

SCIENTIFIC LETTER

Direct view through smart glasses guided vascular cannulation. Is it feasible? Will it be useful?



Canalización vascular guiada por la visión directa de la imagen ecográfica a través de gafas de realidad aumentada. ¿Es posible? ¿Será útil?

Dear Editor:

In pediatric care practice, establishing vascular access is often challenging due to the small caliber of blood vessels (especially in infants) and vessel collapse associated with hypovolemia and shock.¹ The use of point of care ultrasound (POCUS) has significantly improved the rate of success in these procedures, performed by pediatricians or nurses, reducing their duration and the number of attempts required

to establish vascular access, as well as the incidence of mechanical complications.²

Despite the usefulness of POCUS in guiding cannulation, this approach requires providers need to move their head and eyes throughout the procedure to look between the ultrasound screen and the puncture site, simultaneously or consecutively, which can affect the outcome by interrupting visual tracking of the needle. Furthermore, to be able to align the puncture site with the ultrasound screen, the operator frequently has to adopt an awkward posture that increases fatigue and reduces dexterity, making the procedure more difficult.

In this context, smart glasses are emerging as a promising tool whose chief advantage would be allowing the operator to maintain the sonographic image and the puncture site in the same field of vision to avoid losing track of the needle, which could contribute to reduce risks and the number of failed attempts while working more ergonomically (Figs. 1 and 2). Since smart glasses are a novel device,

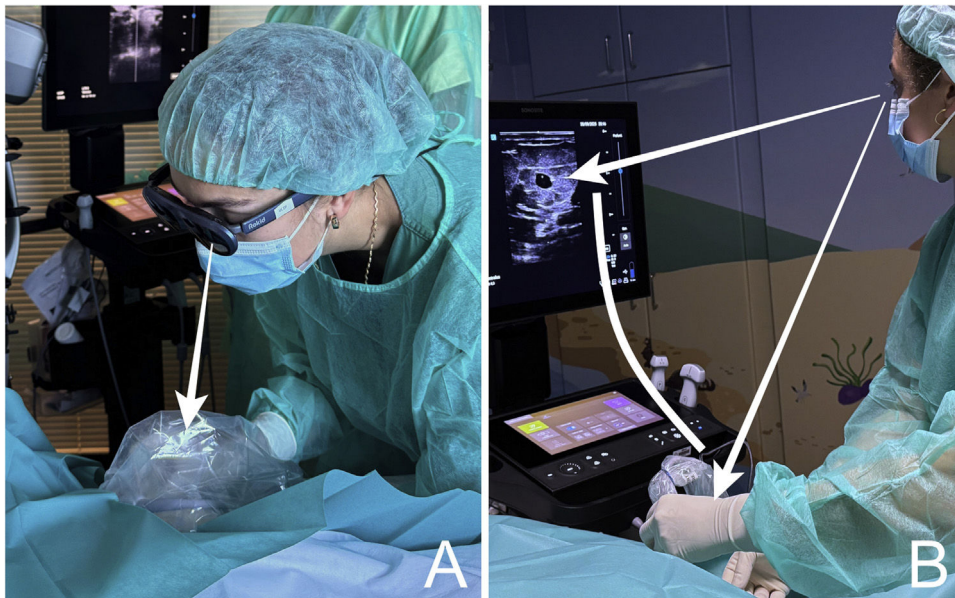


Figure 1 Comparison of the operator's visual axis (white arrows) when performing ultrasound-guided cannulation with augmented reality glasses (image A) versus a conventional ultrasound display (image B).

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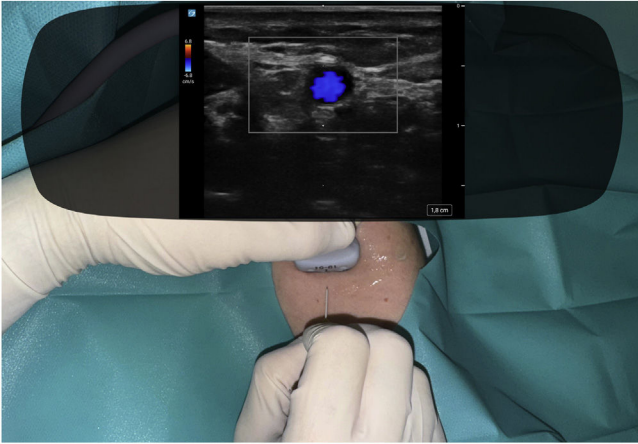


Figure 2 Photomontage showing the operator's field of vision during the ultrasound-guided cannulation procedure with the smart glasses connected to the ultrasound machine via a data cable.

there are still few studies on the subject, but the existing evidence suggests that augmented reality glasses could contribute to improving the safety and efficacy of vascular catheterization.³⁻⁶

To test this hypothesis, we undertook a study to evaluate ultrasound-guided vascular cannulation with projection of the sonographic images in the lenses of a commercial smart glasses model. The research ethics committee of our hospital considered the study exempt from an ethics review, as it was conducted in a simulation setting. In a preliminary phase, we run several tests to get familiarized with the smart glasses and explore their potential advantages and drawbacks.

In the pilot study, we compared the use of Rokid smart glasses connected in real time to a Sonosite LX ultrasound machine to the conventional visualization of sonographic images in the device's display in a simple simulation model of vascular cannulation. Twenty residents in pediatrics participated on a voluntary basis and performed the simulated procedure on a block of cooked ham. The mean time to achieving the objective of the simulation was 5 s shorter with the smart glasses compared to the conventional display, with a 15% increase in success on the first-attempt. Participants reported that using the smart glasses required more physical and mental effort, but took less time, and rated their performance for achieving the objective favourably compared to the use of the conventional ultrasound machine. The observed differences were not statistically significant, probably due to the small sample size and the design of the simulation model.

Our preliminary data suggest that the use of smart glasses for ultrasound-guided vascular cannulation is easy and feasible, although it is important to take into account that this is a novel tool with a learning curve of its own, albeit, based on our experience, a fast one.

In short, the possibility of displaying sonographic images directly in the operator's field of vision through augmented reality glasses could offer technical advantages by helping perform ultrasound-guided procedures, such as vascular

cannulation in pediatric patients, more successfully and safely, while allowing a more ergonomic posture. This hypothesis should be tested in controlled clinical trials to allow systematic comparison with the conventional technique and to validate the use of this tool in children.

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Declaration of competing interest

The authors have no conflicts of interest to declare.

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