Atrial Functional and Electrical Remodeling Following Short Duration Atrial Fibrillation

Hirotsugu Yamada, Yong-jin Kim, Tomotsubo Tabata, Neil L. Greenberg, Erwan Donal, Deborah A. Agler, Junko Watanabe, Yauhua Zhang, Shaowei Zhuang, Don W. Wallick, James D. Thomas, Leonardo Rodriguez, Department of Cardiovascular Medicine, The Cleveland Clinic Foundation, Cleveland, Ohio.

Background: Atrial fibrillation (AF) leads to complex remodeling of the left atrium (LA) that affects function and thrombus formation. LA function may be associated with increased likelihood of immediate success and long-term maintenance of sinus rhythm. This study examined the relationship between pulmonary venous a-wave reversal velocity (PVA) and invasive LA pressure (LAP) during isovolumic atrial contraction.

Methods: Eight anesthetized open-chest dogs were studied and subjected to 3 hours of atrial flutter. The reversal of LA electrical remodeling precedes the recovery of LV systolic function. Clinical outcome at 8-weeks showed no difference between the AFL and AF groups for embolism, bleeding, death, and or death. AFL pts had greater post-CV SR success and 8-week SR maintenance (table), despite lower antiarrhythmic use.

Conclusion: Results from the ACUTE trial show that pts with atrial flutter, despite a history of AF, had greater atrial mechanical activity and fewer embolic risk factors compared to AF patients as assessed by TEE. For pts with AFL, the higher baseline atrial mechanical function may be associated with increased likelihood of immediate success and longer-term maintenance of sinus rhythm.

**Results:**

- LA emptying, cm/s
  - AFL: 45.3±24.7 vs. 35.0±21.3 (p<0.01)
  - AF: 35.8±17.4 vs. 26.1±15.4 (p<0.01)

- PV systolic, cm/s
  - AFL: 35.8±17.4 vs. 26.1±15.4 (p<0.01)
  - AF: 35.8±17.4 vs. 26.1±15.4 (p<0.01)

- SR post-CV, n (%) (95% CI)
  - AFL: 39/41 (95%) vs. 593/749 (79%) (p=0.01)
  - AF: 39/41 (95%) vs. 593/749 (79%) (p=0.01)

- SR at 8-weeks, n (%) (95% CI)
  - AFL: 41/53 (77%) vs. 584/1054 (55%) (p<0.01)
  - AF: 41/53 (77%) vs. 584/1054 (55%) (p<0.01)

**Conclusion:** The reversal of LA electrical remodeling precedes the recovery of mechanical function following a short duration of AF. Therefore, the mechanism and relationship between the electrical and mechanical remodeling has not been previously investigated. We compared the recovery of atrial effective refractory period (ERF) and peak left atrial appendage flow velocity during atrial systole (LAALF) after a short duration of AF.
**1163-67 Maintenance of Sinus Rhythm After Cardioversion is Dependent on Immediate Improvement of Left Ventricular Systolic and Diastolic Function**

Kazumasa Harada, Mokoto Sonoda, Hiroshi Nishimura, Katsu Takenaka, Ryozo Nagai, Yushikyu Takekushi, University of Tokyo, Tokyo, Japan.

Background: An increase in ejection fraction after cardioversion from atrial fibrillation (AF) has been attributed to improvement of atrial mechanical function, but patients maintaining sinus rhythm and those with ultimate reversion to AF may have different mechanisms. Methods: To assess the immediate improvement of LV systolic function after the cardioversion is the result of return of atrial function or the result of improvement in LV diastolic function, we measured LV volumes, transmirtal flow velocities, and pulmonary venous flow velocities before and 24 hours after elective cardioversion in 17 patients. ALOOGO 500 (GE Yokogawa Medical System Ltd) was used. All patients had duration of AF more than 1 month, and received bepisulf (150 mg/day) throughout the study. Results: Ten patients maintained sinus rhythm more than 1 month after cardioversion (SR) and seven showed the reversion to AF within 1 month (ReAF). Immediately following cardioversion, ejection fraction and LV stroke volume (SV) increased significantly only in the SR group (11.2±11.1%, 148±16%, *p<0.05 vs. baseline), but not in the ReAF group (99±13%, 103±30%). In contrast, relative decreases in cycle length were comparable. Transmirtal peak A-wave velocity at 24 hours did not differ significantly between the groups (SR, 66±13 cm/s, ReAF, 62±31.3 cm/s), nor correlated with the improvement of LV diastolic function. However the LV diastolic function was significantly 20% higher in the SR group (122±22%/ReAF, 103±16%, *p<0.05 vs. ReAF), but not the changes in LV end-systolic volume (SR, 102±23%; ReAF, 107±27%). Moreover, the ratio of S-wave of the pulmonary venous flow velocities at 24 hours was comparable (SR, 0.65±0.26; ReAF, 0.74±0.44). Conclusion: Maintenance of sinus rhythm after cardioversion is suggested to be dependent on the immediate improvement of LV diastolic function.

