High-sensitivity cardiac troponin T in stable patients undergoing pharmacological stress testing

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PREVENTION

High-Sensitivity Cardiac Troponin T in Stable Patients Undergoing Pharmacological Stress Testing

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ABSTRACT

Background: Acute changes in high-sensitivity troponin T (hs-TnT) are induced by myocardial ischemia during exercise stress testing, but there are no reports of pharmacological stress testing.

Hypothesis: The pattern of troponin release by myocardial ischemia–induced pharmacological stress testing differs according to the ischemic burden in stable patients.

Methods: In total, 250 patients with suspected coronary artery disease underwent pharmacological stress magnetic resonance imaging (MRI). The amount and degree of myocardial ischemia on MRI and ischemic outcomes at 6 months were determined. hs-TnT levels were measured at baseline and 1 and 3 hours after testing. The 6-month clinical outcome was prespecified.

Results: Fifty-one patients had moderate to severe myocardial ischemia (group A), and 199 patients had no or mild myocardial ischemia (group B). hs-TnT levels were significantly higher in group A than B at baseline (11 vs 8 pg/mL, $P = 0.016$) and at 1 hour (12 vs 8 pg/mL, $P = 0.009$) and 3 hours after testing (12 vs 9 pg/mL, $P = 0.012$). Baseline hs-TnT levels of $\geq$14 pg/mL showed a 43% sensitivity and 77% specificity in predicting moderate to severe ischemia by MRI ($P = 0.03$; area under the curve: 0.608, $P = 0.017$). Patients administered dobutamine had a higher acute change in hs-TnT levels 3 hours after testing than did those administered adenosine (21 vs 0 pg/mL, $P < 0.001$). There was a trend toward a higher incidence of myocardial infarction in patients with baseline hs-TnT levels of $\geq$14 pg/mL.

Conclusions: hs-TnT levels are significantly higher in patients with moderate to severe than no or mild myocardial ischemia.

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Table 1. Baseline Demographics of Patients With Moderate to Severe Ischemia (Group A) and Patients With No or Mild Ischemia (Group B) as Shown by Magnetic Resonance Imaging

Characteristics	Group A, n = 51	Group B, n = 199	*P* Value
Age, y	65 ± 9	66 ± 11	0.521
Male	25 (49.0)	80 (40.2)	0.255
Symptoms			
Dyspnea on exertion	20 (39.2)	107 (53.8)	0.064
Typical angina	14 (27.5)	14 (7.0)	<0.001
Atypical angina	10 (19.6)	40 (20.1)	0.937
Congestive heart failure	5 (9.8)	17 (8.5)	0.783
Asymptomatic	7 (13.7)	37 (18.6)	0.415
Diabetes mellitus	27 (52.9)	66 (33.2)	0.009
Hypertension	42 (82.4)	157 (78.9)	0.584
Dyslipidemia	40 (78.4)	146 (73.4)	0.460
Coronary artery disease	15 (29.4)	28 (14.1)	0.010
Prior CABG*	3 (5.9)	8 (4.0)	0.700
Smoker	18 (35.3)	61 (30.7)	0.525
Ejection fraction, %	60 (30–88)	68 (30–90)	0.004
Creatinine, mg/dL	1.1 (0.5–3.0)	1.0 (0.5–2.6)	0.024
Type of pharmacological stress test			
Adenosine	49 (96.1)	175 (87.9)	0.089
Dobutamine	2 (3.9)	24 (12.1)	0.089

Abbreviations: CABG, coronary artery bypass grafting.
Values are mean ± standard deviation, mean (range), or n (%).

