

The Use of a Handheld Cardiac Ultrasound Device to Verify Successful Peripheral Vascular Cannulation in Pediatric Patients



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Introduction

- ❑ IV infiltration is common especially among pediatric patients
- ❑ US can be used to verify successful IV cannulation with Rapid Atrial Swirl Sign (RASS)
- ❑ Goal of evaluating two different US devices in the context of RASS detection: Lumify™ handheld US device with a phased array probe, and the Sonosite® standalone US machine with a linear probe, which is widely available for routine care in our operating suites.

Objective: To determine the sensitivity, specificity, and accuracy of a handheld ultrasound device (Lumify™) to verify successful IV cannulation in pediatric patients compared to a standard ultrasound machine (Sonosite®).

Methods

- ❑ Ongoing study with 18 patients currently enrolled, 1-6 years of age, presenting for surgery requiring IV placement.
- ❑ Patients randomized to either Lumify™ (Handheld Phased Array probe, 1-4MHz) or Sonosite® (US Tower with Linear probe, 3-12MHz).
- ❑ Following induction, IV placed, then airway placed (LMA or ETT).
- ❑ Investigator then obtained Subcostal 4-Chamber view of the heart.
- ❑ A second investigator administered 2 injections through the IV; either real or simulated (investigator-blinded).
- ❑ Investigator reported + or – RASS.

Results

Table 1: Demographic and Clinical Characteristics of Study Population (n=18)

Patient Characteristics	Overall (18)	Lumify (n=10)	SonoSite (n=8)
Age (years)	3±2	3±2	4±1
Gender			
Female	8 (44.4)	4 (40.0)	4 (50.0)
Male	10 (55.6)	6 (60.0)	4 (50.0)
Height (cm)	99.5±13.4	99.6±15.5	99.3±11.1
Weight (kg)	16.3±4.0	16.8±4.7	15.7±3.2
BMI	16.4±1.8	16.8±2.0	15.9±1.4
Intravenous site			
Hand	15 (83.3)	8 (80.0)	7 (87.5)
Saphenous	1 (5.6)	1 (10.0)	0
Wrist	2 (11.1)	1 (10.0)	1 (12.5)

ASA: American Society of Anesthesiologists

Data presented as count (percentages) and mean ± standard deviation

Lumify™



Sonosite®

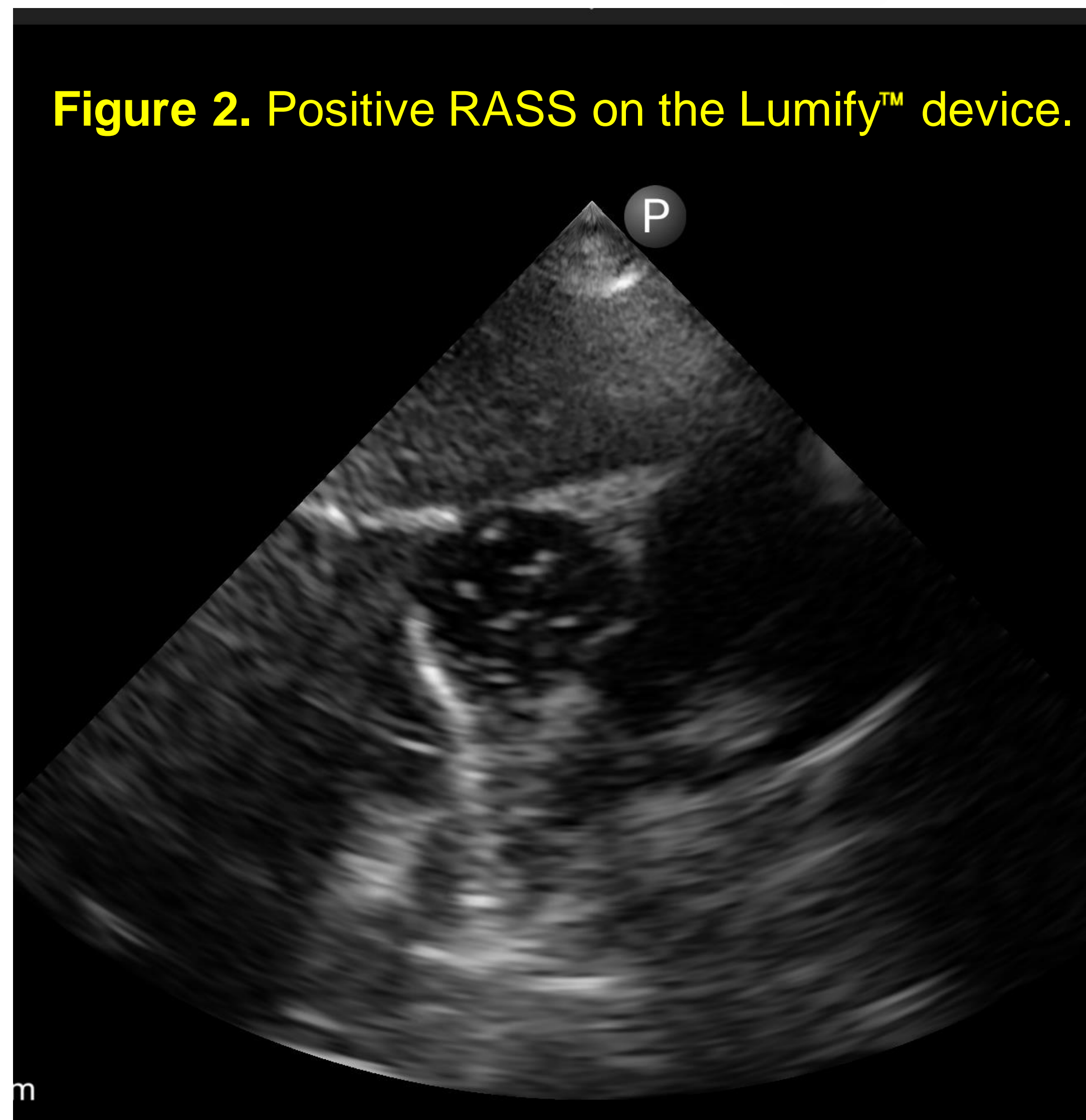


Figure 2. Positive RASS on the Lumify™ device.

