Cardio Mag

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Dear Doctor,
*Greetings from Micro Labs Limited. We are happy to bring you "**Cardio Mag**", which contains latest and interesting news in the field of Cardiology.*

This issue contains

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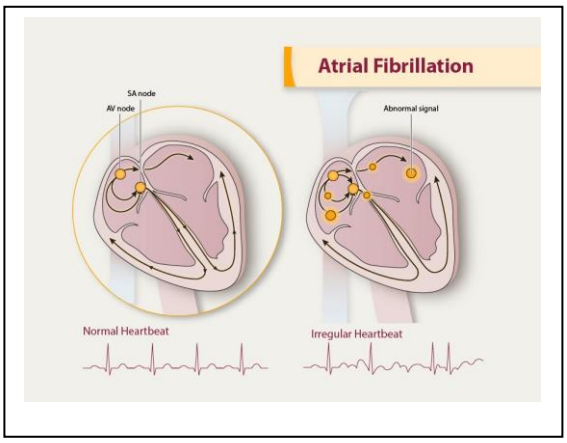
Looking forward to your valuable feedback.
Best Regards,
Medical Team, Micro Labs Limited

1. Measuring Parameters in atrial fibrillation relapse after radiofrequency ablation



Atrial fibrillation (AF) is one of the most common cardiac arrhythmia and affects 1%–2% of the general population.

Radiofrequency ablation with aiming for pulmonary vein isolation has become an established option for drug-refractory AF. but high rates of recurrence are seen following ablation, with the success rate of pulmonary vein isolation varying between 50% and 80%. Left atrial appendage (LAA) is one of the focal potential sources to spontaneously trigger AF, with the left atrium being another possible source of recurrence.[1]

Aim of the study is to measure the volumetric and functional parameters of left atrium and LAA by CT scan for predicting possible recurrence of AF following radiofrequency ablation.

Methods:

Patients who underwent catheter radiofrequency ablation(RFA) for AF for the first time, clinically confirmed and diagnosed by physical examination and electrocardiogram, with preoperative 256-slice spiral CT examination but no serious procedural complications were enrolled.

Poor quality of CT angiography (CTA) images for measuring the volume of the left atrium and LAA, contraindication for CTA examination, contrast agent allergy, pacemaker implantation, valvular and congenital heart disease were excluded from study.

80 patients with AF who underwent RFA for the first time were divided into the recurrence (n = 30) and non-recurrence (n = 50) groups.

256-slice spiral CT scanning was performed in patients with AF. Before scanning, patients were trained in breath holding, and metoprolol was used to decrease the heart rate. Non-ionic contrast agent iohexol (350 mg I/ml, 0.8 ml/kg) was injected intravenously with a two-barrel high-pressure syringe. The scanning range was from 0.5 cm below the tracheal bifurcation to the diaphragm of the heart

Clinical data and quantitative measurement of the morphology and functional parameters of the LA and LAA were analyzed, including the maximal and minimal volume, ejection fraction and volume, and volume strain of LAA and LA (; LAAVmax, maximal volume of the LAA; LAAVmin, minimal volume of the LAA; LAAEV, LAA ejection volume; LAAEF, LAA ejection fraction; LAA-VS, LAA volume strain; LAVmax, maximal left atrial volume; LAVmin, minimal left atrial volume; LAEV, left atrial ejection volume; LAEF, left atrial ejection fraction; LA-VS, left atrial volume strain).

Results:

The proportion of patients with heart failure and CHA2DS2-VASc score were significantly ($P < 0.05$) higher in the recurrence than non-recurrence group. The LAAVmax, LAAVmin, LAVmax, LAVmin, LAAV and LAV were all significantly greater in the recurrence than non-recurrence group ($P < 0.05$).

Major and minor axes of LAA orifice and LAA depth were also significantly greater in the recurrence than non-recurrence group. The LAAEF, LAEF and LAA-VS were significantly ($P < 0.05$) lower in the recurrence than non-recurrence group ($P < 0.05$).

Heart failure, CHA2DS2-VASC score, LAEF, LAV, LAAEF and LAA-VS were univariately significant

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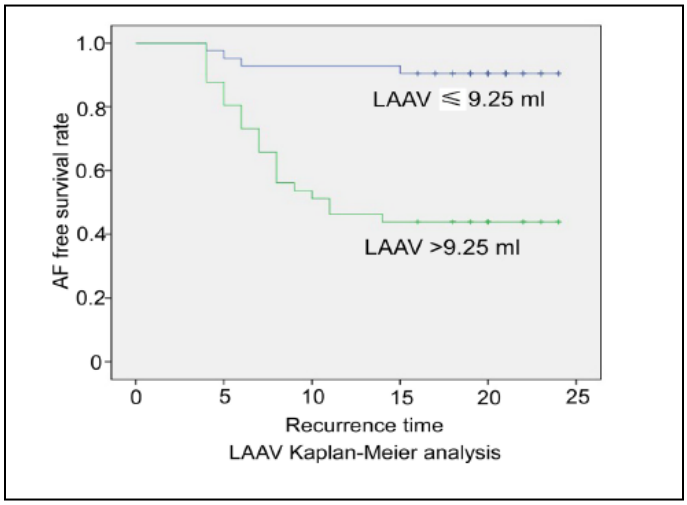
(P < 0.05) risk factors for AF recurrence after ablation.