Table 2. Comparison of hs-TnT Levels Before, During, and After the Pharmacological Stress Test Among Patients With Moderate to Severe Ischemia (Group A) and Patients With No or Mild Ischemia (Group B) as Shown by Magnetic Resonance Imaging in All Patients, in the Adenosine Stress Test Group, and in the Dobutamine Stress Test Group

All Patients, pg/mL	Group A, n = 51	Group B, n = 199	*P* Value
Baseline hs-TnT levels	11 (3–193)	8 (3–81)	0.016
hs-TnT levels at 1 hour	12 (3–184)	8 (3–75)	0.009
hs-TnT levels at 3 hours	12 (3–178)	9 (3–378)	0.012
Adenosine Stress Test Group, pg/mL	Group A, n = 49	Group B, n = 175	*P* Value
Baseline hs-TnT levels	11 (3–193)	7 (3–70)	0.009
hs-TnT levels at 1 hour	12 (3–184)	7 (3–67)	0.005
hs-TnT levels at 3 hours	12 (3–178)	7 (3–67)	0.001
Dobutamine Stress Test Group, pg/mL	Group A, n = 2	Group B, n = 24	*P* Value
Baseline hs-TnT levels	59 (7–112)	12 (3–81)	0.499
hs-TnT levels at 1 hour	49 (20–78)	14 (3–75)	0.148
hs-TnT levels at 3 hours	122 (111–133)	48 (13–378)	0.149

Abbreviations: hs-TnT , high-sensitivity troponin T.
Data are presented as median hs-TnT level (range).

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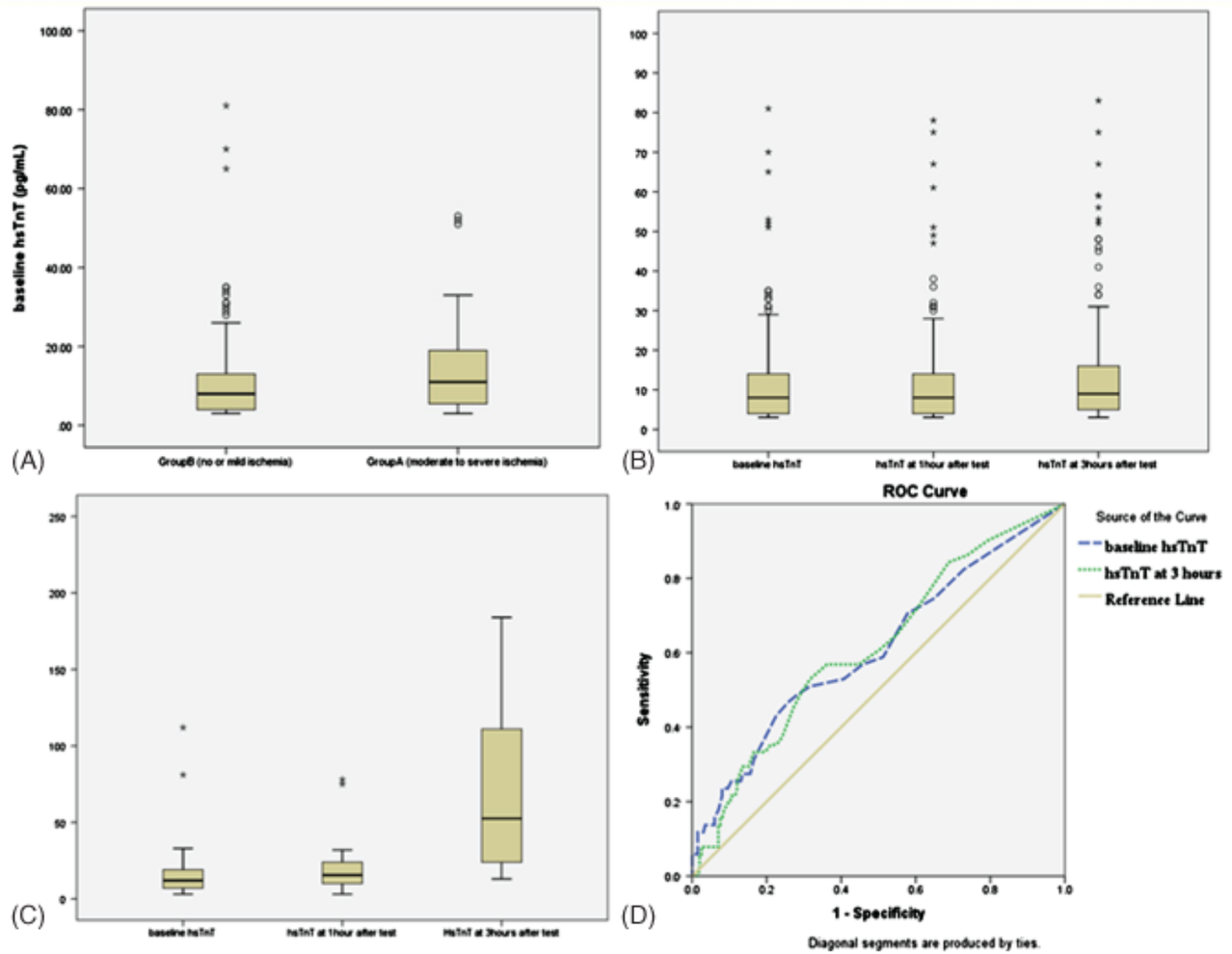

