IMPROVEMENTS IN REGIONAL LEFT VENTRICULAR FUNCTION AFTER LATE PERCUTANEOUS CORONARY INTERVENTION AFTER ANTERIOR MYOCARDIAL INFARCTION

Srilakshmi M Adhyapak, Prahlad G Menon, Kiron Varghese, Abhinav Mehra, SB Lohitashwa and Fabio Fantini

Department of Cardiology, St. John's Medical College Hospital, Bangalore, India. Department of Biomedical Engineering, Duquiesne University, Pittsburgh, PA, USA. Department of Cardiology, University of Florence, Florence, Italy

PCI after Acute Myocardial Infarction

PCI within 12 hours of AMI - Clinical benefit :
- Decreased infarct size
- Prevents infarct expansion
- Prevents adverse LV remodeling
- Promotes electrical stability

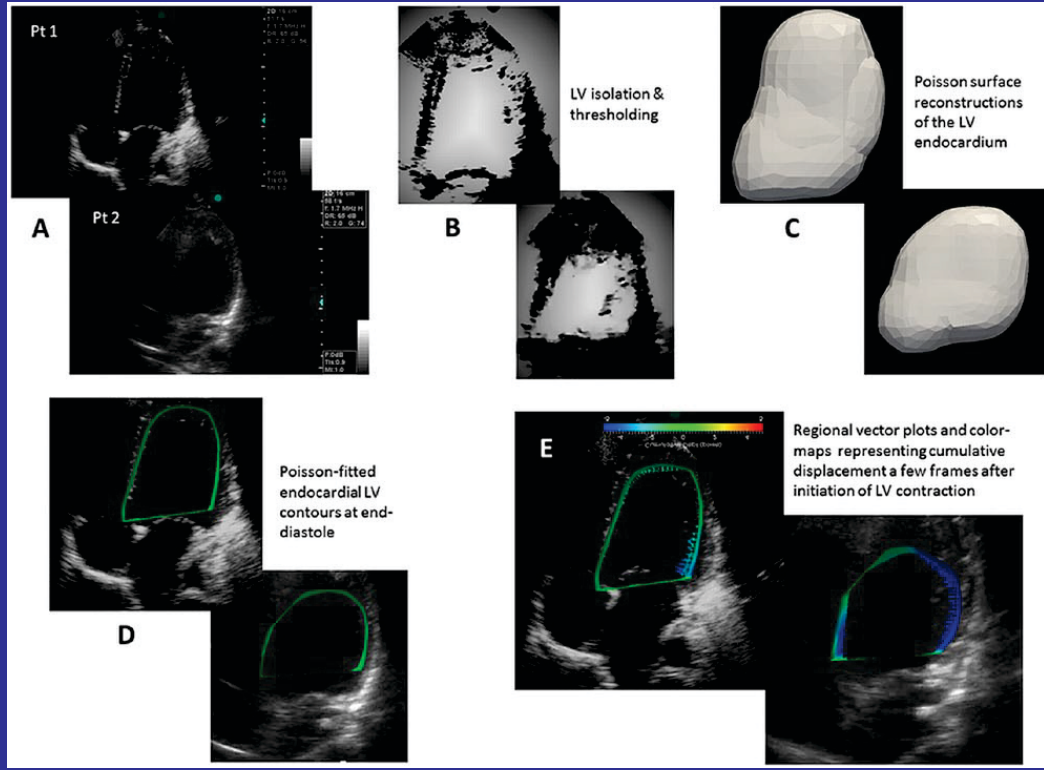## Improvements in Global and regional LV function after late PCI