**1163-68 The Exact Time Course of Recovery of Left Atrial Appendage Function Following Reversion of Chronic Atrial Fibrillation to Sinus Rhythm**

Mitsuki Takaki, Mokoto Suzuki, Yoshishita Enji, Takuya Inoue, Takahiro Ikeda, Kaoru Sugii, Tetsu Yamaguchi, Third Department of Internal Medicine Tokyo University Choshu Hospital, Tokyo, Japan.

Background: Left atrial appendage (LAA) stunning is thought to be associated with thrombus formation and embolic stroke. This phenomenon is observed not only following cardioversion of atrial fibrillation (AF) but also that of atrial flutter (AFL). Therefore, thrombophrophaxis for AFL requires anticoagulation prior to, and following, cardioversion, but little information has been obtained how long anticoagulation is required following cardioversion of AF.

Methods: Ten patients with chronic AFL (duration: 30 ± 41 months, range: 1-140) undergoing curative radiofrequency ablation (RFA) were enrolled. No patient had been documented AF before the study. LAA velocities, LAA fractional area change and stentaneous echo contrast (SEC) were assessed using a transesophageal echocardiography before and 24 hours following RFA. Results: Within 24 hours following RFA, LAA velocities and LAA fractional area change decreased significantly. LAA velocities and LAA fractional area change increased markedly within 2 weeks following RFA. LAA velocity was over 32 cm/s in all patients at 2 weeks following RFA. SEC resolved in all patients at 2 weeks following RFA. (see Table)

Conclusions: All indices of thromboembolic risk improved within 2 weeks following reversion of chronic AFL to sinus rhythm. After cardioversion of chronic AFL, patients may require anticoagulation up to 2 weeks.

<table>
<thead>
<tr>
<th>Before RFA</th>
<th>Within 24h</th>
<th>1 week</th>
<th>2 weeks</th>
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<tr>
<td>LAA velocities (cm/s)</td>
<td>42±8</td>
<td>19±7</td>
<td>40±16</td>
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<tr>
<td>range</td>
<td>31-56</td>
<td>8-31</td>
<td>14-67</td>
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<td>LAA fractional area change (%)</td>
<td>46±7</td>
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<td>Documented SEC (n)</td>
<td>8</td>
<td>85</td>
<td>21</td>
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</table>

**1164-60 Noninvasive Assessment of Left Anterior Descending Artery Coronary Flow Reserve by Transthoracic Echocardiography: Feasibility and Results**

Fausto Rigo, Walter Curtia, Claudio Zanella, Pietro Nicolai, Paola Delia Valentina, Lorenza Pratil, Attila Palkab, Alberto Ravela, Eugenio Picano, CNR, Institute of Clinical Physiology, Pisa, Italy, Division of Cardiology, Mestre Hospital, Mestre, Italy.

Background: Coronary flow reserve (CFR) is a key physiological parameter which can be evaluated noninvasively by transthoracic echocardiography (TTE) during vasodilator stress. Aim: To assess the feasibility and physiologic meaning of TTE assessment of CFR. Methods: Starting June 1, 2000 to August 1, 2001, 238 consecutive patients (12 males aged 67±15 years) were referred for stress echocardiography. CFR was measured in all, TTE (SONOS5500, 3 probe). Quad screen format with second harmonic imaging after another injection of Levovist was also obtained as a gold standard. Regional wall motion (WM) and its feasibility and accuracy would enhance under harmonic imaging with contrast agents. Methods: To explore its utility, we had performed CK in 36 unselected patients during contrast-enhanced DSE. After bolus injection of Levovist, we acquired CK image in apical 4 and 2 chamber view at baseline using ultrasonic mode (SONOS5500, 3 probe). Quad screen format with second harmonic imaging after another injection of Levovist was also obtained as a gold standard. Regional wall motion