Catheter Ablation for Atrial Fibrillation in the Real World
– Insights From the J-CARAF Registry –
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Epidemiologic studies from within and outside Japan have consistently shown that atrial fibrillation (AF) is the most prevalent cardiac arrhythmia in humans, with an incidence that is rising in epidemic proportions. The estimated number of Japanese adults with AF has doubled from 1980 to 2000 and is projected to increase further, afflicting nearly 1 million by 2030. The association of aging with AF incidence is contextually important because Japan, together with many developed countries, has a rapidly aging population. AF-associated stroke, heart failure and increased all-cause mortality are well appreciated in Japan and North America. Catheter ablation (CA) for AF has also evolved significantly over the past decade in parallel with increased understanding of the AF mechanism, and improvements in imaging, mapping, and ablation technology. CA is now a Class I recommendation for drug-refractory AF as acknowledged by the Heart Rhythm Society. As expected, CA has been applied to a broadened range of patient categories in real-world practice. Indeed, temporal trends from the USA and Australia show an exponential increase in catheter ablation for AF (Figure). As the field continues to evolve, the onus is on scientific societies to ensure that the general trend toward increasing safety and efficacy of the procedure is matched by greater transparency of procedural approach and rigor in assessing outcomes. Thus, the study by Inoue et al in this edition of the Journal is a welcome and important contribution initiated by the Japanese Heart Rhythm Society (JHRS) in describing the performance and safety of AF ablation in Japan. The careful approach to the survey is also reflected in the excellent results presented.
The present report is based on 3,373 cases comprising the Japanese Catheter Ablation Registry of AF (J-CARAF), which is constructed on the basis of voluntarily submitted data through online questionnaires completed for the months of September 2011 (1st survey), March 2012 (2nd survey) and September 2012 (3rd survey). Patients’ demographics, acute complications and post-procedural management are presented and compared for the data collected at these 3 time points. As expected, the typical patient in the registry is a middle-aged man (mean age, 62 years), with preserved ejection fraction, relatively low thromboembolic risk (CHADS2:VASc score 1.7) and mild left atrial dilatation. Approximately two-thirds of all the patients had paroxysmal AF (PAF), 22% had persistent and 14% had longstanding persistent AF (PeAF). In the context of published guidelines and recent studies, the authors observed:

1. an increase in the number of patients undergoing ablation who had not previously tried antiarrhythmic drugs (AADs)
2. an increasing number of CA procedures on PAF patients with infrequent AF episodes
3. a relatively high proportion of patient undergoing atrial substrate modification (77%) in addition to pulmonary vein isolation (PVI) in a predominantly paroxysmal AF population. This was predominantly CTI and LA linear ablation, the latter decreasing over the study period. CFAE ablation was infrequently used.
4. declining use of vitamin K antagonists (VKA) and increasing use of novel oral anticoagulants (OAC).

The widening of the indications for AF ablation observed in the current report are consistent with those reported by a large North American AF ablation center, which found that from 1999 to 2005, referred patients increased in mean age, were more likely to have persistent AF and failed fewer AADs prior to referral. In general, this modest increase in the target population in the J-CARAF registry reflects the increasing acceptance of AF ablation as an effective intervention in the appropriate patient population.

The rising number of patients undergoing CA without prior AAD therapy is noteworthy and likely reflects the increasing recognition of the superiority of ablation over AADs in terms of symptomatic AF-free survival and improvement in quality of life. Many patients now express a strong preference for CA as a first-line strategy. However, although this approach is recognized in guidelines, it is important to emphasize the caveat that AF ablation should only be performed as a first-line procedure in appropriately experienced departments. In this context, it is worth noting that over the study period, the median number of AF ablations per month increased to 6, with lower and upper quartiles of 3 and 13, respectively. Although this increase is laudable, it may be argued that there are still many centers performing a relatively small number of procedures with potential implications for efficacy and complication rates. In addition, consideration of CA as a first-line approach should be placed in the context of a recent randomized study comparing AF ablation with AADs in AAD-naïve patients, which demonstrated no difference in AF burden until 24 months when evidence of ablation’s superiority emerged.

In the J-CARAF registry, a high proportion of patients (48%) underwent substrate modification in addition to PVI. A wide range of approaches was used, with the most common being linear ablation. There was also a high rate (57%) of adjunction cavotricuspid isthmus (CTI) ablation performed empirically without necessarily having a clinical history of this arrhythmia. Although this approach must be viewed as empirical, more evidence for the utility of adjunctive CTI ablation may emerge when outcome data from this cohort are reported.

The data showing the range of real-world approaches to CA no doubt reflect the ongoing uncertainty in the field as to the mechanism of non-paroxysmal AF and of how best to proceed when PVI alone proves unsuccessful. The data underscore the need for further work in these areas. One may speculate that in the near future we may see an increase in the use of rotor-directed ablation.

It is also interesting to note that AF inducibility was used as an endpoint in a large proportion of patients, reflecting early data that non-inducibility was associated with greater AF free survival. However, the significance of AF inducibility post ablation remains controversial and sustained AF is not uncommonly induced in patients with neither structural heart disease nor clinical AF. Indeed, the incidence of inducible AF varies according to the method of induction and increases with more aggressive protocols.

The universal performance of CA under conscious sedation rather than general anesthesia can be appreciated, given the lower cost of equipment, reduced need for medical personnel, the potential for reduced procedure time and more rapid laboratory turnover. The use of general anesthesia vs. conscious sedation varies by geographic location and ultimately depends on local preferences and availability. There are some preliminary data suggesting that general anesthesia may provide greater catheter stability and contact force, and increase the single procedure success rate.

The increasing use of novel OAC, as realized by this report, is inevitable as physicians move away from the inconvenience of frequent monitoring and dose adjustments, dietary restrictions, and the delayed and prolonged effects of VKA in preference to the novel OAC with more predictable pharmacokinetics and pharmacodynamics. Emerging data support the safety and efficacy of these agents at the time of CA procedures. Although many reports withheld the novel OAC for 1–2 doses pre- ablation, a recent report observed that uninterrupted rivaroxaban was as safe and efficacious as uninterrupted warfarin in preventing bleeding and thromboembolic events during AF ablation. In the current registry, there was no increase in hemorrhagic complications over the 3 surveys despite the increasing utilization of new OACs. Indeed, complication rates declined through the 3 time points in the study (6.8%, 3.28%, 4.2%), with absolute numbers and trends consistent with prior reports. There were no observed deaths and incidence of atrioesophageal fistula was rare (0.1%).

A number of inherent limitations of the report should be noted. As with all published ablation registries, the survey is by voluntary submission. As conducted over 1 year alone, it is difficult to estimate with surety the temporal trends in procedural numbers. Further, low-volume centers may not have reported potentially affecting outcome and complication data. The retrospective nature of the survey may introduce selection bias.

The survey importantly allows focus on potential areas for improvement. For example, fluoroscopy times were still quite long and should be reduced in order to reduce radiation exposure to both patients and physicians.

The JHRS, co-authors and all contributors to the J-CARAF ought to be highly commended for a collaborative national effort that embodies the ethos of improving patient care. Registries such as this will improve the transparency, rigor and consistency of scientific reporting of the procedural approach, complications and outcomes of AF ablation and portray AF man-
agement in the real world setting. The report also highlights key controversies and gaps in the scientific literature that ultimately lead to refinement of the procedure and improved patient care. The rest of the world should follow suit in setting up such comprehensive registries as an adjunct to the performance of randomized controlled studies.

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