Osteoarthritis and Cartilage

Letter to the Editor

Use of preoperative comorbidity scores to predict mortality after total arthroplasty☆

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Dear Editors,

With great interest we read the recent article by Inacio *et al.*[1] comparing performance of three comorbidity measures to predict 90-day and 1-year mortality after total hip and knee arthroplasty in a cohort of elderly patients. They showed that the Elixhauser and Charlson comorbidity scores had similar performance for postoperative mortality prediction, but performed better than the RxRisk-V comorbidity score. Furthermore, a combined model with comorbidities identified by three comorbidity scores was the best postoperative mortality prediction model. This study includes a large sample of patients and the authors have used the right statistical methods to compare the performance of different models for postoperative mortality prediction. In our view, however, there are several issues in this study that need to be clarified before adoption into routine practice.

First, three comorbidity scores used in this study only include baseline characteristics of study patients, but not preoperative mobility ability and functional status of patients. Actually, mobility disability is common among patients undergoing total hip and knee arthroplasty. Such condition can not only impair patient survival, but also may adversely affect postoperative recovery and outcomes. The available evidence shows that mobility disability is a strong independent predictor of mortality after total hip and knee arthroplasty[2,3].

Second, other than the preoperative comorbidities and illness severity, surgical burden and risk also are the important determinants for postoperative mortality. It has been shown that compared with the total knee replacement, the unicompartmental knee replacement significantly decreases 45-day mortality[4]. As compared with other surgical approaches, posterior surgical approach is associated with decreased 90-day postoperative mortality after total hip replacement[5]. Furthermore, the early postoperative mortality is significantly lower in the bilateral hip or knee arthroplasty than in the unilateral procedure. As the weighted mean volume of blood loss is more than 1000 ml, total hip and knee arthroplasty is one of leading indications for surgical transfusions, and intraoperative blood transfusion has been identified as an independent predictor for increased postoperative mortality[2,6]. In addition, perioperative hypotension is most prevalent during the intraoperative period and has been associated independently with short-term morbidity and mortality after noncardiac surgery. In fact, as comparison with the surgical risk stratification that only includes preoperative variables, the inclusion of intraoperative elements in the multivariable model can improve the performance to predict perioperative mortality and adverse cardiac events[7].

Third, for noncardiac surgical patients, the preoperative comorbidities including cardiac, renal and pulmonary diseases, can be deteriorated by perioperative stress and complications, especially for elderly patients. Furthermore, new onset postoperative organ injury and dysfunction, such as myocardial or kidney injury, heart failure, arrhythmias, acute ischemic stroke, delirium and deep vein thrombosis, have been shown as independent predictors of increased mortality after noncardiac surgery. In available literature, the performance of preoperative comorbidity scores in predicting the postoperative mortality of patients has been questioned[8,9].

Thus, we argue that alone use of preoperative comorbidity scores may not provide an exact prediction for postoperative mortality in the elderly patients undergoing total hip and knee arthroplasty. The best postoperative mortality prediction model should include the known preoperative, intraoperative and postoperative risk factors affecting postoperative mortality.

Authors' contributions

Fu-Shan Xue: This author had carefully read the manuscript of *Inacio et al.*, analyzed their methods and data, suggested the comment points, and drafted this manuscript, and is the author responsible for this manuscript. **Fu-Shan Xue** had seen and approved the final manuscript.

Gui-Zhen Yang: This author had read the manuscript of *Inacio et al.*, and helped to analyze their methods and data, and reviewed this manuscript. **Gui-Zhen Yang** had seen and approved the final manuscript.

Chao Sun: This author had read the manuscript of *Inacio et al.*, and helped to analyze their methods and data, and revise the comment points. **Chao Sun** had seen and approved the final manuscript.

Conflict of interest

None declared.

References

1. Inacio MC, Pratt NL, Roughead EE, Graves SE. Evaluation of three co-morbidity measures to predict mortality in patients undergoing total joint arthroplasty. Osteoarthritis Cartilage 2016;24(10): 1718—26.
2. Jämsen E, Puolakka T, Eskelinen A, Jäntti P, Kalliovalkama J, Nieminen J, et al. Predictors of mortality following primary hip and knee replacement in the aged. A single-center analysis of 1,998 primary hip and knee replacements for primary osteoarthritis. Acta Orthop 2013;84:44—53.
3. Nüesch E, Dieppe P, Reichenbach S, Williams S, Iff S, Jüni P. All cause and disease specific mortality in patients with knee or hip osteoarthritis: population based cohort study. BMJ 2011;342:d1165.
4. Hunt LP, Ben-Shlomo Y, Clark EM, Dieppe P, Judge A, MacGregor AJ, et al, National Joint Registry for England and Wales. 45-Day mortality after 467 779 knee replacements for osteoarthritis from the National Joint Registry for England and Wales: an observational study. Lancet 2014;384:1429—36.
5. Hunt LP, Ben-Shlomo Y, Clark EM, Dieppe P, Judge A, MacGregor AJ, et al, National Joint Registry for England, Wales and Northern Ireland. 90-Day mortality after 409 096 total hip replacements for osteoarthritis, from the National Joint Registry for England and Wales: a retrospective analysis. Lancet 2013;382:1097—104.
6. Spahn DR. Anemia and patient blood management in hip and knee surgery: a systematic review of the literature. Anesthesiology 2010;113:482—95.
7. Reich DL, Bennett-Guerrero E, Bodian CA, Hossain S, Winfree W, Krol M. Intraoperative tachycardia and hypertension are independently associated with adverse outcome in noncardiac surgery of long duration. Anesth Analg 2002;95:273—7.
8. Kim JD, Choi JY, Kwon JH, Jang JW, Bae SH, Yoon SK, et al. Performance of posttransplant model for End-Stage Liver Disease (MELD) and delta-MELD scores on short-term outcome after living donor liver transplantation. Transplant Proc 2009;41: 3766—8.
9. Filardo G, Hamilton C, Grayburn PA, Xu H, Hebeler Jr RF, Hamman B. Established preoperative risk factors do not predict long-term survival in isolated coronary artery bypass grafting patients. Ann Thorac Surg 2012;93:1943—8.

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