Evaluation of noninvasive mathematical analysis of spectral ECG comparing to Coronary Angiography for severe Ischemic Heart Disease in Emerging Country

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Japan Myanmar Medical Help Group (JMMHG) Activity

Objective

In the emerging countries (South East Asia including Myanmar), the death rate by communicable diseases is still higher compared to the developed countries; however, the ratio of death caused by lifestyle diseases is gradually increasing. Among lifestyle diseases, Ischemic Heart Disease (IHD) is one of the highest causes of death and its prevalence is growing faster while the number of Cath Lab and doctors with skills are limited.

Methods

This study is to evaluate the feasibility of Multifunction Cardio Gram(MCG) for the assessment of patients with severe IHD by comparing with Coronary Angiography (CAG).

MCG is the mathematical analysis of spectral ECG extracting spectral information not visible on standard ECG and analyzes it by its AI (Artificial Intelligence) with matching to the database of more than 40,000 patients' spectral data.

Total 30 patients (Age 59 ± 8.9, Male:21, Female:9) with MCG (≥ 4 score) scheduled to do CAG were selected in Myanmar. Coronary Stenosis by CAG of ≥75% (75%-100% of stenosis) in a single or multiple vessels is defined as severe IHD necessary to start an appropriate treatment.

MCG score ≥ 6, 5, 4 were used as cut-off respectively to indicate presence of coronary stenosis by CAG (≥ 75%).

Result

MCG scores in patients with or without severe IHD are significantly different. (with IHD:7.0, without IHD:5.4 , p<0.01) (Figure 1).
Best cut off value of MCG is ≥ 6, and is identified Sensitivity 76.5%, Specificity 69.2%, PPV 76.5%, NPV 69.2%, and Accuracy 73.3% (p<0.05).

<Figure1>

MCG severity score vs Presence or Absence of Coronary stenosis CAG (≥ 75%)

Ave5.4   Ave7.0
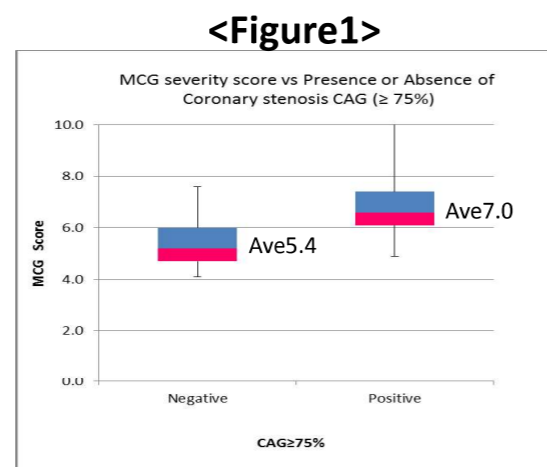
MCG score in patients with or without severe CAD are significantly different

Conclusion

MCG showed high sensitivity and specificity, and high score of MCG ≥6 likely indicates the presence of severe IHD.

Clinical Implication

We suggest that MCG could be used for prompt detection of severe IHD in order to start appropriate Treatments (Percutaneous Coronary Intervention/Optimal Medical Therapy /CABG) in the emerging countries such as Myanmar where less medical facilities and skills are available. (Table1)
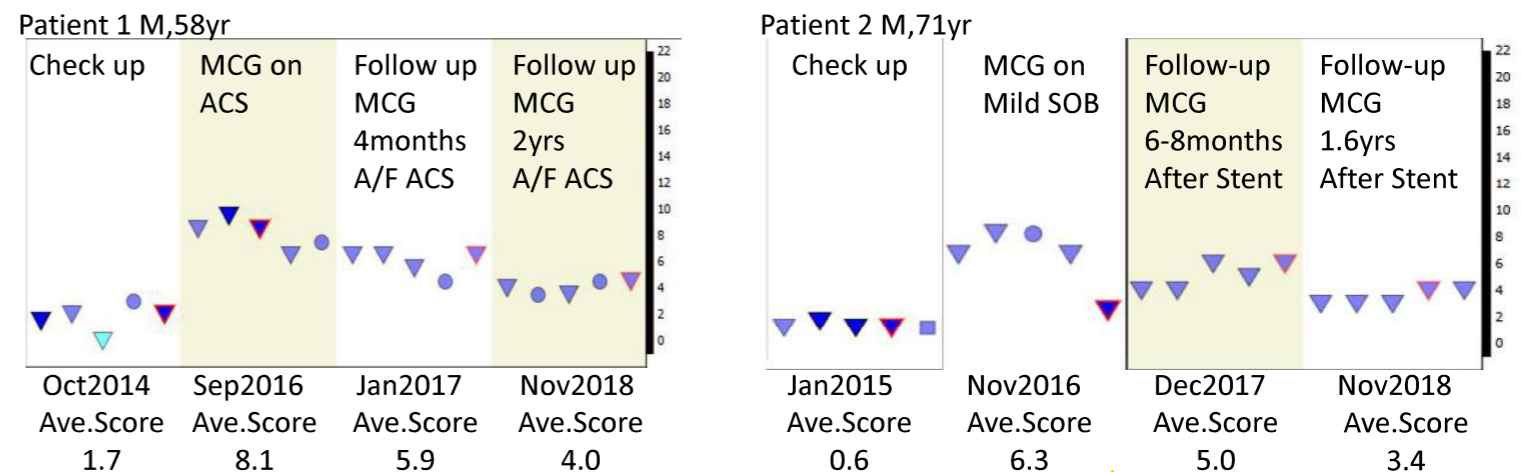
<Table1>

	TP	TN	FP	FN
PCI	10	3		4
Med Therapy	2	6	4	
CABG	1			
Total	13	9	4	4

Treatment at Best cut off value: MCG 6.0

Discussion

< Follow up cases for patients with serial MCG scores and treatment modality >

Patient 1 M,58yr

Check up	MCG on ACS	Follow up MCG 4months A/F ACS	Follow up MCG 2yrs A/F ACS

Oct2014 Ave.Score 1.7	Sep2016 Ave.Score 8.1	Jan2017 Ave.Score 5.9	Nov2018 Ave.Score 4.0

Patient 2 M,71yr

Check up	MCG on Mild SOB	Follow-up MCG 6-8months After Stent	Follow-up MCG 1.6yrs After Stent

Jan2015 Ave.Score 0.6	Nov2016 Ave.Score 6.3	Dec2017 Ave.Score 5.0	Nov2018 Ave.Score 3.4

Patient 1 M,58yr

Aneurysm, Jan 2017

Patient 2 M,71yr

<Pre>   <Post>

CTO LAD LMT stenosis Pre Stent, Apr2017

CTO LAD LMT stenosis Post Stent, Apr.2017
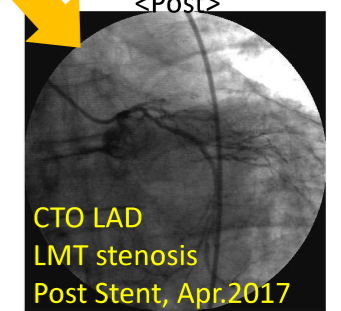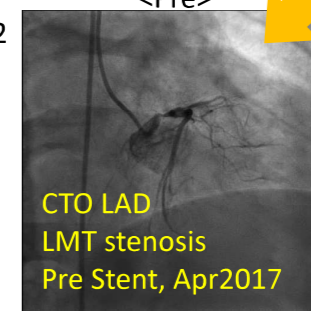
Disclosure

There are no financial or other relationships that might lead to a conflict of interest.

Reference

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