Figure 1. (A) Box plot of high-sensitivity troponin T (hs-TnT) values at baseline in the no- and mild-ischemia group (group B) and in the moderate- to severe-ischemia group (group A). (B) Box plot of hs-TnT levels in individual subjects at baseline, 1 hour after the stress test, and 3 hours after the stress test. (C) Box plot of hs-TnT levels in individual subjects who underwent the dobutamine stress test at baseline, 1 hour after the stress test, and 3 hours after the stress test. (D) Receiver operating characteristic (ROC) curve of baseline hs-TnT levels ≥14 pg/mL and hs-TnT ≥12 pg/mL, 3 hours after the stress test in predicting moderate to severe ischemia by magnetic resonance imaging. Abbreviations: ROC, receiver operating characteristic.

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Table 3. Paired Sample Analysis of the Change in hs-TnT Levels Between 3 Hours After the Stress Test and at Baseline Among Patients With Moderate to Severe Ischemia (Group A) and Patients With No or Mild Ischemia (Group B) as Shown by Magnetic Resonance Imaging

Delta Change Between3 Hours and Baseline	Total No.: Groups A/B	Group A	Group B	*P* Value
Delta change in all patients	250: 51/199	0 (−15 to 104)	0 (−6 to 373)	0.558
Delta change in adenosine group	224: 49/175	0 (−15 to 23)	0 (−6 to 10)	0.880
Delta change in dobutamine group	26: 2/24	63 (21 to 104)	21 (−1 to 373)	0.500

Abbreviations: hs-TnT , high-sensitivity troponin T.
Data are shown for all patients, those who underwent the adenosine stress test (adenosine group), and those who underwent the dobutamine stress test (dobutamine group).
Data are presented as median hs-TnT level (range).

Table 4. Paired Sample Analysis of the Change in hs-TnT Levels Between 3 Hours After the Stress Test and at Baseline Among Patients Who Received Adenosine Versus Dobutamine as the Pharmacological Stress Test

Delta Change Between 3 Hours and Baseline	Total No.: Adenosine/Dobutamine	Adenosine	Dobutamine	*P* Value
Delta change between adenosine vs dobutamine in all patients	250: 224/26	0 (−15 to 23)	21 (−1 to 373)	<0.001
Delta change between adenosine vs dobutamine in group B	199: 175/24	0 (−6 to 10)	21 (−1 to 373)	<0.001
Delta change between adenosine vs dobutamine in group A	51: 49/2	0 (−15 to 23)	62 (21 to 104)	0.019

Abbreviations: hs-TnT , high-sensitivity troponin T.
Data are presented as median hs-TnT level (range) and are shown for all patients, those with moderate to severe ischemia (group A), and those with no or mild ischemia (group B) as shown by magnetic resonance imaging.