

# Accuracy of a Handheld Ultrasound Device and a Traditional Ultrasound for Neuraxial Depth and Landmark Assessment

Katherine Seligman MD<sup>1</sup>, Carolyn F Weiniger MBChB<sup>2</sup>, Brendan Carvalho MBBCh, FRCA<sup>3</sup>

<sup>1</sup>Department of Anesthesiology and Critical Care Medicine, University of New Mexico, New Mexico

<sup>2</sup>Department of Anesthesiology and Critical Care Medicine, Hadassah Hebrew University Medical Center, Jerusalem, Israel

<sup>3</sup>Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine, California

## Introduction

- Ultrasound guidance for neuraxial blocks is gaining in popularity
- Lack of clinician expertise and availability of equipment has limited widespread adoption.<sup>1</sup>
- We investigated a novel handheld ultrasound (HU) device with pattern recognition software that recognizes lumbar spine bony landmarks and calculates depth to epidural space.
- We compared the accuracy of HU measurements to Touhy needle depth (ND) (at loss of resistance during epidural insertion), and to traditional ultrasound (TU) measurements.

## Results

- Data analyzed from 47 women; age  $32.3 \pm 5.6$  yrs, BMI  $28.8 \pm 4.7$ ; 32% had BMI  $\geq 30$  kg/m<sup>2</sup>.
- Mean difference between HU and ND was -0.61 cm; 95%CI -1.75 to 0.52 (Figure 1a)
- Mean difference between HU and TU depth was -0.29 cm; 95%CI -1.08 to 0.50 (Figure 1b)
- First attempt successful epidural placement in 87% of patients
- 78% required no re-directs
- HU accurately identified L3/4 interspace in 94% of patients.

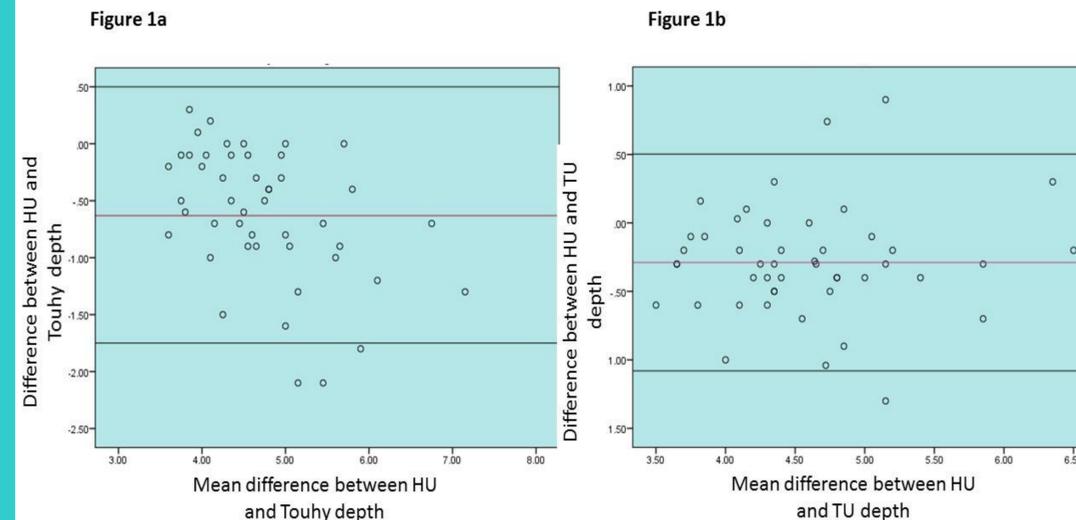
## Discussion

- HU accurately predicted Touhy needle depth to epidural space and provided similar accuracy comparable to TU.
- HU-identified epidural insertion was associated with high first pass success and minimal needle redirections
- This handheld ultrasound device appears to be a useful to guide epidural insertion in our non-obese laboring population
- Future investigation is needed to examine its utility in an obese population

## Methods

- Prospective, IRB-approved study of women requesting labor epidural analgesia
- L2/3, L3/4, L4/5 interspaces and respective depths to epidural space were identified, marked and measured using HU (Accuro, Rivanna Medical) and TU (GE Logiq S8) (Figure 2)
- The proceduralist, blinded to measured ultrasound depths, used the HU-identified insertion point (without palpation) for the epidural placement attempt.
- Bland Altman analysis was used to compare the epidural depths measured by HU, TU and Touhy needle.
- Number of Touhy needle passes, re-directs, the interspaces attempted were recorded

**Figure 1:** Bland Altman plots. **Figure 1a** shows the differences between measurements for the handheld ultrasound (HU) and the clinical depth represented by the Touhy needle. **Figure 1b** shows the differences between measurements for HU and traditional ultrasound (TU). On both figures the x-axis represents the mean difference and the y-axis represents the difference between these measured depths.



**Figure 2:** Accuro Handheld ultrasound on left and GE Logiq S8 on Right

Level of Training	Number of Blocks Placed for Study
CA1	2
CA2	8
CA3	23
Fellow	10
Attending	4

**Table 1:** # of blocks placed for study by different training levels

1) Shaikh F. *BMJ* 2013;346:f172