Multivariate analysis revealed LAAEF (HR: 0.790, 95% CI: 0.657–0.950, P = 0.012) and LAAV (HR: 1.160, 95% CI: 1.095–1.229, P <0.001) to be two significant independent predictors of recurrence.

In this study, LAAEF <44.68% had the highest predictive value for recurrence after radiofrequency ablation, with the sensitivity of 90% and specificity of 67.4%, whereas LAA volume >9.25 ml had the highest predictive value for AF recurrence after RFA, with the sensitivity of 85.2% and specificity of 67.9%.

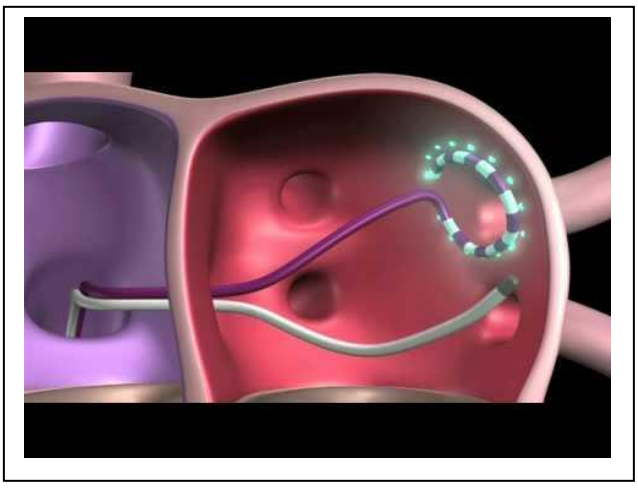


Discussion:

Left atrial overload result in structural remodeling, atrial hypertrophy and stretch, and subsequent ionic current alterations and electrical remodeling.

Cardiac endothelin-1 expression correlates with enlarged left atrium size and responds to the wall stress caused by enlarged left atrium, promoting hypertrophy of myocytes and fibrosis of myocardial interstitium.

Atrial fibrosis can cause slow conduction and change dynamic repolarization in few areas, consequently shifting the initiation focus and AF maintenance to the left atrium from the pulmonary veins



Radiofrequency ablation is an effective therapeutic approach for the treatment of AF, especially for refractory patients who have episodes of arrhythmia despite antiarrhythmic medicine therapy.

In patients with paroxysmal AF, catheter radiofrequency ablation can be used as a first-line therapy. But recurrence of AF can occur.

Current study showed that LAVmin, LAAVmax, and LAAVmin were all significantly elevated whereas LAAEF and LAEF significantly decreased in patients with

recurrence compared with those without recurrence with LAAEF and LAAV being two significant independent factors to predict recurrence following catheter radiofrequency ablation.

Increased volumes of left atrium and LAA but decreased ejection fraction of the left atrium and LAA are are risk predictors of recurrence after radiofrequency ablation of AF. [1]

Conclusion:

Left atrial volume, left atrial appendage volume and morphology significantly increased while the ejection fraction and volume strain of left atrium and left atrial appendage h significantly decreased in recurrence than in non-recurrence after radiofrequency ablation.

Reference:

Tian X et al. Morphological and functional parameters of left atrial appendage play a greater role in atrial fibrillation relapse after radiofrequency ablation. Sci Rep. 2020;10(1):8072.

2. Use of Esmolol in resistant VF – A case report

Acute MI ca result in Ventricular tachyarrhythmias such as ventricular tachycardia (VT) or ventricular fibrillation (VF). These depict an ongoing cardiac ischemia.

Cardiopulmonary resuscitation (CPR) with guideline recommended medications like epinephrine and amiodarone and appropriate defibrillation for shockable rhythms remain the cornerstone of advanced cardiac life support (ACLS).

VF is considered refractory if return of spontaneous circulation (ROSC) is not achieved despite at least 10 minutes of high-quality CPR, three defibrillation attempts, 3 mg of epinephrine, and 300 mg of amiodarone.

