Michigan Society of Echocardiography
ECHO IN SLOPES 2012

How We Do It ?
Accelerated Dobutamine Echocardiography
Henry Ford Initial Experience

Karthik Ananthasubramaniam, MD FRCP FACC FASE FASNC

Associate Professor of Medicine, Wayne State University
Director, Echocardiography and Nuclear Cardiology
Program Director, Advanced Cardiac Imaging Fellowship
Heart and Vascular Institute
Dept of Medicine, Henry Ford Hospital
Detroit Michigan

kananth1@hfhs.org

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Off label use of dobutamine for stress echo

Background

Dobutamine take about 8-10 minutes to achieve steady state yet we titrate it every 3 minutes in standard DSE

Whether direct administration of high dose Dobutamine at a steady rate for 10 minutes helps achieve desired target heart rate and is safe has been evaluated only in small studies (2 studies)

The FEASIBILITY OF combination of atropine with high dose steady infusion of dobutamine is not KNOWN

Potential advantages : faster test completion, higher achievement of THR

Potential disadvantages : unfamiliarity, side effects, limited data

Potential Advantages of ADSE

Thus a protocol utilizing the full effect of dobutamine at a higher dose at start of test with infusion for a longer time at higher dose may result in

1.More rapid achievement of heart rate with or without supplemental atropine

2.Significantly cut short the test time improving lab efficiency

3.The longer administration of high dose dobutamine (5-10 instead of 3 minutes more closely resembles time for steady state achievement of dobutamine)

4.Potential for dose savings if protocol is adjusted accordingly to include atropine

MAJOR DRAWBACK : not very friendly for viability detection

IF viability assessment has to be done with this ADSE protocol, IT will need to be assessed in the first 2 minutes of high dose as that equals a 10-20mcg/kg/min dose of dobutamine in the standard DSE viability assessment

HFH ADSE Inclusion Criteria

INCLUSION CRITERIA FOR ADSE PROTOCOL

All patients with suspected or known CAD who are stable and asymptomatic (no anginal symptoms for past 12 hours) at time of testing and unable to exercise adequately

Observation and telemetry patients who have ruled out for ACS are included in this group.

Resting ejection fraction ≥ 50%

and WITHOUT FOLLOWING EXCLUSION CRITERIA

HFH ADSE Protocol

Time	0 Minute	3 Minute Images	6 Minute Images	Peak Images (if 85% PMHR achieved)	PRN atropine per standard protocol if ≥ 85% PMHR not achieved after 10 minutes of Dob infusion	Peak Stress Echo post atropine per protocol is used to achieve 85% PMHR
Resting Echo	Start Dobutamine infusion 50mcg/kg/min	DSE infusion	DSE infusion	DSE infusion terminated after imaging	Continue dobutamine infusion during atropine administration	Terminate infusion after images obtained

HFH ADSE Exclusion Criteria

EXCLUSION CRITEIRA FOR ADSE PROTOCOL (Please note that patients not eligible for ADSE protocol may be eligible for standard DSE protocol)

Recent MI < 10 days prior
Active unstable angina
EF < 50% (new or prior) or recently diagnosed intra-cardiac thrombus
Atrial fibrillation
Uncontrolled hypertension (SBP ≥ 180 or DBP ≥ 100)
Severe aortic stenosis
Severe hypertrophic cardiomyopathy or obstructive cardiomyopathy with resting gradient > 30 mm hg.
Moderate-severe pulmonary hypertension (PASP > 50 mm hg)
Any prior or current active ventricular arrythmias such as documented NSVT or VT or frequent PVC's (> 3) on resting EKG
Patient unwillingness to consent for DSE
Known prior aortic aneurysm or intracranial aneurysms

