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HIGH-SENSITIVITY TROPONIN T PREDICTS PERIOPERATIVE ADVERSE EVENTS IN PATIENTS UNDERGOING FEMUR INTERLOCKING PROCEDURES

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ABSTRACT

Objectives: Previous studies have shown that troponin is a valuable predictor of perioperative complications after non-cardiac surgery. However, the relationship of the preoperative troponin level with perioperative adverse events has not been well described in patients undergoing orthopaedic surgeries . The aim of this study was to evaluate the impact of the preoperative high-sensitivity cardiac troponin T (hs-cTnT) level on the outcome of patients who underwent long bone interlocking procedures.

Methods: The records of 83 patients who were over 18 years of age and underwent elective femur interlocking between January 2019and December 2019 were retrospectively evaluated. Patient medical and demographic data and the results of routine preoperative laboratory tests, including the hs-cTnT level, were collected to assess a potential association between these factors and perioperative adverse events.

Results: Perioperative adverse events occurred in 5 patients. Older patients and those with more comorbid conditions tended to have a higher rate of perioperative adverse events. The preoperative hs-cTnT level was significantly higher in the individuas who experienced a complicated in-hospital course than in those who did not (22.6±6.7 ng/L vs 6.3±3.1 ng/L; p<0.001). Multivariate analysis indicated that age (odds ratio [OR]: 2.33, 95% confidence interval [CI]: 1.16-4.35; p<0.01), the presence of diabetes (OR: 3.13; 95% CI: 1.15-6.32; p=0.004), and a preoperative hs-cTnT level of >18.3 ng/L (OR: 4.51, 95% CI: 2.34–7.82; p<0.001) were significant and independent predictors of perioperative adverse events.

Conclusion: The results of this study indicated that a higher preoperative hs-cTnT level was associated with perioperative adverse events in adult patients undergoing elective orthopaedic surgery.

KEYWORDS : High-sensitivity troponin T, femur interlocking , prognosis

The early recognition of predictors of adverse outcomes in patients undergoing surgery is important for timely risk stratification and management [1]. Clinical risk stratification tools and preoperative laboratory tests have frequently been used as a component of the preoperative workup for patients undergoing various surgical procedures [1]. Several studies have reported that patient factors, comorbidities, and surgical characteristics are associated with a higher incidence of complications in major surgery [2, 3]. However, only a few studies have examined the association between preoperative biomarkers and perioperative complications following long bone surgery.

Troponins are proteins that regulate the calcium-induced interaction between myosin and actin that results in muscle contraction [4]. Troponin I and troponin T are the most widely used and are the most specific biomarkers for myocyte injury. Elevated troponin levels are a predictor of major adverse events in multiple settings [5, 6]. Multiple studies have demonstrated that preoperative troponin I and T are valuable predictors of worse outcomes not only after cardiac or vascular surgery but also after noncardiac surgeries [7-10]. Although the predictive value of cardiac biomarkers, such as troponins and natriuretic peptides, has been evaluated in various noncardiac surgical procedures, including vascular, gynecological, urological, orthopedic, reconstructive, and abdominal surgeries [11-13], their ability to predict adverse events in patients undergoing neurosurgery is unknown. High-sensitivity troponin (hs-cTnT) assays have been introduced in recent years [14]. This retrospective cohort study was an examination of preoperative hs- cTnT test results and adverse events in patients who under- went long bone surgery.

MATERIALS AND METHODS

The results of descriptive analyses are expressed as mean±SD for normally distributed variables, as medians and maximum- minimum values for non-normally distributed variables, and as percentages for categorical variables. In the evaluation of the differences between the categorical variables, Fisher's ex- act test was used in row and column tables and Pearson's chi- square test was used for 2x2 tables. In order to compare continuous variables in patients with and without perioperative adverse events, independent t-tests were used for normally distributed data, and the Mann-Whitney U test was used for non- normally distributed data. Univariate and multivariable logistic regression analyses were performed to determine independent predictors of perioperative complications. Jamovi software (The jamovi project 2018, version 0.9.1.7, retrieved from https://www.jamovi.org) was used to perform the statistical analysis.

RESULTS

A total of 83 patients who underwent elective femur interlocking procedures (mean age: 69.3±8.4 years, 52% male) were included in this study.

Perioperative adverse events

Perioperative adverse events occurred in 5 (6.0%) patients. The in-hospital perioperative adverse events are presented in Table 1. Patients who had perioperative adverse events were older (mean age: 73.7±8.7 years vs 68.4±9.9 years; p<0.001), and were more likely to have underlying comorbid diseases, such as coronary artery disease (28.7% vs 11.0%; p<0.001), diabetes mellitus (29.9% vs 15.6%; p<0.001), and heart failure (15.1% vs 9.3%; p<0.001). The preoperative hs-cTnT level was significantly higher in the individuals who experienced a complicated in-hospital course than in those who did not (21.6±8.2 ng/L vs 6.3±3.1 ng/L; p<0.001).

Predictors of perioperative adverse events:

A relationship between preoperative adverse events and the following variables was demonstrated via univariate analysis: age, coronary artery disease, diabetes, heart failure, and pre- operative hs-cTnT level. Multivariate analysis showed that age (OR: 2.33, 95% CI: 1.16-4.35; p<0.01), presence of diabetes (OR: 3.13, 95% CI: 1.15-6.32; p=0.004), and preoperative hs-cTnT of >18.3 ng/L (OR: 4.51, 95% CI: 2.34–7.82; p<0.001) were significant and independent predictors of perioperative adverse events (Table 2).

DISCUSSION

This was a single-center, retrospective, and observational study of 2519 consecutive patients over the age of 18 who underwent elective long bone surgery. The incidence of perioperative adverse events was 6%. Multivariate analysis revealed that older age and a high preoperative hs- cTnT level were independent prognostic factors for perioperative adverse events.

Morbidity and mortality can occur in cardiac or non-cardiac surgery as a result of significant perioperative complications [1]. Although long bone surgical procedures have been thought to present an intermediate risk of death and cardiovascular complications, perioperative adverse events are not uncommon [16]. Current data show that preoperative measurements of the biomarkers of cardiovascular dysfunction provide additive prognostic information of major adverse events and mortality after various noncardiac surgical procedures, such as vascular [17], gastrointestinal [18], and orthopedic [19] procedures. Ruggieri et al. [20] analyzed N-terminal pro-brain natriuretic peptide and the prognostic value of serum cardiac troponin T in patients with no history of cardiac anomalies before and after elective surgery for intracranial tumor resection. In another study, McClendon et al. [21] examined the effect of renin-angiotensin system inhibitors on postoperative troponin elevation in spinal fusions and analyzed the correlation with hospital stay. They examined 208 patients retrospectively, and found that the preoperative use of renin-angiotensin system inhibitors was independently associated with postoperative troponin elevation and a longer hospital stay. However,

they did not evaluate the prognostic value of troponin in their study population. In a study conducted by Macfarlane et al. [22] to investigate the predictive features of troponin I level, it was concluded that it was insufficient to measure consecutive postoperative troponin 1 levels in routine elective spine surgery as a predictor of increased 30-day mortality. According to the current literature, hs-cTnT is more sensitive than conventional troponin measures to detect acute coronary syndromes [24]. In addition, several studies have shown that hs-cTnT values can improve diagnostic accuracy as well as prognostic accuracy, which can identify high-risk patients in the conventional troponin-negative group in a variety of diseases [25, 26].

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