Walk This Way, Doc This Way — There is More Than One Way to Care for a Patient. This Month: Chest Pain

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A man walks into a bar. He's had a long day. While competing with other patrons for the bartender's attention, he gets frustrated and his chest starts to tighten. "What are you waiting for?" his friend says, "Go to the ER, man!"

We've met this guy before — late fifties, we'll say, maybe 10 pounds overweight. One quick look at his ECG, and we see normal sinus rhythm without abnormalities. His vital signs are normal. We ask some quick questions. In one scenario, we learn that George is a regular smoker and drinker with high cholesterol, borderline hypertension, and diabetes. This chest pain (CP) isn't his first to accompany physical and emotional stress, and it's been happening more often, including twice today. In another scenario, Wallace is a rare drinker without comorbidities who doesn't smoke and has never felt like this before. For both it's tight, left-sided CP without radiation, associated with some mild shortness of breath. It's been slowly resolving since onset one hour ago. While we're at it, let's say the young chain-smoking girlfriend with the fast-food diet, Gina, has come along too. She's annoyed and short of breath.

Now what? CP is one of the most litigious chief complaints in our field. What literature is out there to support our management of possible angina? There's old stuff and some new literature, and beyond that, there's physician preference and comfort level. Clock's ticking — let's get moving.

"Low Risk" Chest Pain: TIMI and Vancouver

In the first scenario, although George's CP is resolving spontaneously, he seems a decent candidate for that-which-we-seek: Coronary Artery Disease (CAD). We send his one hour troponin, and it's negative. However, negative cardiac enzymes will not rule out unstable angina, and this guy fits the picture. Plus, his TIMI score is two — for CAD risk factors and recurrent CP — which gives him an 8% risk of morbidity or mortality in 14 days. As a conservative doc, I'm calling George unstable angina with more than low risk. I'm admitting him to pursue further supervised diagnostic testing.

What if he had a negative stress test last year? Too bad. HPI dictates disposition in the ED. Studies show that fly-below-the-radar, non-occlusive plaques do rupture and cause ACS. In one chart review, 20.7% of CP patients presenting to the ED with a negative stress test, within three years still had significant CAD, including myocardial infarction or a positive stress test within 30 days.[1]

Wallace is trickier. He's an otherwise healthy guy who had a bad day. His CP could easily be non-cardiac. How long until I can send him home? As a conservative doc, I'm still working him up for CAD, but I'm running the numbers that brand him as low risk. Current recommendations suggest several options for low risk CP: The Vancouver Chest Pain Rule would send him home; the TIMI score would admit him. If I'm thinking home, there's a negative two-hour delta CK-MB and Troponin (or single negative value after eight hours),[2] and then home to follow up for a stress test within 72 hours.[3] These recommendations follow the Vancouver Chest Pain Rule, originally derived in 2006 to identify a cohort of very low risk CP patients who CAN go home — all while missing <2% of AMI or unstable angina. Basically, as long as your baseline ECG has nothing more concerning than flattened T waves and you've never had an MI, angina, or used nitrates (OK, that excluded 60% of their patients already — including George), you can go home with a 1.2% chance of events IF you meet these criteria too: a) you're under age 40 (28% of their remaining patients), or b) you're over 40 with a negative first CK-MB or negative delta cardiac enzymes at two hours.[4]

The two issues with this rule? The incidence of CAD in your region really does make a difference in the miss rate. In Canada,[4] where there's more CAD, (21% of CP patents had AMI/unstable angina), miss rates were 1.2% (Sens 98%, Spec 32%), but external validation of the same rule in Iran this year (where only 15% of CP patients develop AMI/UA) showed miss rates of 1.4% (Sens 95%, Spec 56%).[5] Perhaps more importantly, some EDs don't use CK-MB anymore — mine doesn't. So I'm only "pseudo-following" this rule, with a presumed acceptable miss rate.