HFH ADSE Termination Criteria

INDICATIONS FOR TERMINATION OF ADSE PROTOCOL

Intolerable symptoms and /or patient request to terminate study

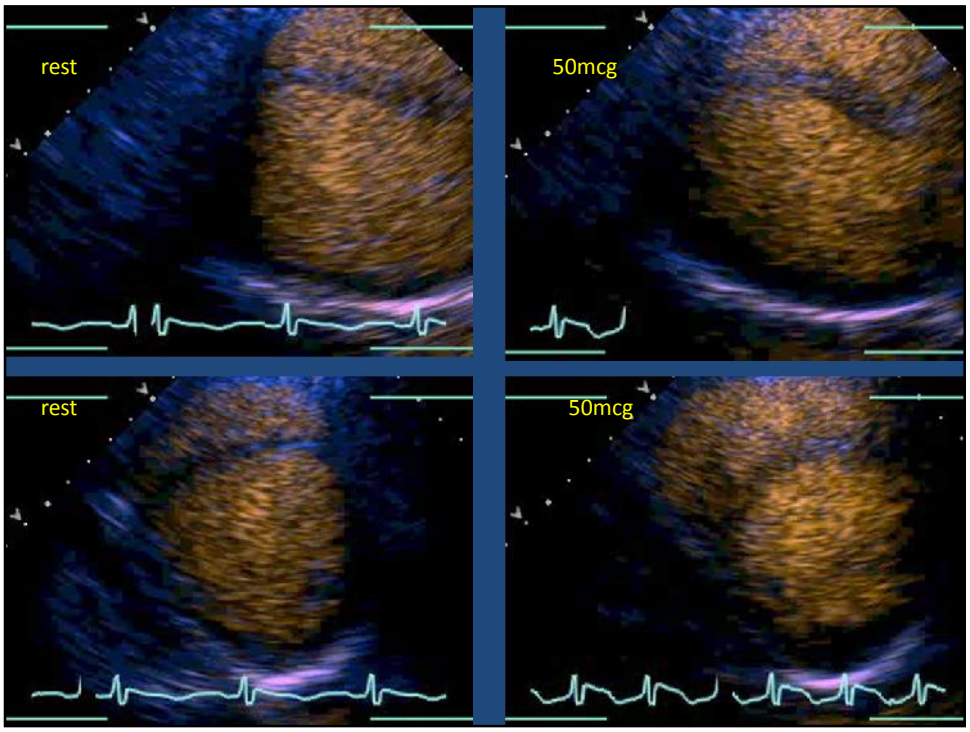
Severe hypertensive response (SBP > 210 and / DBP > 110 mm hg)
Severe hypotensive response (drop in SBP > 40 mm hg)

New SVT , atrial fibrillation or VT or frequent (> 2) ventricular triplets, polymorphic PVC's or > 2 non-sustained runs of atrial tachycardia
Achievement of ≥ 85 % PMHR

New development of multiple wall motion abnormalities prior to protocol completion

Significant ischemic EKG changes as defined by > 1.5 mm horizontal or downsloping ST depression in leads without Q waves or new ≥ 1 mm ST elevation (If this leads to premature protocol termination images should be captured immediately at time of EKG changes and following EKG resolution).

