The ET-GP Study: Ablation of Ectopy-Triggering Ganglionated-Plexi without pulmonary vein isolation as a therapy for Paroxysmal Atrial Fibrillation

Belinda Sandler, Markus Sikkel, Min-Young Kim, Fu Siong Ng, Ian Mann, Hanney Gonna, Amy Roberts, Martic D, Michael Koa-Wing, Norman Qureshi, Zachary Whinnett, Wyn Davies, Nichols Peters, Nick Linton, Boon Lim, Prapa Kanagaratnam
Ablation abolishes neural responses

Figure from Scherlag et al. Electrical Stimulation to Identify Neural Elements on the Heart: Their Role in Atrial Fibrillation. JICE 2005. Aug;13 Suppl 1:37-42
What do we know about GP ablations?

Anatomic Approach for Ganglionic Plexi Ablation in Patients With Paroxysmal Atrial Fibrillation

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Ganglion Plexus Ablation in Advanced Atrial Fibrillation

The AFACT Study

Antoine H.G. Driessen, MD, Wouter R. Berger, MD, Sébastien P.J. Krul, MD, Nicoline W.E. van den Berg, MD, Jolien Neefs, MD, Femke R. Piersma, RN, Dean R.P.P. Chan Pin Yin, MD, Jonas S.S.G. de Jong, MD, PhD, WimJan P. van Boven, MD, PhD, Joris R. de Groot, MD, PhD
A different approach to selectively identifying GPs

Lim JCE 2011
Can ET-GP ablation be an alternative approach to PVI in PAF patients?
Methods

Single-centre, double blinded, prospective study of PAF patients indicated for AF ablation

Patients randomised to PVI vs ET-GP ablation

Inclusion criteria

• 18-85yrs old, good LVSF, <5cm LA diameter, no stroke in the past 6 months, no significant CAD

Exclusion criteria

• On amiodarone

Patients stopped all AADs 48hours prior to their scheduled ablation
GP ablation workflow

- **GA induction + TOE**
- **TSP -> 3D CARTO mapping of left atrium**
- **HFS mapping of the whole of left atrium**
- **Tag both +ve and –ve responses to HFS on CARTO geometry**

Pace for at least 4 beats to ensure no V capture. HFS at 40Hz, 14V, 20ms delay from pacing spike to ensure HFS is delivered within the atrial refractory period.

A positive response to HFS was called ectopy-triggering GP site (ET-GP).
Green = ET-GP
Purple = HFS-ve
White = Phrenic capture
Follow-up

- Post 90-day blanking period, 48 hour Holter monitors and symptom assessment at 3, 6, 9, 12 months post ablation.

- Primary endpoint = >30s documented atrial arrhythmia or booked for redo AF ablation

- Redo ablation offered after 6 months
Variable ET-GP sites between patients
Sustained AF triggered by HFS at ET-GP site

Ventricular signal from atrial pacing

Ectopy

Sustained AF
After ablation at this site, no further arrhythmia inducible
Success with ET-GP ablation

No AF/AT at 365 days

Follow up time - 365 days

Sites tested - 131

ET-GP sites - 6

Ablation points - 12

- ET-GP site
- Tested site
- Map led ectopy
- Ablation site
- More ablation on retesting
Success with ET-GP ablation

No AF/AT at 365 days

Follow up time - 365 day

Sites tested - 74

Positive sites - 19

Ablation points - 23

- ET-GP site
- Tested site
- Map led ectopy
- Ablation site
- more ablation on retesting
Recurrent AF after ET-GP ablation

AF recurrence 168 days post procedure

ET-GP sites 21
Sites tested 40
Ablation Points 18

GP sites rechecked and then PVI performed

Insufficient mapping

ET-GP site
Tested site
Ablation
Atrial Tachycardia after ET-GP ablation

ET-GP sites- 30
Sites tested- 64
Ablation points- 44

Sustained AT 218 days post procedure

Roof dependent AT using LAT map but unable to terminate with CPVA and conventional roof line

Ripple mapping revealed critical isthmus on anterior wall, ablation terminated tachycardia.
Results

- 67 patients recruited.

- 39 randomised to ET-GP ablation
  - 27 patients had ET-GP ablation alone
  - 8 crossed over to PVI due to incessant AF in early stages
  - 4 patients had both ET-GP and AVD-GP ablations

- 28 randomised to PVI
  - 36 received PVI including cross-overs.

- The groups were comparable for demographics including age, sex, and CHADVASC scores.
Results

- On average, $101 \pm 20$ sites were tested with HFS in and $23 \pm 6$ ET-GP sites were ablated.
- All PVs were still electrically connected at the end of the ET-GP procedures.
Results

- GP ablation arm – success at 12 month f/u = 16/31 (52%)
- PVI arm – success at 12 month f/u = 20/36 (56%)  
\( p=0.75 \)
- GP ablation no. of redos up to 1760 days post procedure = 15 (48%)
- PVI no. of redos up to 1760 days post procedure = 11 (31%)

<table>
<thead>
<tr>
<th>Randomisation</th>
<th>AT ablation</th>
<th>PVI + AT ablation</th>
<th>CTI line for AFL</th>
<th>Empirical CTI line, no AFL on the day</th>
<th>PVI only</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP ablation (n=31)</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>PVI (n=36)</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>
ET-GP ablation used less RF energy than PVI (22 ±15 kWs vs 54 ±21 kWs, p<0.01).

Similar procedure times (3.8 ±0.8hrs (ET-GP) vs 3.4 ±0.7hrs (PVI), p=0.17).
Complications

PVI group
(i) groin haematoma. Conservative management.

GP group
(i) Phrenic nerve palsy resolved 1 day post procedure.
(ii) Incidental aortic root enlargement at pre-op toe - Root replacement 17/06/15
(iii) stroke 5months post ablation;
Pt had stroke 1 year pre ablation
At 5/12 post ablation developed r sided weakness (4/5) and speech disturbance.
Symptoms resolving by day 2 but fully resolved by day 7
inr sub-therapeutic
Similar symptoms to first stroke but less severe.
Conclusion

• Compelling evidence that the ANS is important in initiation and maintenance of AF in humans

• It may be that “inadvertent” autonomic ablation already occurs during standard WACA procedures.

• ET-GP ablation without pulmonary vein isolation is able to prevent AF with similar efficacy but less RF than conventional PVI.

• A larger randomised multicentre clinical trial is currently under way to further investigate ET-GP ablation vs PVI in PAF patients.