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Cardiac Imaging

- 2D echocardiography : GE Vingmed Ultrasound v7 imaging system.
- The LV end-diastolic volume (EDV), LV endsystolic volume (ESV), and LVEF were noted at admission and within 24 hours of PCI. All values were indexed to body surface area (BSA) in accordance with ASE (American Society of Echocardiography) recommendations of chamber quantification.
- Mitral inflow Doppler data were used to quantify LV diastolic function.
- The 4-chamber echocardiographic views were studied quantitatively over time after further processing for analysis of LV wall motion across several discrete phases of the cardiac cycle.
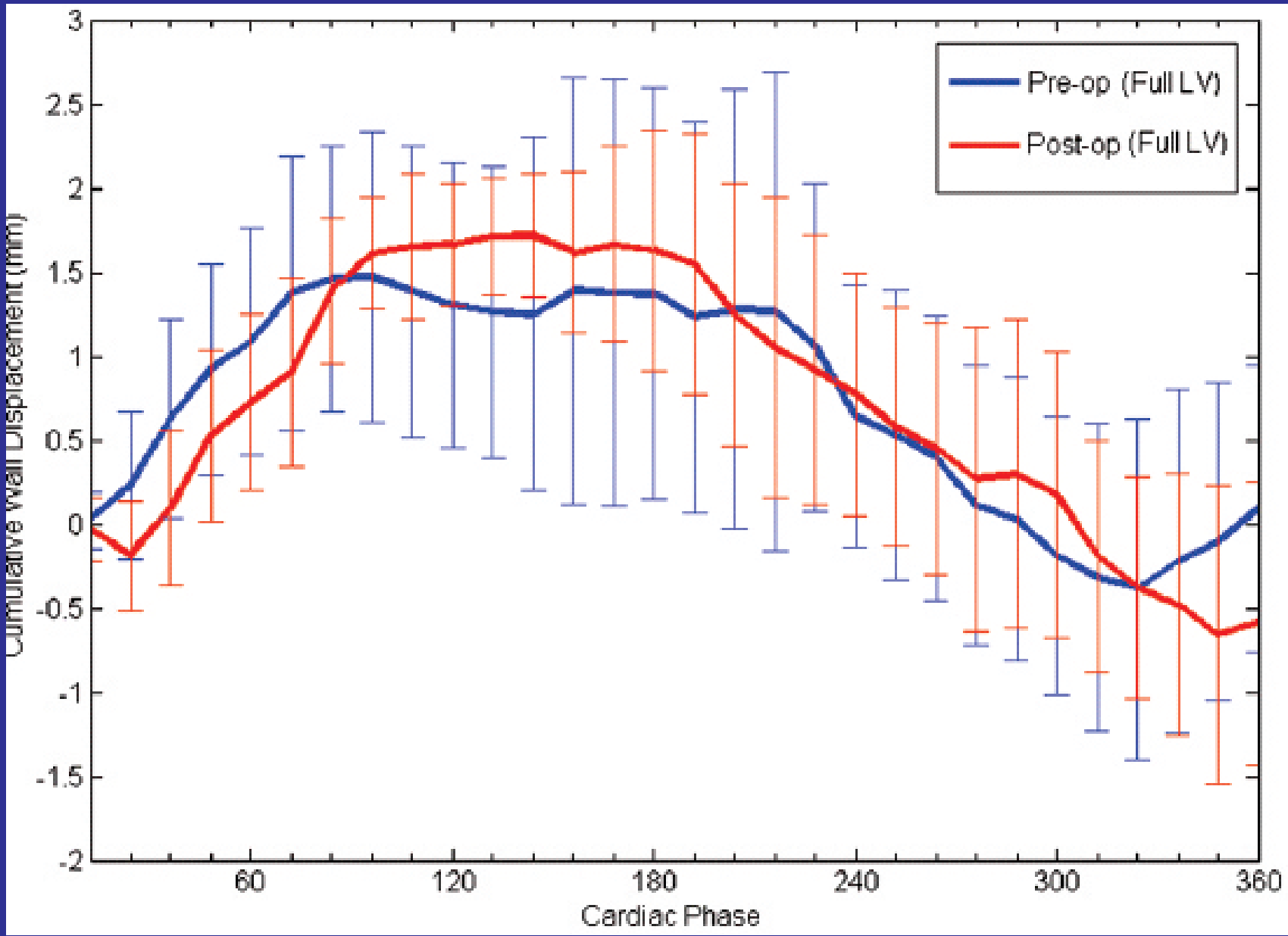
Automatic LV segmentation

Results

- Patient clinical characteristics at baseline.
- Patient Number: (N = 13)
- Age: 53.3 ± 15.7 years
- Females :3
- Killip class: 1.3 ± 0.9
- Hypertension: 8
- Diabetes :7
- Smoking :6
- Family history of CAD: 2
- BMI(kg/m2) :22 ± 5
- Time between primary event and PCI: 10 ± 2.5 days
- All patients presented late to the hospital (ie, >28 ± 4.5 hours after MI) and therefore did not receive primary PCI

Comparison of 2-D Echocardiographic parameters at baseline and after PCI.

