left atrium respectively. Of other five scores, including the ALARMEc score [4] (AF type, left atrial size, renal insufficiency, metabolic syndrome and cardiomyopathy), the APPLE score [5] (age, impaired eGFR, AF type, left atrial dimeter (LAD) and left ventricular ejective fraction), the CAAP-AF score [6] (coronary artery disease, LAD, age, persistent AF, number of antiarrhythmic drugs failed and female sex), the BASE-AF_2 score [7] (body mass index, atrial dilatation, current smoking, early recurrence (ER), duration of AF and AF type), and the MB-LATER score [8] (male sex, bundle branch block (BBB), LAD, AF type and ER), which were derived to predict the arrhythmia recurrence by different

derived cohorts, before the study discusses below, only the APPLE score was validated in external ablation cohort.

In the current issue of *International Journal of Cardiology*, Potpara et al. [9] validated a modest predictive value of the MB-LATER score for late recurrence of AF (LRAF) post CA in a historical cohort. It is the first time that the MB-LATER score was validated in an external cohort. The MB-LATER score derived from a cohort without recurrence within 12 months post CA and was validated with modest predictive value of recurrence 12 months later after the procedure (very late recurrence, VLRAF). In Potpara's study, the MB-LATER score was validated with predictive value of recurrence post the blank period. Nevertheless, not all risk factors included in the MB-LATER score like male gender was predictor of LRAF in Potpara's cohort. Under multivariate Cox regression analysis, female gender rather than male had predictive probability in this validation study. Highlights of Potpara's study is that the use of variables based on the MB-LATER score should help in the risk communication to patients of consideration for ablation, ablation decision making and treatment decision post ablation. As mentioned in the limitation section of the original article, the validation study was conducted in a small historical cohort and AF episode might be missed due to the limited screening device used in their study.

There were two other validation studies on the MB-LATER score published or accepted after Potpara et al.'s study. Similar to the result of Potpara's, both of these two studies demonstrated mild or modest predictive probability of the MB-LATER score for LRAF. (see Table 1). Additionally, our previous study [10] found that male gender was not risk factor of LRAF. A similar finding was also arguing in Kornej et al.'s [3] study. We noticed that there were fifteen of twenty patients with VLRAF were male in the small derivation cohort ($n = 133$) of the MB-LATER score. High proportion of male gender among patients with VLRAF made male gender presenting high risk for recurrence (HR 3.37, CI 1.12–10.12, $P < 0.01$). In our study, BBB was not risk factors either. There were only five patients with BBB in the derivation cohort, and recurrence occurred in three of them which made patients with BBB have over six-fold risk for VLRAF than those without BBB. Predictive probability of variables composed of the MB-LATER score should be limited by the characteristics of derivation cohort. Thus, modest or at least mild predictive value for LRAF post CA of the MB-LATER score has been validated in Potpara et al.'s and other three studies, however several aspects still require emphasis on this scoring system. Firstly, more validation studies based on different cohorts from different countries and ethnics need to be conducted to acquire more supporting evidence;

Table 1
Studies on the MB-LATER score[*].

Characteristics/studies	Mujovic et al. [8]	Potpara et al. [9]	Deng et al. [10]	Kornej et al. [3]
Ablation year	2012–2015	2003–2015	2011–2015	2007–2011
Enrolled patients (n)	133	226	1410	873
Mean age (years)	56.9	58.5	57.2	61
Male (%)	63.9	72.1	68	39
PAF (%)	69.2	62.8	77.2	61
Mean follow-up (months)	29.1	24	20.7	Not mentioned
Recurrent rate (%)	31.1	58.8	25.9	34
Predictive endpoint	VLRAF	LRAF	LRAF	LRAF
Compared scores	6	3	6	3
Comparing result	Best	Better	Best	Not mentioned
Ablation strategy	Stepwise	Stepwise	Stepwise	Stepwise
AUC/c index	0.78	0.62	0.73	0.58
P value of AUC	<0.01	<0.01	<0.01	<0.01

VLRAF, very late recurrence of AF; LRAF, late recurrence of AF.

[*] Current study.

Secondly, evidence of the MB-LATER were acquired from retrospectively studies so far, thus some prospectively designed multicentric cohort studies need to be carried out to reveal the predictive value; Thirdly, as demonstrated above, some variables should be substituted. Variables consist of the scoring systems were usually clinical disease or disorders, but there were some variables which strongly associated with the substrate of left atrium should be taken into consideration. Low voltage area of atrium (LVA) was a good predictor of LRAF according to Kornej et al.'s studies, since measurement of LVA seems to be complicated and time wasting during the procedure that could hardly be used in busy center during clinical practice. Combination of ablation strategies such as pulmonary veins isolation with or without additional linear ablation as well as some biomarkers like NTproBNP are relatively workable, thus might be better option.

Compared to the ALARMEc, APPLE, BASE-AF$_2$ and CAAP-AF score, the MB-LATER score is the most validated scoring system so far. Since variables of the MB-LATER score were simple and easily acquired clinical factors, it could be conveniently used by physicians when working in the clinics.

In summary, Potpara et al. first time validated the modest predictive ability for LRAF post CA of the MB-LATER score in an external historical cohort. More validation studies especially those prospective multicentric ones need to be performed to prove and modify the scoring systems. As a good beginning, the job of Potpara et al.'s should turn the "maybe later" into "maybe better".

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Conflict of interest

The authors report no relationships that could be construed as a conflict of interest.

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