B-LBCT04
Late-Breaking Science

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B-LBCT04 -01
SINUS NODE-SPARING HYBRID THORACOSCOPIC ABLATION OUTCOMES IN PATIENTS WITH INAPPROPRIATE SINUS TACHYCARDIA (SUSRUTA-IST REGISTRY)

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Introduction: Inappropriate sinus tachycardia (IST) affects productive young adults causing significant negative impact on the physical and psychosocial facets of their lives. Medical therapy remains suboptimal. Radiofrequency sinus node (RF-SN) ablation has poor success and higher complication rates. We compared clinical outcomes of a novel SN sparing hybrid ablation technique versus conventional RF-SN modification for IST management in drug refractory or intolerant patients.

Methods: In a multicenter, prospective registry comparing SN sparing hybrid ablation strategy versus RF-SN. The hybrid procedure involves through video assisted thoracoscopy using an RF bipolar clamp, isolating superior vena cava, inferior vena cava and crista terminalis, while sparing the SN (identified by 3D mapping and Methylene Blue marking) epicardially plus touching up gaps endocardially with RF catheter. RF-SN modification was performed by endocardial and or epicardial mapping and ablation at the site of earliest atrial activation starting at the lower half of the SN.

Applications: Of the 100 patients (hybrid: 50, RF-SN: 50), the mean age was 22.8 years and 82% were women. Normal sinus rhythm and rate was restored in all patients in hybrid group (vs. 84% in RF-SN group, p=0.006). Hybrid group underwent a total of 54 procedures whereas RF-SN group had a total of 124 procedures with all of them requiring 2 or more procedures. The outcomes of the procedure are shown in the figure.

Next Steps/Future: The novel sinus node sparing hybrid ablation appears to be more efficacious and safer in patients with symptomatic drug-resistant IST with long-term durability compared to the RF-SN ablation. A larger multi-center experience will help to confirm our findings and finetuning the technique.

B-LBCT04 -02
LEFT BUNDLE BRANCH OPTIMIZED CARDIAC RESYNCHRONIZATION THERAPY (LOT-CRT): RESULTS FROM INTERNATIONAL LBBAP COLLABORATIVE STUDY GROUP

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Introduction: Cardiac resynchronization therapy (CRT) based on conventional biventricular (BiV) pacing often results in broad paced QRS and suboptimal clinical response. The aim of the study was to assess the feasibility and outcomes of CRT based on left bundle branch area pacing (LBBAP; in lieu of right ventricular lead) combined with coronary venous left ventricular pacing (CVP) in an international multicenter study.

Methods: LOT-CRT was attempted in patients with CRT indications at 9 international centers. Addition of CVP lead or LBB lead was at the discretion of the implanting physician guided by suboptimal LBBAP or BiV QRS, respectively, or on clinical grounds. To achieve LBBAP, a 3830 lead and deep septal deployment technique were used. Procedural and pacing parameters, functional class, NT-proBNP level, and echocardiographic response were assessed.

Applications: LOT-CRT was successful in 91/112 (81%) patients. Baseline characteristics: age 70±11 years, female 20%, permanent atrial fibrillation 22%, ischemic HF etiology 60%, baseline LVEF 28±14%, LVEDD 62±9 mm, NT-pro-BNP 5821±803 pg/ml, LBBB 42%, RRBB 12%, NIVCD 22%, paced QRS 20%, narrow QRS 1%.

<table>
<thead>
<tr>
<th>Procedure Outcome</th>
<th>Hybrid ablation</th>
<th>RF-SN ablation</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficacy</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mean procedures to reach target</td>
<td>3.22</td>
<td>2.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Acute 6 month HR from baseline (y/n)</td>
<td>52/5</td>
<td>20/4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Peak 6 minute walk from baseline (y/n)</td>
<td>57/5</td>
<td>42/3</td>
<td>0.077</td>
</tr>
<tr>
<td>Peak 6 month HR from baseline (y/n)</td>
<td>50/4</td>
<td>50/4</td>
<td>0.009</td>
</tr>
<tr>
<td>Anxiety score at 6 months</td>
<td>7.1 ± 3.2</td>
<td>7.2 ± 3.1</td>
<td>0.04</td>
</tr>
<tr>
<td>Depression score at 6 months</td>
<td>7.7 ± 4.0</td>
<td>7.7 ± 3.5</td>
<td>0.63</td>
</tr>
</tbody>
</table>

Notes: Acute Pericarditis 9.2% 48% <0.001
Pericarditis ReVIcd 0.1 14% 0.012
Risk of needling pericardium 0% 50% <0.001
Procedure characteristics: fluoroscopy duration 27.3±22 min; LBBAP threshold 0.8±0.5V @0.5ms; R-wave amplitude 10 mV. Reasons for failure: inability to reach LBBP area (n = 16), failed CVP lead implantation (n = 4) and LBBAP lead dislodgement (n = 1). LOT-CRT resulted in significantly greater narrowing of QRS from 180±26 ms to 147±24 ms (p<0.0001) and better than LBBAP alone (166±27 ms, p < 0.0001). At the minimum follow-up of 3 months: EF improved to 37±12% (p < 0.0001); LVEDD decreased to 59±9 mm, NT-pro-BNP decreased to 2561±3555 pg/ml (p < 0.0004), pacing parameters were stable, clinical improvement was noted in 76% of patients (NYHA functional class 2.9 vs 1.8, p < 0.0001).

