

## INCREASED TROPONIN VALUES IN PATIENTS UNDERGOING VASCULAR SURGERY

\*GIOVANNI CANTARELLA, GIUSEPPA LA CAMERA, LUCA VITALE, DANILO CARMELO GRASSO, PIERFILIPPO DI MARCO

\*Department of Medical and Pediatric Sciences-Section Cardiology, Department of Medical Surgical Specialties-Section Anaesthesia and Intensive Care, University of Catania, Italy

*[Aumento dei valori di troponina HS nei pazienti sottoposti ad intervento di chirurgia vascolare]*

### ABSTRACT

*Variations in troponin values THS (cutoff value 14ng/L) were analyzed in 30 patients undergoing vascular surgery in relation to myocardial ischemia. It was found that the measure of troponin THS in selected patients before the operation, along with stability or little increase of such values after the operation, were a reliable basis for a differential diagnosis to exclude acute myocardial infarction, when there was an absence of symptoms and an ECG unchanged after surgery.*

**Key words:** Troponin, acute myocardial infarction, vascular surgery, renal insufficiency, arteriopathy.

*Received May 11, 2013; Accepted May 28, 2013*

### Introduction

The latest methods for measuring troponin T (troponin HS) offer an analytic sensitivity of a few pg/mL in terms of minimum measurable dose. Some recent studies have shown that the increased analytic sensitivity in the diagnosis of myocardial ischemia, which approaches 100% in the first four hours, is accompanied by lower specificity: 79%<sup>(1)</sup>. The data indicate that such tests succeed in correctly identifying subjects with AMI (true positives), but also incorrectly include patients with non-ischemic cardiac injury (false positives). Low specificity results in a significant increase in postoperative cardiology consultations to exclude a possible diagnosis of acute myocardial ischemia (Alpert J., personal communication).

### Materials and methods

Between June and December 2012, 30 vascular patients of both sexes from age 60 to 81 years old were studied. Variations in troponin THS values (cutoff 14ng/mL) during the entire perioperative period were evaluated along with the appearance of

myocardial ischemia. Troponin was measured in serum by means of monoclonal antibodies highly specific for the cardiac isoform of troponin. The blood draws were preoperative (T0), postoperative in Groups I, II and III (T1, T2, T3), and postoperative in Group IV (T1, T2, T3, T4, T5).

Arteriopathy of the peripheral arterial zone in 23 patients was the reason for angioplasty and stent placement. Group I consisted of 5 patients who had a previous infarct and underwent angioplasty with stent; Group II consisted of 10 type-2 diabetic patients; Group III consisted of 8 type-2 diabetic patients with mild renal insufficiency; Group IV consisted of 7 patients with an aortic aneurism (thoracic and abdominal), and received a prosthetic tube implant. At preoperative T0 patients had a cardiology exam with ECG, and echocardiography to evaluate cardiac kinetics, and a blood draw for tests that included glucose, nitrogen, creatinine, troponin THS, and myoglobin.

In the first three groups patients were monitored for three days postoperative at T1 (first day), T2 (second day), and T3 (third day), and in the fourth group for 5 days at T1, T2, T3, T4, T5 (first to fifth days).

## Results

In the preoperative period the median value for troponin THS was 21.3 pg/mL in Group I, 13.2 pg/mL in Group II, 15.1 pg/mL in Group III, and 25.1 pg/mL in Group IV.

In the postoperative period no acute cardiac ischemia was present either clinically or in lab tests (EKG and ultrasound). The median value for troponin THS in Group I was 54.6 pg/mL (3rd, 6th, 12th hour after the operation), second day 55.7 pg/mL, third day 53.2 pg/mL. In Group II the median value for troponin THS was 53.7 pg/mL (3rd, 6th, 12th hour after the operation), second day 55.4 pg/mL, third day 52.3 pg/mL. In Group III the median value for troponin THS was 52.7 pg/mL (3rd, 6th, 12th hour after the operation), second day 54.7 pg/mL, third day 51.3 pg/mL. In Group IV the median value for troponin THS was 103.1 pg/mL (3rd, 6th, 12th hour after the operation), second day 120.4 pg/mL, third day 122.5 pg/mL, fourth day 103.3 pg/mL, fifth day 107.7 pg/mL. There was also a significant increase in myoglobin.

An increase in troponin THS was found in the perioperative period without a rapid rise of values at 3, 6, and 12 hours after the operation<sup>(2)</sup>, according to clinical examination and lab tests. All patients were discharged without any need for admission to a cardiac ward or modification of cardiac therapy.

## Discussion

An increase in troponin THS values may be present even in the absence of ischemic cardiac pathology<sup>(3)</sup>. Such an increase may be observed in the case of injury related to secondary myocardial ischemia (tachycardia, bradycardia, aortic dissection, hypotension, hypertension, acute cardiac decompensation, severe left ventricular hypertrophy, pulmonary hypertension), injury unrelated to myocardial ischemia (cardiac lesions following surgery or ablation, myocarditis, cardio-toxic agents), or related to multifactor causes (renal insufficiency, physical stress, sepsis, acute respiratory insufficiency).

Increases in troponin THS values may be moderate and stable over time, but if the patient has acute symptoms there may be an increase or decrease that is indistinguishable from cases of acute myocardial infarction. According to many authors, such an increase in values must be 50-100% and hence much higher than the 20% considered diagnostic in the uni-

versal definition of AMI<sup>(4)</sup>. In such cases the differential diagnosis is based on clinical and lab evidence (EKG and echocardiography). Recently it has been hypothesized that the release of troponin by the myocardium may be caused by the development of blebs on the myocardium membrane and may be the cause of both ischemia<sup>(5)</sup> and physiological cardiac remodeling<sup>(3)</sup>.

## Conclusions

The possibility of increased requests for cardiology consultations is well-known in hospitals where highly sensitive troponin has been routinely used for some time. This phenomenon is related to the habit of thinking that an increase in troponin indicates acute myocardial infarction. But that common inference is not part of the universal definition of AMI<sup>(4)</sup>, and should not be considered in the absence of clear clinical signs and symptoms of myocardial ischemia. In the absence of symptoms of AMI and when there is an unmodified postoperative EKG, measuring troponin HS in selected patients before an operation, and stability or minor increase of troponin values after an operation, are reliable indications for a diagnosis that excludes acute myocardial infarction.

## References

- 1) Giannoni A, Giovannini S, Clerico A. "Measurement of circulating concentrations of cardiac troponin I and T in healthy subjects: a tool for monitoring myocardial tissue renewal?" *Clin Chem Lab Med* 2009; 47: 1167-77.
- 2) Hickman PE, Potter JM, Aroney C, et al. "Cardiac troponin may be released by ischemia alone, without necrosis" *Clin Chim Acta* 2010; 411: 318-23.
- 3) Thygesen K, Mair J, Katus H, et al. "Recommendations for the use of cardiac troponin measurement in acute cardiac care" *Eur Heart J* 2010, 31: 2197-204.
- 4) Keller T, Zeller T, Peetz D, et al. "Sensitive troponin I assay in early diagnosis of acute myocardial infarction" *N Engl J Med* 2009, 361: 868-77.
- 5) Januzzi JL, Bamberg F, Lee H, et al. "High-sensitivity troponin T concentrations in acute chest pain patients evaluated with cardiac computed tomography" *Circulation* 2010 Mar 16; 121(10): 1227-34.

Request reprints from:

Dott. DI MARCO PIERFILIPPO  
Via Orchidea, 18  
95100 Catania  
(Italy)