Preoperative B-type natriuretic peptide testing in patients undergoing noncardiac surgery

Rawan Rumman MD PhD, Kevin Venus MD

■ Cite as: *CMAJ* 2022 October 11;194:E1350. doi: 10.1503/cmaj.220782

1 Brain natriuretic peptide (BNP) is released by ventricular cardiomyocytes in response to atrial or ventricular wall stretch, myocardial hypoxia, ischemia and fibrosis

The prohormone (proBNP) splits into the inactive N-terminal peptide (NT-proBNP) and the active hormone BNP, which decreases systemic vascular resistance and central venous pressure and increases natriuresis. Elevated BNP may be detected in patients with noncardiac conditions, such as renal failure and critical illness.[1]

2 Elevated preoperative BNP levels are associated with an increased risk of postoperative death and major cardiovascular events

A meta-analysis of 2179 patients showed that those with preoperative BNP values of 0–100, higher than 100–250 and higher than 250 ng/L experienced the composite event of all-cause 30-day mortality or nonfatal myocardial infarction at rates of 5.1%, 11.6% and 26.3%, respectively. Results were similar for patients with elevated NT-proBNP.[2]

3 Measurement of preoperative NT-proBNP adds incremental prognostic value

A 2020 cohort study of 10 402 patients undergoing noncardiac surgery found that the addition of NT-proBNP thresholds to the Revised Cardiac Risk Index (a model for quantifying preoperative risk) substantially improved preoperative risk stratification for about 1 in 4 patients.[3] This information can aid shared decision-making between patients and their medical and surgical teams regarding delaying, cancelling or proceeding with elective surgery.

4 Most postoperative myocardial injuries (93%) are asymptomatic[1]

Therefore, the 2016 Canadian Cardiovascular Society guideline recommended surveillance with an electrocardiogram in the postanesthesia care unit and daily tropinin levels for the first 48–72 hours in patients with preoperative BNP levels of 92 mg/L or higher or NT-proBNP levels of 300 ng/L or higher, and for those in whom preoperative BNP levels are not available.[4]

5 Whether interventions triggered by preoperative measurement of NT-proBNP lower postoperative morbidity and mortality remains unclear

However, recognition of myocardial injuries after noncardiac surgery is an opportunity for intensification of cardiac risk factor management. A randomized controlled trial showed that a composite of vascular complications was reduced in patients treated with dabigatran after developing postoperative myocardial injury.[5]

References

1. Ruetzler K, Smilowitz NR, Berger JS, et al. Diagnosis and management of patients with myocardial injury after noncardiac surgery: a scientific statement from the American Heart Association. *Circulation* 2021; 144:e287-305.
2. Rodseth RN, Biccard BM, Le Manach Y, et al. The prognostic value of pre-operative and post-operative B-type natriuretic peptides in patients undergoing noncardiac surgery: B-type natriuretic peptide and N-terminal fragment of pro-B-type natriuretic peptide: a systematic review and individual patient data meta-analysis. *J Am Coll Cardiol* 2014;63:170-80.
3. Duceppe E, Patel A, Chan MTV, et al. Preoperative N-terminal Pro-B-type natriuretic peptide and cardiovascular events after noncardiac surgery: a cohort study. *Ann Intern Med* 2020;172:96-104.
4. Duceppe E, Parlow J, MacDonald P, et al. Canadian Cardiovascular Society Guidelines on perioperative cardiac risk assessment and management for patients who undergo noncardiac surgery. *Can J Cardiol* 2017; 33:17-32.
5. Devereaux PJ, Duceppe E, Guyatt G, et al. Dabigatran in patients with myocardial injury after non-cardiac surgery (MANAGE): an international, randomised, placebo-controlled trial. *Lancet* 2018;391:2325-34.

Competing interests: None declared.

This article has been peer reviewed.

Affiliations: Department of Medicine (Rumman, Venus), University of Toronto; Division of General Internal Medicine and Geriatrics (Venus), University Health Network, Toronto, Ont.

Correspondence to: Kevin Venus, kevin.venus@uhn.ca