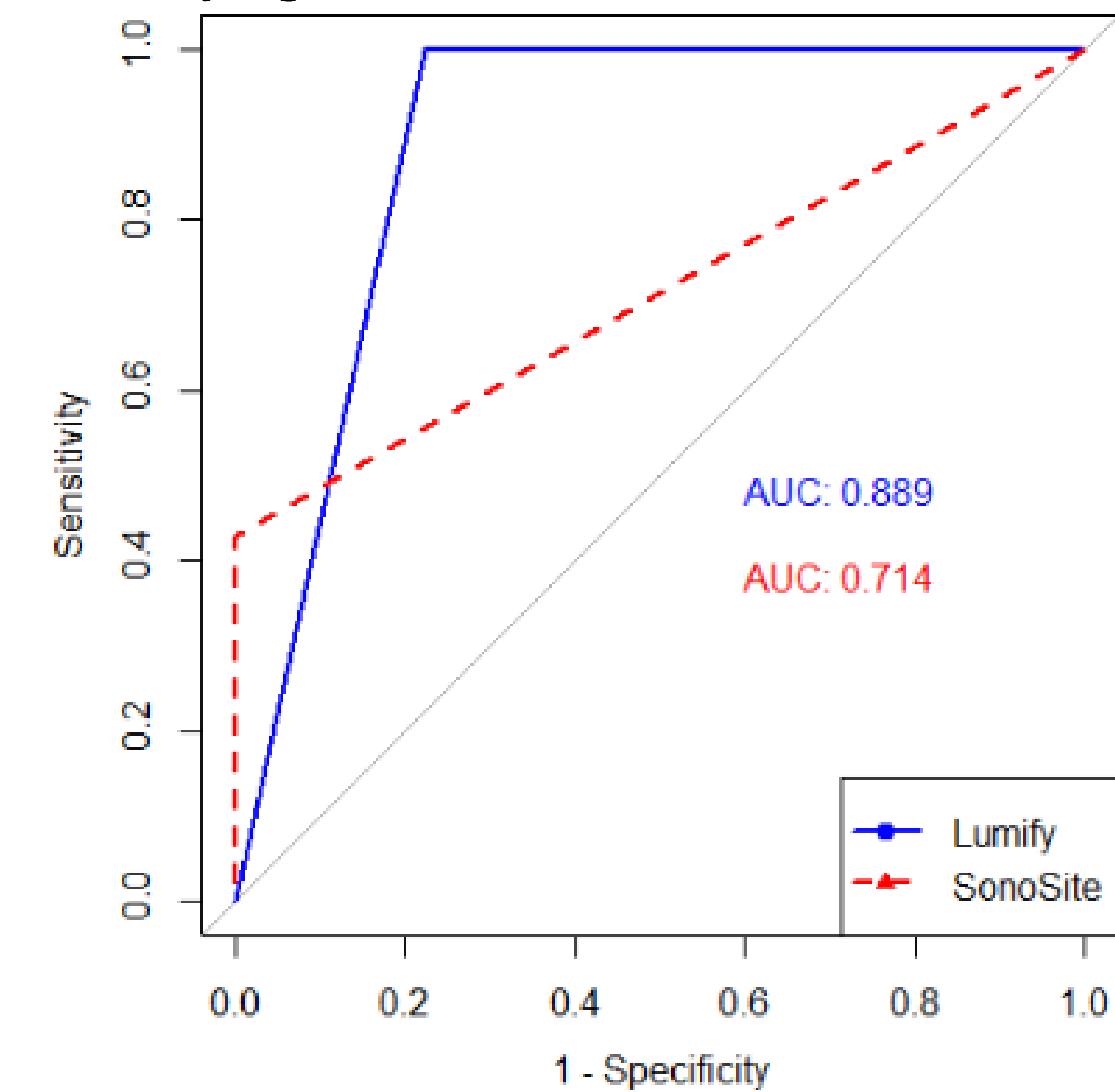
Handheld cardiac ultrasound devices, such as the Lumify™ offer a portable and accurate option for confirming successful peripheral IV cannulation in pediatric patients presenting for surgery.

Results(cont'd)

Table 2. Diagnostic Accuracy Measures (95% CI) for Lumify and SonoSite

Diagnostic Test	Measures of accuracy (95% CI)			
	Sensitivity	Specificity	Accuracy	AUC
Lumify	100 (21-100)	78 (45-94)	80 (49-94)	89 (55-100)
SonoSite	43 (16-75)	100 (21-100)	50 (22-78)	71 (35-97)

Figure 1. ROC Curve comparing AUC for Lumify and SonoSite in verifying successful vascular cannulation.



Conclusion

- ❑ The AUC, sensitivity, and specificity of the Lumify™ probe indicates superior accuracy when compared to the Sonosite® probe in confirming successful vascular cannulation using the Rapid Atrial Swirl Sign (RASS).

References:

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