Few studies suggest that patients with recurrent VF suggest that beta blockade may improve long-term survival after cardiac arrest. But limited data is available on use of beta-blocker for VT or VF. [1]

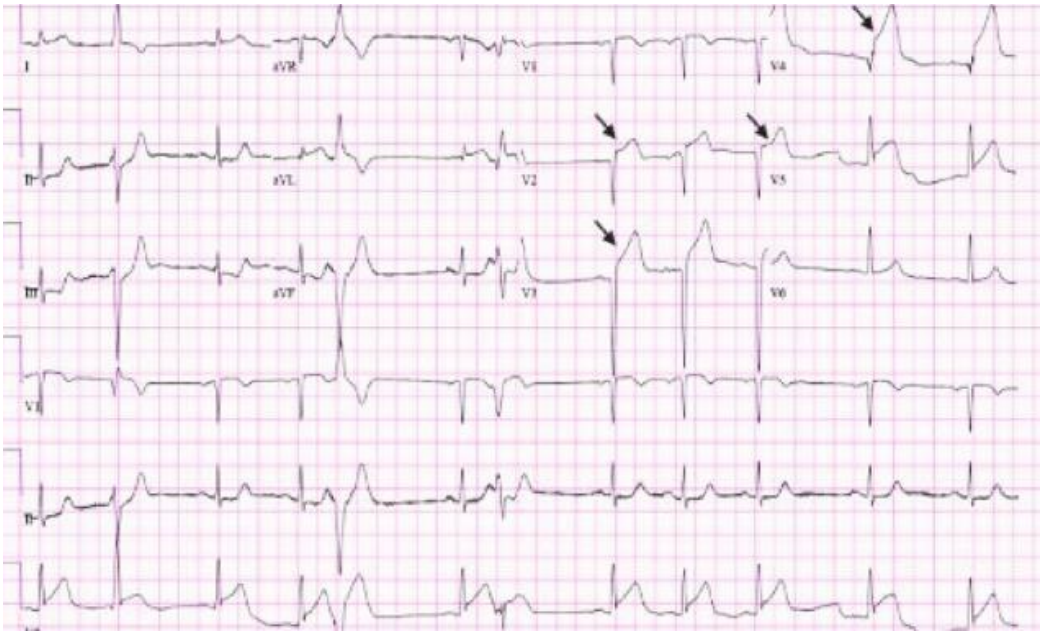
Current is a case presentation of defibrillation refractory VF responding to intravenous Esmolol.

Case presentation:

A 61 years old hypertensive male presented with severe left-sided chest pain of 1-hour duration which radiated to the ipsilateral arm. He was administered 0.4 mg of sublingual

nitroglycerine which improved the pain significantly. Vital signs showed a blood pressure of 100/72 mm Hg.

Heart rate of 71/min, respiratory rate of 19/min with a saturation of 96% on room air, and a temperature of 97.8 F. An electrocardiogram was obtained which reflected a new ST segment elevation in leads V2-V5.



Patient was administered loading doses of aspirin 325 mg, Ticagrelor 180 mg, and atorvastatin 80 mg.

Laboratory investigation showed significant elevation of troponin-I of more than 80.00 ng/mL. the patient started complaining of palpitations and he lost consciousness. On examination, there was no palpable pulse and the cardiac monitor showed ventricular fibrillation.

Cardiopulmonary resuscitation was initiated. Immediate successful intubation was performed. The patient received 9 rounds of 1 mg intravenous (IV) epinephrine every 3-5 minutes, 300 mg IV amiodarone bolus, 1 gram of 10% calcium chloride, 2 doses of 50 mEq sodium bicarbonate, and 5 biphasic defibrillator shocks of 200 joules (J) each.

The cardiac monitor still showed VF. As a resuscitation failure, double sequential defibrillation was performed and he received 4 additional shocks of 400 J each.

Patient was still in an electrical storm and at this moment intravenous esmolol 500 mcg/kg (35 mg) IV bolus was administered. The patient subsequently experienced an immediate return of spontaneous circulation.

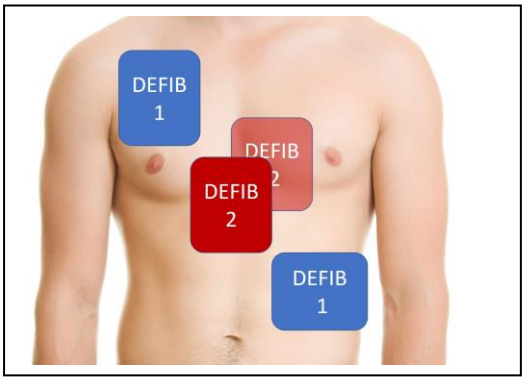
The total resuscitation time was 50 minutes.

