



Ultrasound-guided central venous catheterization may cause lethal mechanical complications intraoperatively. We developed a novel device to prevent such complications. It works as a needle guide to supplement the operator's skill" Asao et al (2019).

Abstract:

Ultrasound-guided central venous catheterization may cause lethal mechanical complications intraoperatively. We developed a novel device to prevent such complications. It works as a needle guide to supplement the operator's skill. We evaluated the utility of this device in terms of the success rate and visualization of the needle tip while penetrating the target vessel using a simulator. This study was approved by the local ethics committee. The new device - an optical skill-assist device - has a slit and a mirror in the center. The operator can see the needle's reflection in the mirror through the slit and can thus ensure that the needle is directed in line with the ultrasound beam. Participants were recruited by placing an advertisement for a hands-on seminar on ultrasound-guided vascular access. They received hands-on training on the in-plane approach for 2 hours. Pre-test and post-test without the device and an additional test using the device were performed to evaluate the proficiency of ultrasound-guided vascular access. An endoscope inserted into the simulated vessel was used to detect the precise location of the needle tip in the vessel. The primary outcomes were the success rate of the procedure. The secondary outcome was visualization of the needle tip while penetrating the simulated vessel. The chi-squared test was used for comparing the

success rate and needle tip visualization between the different tests. $P < .05$ was considered to indicate significant differences. Forty-two participants were enrolled in this study. The success rate did not increase after the simulation training ($P = .1$). Using the optical skill-assist device, the rate improved to 100%. There was a significant difference in success rate between the pre-test and additional test using the optical skill-assist device ($P = .003$). Needle tip visualization significantly improved with the use of the optical skill-assist device compared to the pre-test ($P < .001$) and post-test ($P = .001$). Simulation training improved participants' skill for ultrasound-guided vascular access, but the improvement depended on each participant. However, further, improvement was achieved with the use of the optical skill-assist device. The optical skill-assist device is useful for supplementing the operator's skill for ultrasound-guided central venous catheterization.

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Reference:

Asao, T., Kikuchi, M., Tokumine, J., Matsushima, H., Andoh, H., Tanaka, K., Kanamoto, M. and Ideno, Y. (2019) Optical skill-assist device for ultrasound-guided vascular access: A preliminary simulation study. *Medicine*. 98(26), p.e16126. doi: 10.1097/MD.00000000000016126.

