Reply to Letter to the Editor on: Augmented Reality-Based Navigation System for Wrist Arthroscopy: Feasibility (J Wrist Surg 2013;2(4):294–298)

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J Wrist Surg 2014;3:154.

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Many thanks to Frank Unglaub and Christian Spies for their careful reading of the article “Augmented Reality-Based Navigation System for Wrist Arthroscopy: Feasibility.”

Regarding their review on the clinical appearance, they emphasize the importance of accurately determining the TFCC lesions before a repair. We can only agree with them on this point. However, we wish to note that, at present, our work has only allowed us to ensure the recalibration of the arthroscope before positioning and of the instruments when they came out of the field of view. Certainly, it is a significant step forward and we thank Drs. Unglaub and Spies for recognizing the value of our work, but the development of this technique still needs to evolve before finding reliable, clinical applications. Indeed, the aim would be to readjust the images of the arthroscope to the pathological MRI images in real-time viewing, as, for example, a deep lesion of the TFCC as described by Atzei,¹ or an intraosseous lesion of the lunate bone,² both of which are not visible when the arthroscope is placed into the radiocarpal joint. This technique of augmented reality has already been successfully used during laparoscopy for deep tumors of the liver, non-visible on the surface.³

Regarding the educational aspect of their critique, we agree with Drs. Unglaub and Spies that shortening the learning curve is a major objective at a time when everything is accelerating and when the notion of loss of opportunity puts psychological pressure on surgeons.⁴ Again, controlling the position of the arthroscope before its insertion could prevent a lot of cartilage damage, a major complication among surgeons who begin in arthroscopy.⁵ The same applies for losing the view of the instruments within the joint; this could be avoided by using augmented reality, which would allow to find them at any time, regardless of their position, intra- or extra-articular. However, this progress is a

first step toward the complete simulation of surgical procedures using dedicated programs, allowing even experts to develop new surgical techniques. This simulation technique for several surgical procedures has already been used with success.⁶

Concerning the financial aspect of their critique, we share the concern expressed by Drs. Unglaub and Spies about possible overcharging for these technologies, but every innovation comes with costly investment. The theoretical advantages of augmented reality applied to the wrist arthroscopy are expected to gradually compensate this inconvenience, as, for example, the decrease of the learning curve, less potential cartilage damage, time savings in the precise localization of deep lesions, and the accuracy of repairing techniques.

Again, many thanks to Frank Unglaub and Christian Spies for their constructive criticism.

References

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