	PRE-PCI	POST-PCI	P VALUE
LV EDV	100 ± 13 mL	96 ± 9 mL	.43
LV ESV	55 ± 9 mL	42 ± 8 mL	.034
LVEF	41% ± 9%	52% ± 7%	.04
LVDD	1.9 ± 0.4	1.2 ± 0.7	.34

Abbreviations: LV EDV, left ventricular end-diastolic volume; LV ESV, left ventricular end-systolic volume; LVDD, left ventricular diastolic dysfunction; LVEF, left ventricular ejection fraction; PCI, percutaneous coronary intervention.

Global LV CWD throughout the cardiac cycle

Conclusions

- Late PCI demonstrated significant improvements in regional myocardial synchrony which reflected in improved 30 day outcome.
- Major Limitation: Small sample size and lack of control group. Findings need verification with a larger sample size along with control arm comparison

Late PCI after AMI

- Late PCI has not shown clinical benefit
- OAT trial showed global improvements in LV function
- No Imaging studies in this trial: Drawback
- Our Hypothesis: Following late PCI, improvements in LV function may be significant to decrease Heart Failure morbidity

Methods

- N=13. AWMI :PCI eligible (Primary PCI not done due to late presentation)
- Study Period: August 2013 to September 2014
- Inclusion: Patients with AWMI
- Exclusion: Primary PCI.
- Above age of 80 years, cardiogenic shock, and those with mechanical complications following acute MI and with contraindications for PCI.
- Institutional Ethics Review Board approval was obtained for the study, and informed patient consent was taken for participation in the study.
- IEC Study Ref. No. 194/2014

