

Aetiology and outcomes of perioperative myocardial infarctions/injuries after non-cardiac surgery

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Background

Perioperative myocardial infarctions/injuries (PMI) are common complications following non-cardiac surgery and, associated with significantly increased postoperative mortality. Due to its mostly asymptomatic presentation it is currently often missed in clinical routine. With the advent of routine screening, PMI will be an increasingly recognised complication. Therefore, a more detailed understanding of the different aetiologies of PMI is needed to guide management.

Methods

Population: We included consecutive **high-risk patients undergoing non-cardiac surgery** at three hospitals. A screening and response system for PMI was implemented as part of the standard of care for high-risk patients undergoing inpatient non-cardiac surgery (defined as: planned hospital stay >24h after surgery and ≥65 years of age, OR ≥45 years with history of known cardiovascular disease).

Cardiac troponin (high-sensitivity-cTnT in Basel and Sao Paulo, sensitive cTnI in Aarau) was measured prior to surgery, and on postoperative days 1 and 2.

PMI: PMI was defined as an **absolute cTn-increase** of +14ng/L hs-cTnT or +45ng/L scTnI from baseline values. PMI was centrally adjudicated into predefined subtypes (“type I myocardial infarction (T1MI)”, “tachyarrhythmia”, “acute heart failure” (AHF), “extra-cardiac” triggers, “unknown”) by two independent reviewers using all clinical information available. 30-day occurrence of major adverse cardiac events (MACE) was collected. We describe the characteristics and outcome of each subtype. Finally, we conducted a multivariable analysis to identify factors associated with PMI of “unkown” origin.

PMI aetiologies	n	30-day MACE	aHR for 30-day MACE
No PMI	3843	1.9% (1.4-2.7)	Reference
Type I PMI	50	40% (25-52)	16,7 (9,9-28,3)
Tachyarrhythmia	28	25% (7-39)	7,4 (3,4-16,5)
Acute heart failure	25	44% (21-60)	17,6 (9-34,5)
Extra-cardiac, sepsis	47	23% (9-35)	5,6 (2,7-11,8)
Extra-cardiac, other	38	37% (20-51)	16,5 (8,9-30,5)
PMI unknown origin	444	8% (5.4-10.5)	3,3 (2,2-5,1)

Table: Incidence of major adverse cardiac events (MACE) within 30 days and adjusted hazard ratios (aHR) split according to aetiology

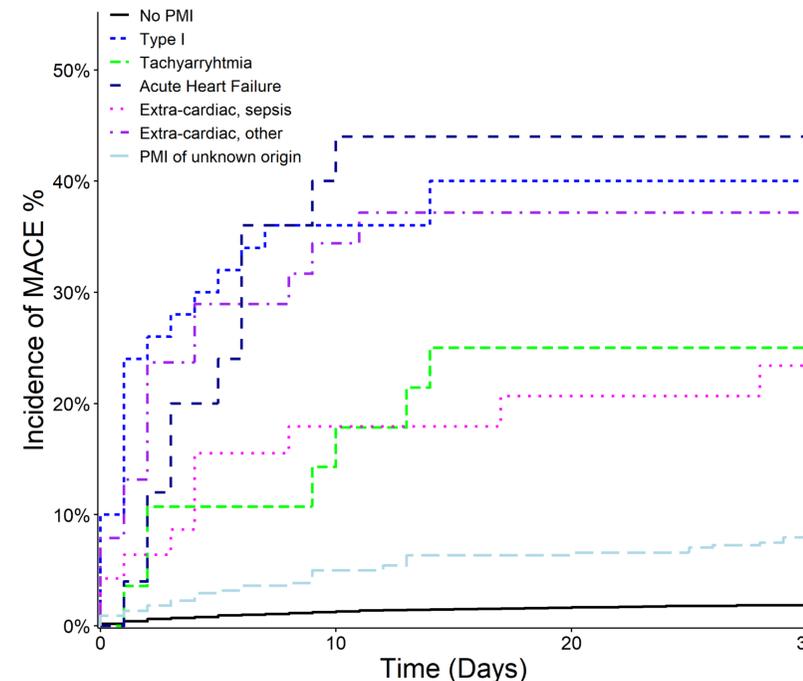


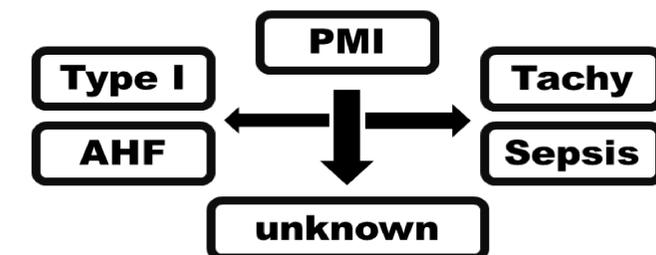
Figure: 30-day incidence of MACE stratified according to final adjudicated diagnoses of PMI aetiology

Results

We enrolled 4475 patients undergoing 5602 surgeries. PMI occurred after 848 (15,1%) surgeries. Overall, 87% of PMI were adjudicated as “cardiac” events with 6,5% of PMI were adjudicated “T1MI”, 4,6% “tachyarrhythmia”, 4,1% “AHF”, 13,1% “extra-cardiac” and the majority of 71,7% as “unknown origin”. All subtypes were associated with increased MACE (40% for T1MI, 25% for “tachyarrhythmia”, 44% for “AHF”, 23% for “extra-cardiac, sepsis”, 36% “extra-cardiac, other”, 8% for “unknown”) compared to non-PMI patients (1,9%, p<0,001). PMI of “unkown origin” was associated with older age and cardiovascular comorbidities, as well as anaemia, bleeding, postoperative hypotension or tachycardia, or duration of surgery, hinting toward demand-supply ischemia as most likely pathophysiology.

Conclusion

The majority of PMI in high-risk patients undergoing noncardiac surgery were cardiac events. Different aetiologies of PMI are associated with increased, but starkly differing occurrence of 30-day MACE.



Conflicts of Interest