Completion of ADSE protocol with 10 minutes of infusion and supplemented by atropine (if not contraindicated) upto a maximum of 2 mg regardless of achieved PMHR.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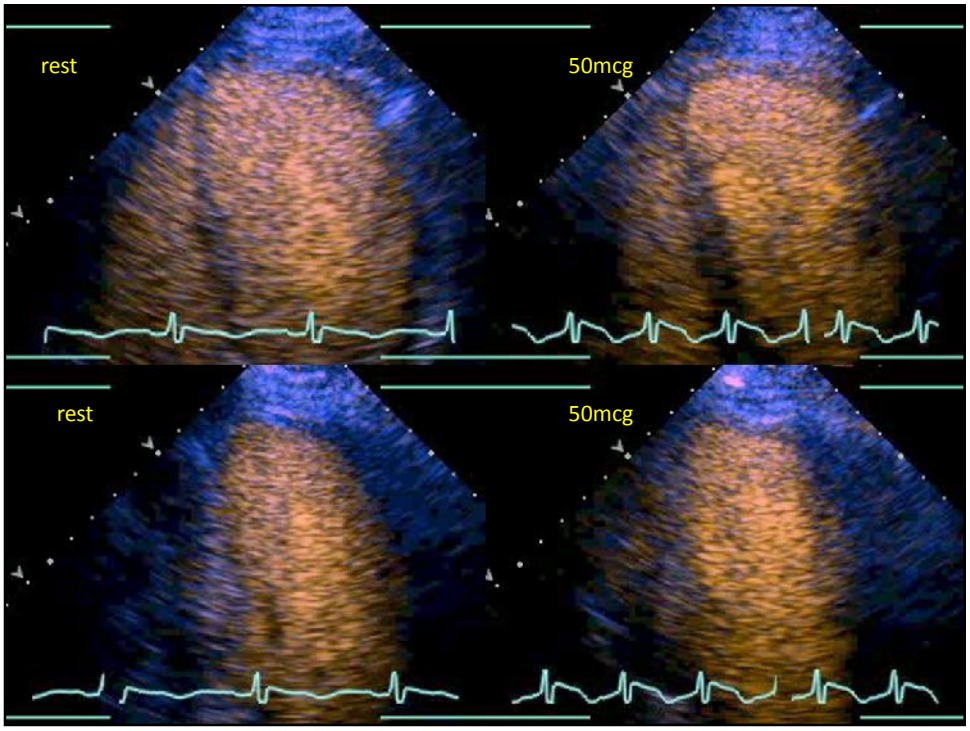
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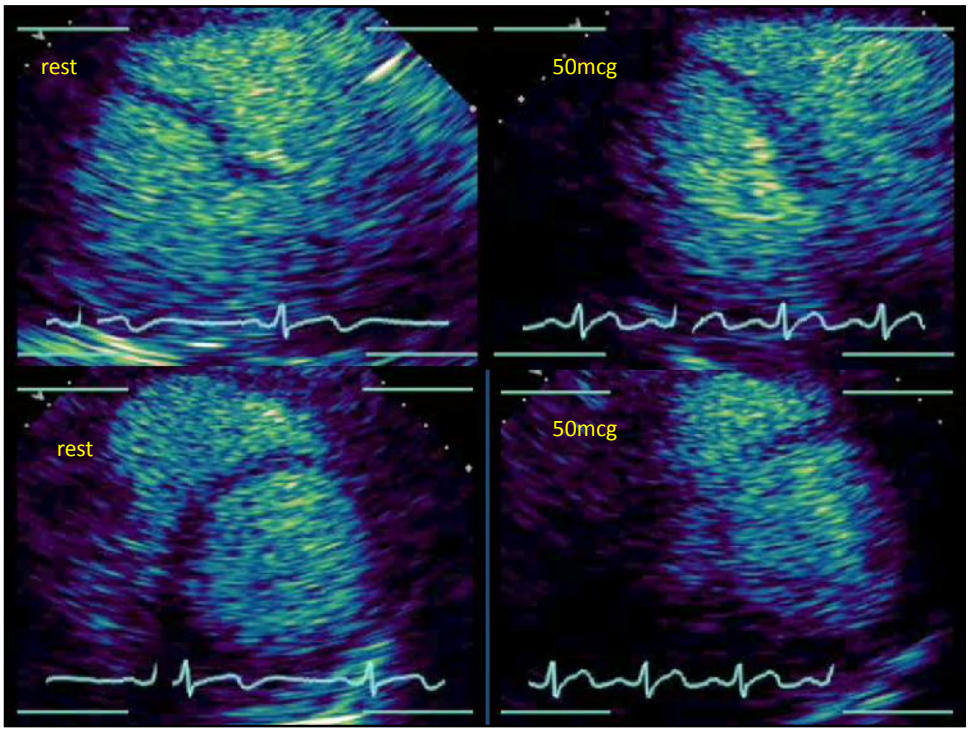
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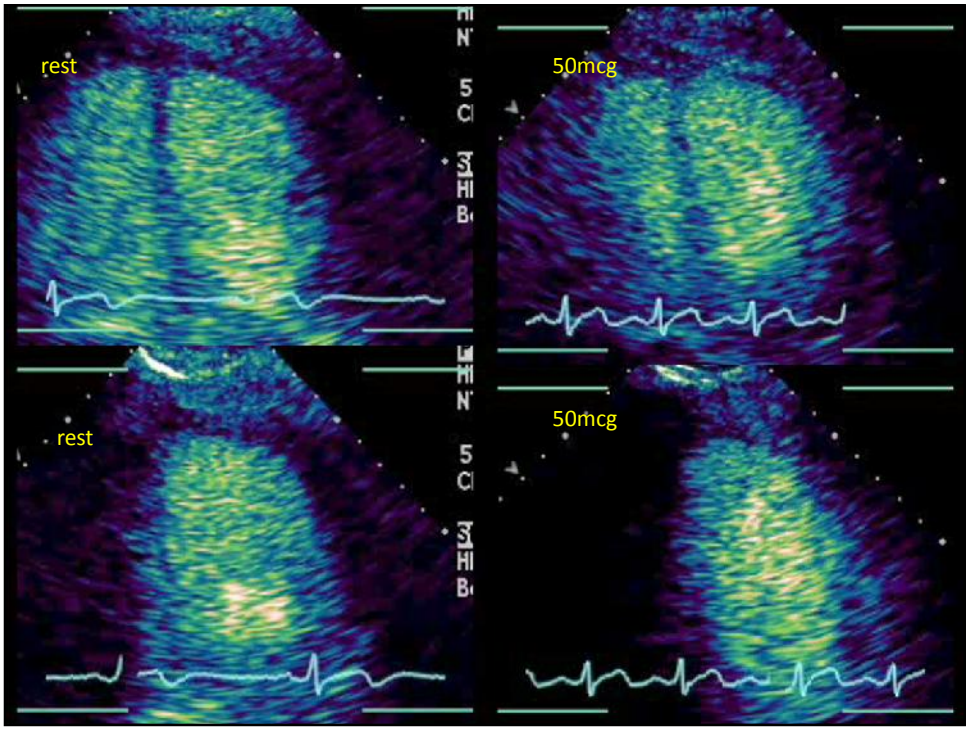
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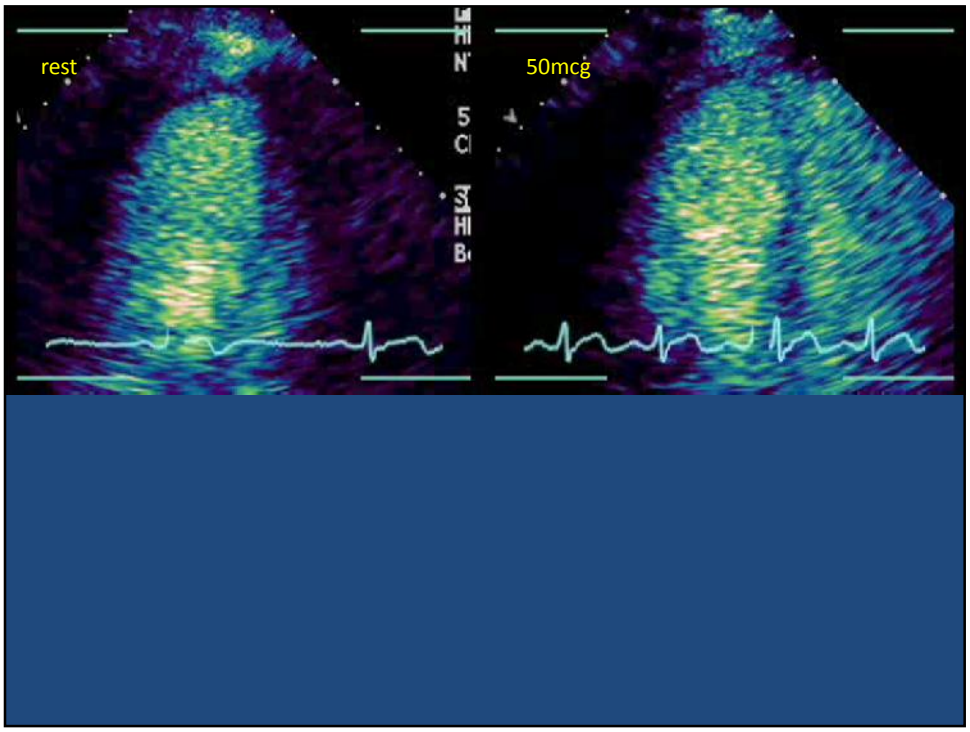