Automatic LV segmentation

- Automatic LV segmentation was conducted at each available image frame over a single cardiac cycle from video exports of 4-chamber echocardiographic views.
- The image-processing workflow entailed first endocardial segmentation of the LV from the 4-chamber echocardiographic view, using a region partitioning active contour algorithm, followed by smooth surface reconstruction of the resulting contours using an implicit Poisson surface fitting algorithm to obtain smooth surface segmentations of the LV endocardium
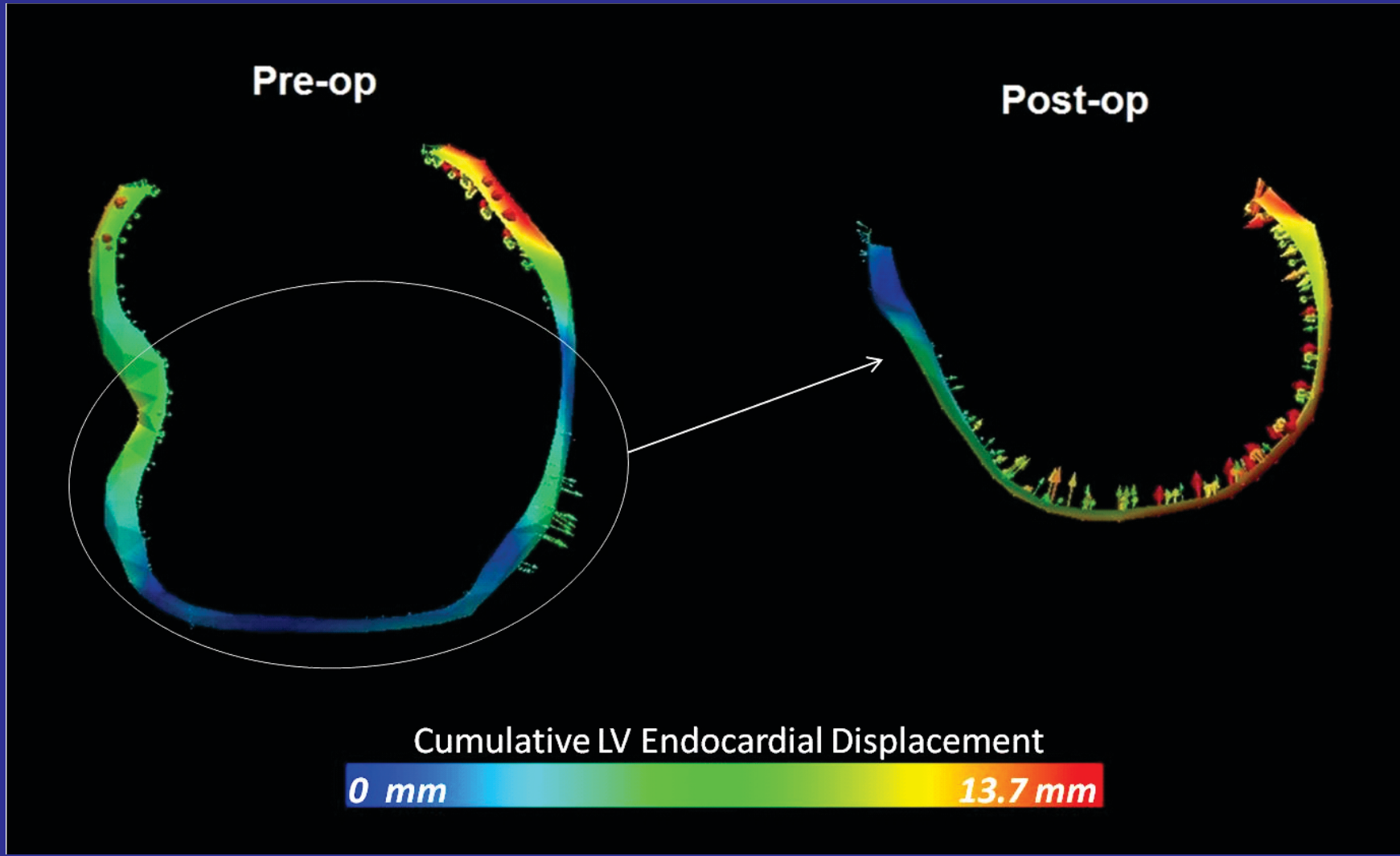
LV segmentation

