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Case Report

A HEART Pathway pitfall in an admitted patient

Joshua J. Oliver, MC, USA, MD [a,*], Matthew J. Streitz, MC, USAF, MD [a], Jessica M. Hyams, MC, USAF, MD [a], Jackson P. Beall [b], Brit Long, MC, USAF, MD [a], Michael D. April, MD, DPhil, MSc [a]

[a] Department of Emergency Medicine, San Antonio Uniformed Services Health Education Consortium, 3551 Roger Brooke Dr, Fort Sam Houston, TX 78234, United States
[b] North Thurston High School, 600 Sleater-Kinney RD NE, Lacey, WA 98516, United States

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ABSTRACT

This paper discusses a possible weakness of the HEART Pathway specific to patients identified as high risk, requiring admission for inpatient risk stratification. Emergency Department (ED) crowding is at an all-time high and the possibility that many of these patients will board in the ED for a period of time before they are transported to an inpatient ward is becoming more likely. Given troponins peak at 6 h after the initial cardiac injury, it is plausible an initial troponin could still remain negative upon arrival. Extending the HEART Pathway to include a 3-hour delta troponin for admitted patients boarded in the emergency department may help alert the patient's inpatient team of those requiring more aggressive evaluations or more timely interventions. The case discussed herein highlights the course of a patient who was admitted to a medicine floor for chest pain along the HEART Pathway. After remaining in the ED for 3 h following admission a second troponin was drawn that resulted in the diagnosis of a non-ST segment myocardial infarction. The patient then received further management in the ED and a change in admission to the Cardiac Care Unit instead of the medicine floor. The patient ultimately received a Coronary Artery Bypass Graft during admission. If the patient had not had the second troponin while in the ED this care would have been delayed.

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1. Introduction

Chest pain and its associated chief complaints account for at least 5% of all emergency department visits [1,2]. Ruling out acute coronary syndrome (ACS) is imperative but the emergency physician must also determine if these patients require risk stratification for future adverse cardiac events. Though many other scoring systems have been tested, the HEART Score and subsequently, the HEART Pathway have emerged as the prominent decision making aid in the disposition of patients presenting for chest pain [3-8].

The HEART Score is a 5 component decision making tool with each component assigned a score of 0, 1, or 2 for total possible scores ranging between 0 and 10. The five components are History, ECG, Age, Risk Factors, and Troponin (Table 1) [3]. A score of 4 or higher identifies those at high enough risk for Major Adverse Cardiac Events (MACE) that they require admission for risk stratification, while scores between 0 and 3 were low risk and safe for risk stratification as an outpatient. However, these patients were still having MACE defined as myocardial infarction, death, or revascularization at a rate of >1%. This led to the creation of the HEART Pathway which added a second troponin 3 h after the initial and a risk-benefit assessment on an individual patient-centered level [9]. This pathway reduced the MACE rate to <1% and has since been externally validated [3,10-12].

For those patients the pathway recommends admitting, a second troponin would not be ordered as the HEART Pathway only dictates ordering a second troponin in patients with a score of 3 or less. ED boarding has resulted in prolonged ED length of stay [13]. We describe a case in which a patient had a HEART Score of 6, was boarded in the ED for >3 h, and had a second troponin ordered in the ED that altered the patient's management.

2. Case report

A 76-year-old male with a history of smoking, hypertension (HTN), diabetes mellitus type II (DMII), coronary artery disease (CAD) and a history of prior cardiac stent presented with over 6 h of chest pain. He described his pain as gradual in onset that waxed and waned. He described it as tightness with onset at rest. He stated the pain was worse with exertion and better with rest. He denied radiation, nausea, and sweating. His ECG demonstrated normal sinus rhythm without signs of ischemia, and his initial troponin I yielded a result of <0.01 ng/mL which is within normal limits. This yielded a HEART Score of History (H)2, ECG(E)0, Age(A)2, Risk(R)2, and Troponin(T)0 for a total of 6, suggesting he needed admission but no further workup in the ED and treatment limited to 324 mg oral aspirin. His admission was delayed for several hours and 3-hour delta troponin and repeat ECG were obtained

* Corresponding author.
E-mail address: yosholiver@gmail.com (J.J. Oliver).

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Table 1
HEART Score [3].

HEART Score		
Component	Grading	Score
History	Highly suspicious	2
	Moderately suspicious	1
	Slightly or non-suspicious	0
ECG	Significant ST-depressions	2
	Nonspecific repolarization disturbance	1
	Normal	0
Age	≥65 years	2
	45–64 years	1
	≤45 years	0
Risk factors	≥3 risk factors[a], or history of atherosclerotic disease[b]	2
	1–2 risk factors[a]	1
	No known risk factors	0
Troponin	≥3× normal limit	2
	>1–<3× normal limit	1
	<Normal limit	0

[a] Risk factors: hypercholesterolemia, hypertension, diabetes mellitus, cigarette smoking, family history, obesity.
[b] Atherosclerotic disease: history of coronary revascularization, myocardial infarction, stroke, and peripheral vascular disease.

while still in the ED, yielding a value of 0.3 ng/mL and unchanged ECG. This resulted in the diagnosis of non ST segment myocardial infarction (NSTEMI) as the upper limit of normal on a troponin I is 0.09 ng/mL. His disposition was changed from admission to the medicine floor to admission to the Cardiac Care Unit (CCU) and he was started on a Heparin drip and given oral Plavix. During the hospitalization, the patient underwent a Coronary Artery Bypass Graft (CABG). For this patient; the diagnosis of NSTEMI and the intervention of revascularization with a CABG met the criteria for MACE.

3. Discussion

We present a case of chest pain, defined by the HEART Pathway as high risk, requiring admission. However due to delays in admission, the patient boarded in the ED. The patient had reached the end of the HEART Pathway when it was determined he required admission. If strictly followed no further work up or treatment would have been initiated in the ED. [9] While chest pain patients would undoubtedly have their troponins trended as an inpatient, or after the admitting team assumed care while still in the ED, it is unlikely it would be drawn until the six-hour mark [14]. In high risk cases such as this, adding a three-hour delta troponin would decrease time to diagnosis and the need for a higher level of care. Clarification is required regarding the term high risk. In literature describing the HEART Score three categories are described: low risk (0–3), intermediate risk (4–6), and high risk (7–10) [3-4,6-7]. The HEART Pathway is simplified to two groups, low risk (0–3) and high risk (≥4) [8,10-11,15]. This report follows the convention of the HEART Pathway and recommends that those patients with a HEART Score of 4 or more receive a repeat troponin at 3 h.

4. Conclusion

Adding a 3-hour delta troponin for patients that are high risk and need further evaluation as an inpatient may help identify up-trending troponins and the need for more aggressive evaluation and intervention earlier in their hospital stay.

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