Variable	Response	Cases (N= 467)	Controls (N= 480)	p-value
Age		62.8 ± 11.8	56.9 ± 20.7	<.001
Sex	1. Male	165 (35%)	194 (40%)	0.107
	2. Female	302 (65%)	286 (60%)	
Race	1. Caucasian	285 (61%)	104 (22%)	<.001
	2. AA	125 (27%)	325 (68%)	
	3. Hispanic	3 (1%)	4 (1%)	
	4. Other	54 (12%)	47 (10%)	
Weight (kg)		88.9 ± 22.7	89.5 ± 23.2	0.914
BMI		32.2 ± 7.6	31.5 ± 8.3	0.068
Smoker	1. Yes	204 (44%)	134 (28%)	<.001
	2. No	263 (56%)	346 (72%)	
GFR	0. <=60	79 (17%)	141 (29%)	<.001
	1. >60	388 (83%)	339 (71%)	
Creatinine		1.1 ± 1.0	1.8 ± 2.3	<.001
Dialysis	1. Yes	7 (1%)	42 (9%)	<.001
	2. No	460 (99%)	438 (91%)	
Type of dialysis	1. Hemodialysis	7 (1%)	39 (8%)	<.001
	2. Peritoneal	0 (0%)	3 (1%)	
	3. None	460 (99%)	438 (91%)	
EF <50	1. Yes	0 (0%)	12 (3%)	<.001