Back to Wallace, another approach would admit him. His TIMI score of zero marks him low risk, with only 1.8% chance of adverse event in 14 days. That said, remember the TIMI score does NOT tell us who can go

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TIME RISK SCORE for UA/NSTEMI

HISTORICAL	POINTS
Age ≥ 65	1
≥ 3 CAD risk factors (FXx, HTN, ↑ Chol, DM, active smoker)	1
Known CAD (stenosis ≥ 50%)	1
ASA use in past 7 days	1
PRESENTATION	
Recent (≤ 24H) severe angina	1
↑ cardiac markers	1
ST deviation ≥ 0.5 mm	1

RISK SCORE =Total Points (0 - 7)

RISK OF CARDIAC EVENTS (%) BY 14 DAYS IN TIMI 11B*		
RISK SCORE	DEATH OR MI	DEATH, MI, OR URGENT REVASC
0/1	3	5
2	3	8
3	5	13
4	7	20
5	12	26
6/7	19	41

*Entry criteria UA or NSTEMII defined as ischemic pain at rest within past 24H, with evidence CAD (ST segment deviation or +marker)

For more info go to www.ti.mi.org

Antman et al *JAMA* 2000: 284: 835 · 842

home. It was originally developed to anticipate the morbidity of patients ADMITTED for CP — and receiving anticoagulants for unstable angina at that. Its appropriate use is to risk-stratify patients to the appropriate hospital unit — not risk-stratify for discharge. A 2010 meta-analysis of ED patients admitted for CP shows strong external validity for the low morbidity rates of TIMI 0 patients: about a 1.5% risk of acute coronary event in 30 days (Sens 97%, Spec 25%). However, 97% of TIMI 0 patients in these studies were admitted to the hospital.[6]

New Possibilities: ADAPT and the 30-Day Follow Up

The recent ADAPT trial proposes a promising new decision tree to define low risk CP: it uses delta troponin I as the only biomarker and offers the best miss rate yet — 0.25% chance of a major acute coronary event (MACE) at 30 days.[6] The algorithm is this: a) TIMI score zero, b) NEGATIVE delta Trop I at 1 and 2 hours, and c) NO new ischemic changes on initial ECG (including T inversions and Q waves). In the study 20% of enrolled patients qualified as low risk, and although most were still admitted for observation, 0.25% had adverse events within 30 days (Sens 99.7%, Spec 23%, NPV 99.7%).[7]

Even more impressive is the authors' commitment to polishing their decision tree. Their first trial, ASPECT, enrolled 3,582 patients in 14 EDs in nine countries and tested the delta of all cardiac enzymes.[8] The next study tested the logistics of using only delta Trop I or delta Trop T.[9] The final ADAPT study of 1,975 patients tested delta Trop I alone. Specifically, they noted that including the TIMI score for risk stratification helped decrease MACE events in the cohort from 3% to 0.25%, and using delta troponin alone rather than all cardiac enzymes improves specificity (23% vs 11%) while maintaining sensitivity (99%), likely because it works best for both early and late presenting CP.[7]

Although 74% of low risk ADAPT patients had follow-up cardiac testing within 30 days, 88% of which was during admission, it certainly suggests that these patients could be GREAT candidates for discharge and close follow up — and perhaps candidates for safe follow up far beyond 72 hours.

Remember that patients with an uninterpretable ECG — LBBB, pre-excitation, electronically paced rhythms, resting ST segment depressions <1mm at rest, and digoxin use — CANNOT use a standard exercise treadmill test to evaluate for ischemic changes.[10] They require pharmacologic testing with imaging, using drugs such as regadenoson or dobutamine with Sestamibi (a radioactive tracer of coronary perfusion).

Silent MI: Women Are Higher Risk Than We Thought

Last but not least, in our brief review of bar-side stressors is a discussion of who might NOT be so low risk: Gina. In short, beware of young females with vague symptoms, vague ECGs … and positive troponins. A *JAMA* study last year suggests females are more likely to have silent MI's than men by a margin of 40% vs 30% — especially when younger (OR 1.3 for women <45yo compared to men, vs OR 1.1 as they age) — and they show increased mortality compared to men with similar symptoms (14% vs 11%), although again these differences grow less pronounced with age (OR 1.1 at age <45yo vs 0.81 when >85yo).[11]

Take Home Messages

I don't change my practice based on one article, but I do start paying attention a bit more to the trends in my patient outcomes. We've all heard the adage that you don't want to be the first or last doc to do anything, and as a young doc I'm all the less likely to be trying brave new strategies without the input of my partners and consultants. Keeping your eyes and ears open will ensure you're staying with the pack, and within your personal comfort zone.

Dr. Ross is a former AAEM/RSA President and currently works in private practice in Virginia — a job she loves. As a young doc, she's learning to balance the thrill of attending life with the responsibilities of staying well-read, thoughtful, and efficient in the ED. She welcomes your feedback at tmrossmd@gmail.com.

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