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Dear Professor Karlsson

We would like to share our views on a paper recently published in Knee Surgery, Sports Traumatology, Arthroscopy. Feichtinger et al [1] conclude that conservative treatment should be recommended for patients with Rockwood (RW) type III acromioclavicular joint (ACJ) dislocations and that surgery should be recommended in patients with RW type IV ACJ dislocations. Although we applaud the authors for their hard work on this in an attempt to tackle some still unanswered and important questions on ACJ injuries, we are concerned that these conclusions are potentially misleading due to a high risk of selection and attrition bias, as well as measurement and classification concerns, that essentially render the study fundamentally flawed.

When comparing conservative and surgical approaches within the RW type III and IV classifications, patients are selected according to the treatment received rather than through a process of random allocation. Such non-random selection risks selection bias meaning that the groups being compared differ systematically in important ways that might influence their response to treatment. So, any attempt to compare the effectiveness of treatments is not valid because if the groups are different to begin with, they will be different at the end of treatment for reasons other than the treatment received. An example validating our concern regarding selection bias is the difference in age of patients in the conservatively and surgically treated patients. For RW type III ACJ dislocations, those treated surgically were on average 39.8 years old, whereas those treated conservatively were on average 49.1 years old. This is almost a 10-year difference and any clinician will reflect the clinical importance of this age gap in this condition and how it might influence treatment selection. Feichtinger et al [1] report this difference as not significant, inferring this is not a concern, but this reflects a misuse of significance testing. In declaring no significant difference in age between the two groups, data from 19 patients treated conservatively was analysed and 10 patients undergoing surgery. Hence, a lack of significant difference is due to a lack of data to detect a difference and it is certainly not safe to assume the groups are comparable. In patients with RW type IV ACJ dislocations, the age difference between the conservatively managed and surgical groups was 20 years. Clearly, any comparison of treatments cannot be made when groups differ markedly to begin with.

Our second major concern relates to attrition bias. Of 226 patients, only 56 (25%) were followed-up. This means that data from the vast majority (75%) is missing. Such attrition alone would be regarded as a fundamental flaw because the response of the vast majority of the patient group is unknown and would effect any inference about comparative treatment effectiveness if included.

Thirdly, the chosen scoring system (ACJI) is a non-validated outcome scoring system that heavily favours radiological alignment over clinical parameters. It is well recognised that surgery achieves better joint alignment than non-operative treatment, so unsurprising that this score is higher. This is not addressed by the authors and in fact the conclusion and title claim surgery provides better 'clinical and radiological outcomes'. This is not supported by the results of the validated clinical measures.

Finally, there is no clarification on how the injuries were classified. The method of classifying ACJ injuries is not standardised in the literature and there is a large degree of inter- and intra-observer disagreement with radiographic methods (radiographs and CT scans). This adds another level of possible error, especially given the small sample sizes at final evaluation.

We recognise that the authors of the paper acknowledge some of these limitations briefly but they are not reflected in the conclusion of the paper. Given the seriousness of these flaws, they need to

be clearly reflected in the conclusion as follows: Due to high risk of selection and attrition bias, use of a non-validated outcome measure and potential for classification error, significant caution should be exercised when interpreting these results that could be misleading.

#### **Conflict of interest**

We declare no conflicts of interest

#### **References**

- [1] Feichtinger X, Dahm F, Schallmayer D, Boesmueller S, Fialka C, Mittermayr R (2020). Surgery improves the clinical and radiological outcome in Rockwood type IV dislocations, whereas Rockwood type III dislocations benefit from conservative treatment. *Knee Surgery, Sport Traumatol Arthrosc.* <https://doi.org/10.1007/s00167-020-06193-0>.