	2. No	467 (100%)	468 (98%)	
Diabetes	1. Yes	131 (28%)	195 (41%)	<.001
	2. No	336 (72%)	285 (59%)	
Hyperlipidemia	1. Yes	282 (60%)	198 (41%)	<.001
	2. No	185 (40%)	282 (59%)	
Hypertension	1. Yes	335 (72%)	360 (75%)	0.256
	2. No	132 (28%)	120 (25%)	
COPD	1. Yes	29 (6%)	35 (7%)	0.507
	2. No	438 (94%)	445 (93%)	
Asthma	1. Yes	77 (16%)	57 (12%)	0.042
	2. No	390 (84%)	423 (88%)	
CVA	1. Yes	37 (8%)	43 (9%)	0.567
	2. No	430 (92%)	437 (91%)	
CHF	1. Yes	6 (1%)	32 (7%)	<.001
	2. No	461 (99%)	448 (93%)	
CAD	1. Yes	18 (4%)	64 (13%)	<.001
	2. No	449 (96%)	416 (87%)	
MI	1. Yes	10 (2%)	56 (12%)	<.001
	2. No	455 (98%)	424 (88%)	
Indication	Chest pain	253 (54%)	243 (51%)	0.003
	Preop	113 (24%)	160 (33%)	
	Other	101 (22%)	77 (16%)	

Hemodynamics : ADSE vs Controls

Variable	Response	Cases (N= 467)	Controls (N= 480)	p-value
Pre HR		71.6 ± 13.2	71.2 ± 12.8	0.793
Post HR		135.7 ± 15.5	133.4 ± 18.5	0.205
Pre SBP		132.7 ± 18.0	133.5 ± 19.9	0.740
Post SBP		141.2 ± 32.2	149.8 ± 32.8	<.001
Pre DBP		77.6 ± 10.4	76.4 ± 10.8	0.168
Post DBP		64.2 ± 13.4	65.0 ± 13.3	0.496
Rest LVEF		60.7 ± 4.3	57.9 ± 5.7	<.001
Post LVEF	Other	4 (1%)	0 (0%)	<.001
	Normal	458 (98%)	415 (86%)	
	Abnormal	5 (1%)	65 (14%)	
THR		139.8 ± 10.4	135.8 ± 11.2	0.405
THR achieved	1. Yes	387 (83%)	370 (77%)	0.026
	2. No	80 (17%)	110 (23%)	
Time to THR		7.3 ± 3.5	9.6 ± 2.7	<.001

Transient Symptoms

Variable	Response	Cases (N= 467)	Controls (N= 480)	p-value
Palpitations	1. Yes	62 (13%)	32 (7%)	<.001
	2. No	405 (87%)	448 (93%)	
Nausea	1. Yes	51 (11%)	15 (3%)	<.001
	2. No	416 (89%)	465 (97%)	
Dyspnea	1. Yes	18 (4%)	0 (0%)	0.654
	2. No	448 (96%)	5 (100%)	
Headache	1. Yes	33 (7%)	35 (7%)	0.893
	2. No	434 (93%)	445 (93%)	
Chest pain	1. Yes	48 (10%)	123 (26%)	<.001
	2. No	419 (90%)	357 (74%)	
Dizziness	1. Yes	47 (10%)	19 (4%)	<.001
	2. No	419 (90%)	461 (96%)	

Dosing Comparisons

Variable	Response	Cases (N= 467)	Controls (N= 480)	p-value
Dobutamine dose		50.0 ± 0.0	34.8 ± 9.5	<.001
Cumulative dose (overall)		368.9 ± 190.3	247.7 ± 116.9	<.001
Atropine during test	1. Yes	84 (18%)	278 (58%)	<.001
	2. No	383 (82%)	202 (42%)	
Duration of test (mins)		7.4 ± 3.8	10.3 ± 3.3	<.001

Immediate and Long term F/U

Variable	Response	Cases (N= 467)	Controls (N= 480)	p-value
Arrhythmia during f/u	Yes	5 (1%)	8 (2%)	0.431
	No	462 (99%)	472 (98%)	
Death in f/u	1. Yes	8 (2%)	42 (9%)	<.001
	2. No	459 (98%)	438 (91%)	
MI in f/u	1. Yes	4 (1%)	3 (1%)	0.675
	2. No	462 (99%)	477 (99%)	
CHF in f/u	1. Yes	3 (1%)	7 (1%)	0.221

REVISED 2012 ADSE PROTOCOL TO BE IMPLEMENTED

Time	0 Minute	3 Minute Images	PRN atropine per standard protocol if ≥ 85% PMHR not achieved after 5 minutes of 0.2 mg atropine boluses	Peak Stress Echo images post atropine per protocol if 85% THR achieved (stop study)
Resting Echo	Start Dobutamine infusion 50mcg/kg/min	DSE infusion continued	Continue dobutamine infusion during atropine administration	Terminate infusion after 10 minutes regardless of heart rate if >/=85%THR not achieved