- The average and standard deviation in the endocardium averaged Cumulative Wall Displacement were plotted as characteristic curves for each of our cohort patients.
- The CWD curves which resulted were sampled into 30 equally spaced cardiac phases, the same for each patient, for the purpose of comparison of the different patients as well as comparison of regional LV function before and after PCI
- Statistical Analysis: Unpaired Student t test was used to compare the differences between means and P < .05 was considered statistically significant.
- All statistical analyses were performed using SPSS v14 (SPSS Inc., Chicago, IL, USA). All continuous variables are expressed as mean ± SD.
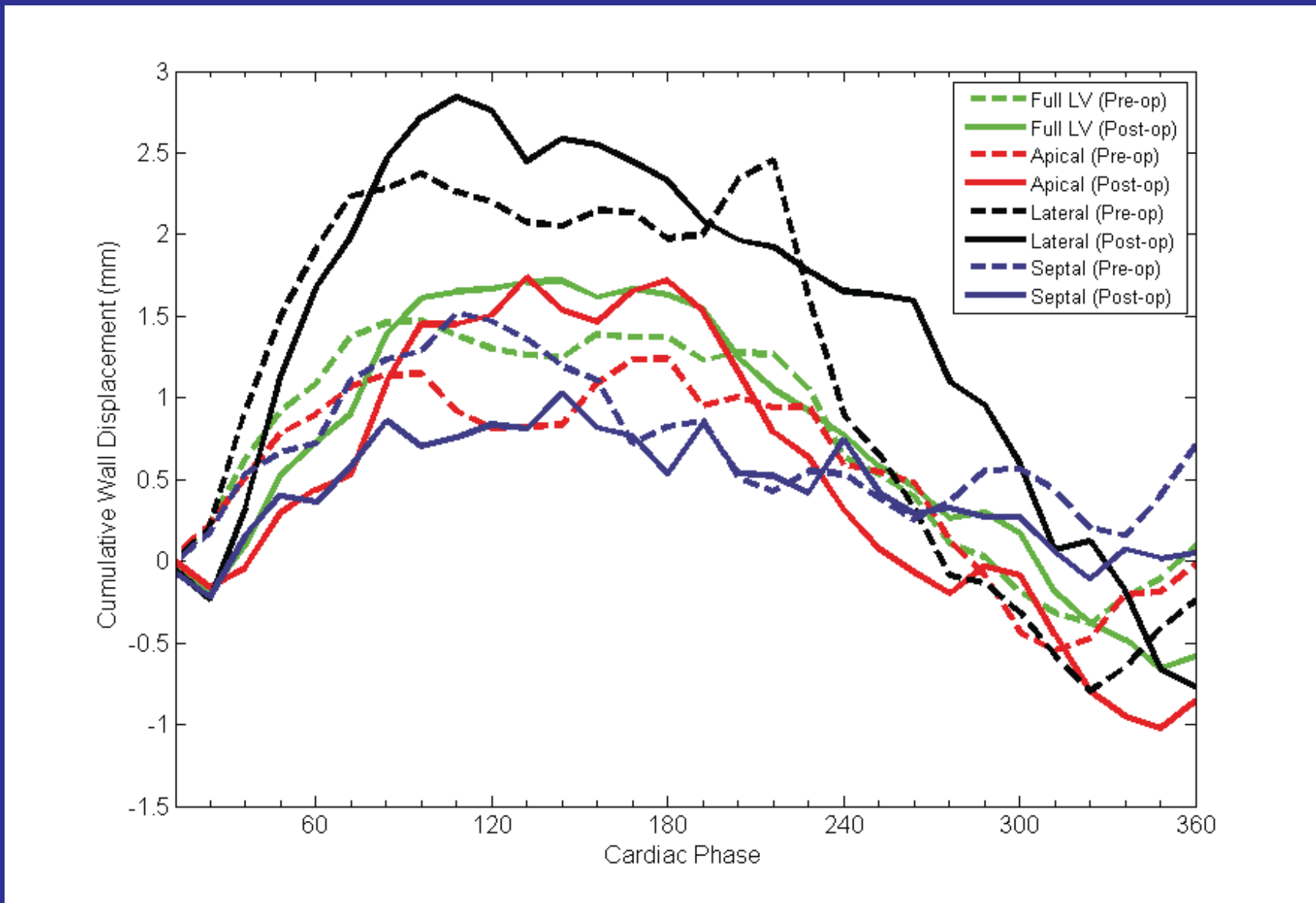
Clinical Outcome

- All patients demonstrated successful patency of the IRA with TIMI 3 flow grade.
- All patients had improvement in Killip class at discharge from hospital and no readmissions for angina, re-infarction, or heart failure.
- At 30 days following the primary event, there was no mortality or morbidity.

Cumulative Wall Displacement : Blue: Akinetic, Yellow and Red: Contractile Myocardium

Regional LV Cumulative Wall Displacement(Mean of 13 patients)

Improvements in Regional Left Ventricular Function Following Late Percutaneous Coronary Intervention for Anterior Myocardial Infarction

Srilakshmi M Adhyapak1*, Prahlad G Menon2,3,4,5*, Kiron Varghese1, Abhinav Mehra5, SB Lohitashwa1 and Fabio Fantini6

1Department of Cardiology, St. John's Medical College Hospital, Bangalore, India. 2Department of Biomedical Engineering, Duquesne University, Pittsburgh, PA, USA. 3Department of Biomedical Engineering, University of Pittsburgh, Pittsburgh, PA, USA. 4Department of Biomedical Engineering, The University of Texas at San Antonio, San Antonio, TX, USA. 5QuantMD LLC, Pittsburgh, PA, USA. 6Department of Cardiology, University of Florence, Florence, Italy.