

## THERAPEUTICS

# An early invasive strategy was effective in the acute coronary syndrome with elevated cardiac troponin I and T levels

Morrow DA, Cannon CP, Rifai N, et al., for the TACTICS-TIMI 18 Investigators. Ability of minor elevations of troponins I and T to predict benefit from an early invasive strategy in patients with unstable angina and non-ST elevation myocardial infarction. Results from a randomized trial. JAMA. 2001 Nov 21;286:2405-12.

## QUESTION

In patients with the acute coronary syndrome (ACS) and elevated baseline cardiac troponin I (cTnI) or T (cTnT) levels, is an early invasive strategy more effective than an initial conservative strategy?

## DESIGN

Randomized (allocation concealed\*), blinded (outcome assessors),\* controlled trial with 6-month follow-up.

## SETTING

169 hospitals in 9 countries.

## PATIENTS

2220 patients  $\geq 18$  years of age who had angina within the preceding 24 hours, were candidates for coronary revascularization, and had  $\geq 1$  of the following: ST-segment depression, transient ST-segment elevation, or T-wave inversion in  $\geq 2$  leads not known to be old; elevated cardiac markers; or documented coronary disease. Exclusion criteria included persistent ST-segment elevation and secondary angina. 1821 patients had baseline cTnI data. 80% of randomly allocated patients were followed for 6 months.

## INTERVENTION

1114 patients allocated to the early invasive

strategy had coronary angiography 4 to 48 hours after randomization and revascularization, when feasible, on the basis of coronary anatomy assessment. 1106 patients allocated to an early conservative strategy were treated medically and, if stable, had a pre-discharge exercise tolerance test; they also had coronary angiography and revascularization as appropriate only if they had recurrent ischemia at rest or on provocative testing.

## MAIN OUTCOME MEASURE

The primary end point was combined incidence of death, myocardial infarction (MI), and rehospitalization for ACS.

## MAIN RESULTS

{Analysis was by intention to treat.}† For patients with elevated cTnI levels ( $\geq 0.1$  ng/mL), the early invasive strategy reduced the primary end point more than did the ini-

tial conservative strategy (Table). For patients with normal baseline levels of cTnI ( $< 0.1$  ng/mL), groups did not differ (Table). Nearly identical findings were seen for patients based on cTnT levels.

## CONCLUSION

In patients with the acute coronary syndrome and elevated cardiac troponin levels, an early invasive strategy reduced the combined incidence of death, myocardial infarction, and rehospitalization.

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\*See Glossary.

†Information provided by author.

## Early invasive vs early conservative strategy in ACS for the primary end point at 6 months‡

Patient subgroup	Invasive	Conservative	RRR (95% CI)	NNT (CI)
cTnI $\geq 0.1$ ng/mL	15%	25%	39% (22 to 53)	8 (11 to 19)
			RRI (CI)	NNH
cTnI $< 0.1$ ng/mL	16%	12%	33% (-10 to 81)	Not significant

‡ACS = the acute coronary syndrome; cTnI = cardiac troponin I; primary end point = combined incidence of death, myocardial infarction, and rehospitalization. Other abbreviations defined in Glossary; RRR, RRI, NNT, NNH, and CI calculated from data in article.

## COMMENTARY

The study by Morrow and colleagues follows the original report of the TACTICS-TIMI 18 study (1) to emphasize a single point: the early intervention benefit in patients with ACS is limited to those with detectable baseline elevations in cTnI. The TIMI group and others have shown previously that cTnI or cTnT elevations are predictive of high risk for adverse outcomes in hospitalized patients with ACS.

Not all patients are candidates for catheterization for such reasons as their wishes; severe concurrent illnesses; and excessive frailty, although advanced age alone should not be a barrier. The predictive power of elevated troponin levels for prognosis and treatment selection was derived from carefully selected patients enrolled in clinical trials who were hospitalized for chest pain. In TACTICS-TIMI 18, the cTnI blood specimens were processed by research personnel and analyzed at a core laboratory. In practice, clinicians often encounter elevated troponin levels in patients with other clinical disorders, such as pulmonary embolus, heterophile antibody, pericarditis, or sepsis with preexisting coronary artery disease. Such patients would not have been eligible for the TACTICS-TIMI 18 study and are unlikely to benefit from being taken to the cardiac catheterization laboratory. A hastily

analyzed specimen from the emergency department may be positive because of fibrin clots in the autoanalyzer. Thus, clinicians should rely on elevated troponin levels as an indication for an early invasive strategy only in patients likely to have ACS as their presenting illness.

Recently updated guidelines have recognized the strength of the TACTICS-TIMI 18 findings and now suggest an early invasive strategy for patients with elevated troponin levels or other markers of increased risk for adverse outcomes, such as ST-segment depression, recurrent symptoms at rest despite treatment, or heart failure (2). Concomitant treatment with glycoprotein IIb/IIIa-blocking drugs (tirofiban or eptifibatid) will probably enhance the outcome of the intervention.

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## References

1. Cannon CP, Weintraub WS, Demopoulos LA, et al. N Engl J Med. 2001; 344:1879-87.
2. American College of Cardiology/American Heart Association. [www.acc.org/clinical/guidelines/unstable/update%5Fexplantext.htm](http://www.acc.org/clinical/guidelines/unstable/update%5Fexplantext.htm).