group [2]. In it, we describe a classification system for Non-Prosthetic Peri-Implant Fractures, or NPPIFs, based on a similar retrospective cohort methodology, and would like to highlight the similarities and differences.

Both classification systems recognize the importance of the nail (N) or plate (P) as the primary fixation device. Similarly, these fractures are also subclassified according to the location of the fracture in relation to the implant (at the end, or distant to it).

Whilst the current article addressed peri-implant fractures specific to the femur, our classification system is generalisable to all long bones. We also identify the healing status of the original fracture, as well as the integrity of the primary fixation, as important factors to be highlighted as subclasses of our system. In particular, we believe the identification of the healing status to have a significant bearing on the decision to retain or remove the primary implant, which in turn influences the fixation options for addressing the second fracture. Based on our series, our paper recommends management strategies for specific subtypes of peri-implant femoral fractures.

We congratulate the authors on amassing a large number of cases in their series, and the incorporation of the AO-OTA classification which will extend the applicability of their system. However, we suggest to enhance the comprehensiveness of their proposed classification system by integrating the healing status of the primary fracture.

Conflict of interest

The authors of this manuscript have no conflict of interest to declare.

References

[1] Videla-Cés M, et al. Proposal for the classification of peri-implant femoral fractures: Retrospective cohort study. Injury 2018, doi:http://dx.doi.org/10.1016/j.injury.2018.10.042 ePub ahead of print.
[2] Chan Lester, Gardner Antony, Wong MK, Chua Kenon, Kwek Ernest BK, on behalf of the Singapore Orthopaedic Research CollaborativE (SORCE). Non-prosthetic peri-implant fractures: classification, management and outcomes. Arch Orthop Trauma Surg 2018;138(6):791–802.

Ernest Beng Kee Kwek*On behalf of the Singapore Orthopaedic Research CollaborativE (SORCE) Group
Department of Orthopaedic Surgery, Tan Tock Seng Hospital, Singapore

* Corresponding author at: Department of Orthopaedic Surgery, Tan Tock Seng Hospital, 11 Jalan Tan Tock Seng, 308433, Singapore.
E-mail address: ernest_kwek@ttsh.com.sg (E. Kwek).

http://dx.doi.org/10.1016/j.injury.2018.12.037

Letter to the Editor

Authors' reply to letter to editor "Surgical approaches for open reduction and internal fixation of intra-articular distal humerus fractures in adults: a systematic review and meta-analysis"

Dear Dr Vijay,

We thank you for your comments [1] on our recently published study [2]. We agree and are well aware that capitellar and trochlear fractures are an important subset of intra-articular distal humerus fractures (IDH), however non-inclusion of such studies in our study was not by oversight. Our combined search results did yield studies looking at these injuries, but these were excluded due to our well-defined study objectives and strict inclusion criteria. The study by Singh et al [3] was excluded as it looked at primarily at the fixation modality rather than the approach, which was one of the exclusion criteria for our study.

We congratulate you on your excellent case series describing the anterolateral approach for fixation of capitellar fractures [4]. Our search strategy was comprehensive and designed to identify as relevant many studies as possible, but as is the case with all search strategies, it is not without its limitations. Although we were very meticulous in including all studies that met the inclusion criteria, studies that were in the pre-publication stage or that had not been indexed by our search sources might have been excluded inadvertently.

Since our meta-analyses included only comparative studies, we disagree that exclusion of your study [4], which is essentially a non-comparative, prospective case series, would skew the results of the quantitative analysis.

The primary aim of our study was to determine which surgical approach for open reduction and internal fixation (ORIF) of intra-articular distal humerus (IDH) fractures is superior, in terms of functional outcomes and complication rates. The study was not meant to be an exhaustive listing of the numerous surgical approaches that have been well described in the literature. We also reiterate the main finding of our study: the evidence to determine which surgical approach is superior for ORIF of IDH fractures is limited. As is evident from our study, this is primarily due to the abundance of case series, many of which do not report on important outcome measures, and lack of well-designed controlled trials.

Finally, we are pleased to note that He et al. [5] have recently published a systematic review looking exclusively at corornal shear fractures of the distal humerus, which will add to our understanding of these rare, nevertheless, important injuries.

Siddhartha Sharma, Rakesh John, Mandeep S Dhillon, Kamal Kishore.

Funding sources

None.

Writing assistance

None.

Conflicts of interest

None.

Conflict of interest statement

The authors declare that they have no conflicts of interest.

References

[1] Vijay V, Vaishya R, Vaish A. Letter to editor regarding "Surgical approaches for open reduction and internal fixation of intra-articular distal humerus fractures in adults: a systematic review and meta-analysis". Injury 2018(September) pii: S0020-1383(18)30483-2.
[2] Sharma S, John R, Dhillon MS, Kishore K. Surgical approaches for open reduction and internal fixation of intra-articular distal humerus fractures in adults: a systematic review and meta-analysis. Injury 2018;49:1381–91.
[3] Singh AP, Singh AP, Vaishya R, Jain A, Gulati D. Fractures of capitellum: a review of 14 cases treated by open reduction and internal fixation with Herbert screws. Int Orthop 2010;34:897–901.
[4] Vaishya R, Vijay V, Jha GK, Agarwal AK. Open reduction and internal fixation of capitellar fracture through anterolateral approach with headless double-threaded compression screws: a series of 16 patients. J Shoulder Elbow Surg 2016;25:1182–8.

