



Ultrasonography is an accurate, quick and safe method for localization of percutaneous central venous catheter tip in neonates

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ABSTRACT

Percutaneous central venous catheters (PCVCs) are used commonly and widely in the neonatal intensive care unit. This prospective study aimed to analyze the role of ultrasonography in localizing PCVC tip in neonates. The PCVCs which were localized by radiography before study were retrospectively reviewed and compared the malposition rates and the duration of localization. The results showed that ultrasonography had significantly better localization than conventional radiography.

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INTRODUCTION

Percutaneous central venous catheters (PCVCs) are typically used in the neonatal intensive care unit (NICU) for fluid supplementation, parenteral nutrition, and medication delivery. Malposition of PCVCs may cause life-threatening complications and prolong hospitalization. Conventional radiography with or without contrast media has been used routinely for assessing the tip position of PCVCs in Taiwan. However, radiography cannot provide real-time image and may cause babies exposure to radiation. This study was designed to identify the appropriate tool for confirmation of PCVC tip location in NICU

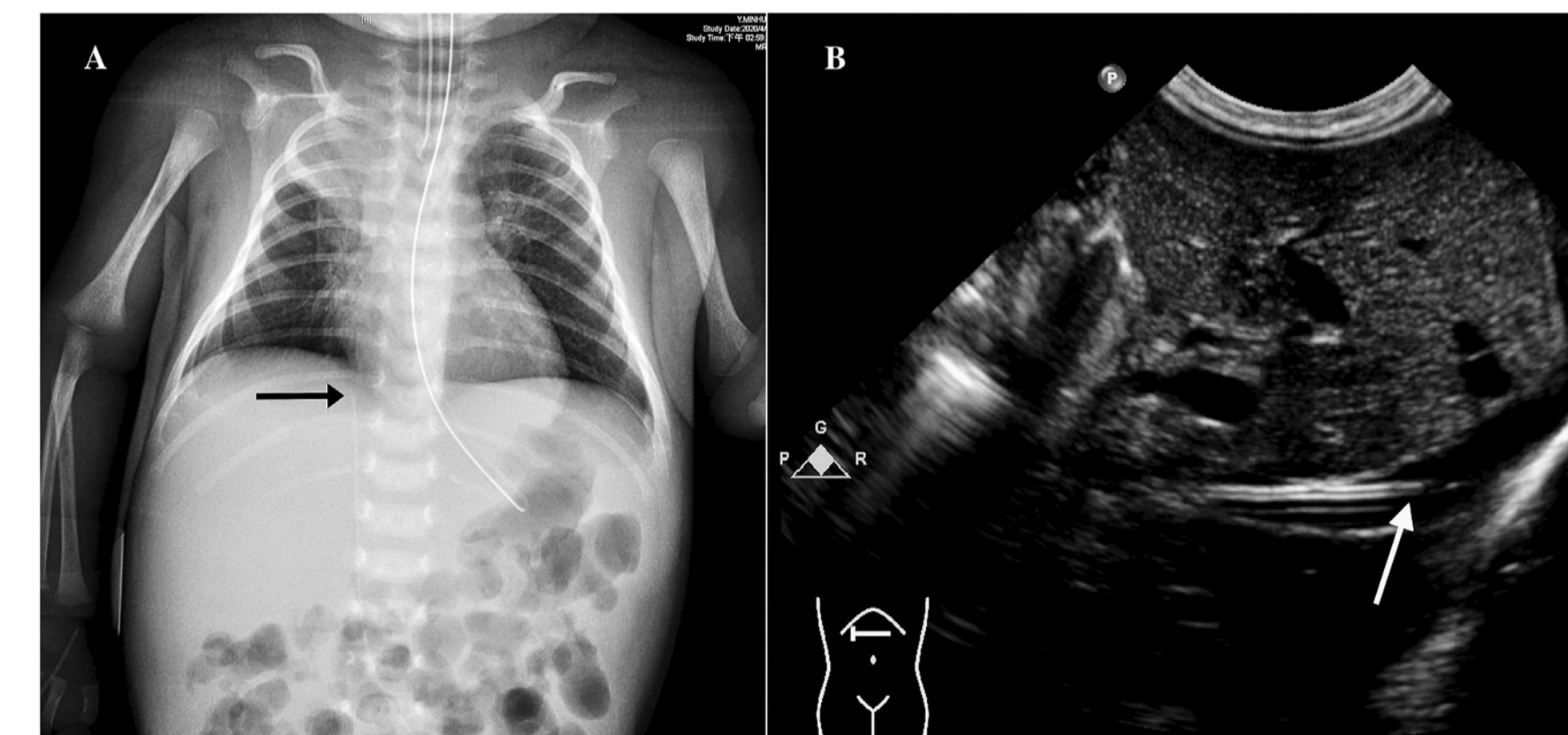
METHODS AND MATERIALS

This prospective cohort study enrolled neonates who received PCVC insertion in the lower extremities in the NICU from March 2019 to April 2020. PCVCs inserted in 2018 were also retrospectively reviewed. PCVCs including in the sono group was confirmed their tip location by ultrasonography (US) and conventional radiography. PCVCs including in the non-sono group was confirmed only by radiography. Demographic data, malposition rates and duration of localization between the two groups were analyzed by Mann-Whitney *U* test and Fisher exact test. The risk factors for PCVC malposition were also analyzed by binary logistic regression.

RESULTS

The sono group included 166 PCVCs and the non-sono group included 141 ones. There was no difference of mean gestational age at date of PCVC insertion between sono and non-sono groups (34.09 vs. 33.30 weeks, $p = 0.233$). Malposition rates were lower in sono group (10.8 vs. 65.9%, $p < 0.001$). The average duration of localization in sono group were significantly shorter than non-sono group (3 vs. 158.5 minutes, $p < 0.001$). Besides, low body weight was the risk of PCVC malposition ($p = 0.01$).

GRAPHS



Black arrow in radiography and white arrow in ultrasonography shows the tip of PCVC in the same patient



DISCUSSION

This study demonstrated that real-time US had quicker and lesser malposition rate as compared to conventional radiography. The benefits of US are identification of migration, and allowance of repositioning of central lines to an appropriate position immediately. Quicker localization of PCVC appropriately enable us to initiate drug or nutrition supplementation earlier, thus the management quality to the neonates can be improved.

CONCLUSIONS

Ultrasonography provides more reliable and quicker images than conventional radiography for identifying PCVC tip location in neonates.

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