

Title: The use of handheld ultrasound device for neuraxial placemen in obstetric patients.

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Background: Although the use of ultrasound (US) guided neuraxial anesthesia was described over two decades ago, its use remains scarce. The lack of adoption of this non-invasive technique persists despite its known benefits of better identification of the lumbar interspace level, optimal needle insertion site, diagnosis of associated scoliosis and estimated depth of epidural space. The causes for its limited use may relate to cost, technical expertise, difficulty interpreting images, access to, and space for storage of ultrasound equipment.(1,2)

Methods: After institutional review board approval, we have started this prospective observational study for epidural placement utilizing handheld US (Butterfly iQ+) guidance and landmark technique. We evaluated time to perform epidural placement (the time from needle insertion till loss of resistance), number of insertion attempts (needle in and out of skin), number of needle redirections (needle adjustments without removal of needle from insertion point), and -for cases in which US was utilized we compared the estimated depth by US and actual depth of epidural space. Intergroup differences were assessed for significance using Mann-Whitney test. Values are presented as mean and standard deviation (SD)

Results: A total of 139 of epidural placement were evaluated, 84 of which were placed with US guidance. The average number of needle insertion attempts [US 1.0 (0.6) versus landmark 2(1.3); $p = 0.29$] and number of needle redirection [US 1.0 (0.8) versus landmark 3.0 (1.3); $p < 0.001$] was lower in the US group. The duration of the procedure was also lower in the US groups versus the landmark groups with average duration of 3.1 min (3.2) versus 6.3 (7.5); $p = 0.009$, respectively. In terms of accuracy, our handheld US underestimated measurements by -0.15 (0.37) 95% confidence interval [-0.07, -0.23].

Conclusion: In a cohort of patients with a mean (SD) body mass of 33.3 (6.9), the use of US helped reducing the number of needle insertion attempts and adjustments in a statistically significant manner when compared to landmark-guided technique. Our results are in agreement with previously reported accuracy, with some authors reporting an accuracy within 0.8 cm. The use of the portable Butterfly iQ+, obviates some of the limitations related to cost and real state. More importantly, the use of this device resulted in procedure performance in half the time when compared to a landmark technique. the authors think that the additional information obtained improves patient satisfaction and may potentially decrease the risk of complications, such as accidental dural puncture.

References:

1. Anesthesia Analgesia. 2018 Jun;126(6):1995 1998.
2. Semin Perinatol. 2014 Oct;38(6):349 358.