Hypothermia protocol was initiated, and the patient was urgently transferred to the cardiac

catheterization laboratory. A loading dose of tirofiban IV 25 mcg/kg and bivalirudin IV 0.75 mg/kg was administered, and a tirofiban maintenance infusion was continued for 12 hours.
Catheterization revealed a 100% occlusion of the left anterior descending artery (LAD) with subsequent placement of two drug-eluting stents (DES) in the LAD.
Therapeutic hypothermia was stopped after 24 hours and meanwhile echocardiography revealed an ejection fraction of 30% with anterior and apical wall akinesia confirming a diagnosis of ischemic cardiomyopathy.
Patient was successfully extubated after 4 days, and his neurological function was at his baseline. His hospital stay was complicated by an isolated episode of atrial fibrillation with rapid ventricular response and aspiration pneumonia.
Patient responded to beta-blockade for rate control. Aspiration pneumonia was treated with 7 days of intravenous ceftriaxone and metronidazole as per the sensitivity of Haemophilus influenzae.
Patient was discharged from the hospital on day 12 on aspirin 81 mg once daily, ticagrelor 90 mg two times a day, metoprolol succinate extended-release tablet 150 mg once a day, lisinopril 5 mg once a day.
Patient was followed up in a week , found to be asymptomatic and compliant with medications.

Discussion:

Ventricular fibrillation/pulseless ventricular tachycardia are the most common life threatening arrhythmias and the main cause of sudden cardiac arrest (SCA) in patients with structural heart disease.



Management of VF unresponsive to multiple defibrillation attempts is still a mystery. However several novel interventions have been described in the literature.
Electrical storm is the occurrence of three or more episodes of ventricular tachyarrhythmia in 24 hours.
Electrical storm can manifest any structural heart disease or genetic arrhythmia syndromes. Activation of the sympathetic nervous system plays a major role in the propagation of electrical storm.
One of intervention is double sequence defibrillation (DSD). This demonstrated the potential usefulness of DSD in resuscitation attempts for refractory VF. Extracorporeal

cardiopulmonary resuscitation using extracorporeal membrane oxygenation (ECMO) can also be considered.

Survival rates for refractory VF remain exceptionally poor, and low quality evidence precludes the widespread adaptation of these strategies into routine ACLS management.

Rationale for esmolol was based on beta-adrenergic myocardial hyperstimulation lowering the threshold for refractory VF and widen the ischemic insult in patients with an electrical storm.[1]

Conclusion:

A case of refractory VF to double sequence defibrillation, was successfully treated with Esmolol.

Reference:

1)Agrawal A et al. Case Report Esmolol Use in Dual Axis Defibrillation Resistant Ventricular Fibrillation. Case Reports in Cardiology. 2020; 7297303: 1-4 pages.

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IN FOCUS

3. Remote ECG Monitoring Patch.

A company has received CE mark from Europe for ECG monitoring patch. This is a single-use clinical-grade, wireless multiparameter biosensor patch.

The patch is integrated with a remote monitoring platform designed as a continuous electrocardiography (ECG) and heart rate monitor.

ECG Remote Monitoring Patch is disposable and captures data for up to three days. The device is lightweight and splash-proof. Each patch features the company's patented LC1100 Processor, that operates on a coin-cell battery and detects, stores, and securely transmits patient data to a cloud based platform that is accessible by healthcare professionals.

This is designed for use in both healthcare and home settings. Platform can be integrated into existing telemetry and remote monitoring systems.[1]

How the device works:

- The interoperable and customisable biosensor can be integrated into LifeSignals platforms or a third-party platform.
- Continuous patient data is wirelessly live-streamed to the cloud via an Access Point.
- Data can be monitored remotely on a multi-patient monitoring display.
- Changes in respiration, temperature, SpO2 can trigger an alert, prompting early intervention.
- Large-scale, collective patient data can be monitored for resource management and planning.

Parameters monitored by the device

- ✓ 2-Channel ECG
- ✓ Heart Rate
- ✓ Respiration Rate
- ✓ Skin Temperature
- ✓ Motion (Accelerometer)

Advantages:

- ❖ Continuous remote monitoring of patient vital signs including ECG trace and SpO_2 on admission
- ❖ Monitoring at home after discharge from hospital.
- ❖ A disposable, monitoring device can be self-applied
- ❖ Reduces cross contamination risk
- ❖ Reduces time spent connecting patients to individual devices.
- ❖ The health status high-risk populations in homes can be monitored remotely.[2]

Reference:

1)Available at: https://www.medgadget.com/2020/05/lifesignals-receives-ce-mark-for-ecg-remote-monitoring-patch.html. Accessed on 19-05-2020.

2) Available at: https://lifesignals.com/covid19/. Accessed on 19-05-2020.

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