

Routine Screening of Preoperative Troponin as a Predictor of Cardiac Events and Mortality in Hip Fracture Patients

Aly Samory Toure, Bryan Medilien, Kenechukwu A Okafor, Joshua A Parry, Roberto C Hernandez-Irizarry, Caitlin Akard Bradley, Jaimo Ahn, Mara Lynne Schenker

INTRODUCTION: The 2024 AHA Guideline for Perioperative Management of Noncardiac Surgery includes troponin as a preoperative biomarker for risk stratification. The guideline acknowledges that preoperative high-sensitivity cardiac troponin can identify myocardial injury and elevated perioperative risk, but there is limited evidence on its ability to predict adverse outcomes in routine preoperative screening. This study evaluates preoperative troponin as a predictor of in-hospital cardiac events and mortality in hip fracture patients.

METHODS:

We conducted a retrospective cohort study of 508 patients who underwent hip fracture surgery at a Level 1 trauma center between 2020 and 2024. All patients had routine preoperative high-sensitivity cardiac troponin levels collected and were categorized as normal (<30 ng/L), elevated (30–100 ng/L), or significantly elevated (>100 ng/L). Multivariable logistic regression was used to assess associations between troponin levels and two primary outcomes: in-hospital cardiac events and in-hospital mortality. Models were adjusted for age, ASA class, and cardiovascular disease. Odds ratios (ORs) with 95% confidence intervals (CIs) were reported. Additionally, chi-square tests were performed to evaluate the unadjusted association between ASA class and each outcome.

RESULTS:

Among 508 patients who underwent hip fracture surgery, 2.8% experienced in-hospital mortality and 5.1% experienced a cardiac event. Patients with significantly elevated preoperative troponin levels (>100 ng/L) had substantially higher odds of in-hospital mortality (OR 6.03, 95% CI 1.60–22.8, $p = 0.008$) and cardiac events (OR 12.2, 95% CI 4.63–32.2, $p < 0.001$) compared to those with normal troponin levels (<30 ng/L). Elevated troponin (30–100 ng/L) was not significantly associated with increased risk for either outcome.

In unadjusted analyses, ASA class was significantly associated with both mortality and cardiac events. Mortality rose across ASA categories: 0.0% in ASA I–II, 2.4% in ASA III, and 8.4% in ASA IV ($\chi^2 = 11.55$, $p = 0.003$). Cardiac event rates followed a similar trend, occurring in 3.1% of ASA I–II, 4.4% of ASA III, and 11.3% of ASA IV patients ($\chi^2 = 6.70$, $p = 0.035$).

DISCUSSION AND CONCLUSION: Routine perioperative troponin measurement serves as a strong predictor of in-hospital cardiac events and mortality following hip fracture surgery. Interpreting the etiology of troponin elevation—whether from myocardial injury after noncardiac surgery (MINS) or extra-cardiac causes such as pulmonary embolism or sepsis—is essential to tailoring management strategies. While our findings support the prognostic value of preoperative troponin, further studies are needed to determine whether outcomes can be improved through targeted preoperative optimization or if expedited surgical intervention offers greater benefit in this high-risk population.

Table 1: Adjusted Odds Ratios for Mortality and Cardiac Events

Outcome	Predictor	OR	95% CI	p-value
Mortality	Significantly Elevated Troponin (>100 ng/L)	6.03	1.60–22.8	0.008
Mortality	Elevated Troponin (30–100 ng/L)	1.43	0.29–7.07	0.659
Cardiac Event	Significantly Elevated Troponin (>100 ng/L)	12.2	4.63–32.2	0.000
Cardiac Event	Elevated Troponin (30–100 ng/L)	2.29	0.70–7.50	0.173

Table 2: ASA Class vs Mortality and Cardiac Events

ASA Class	Mortality (%)	Cardiac Event (%)	n	Mortality χ^2 (p)	Cardiac Event χ^2 (p)
ASA I–II	0.0	3.1	97	11.55 (0.003)	6.70 (0.035)
ASA III	2.4	4.4	340		
ASA IV	8.4	11.3	71		

Table 3: Baseline Characteristics by Troponin Category

Troponin Category	n	Age (mean \pm SD)	CVD (%)	Mortality (%)	Cardiac Event (%)	Delayed Surgery >48h (%)
Normal (<30 ng/L)	415	75.8 \pm 14.3	64.8	1.9	2.9	33.0
Elevated (30–100 ng/L)	55	79.9 \pm 11.3	69.1	3.6	7.3	30.9
Significantly Elevated (>100 ng/L)	38	71.2 \pm 18.3	65.8	10.5	26.3	47.4