**Next Steps/Future:** Combining LBBAP and CVP is feasible, safe and provides greater electrical resynchronization in comparison to BIV and could be an alternative option for CRT in the very sick patients or when suboptimal electrical resynchronization was obtained with BIV.

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**GANGLIONATED PLEXUS ABLATION TO PREVENT ATRIAL FIBRILLATION (GANGLIA-AF TRIAL)**

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**Introduction:** The ganglionic plexus (GP) of the autonomic nervous system may represent a driver for atrial fibrillation (AF). We hypothesised that ablating GPs can prevent AF.

**Methods:** GANGLIA-AF (NCT02487654) was a prospective, randomized, controlled, 3-centre trial. GPs were identified via endocardial high frequency stimulation (HFS) using a Grass S88 Stimulator (Astromed) and Smart-Touch catheter (Biosense Webster). GPs triggering atrial ectopy/AF (ET-GP) were mapped by delivering HFS within the atrial refractory period during sinus rhythm, and ablated until non-functional. If triggered AF became incessant, GPs with atrioventricular (AV) dissociation (AVD-GP) causing asystole or significant bradycardia were ablated instead. We compared GP ablation (GPA) without pulmonary vein isolation (PVI) against circumferential PVI, each using CARTO-optimized radiofrequency (RF) application in paroxysmal AF (PAF) patients. Follow-up was for 12 months with 3-monthly 48hr Holter monitors. The primary endpoint was ≥30s atrial arrhythmia in ECGs after a 3-month blanking period.

**Applications:** 106 patients were recruited and randomised. 52 GPA and 50 PVI were analysed on a per-protocol basis. 6 were withdrawn for ablation protocol deviations. Panel A shows an example CARTO map of 13 ET-GPs ablated by 16.5mins RF without PVI: pacemaker interrogation at 12 months showed no evidence of ≥30s atrial arrhythmia, off all antiarrhythmics. Patients undergoing GPA had on average 89±26 HFS sites tested, identifying median 18.5 (IQR 16; 21%) GPs. Total RF ablation time in GPA was significantly less than in PVI (22.9±9.8 mins vs 38±14.4 mins; p<0.0001). There was greater freedom from ≥30s atrial arrhythmia at 12-month follow-up with PVI at 64% (32/50) vs 50% with GPA (26/52) (log rank p=0.09) (Panel B). There were fewer redo ablations for symptomatic recurrence after PVI at 30% (15/50) vs 36.5% (19/52) after GPA (p=0.53).

**Next Steps/Future:** Clinical outcomes following GPA and PVI were not statistically different, but less RF energy was required to complete GPA. GANGLIA-AF provides further mechanistic data towards a role for GPs in the pathogenesis of human AF.

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**FIRST-IN-HUMAN CLINICAL EXPERIENCE WITH A NOVEL 4D ICE CATHETER DURING CATHETER ABLATION AND LAA CLOSURE PROCEDURES**

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**Introduction:** A novel 4D ICE catheter is capable of real-time volumetric imaging with a 90° x 90° field of view, both 2D and 4D Color Doppler flow ability, independent distal tip rotation and penetration depth up to ~15 cm (NuVision, Biosense Webster Inc, Irvine, CA). The catheter was designed to allow multiplanar visualization of target cardiac structures with facile, minimal catheter manipulation. We conducted a multicenter first-in-human clinical study to evaluate the diagnostic value of the 4D ICE catheter in left atrial procedures.
**Methods:** This prospective, non-randomized, multicenter study was conducted by 9 operators at 2 European clinical sites. The 10F catheter was introduced into the right atrium (RA) via femoral vein access, and imaging was performed from the RA, coronary sinus, or directly from within the left atrium, after manipulating the catheter through a transeptal puncture hole dilated with a 12Fr sheath (n=2). Primary and secondary safety endpoints were absence of: i) unanticipated AEs or procedure/device related AEs, and ii) all device or procedure-related AEs. Primary and secondary performance endpoints were ability to provide adequate imaging for procedural completion. Secondary performance endpoint was positive user questionnaire responses of 2D/3D images (Likert scale 1-5).

**Applications:** In 28 patients (age 59±15 yrs, 25% F), the 4D ICE catheter was used to guide either LAA closure (n=2: one each - Watchman-Flx & Amulet) or catheter ablation of AF (cryoballoon, n=8; RFA, n=12) or other arrhythmias (PVC / VT / SVT / WPW; n=6). All safety and performance endpoints were met in all patients. Specifically, the catheter effectively guided transeptal puncture in all attempts, and image quality and catheter performance were rated by Operators at 5 (very good) in 82% of patients. Examples of 2D, volumetric and multiplanar imaging are shown in **Figure 1**. Overall, the 4D ICE catheter is a safe and effective visualization tool to guide a variety of electrophysiology procedures with multiplanar imaging.

**Next Steps/Future:** Further data on reproducible image acquisition, safety outcomes, and hospital resource utilization will be collected.