

Correspondence

Sequence of the Essex-Lopresti lesion—a high-speed video documentation and kinematic analysis

Sir—It was with great interest that we read the paper by Wegmann et al. 2014) “Sequence of the Essex-Lopresti lesion—a high-speed video documentation and kinematic analysis”. We wish to congratulate the authors on their excellent work. These findings add to our knowledge and understanding of the pathobiomechanics of this rare lesion, with a demonstration that fracture of the radial head may be preceded by at least partial lesions of the interosseous membrane in the course of high-energy axial trauma. However, we have some concerns regarding the pathobiomechanics described by the authors, and wish to share them with the author.

In our previous experience of diagnosing and treating patients with Essex-Lopresti lesions, all patients presented with radial head fracture, rupture of the interosseous membrane and disruption to the distal radio-ulnar joint. But in any Essex-Lopresti lesion, injury to one component is generally more severe than that to the other two. The radial head fracture is usually the most severely injured in these types of high-energy trauma in young patients with good bone quality. By comparison, the most severe injury in older patients occurs to the interosseous membrane; we have yet to ascertain an association for injury to the distal radio-ulnar joint in patient populations. We assume that the interosseous membrane in older patients is fragile, and that, when ruptured, it progresses into an Essex-Lopresti lesion, which is subsequently followed by radial head fracture. This hypothesis happens to be confirmed by the current study by Wegmann and co-workers, as they tested four specimens from volunteer donors with an average age of 84 (74–91) years. Therefore, our other hypothesis—that the interosseous membrane in younger patients is very strong and that the radial head will likely fracture before rupture of the interosseous membrane—could be further confirmed by similar mechanical experiments. Together, we infer from these experiments that there is no strict sequence for the development of the Essex-Lopresti lesion.

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Sir—We thank Dr. Liu et al. very much for their interesting letter concerning our biomechanical study, in which we found the rupture of the interosseous membrane of the tested cadaver specimens to precede the fracture of the radial head.

We witnessed a transversal movement of the radius and ulna away from each other leading to bending of the bones and with the resulting tension within the membrane being the final cause for the tear.

The authors remark that from their perspective the radial head is the first structure to fail and that it is not preceded by a lesion to the interosseous membrane. The authors argument is that interosseous membrane lesions come with radial head fractures, but you are not aware of isolated lesions of the interosseous membrane with an intact radial head. Hence the radial head fracture has to be the initial lesion, leading to longitudinal instability with a longitudinal tear of the membrane. Moreover the authors have witnessed the tear of the interosseous membrane to happen in older patients, while young patients rather present with high grade fractures of the radial head without lesion to the interosseous membrane.

It is to our knowledge unknown whether lesions to the interosseous membrane can be excluded if the radial head is not fractured. There exist no imaging studies to prove that. Nor are we aware of a biomechanical study to give arguments for that suspicion. Our study is the first one to show images of the generation of the Essex-Lopresti lesion and thereby presents new information.

Experimental studies in general are simulations and cannot reproduce fully realistic situations. Hence the conclusions are limited. It is correct that we investigated specimens from volunteer body donors of an average age of 84 years (74 – 91) in our study. That fact limits the comparability of our results to the trauma mechanism in specimens or patients of significantly lower age—nor does our study claim to do so. The age of the specimens represents a limitation and we thank the

authors for the remark. We have discussed the limited comparability of our study results in the publication. Indeed, it is rational to expect the interosseous membrane in older patients to be more brittle compared to younger patients with possible effect on any mechanical trauma to the upper extremity.

Further studies will have to be conducted in specimens of younger age to investigate a possible difference.

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Wegmann K, Engel K, Burkhart K J, Ebinger M, Holz R, Brüggemann G P, Müller L P. Sequence of the Essex-Lopresti lesion—a high-speed video documentation and kinematic analysis. *Acta Orthop* 2014; 85 (2): 177-80.