

The impact of novel multi-array catheters on procedure time and outcome for ablation of atrial fibrillation

S.A. James, E.J. Shepherd, S.A. Gall, K.E. Neville-Smith, S.S. Furniss, S.W. Lord, and J.P. Bourke

Freeman Hospital, New Castle upon Tyne, UK

Aims: Pulmonary vein isolation (PVI)/left atrial ablation using standard radiofrequency ablation and non-fluoroscopic mapping systems remains a time-consuming and lengthy procedure, with variable success rates. We describe our early experience using the novel decapolar circumlinear catheter (PVAC, Ablation Frontiers Inc.) using duty cycled bipolar–unipolar radiofrequency energy, and its impact on procedure/fluoroscopy time.

Methods and results: Sixty-five consecutive patients mean age 52 years (range 31–69) with a minimum follow-up of 6 months were included in this data analysis. All had a history of drug refractory atrial fibrillation (AF). All patients underwent PVI for paroxysmal ($n = 48$) or persistent ($n = 17$) AF. Additional ablation to sites of complex fractionation in either atrium was performed in 31 cases. All patients were followed up with outpatient review and 7 day Holter monitoring. Recurrence of AF was defined as AF on ECG or Holter or recurrence of previous symptoms. Mean procedure and fluoroscopy times using conventional ablation techniques (irrigated tip ablation catheter, computer mapping system, and PVI using circumferential ablation), in 100 consecutive patients were 208 min (range 100–295) and 48 min (range 19–69), respectively. Mean procedure time using PVAC was significantly shorter at 165 min (range 82–270), $P = 0.0000008$, with a fluoroscopy time of 42 min (range 14–75), $P > 0.05$. All identified veins were successfully disconnected at their ostia in 61 cases (94%). One patient developed cardiac tamponade during the procedure requiring pericardiocentesis. In four cases, the PVAC catheter tip became unusable, and a conventional irrigated 4 mm tip ablation catheter was required to complete electrical disconnection. Four patients developed left atrial flutter post-procedure and one required further catheter ablation.

Acute success (sinus rhythm at the end of procedure and disconnection of all identified veins) was achieved in 64 patients. During mean follow-up of 9.1 months (range 6–14), 57 patients (88%) have been free of AF. Recurrences of AF occurred in eight patients (12%).

Conclusion: Pulmonary vein isolation/left atrial ablation using PVAC and duty cycled bipolar–unipolar RF energy is safe and results in high acute success and low AF recurrence rates during medium term follow-up. PVAC significantly reduces procedure time and suggested a trend towards reduced fluoroscopy time, when compared with conventional map guided point by point PVI. The PVAC catheter is a genuine advance in AF-ablation technology.

http://europace.oxfordjournals.org/cgi/reprint/10/suppl_2/ii1

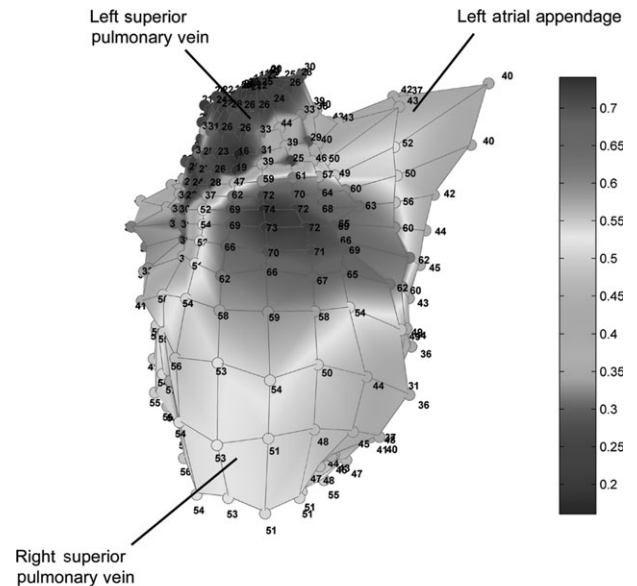
Successful ablation of long-lasting persistent atrial fibrillation targeting organized activation without pulmonary vein disconnection

J.W.E. Jarman, T. Wong, H. Spohr, P. Kojdjojo, J.E. Davies, O.R. Segal, P. Kanagaratnam, D.P. Francis, D.W. Davies, V. Markides, and N.S. Peters

St Mary's Hospital and Imperial College, UK

Aims: Stable micro re-entrant drivers have been implicated in maintaining persistent atrial fibrillation (AF) but are difficult to map in humans. Regions of high-frequency left atrial activation have previously been supposed to harbour such drivers and been used as targets for AF ablation therapy with moderate success. Our group has systematically mapped high-frequency left atrial activation and shown it to be a spatiotemporally unstable phenomenon with poor reproducibility between maps created in successive time periods. In contrast, we found that regions of highly organized activation remained spatiotemporally stable, and additionally, we found greater stability of activation frequency in such regions. As all of these properties might be expected in areas where stable drivers are present, we hypothesized that ablation at sites of highly organized activation would result in successful therapy of persistent AF without requiring additional pulmonary vein isolation. We tested this hypothesis in a small pilot study.

Methods and results: Patients attending for AF ablation who had not had previous left atrial ablation underwent non-contact mapping of the left atrium. We applied novel and patented software to 30 s non-contact mapping signals during persistent AF at 256 left atrial sites to subtract far-field ventricular noise and Fourier transform the remaining atrial signals. The resultant power frequency spectra were used to calculate an organizational index at each site as the ratio of the power of the dominant frequency and its harmonics to the total power of the spectrum. Regions of highest organizational index were ablated in a step-wise manner using successive organizational index maps. Pulmonary vein isolation was not performed. Five patients [mean age 55 years (range 31–71)] with long-lasting persistent AF [mean duration 6.9 years (range 4.9–10.8)] were treated. There were no procedural complications. Primary outcome was sinus rhythm at 6 months, assessed by symptoms and Holter monitoring. Secondary outcome was sinus rhythm at discharge the day after ablation. Three patients (60%) achieved the primary outcome and five (100%) achieved the secondary outcome. Both patients who failed the primary outcome were found to be in persistent AF at 6 months. When one attended for re-do ablation, pulmonary vein tachycardia was seen.



ORGANISATIONAL INDEX MAP OF THE LEFT ATRIUM

Conclusion: This pilot study achieved short- and long-term outcomes comparable with those seen with the real-world use of conventional AF ablation techniques, despite using a novel technique without additional pulmonary vein isolation. In view of these promising results, we are now organizing a full-scale trial which will combine our technique with pulmonary vein isolation.