



**Fundació**  
La Marató de TV3

21st SYMPOSIUM  
Heart diseases



# **PERIOPERATIVE MYOCARDIAL ISCHEMIA: TROPONIN MONITORING, PROGNOSTIC THRESHOLDS, ECONOMIC ANALYSIS AND MORE INFORMATION ON PATHOPHYSIOLOGY**

**Pablo Alonso Coello**

Institut de Recerca Hospital de la Santa Creu i Sant Pau

## **1. Abstract**

Over 200 million adults worldwide undergo major non-cardiac surgery each year, of whom more than 10 million suffer a cardiac complication within the first 30 days after surgery, which results in increased morbidity and mortality, prolonged hospital stay and higher costs for the healthcare system. Of all cardiovascular complications, the most frequent is myocardial injury in non-cardiac surgery (MINS), defined as elevated myocardial necrosis markers (troponin) in the first 3 days after non-cardiac surgery and of presumable ischemic origin. Its incidence ranges from 8-16% and is associated with 10% mortality 30 days after surgery. Consequently, the main European and American scientific societies recommend preoperative assessment of risk patients and perioperative monitoring of troponin for early detection of such cardiovascular complications. Perioperative monitoring of high-sensitivity troponin T (hs-cTnT), the most commonly used currently, could therefore improve the clinical outcomes of these patients.

Our study, conducted at Santa Creu i Sant Pau Hospital in Barcelona, proposes four main objectives: 1) To implement the troponin perioperative monitoring program in a hospital setting, 2) to determine the troponin prognostic thresholds, 3) to evaluate the cost-effectiveness of the monitoring program, 4) to study the pathophysiological mechanisms of MINS using two diagnostic tests: coronary computed tomography angiography (CCTA) and cardiac magnetic resonance imaging (MRI), ACE-CARD sub-study.

We have already completed the initial recruitment, evaluation and assessment of 1,500 patients included in the hs-cTnT monitoring program, as well as of the patients included in the ACE-CARD sub-study.

## **2. Results**

We have presented our troponin monitoring initiative to the Commission of Diagnostic and Therapeutic Technologies of Santa Creu i Sant Pau Hospital. After evaluation, the Commission has approved the routine implementation of the perioperative monitoring of troponin in selected high-risk population in our hospital. Within the framework of our

study, hs-cTnT is measured three times: before the surgical intervention, and at 48h and 72h after the intervention. In case of elevated levels of hs-cTnT, a cardiologist conducts a structured visit and evaluation defining a personalized management and follow-up for each patient.

According to the data analyzed so far, the incidence of MINS in our setting is 10.6%. Patients with a history of acute myocardial infarction (23.7%), cerebrovascular accident (15.8%) and / or chronic renal failure (34%) have higher risk of experiencing MINS in the postoperative period. Therefore, most of these patients, given their cardiovascular history, are usually treated with aspirin (43.4%) and beta blockers (36.8%), but apparently these treatments do not protect them from experiencing MINS. The threshold of preoperative hs-cTnT that best predicts mortality at 30 days after surgery in our environment is 21.5 ng / L.

Regarding the pathophysiology of MINS, for CCTA no significant differences were observed in the presence and severity of coronary artery disease between cases (MINS) and controls (No MINS). However, for cardiac MRI we have observed a tendency towards a greater presence of severe perfusion defect, induced by stress in patients with MINS. The preliminary results of the ACE-CARD sub-study suggest that, despite a similar preoperative risk profile between both groups and similar prevalence of coronary heart disease, the presence of phenomena similar to the atherothrombotic process, based on a higher presence of vulnerable plaques, perfusion defects is more relevant in patients with MINS.

### **3. Relevance with possible future implications**

The results of our study will provide high-quality evidence for clinical practice and will have important implications for the management and prognosis of public health cardiovascular diseases in our setting. Successful implementation of the hs-cTnT monitoring program will be a good example for other centers in Spain and other countries for the early detection of cardiovascular complications in high cardiovascular risk patients.

New knowledge about the prognosis thresholds of preoperative and postoperative hs-cTnT may improve the prediction of mortality and of major cardiovascular complications after non-cardiac surgery.

The economic evaluation will assess whether hs-cTnT monitoring is cost-effective compared to usual clinical practice. The hypothesis is that given the low cost of troponin monitoring in this subgroup of patients and the poor prognosis of patients with MINS, hs-cTnT monitoring can be very cost-effective for the national health system.

With regards to the ACE-CARD sub-study, understanding the pathophysiology of MINS will help develop new therapeutic and prophylactic measures to improve the prognosis of patients experiencing this complication.

The success of this study will therefore allow the results of the research to be applied to daily clinical practice. This makes it a good example of knowledge translation, with the aim of improving the prognosis of patients undergoing non-cardiac surgery.

#### **4. Generated scientific bibliography**

The following study protocol has been published "*Rationale and design of perioperative myocardial ischemia: a protocol for troponin monitoring, prognostic thresholds, economic analysis and further insights into pathophysiology for non-cardiac surgery patients*" in the online journal *F1000 research*.

The poster with the preliminary results (first 30 patients) of the ACE-CARD sub-study has been presented for the following congress: "*Perioperative Care Congress*" Toronto, Canada, 03/10/19-03/11/19. The poster has been selected as one of the five best for oral presentation.

Publications of sub-studies that address a number of important issues are pending in the analysis and manuscript drafting stages and will be published during 2020-2021.