[5] He SK, Xu L, Guo JH, Liao JP, Qin TW, Huang FG. The impact of associated injuries and fracture classifications on the treatment of capitellum and trochlea fractures: a systematic review and meta-analysis. Int J Surg 2018;54:37–47.

Siddhartha Sharma*
Department of Orthopaedics, PGIMER, 160012, Chandigarh, India

Rakesh John
Arthroscopy & Sports Medicine Fellow, Division of Orthopaedic Surgery, Dalhousie University, Halifax, Canada

Mandeep S. Dhillon
Department of Orthopaedics, PGIMER, Chandigarh, India

Kamal Kishore
Department of Biostatistics, PGIMER, Chandigarh, India

* Corresponding author.
E-mail address: sharma.sid@pgimer.edu.in (S. Sharma).

http://dx.doi.org/10.1016/j.injury.2018.12.036

Letter to the Editor

Is early postoperative hypoalbuminemia really a risk factor for acute kidney injury after hip fracture surgery?

To the editor,

With interest we read the recent article by Shin and Han [1] assessing the association of early postoperative hypoalbuminemia with acute kidney injury (AKI) after hip fracture surgery. By many statistical methods including multivariate logistic regression analyses, inverse probability of treatment weighting, propensity score matching, and propensity score matching weighting analyses, they showed that minimal early postoperative serum albumin level <2.9 g/dL was an independent risk factor for AKI. Given that AKI is significantly associated with increased risks of morbidity and mortality after hip surgery [2], their findings have potentially clinical implications. Other than the limitations described by the authors in discussion, however, we noted several issues in this study that needed further clarifications.

First, the optimal cutoff value of postoperative albumin level for prediction of AKI was determined based on the Youden index according to the receiver operating characteristic curve analysis. On the basis of an optimal cutoff value of 2.9 g/dL, patients were stratified into the two groups with minimal early postoperative serum albumin levels <2.9 and ≥2.9 g/dL. However, we noted that the area under the receiver operating characteristic curve (AUROC) only was 0.653. Generally, the AUROC can be interpreted as excellent (0.9–1), good (0.75–0.89), fair (0.6–0.74), low (0.5–0.59), or fail/no (<0.5) predictive value [3]. In clinical practice, moreover, the cutoff value of serum albumin level used for diagnosis of hypoalbuminemia is <3.5 g/dl, rather than <2.9 g/dL. That is, their study actually evaluate the association of severely postoperative hypoalbuminemia with the risk of postoperative AKI. Thus, it is better that title of this article is changed into “Severe hypoalbuminemia in the early postoperative period is a risk factor for postoperative AKI following hip fracture surgery”.

Second, the author did not provide the Youden index at the optimal cutoff value of 2.9 g/dL. Apart from being able to provide the optimal cutoff value, the Youden Index also is a direct measure of diagnostic accuracy at the optimal cutoff value [4]. According to the AUROC and Youden index at the optimal cutoff value, sensitivity, specificity, positive and negative predictive values of postoperative albumin level <2.9 g/dL for prediction of AKI can be obtained. Because of this limitation, it was unclear whether the use of minimal early postoperative serum albumin level < 2.9 g/dL to predict postoperative AKI had a good discrimination ability.

Third, patients with a postoperative serum albumin level <2.9 g/dL had a significantly lower preoperative albumin level than those with a postoperative serum albumin level ≥2.9 g/dL. Because the details of perioperative management were not provided, it was unclear whether a decreased serum albumin level in early postoperative period was a continuation of existed preoperative event or was attributable to intraoperative and postoperative factors. It should be emphasized that a decreased preoperative serum albumin level has been independently associated with an increased risk of postoperative AKI after noncardiac surgery [5]. That is, if the decreased postoperative serum albumin level was regarded as a confounder for multivariable statistical adjustment in this study, the low preoperative serum albumin level might become a significant risk factor for postoperative AKI after hip surgery.

Finally, when multivariable statistical adjustments were used to determine the risk factors for AKI after hip surgery, some intraoperative and postoperative risk factors associated the occurrence of AKI were not included in the mode. The recent evidence shows that duration of operation, intraoperative bleeding, postoperative anemia, blood transfusion, acute myocardial infarction, and sepsis are the important risk factors for AKI following hip surgery [6–8]. Thus, not taking above intraoperative and postoperative factors into the model would have biased the inferences of multivariable statistical adjustments for minimal early postoperative serum albumin level <2.9 g/dL as a risk factor for prediction of postoperative AKI.

In the view of above design limitations, we argue that this retrospective observational study cannot answer question well whether early postoperative hypoalbuminemia is a real risk factor for AKI following hip fracture surgery.

Authors’ contributions

Rui-Juan Guo: This author had carefully read the manuscript of ***Shin and Han***, analyzed their methods and data, suggested the comment points, drafted this manuscript. **Rui-Juan Guo** had seen and approved the final manuscript.

Fu-Shan Xue: This author had carefully read the manuscript of ***Shin and Han***, analyzed their methods and data, revised comment points and this manuscript, and is the author responsible for this manuscript. **Fu-Shan Xue** had seen and approved the final manuscript.

Liu-Jia-Zi Shao: This author had read the manuscript of ***Shin and Han***, and helped to analyze their methods and data, revised this manuscript. **Liu-Jia-Zi Shao** had seen and approved the final manuscript.

Li Zheng: This author had read the manuscript of ***Shin and Han***, and helped to analyze their methods and data, and revise this manuscript. **Li Zheng** had seen and approved the final manuscript.

Acknowledgements

All authors have no financial support and potential conflicts of interest for this work.