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Ultrasound imaging for spinal anesthesia

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Background and aims: Ultrasound guidance for regional anesthesia is worldwide a subject of major interest (1). Abnormal anatomical conditions may involve difficulties to perform spinal anesthesia (2). In this preliminary study we assessed the usefulness of ultrasound imaging in performing spinal anesthesia.

Methods: After internal ethic comity approval; a linear array probe 5-10 MHz (TITAN: Sonosite Inc TM, Bothell, WA, USA) was placed midline at level L3-L4, overlying the interspace in transverse plane to show axial anatomical structures. The outlines of the probe and the target in its center (corresponding to the point of puncture) were marked with a dermographic pen. The palpation of bony surface landmarks before location was rated as: well-moderately-absent. The visibility of anatomical structures on the sonogram (spinous process, corpora vertebra, ligamentum flavum, epidural space, dura mater) was rated as: good-moderate-none. Measurement of the time necessary to get an optimum sonogram of the structures (i.e.) the time of location (it included also the time elapsed for making the outlines of the probe and the target point). The distance from the skin to ligamentum flavum (i.e.) epidural space depth, on ultrasound images was compared with the distance measured on the needle after puncture. The number of attempts was noted. Continuous data were expressed as mean ± SD and analyzed using the Student's t-test. Precision of epidural space detection compared to epidural space depth on the needle after puncture was calculated using the Bland and Altman test. Exelstat Microsoft (SPSS, Chicago, IL) software was used for statistical analysis.

Results: 15 patients underwent spinal anesthesia (14 for lower extremity surgery, 1 for cure of hemorrhoids, 12 males and 3 females). Age (42±15 yr), weight (79± 16 kg), length (173± 9cm), BMI (26 ±4kg/m2). The visibility of anatomical structures was good in 90% of patients and moderate in 10% of patients. The time of location was 69±14seconds. The depth of epidural space on ultrasound images and on the needle after puncture were 54±10mm and 57±10mm respectively; theses distances were not significantly different. The precision for the difference between ultrasound measured depth and the depth on the needle after the puncture was 0, 23±0,26mm [figure1]. Spinal anesthesia was perform at the first attempt in 73 % of patients, 2attempts were necessary in 20% of patients, 7 %(1patient) needed 4 attempts. Bony surface landmarks were absent before location in 40% of patients.

Discussion: This study suggests that ultrasonography is likely to identify axial anatomical structures; therefore ultrasound location is able to be integrated in some clinical situations where difficulties for spinal or epidural anesthesia are expected, (obese patients, obstetrical spinal and epidural anesthesia).

References:

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