Catheter ablation of the pulmonary veins has become an important treatment for atrial fibrillation (AF), with a growing body of clinical evidence demonstrating its superiority over antiarrhythmic drug therapy. However, ablation outcomes remain suboptimal, leading to the identification of new anatomical targets for ablation. In addition, technological developments have improved clinical outcomes. In this expert interview, Erik Wissner of the University of Illinois at Chicago, Illinois, discusses recent advances in catheter ablation of AF.

Q: What is the impact of contact force on procedural outcomes in catheter ablation of AF?

Ablation catheters incorporating real-time contact force sensing technology have found widespread use in clinical practice, albeit mixed results from clinical trials. Using additional information such as total duration of contact force applied during a single lesion (force-time integral [FTI]) or multiplying the FTI by the energy (power) delivered (ablation index) may result in more durable lesions.\(^1\) Frequent repositioning of the catheter to non-contiguous locations during circular point-by-point ablation should be avoided. The operator should strive to create contiguous lesions and apply sufficient contact force throughout the duration of energy delivery in order to reduce time to acute pulmonary vein isolation (PVI) and improve long-term patient outcome.

Q: What (if any) proven indications exist for rotor ablation in AF?

Observational studies from a small number of centres have shown evidence of rotors in patients with AF using invasive mapping.\(^2\) Targeting rotors during ablation improved acute and long-term clinical outcomes. However, other centres were unable to replicate these findings. In addition, rotational activity within the right and left atrium can be seen using non-invasive mapping systems. Whether these findings support the existence of rotors or are purely mathematically derived phenomena is unclear. At present, non-invasive and invasive rotor mapping and ablation remain investigational and their routine clinical use is not supported by evidence from randomised trials.

Q: What is the benefit of adding ablation of the autonomic ganglia to standard PVI procedures?

The intrinsic cardiac autonomic system plays a critical role in the initiation and maintenance of AF. Targeting epicardial ganglionic plexi (GP) during ablation may reduce the recurrence of AF. However, no benefit was demonstrated in a randomised trial evaluating thoracoscopic GP ablation in addition to PVI.\(^3\) During percutaneous PVI, GPs may fortuitously be ablated as inferred by a vigorous vagal response resulting in significant bradycardia or transient asystole. Dedicated mapping of autonomic ganglia is not commonly performed and further research is needed before adding GP ablation to standard PVI.
Q: In what situation should high-density mapping be employed?

High-density mapping may be performed using conventional single-tip catheters. However, multi-electrode mapping catheters acquire a higher number of points over a shorter period of time, often with higher density depending on electrode size and spacing. High-density mapping systems can automate the mapping process, acquiring thousands of points within minutes. High-density maps are probably not essential for the diagnosis and treatment of simple tachycardias but offer profound advantages in complex tachycardias for accurate delineation of the extent of scar, the scar border zone and critical portions of the tachycardia circuit.