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A new observational method of assessing the level of sensory blockade after spinal anesthesia

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Introduction: The dermatome level of spinal anesthesia is typically determined by the patient's subjective response to the tester's stimulus using pinprick, touch or ice. This test requires the patient to be responsive and cooperative. In obtunded patients or where communication is a problem, inaccurate or inconsistent responses are obtained. The purpose of this study is to evaluate a new observational method, where objective evaluation of chest and abdominal movements with deep respirations after the onset of spinal anesthesia, is used to assess the sensory level.

Technique: Normally with deep inspiration in the supine position and viewed laterally, both the abdominal and chest walls are seen to move synchronously outwards, from intercostal and diaphragmatic contraction. After spinal anesthesia and the onset of a low to mid-thoracic block, the lower intercostals muscles are paralyzed and do not participate in chest wall movement. Early inspiration now causes normal outward movement of the abdominal wall (unparalyzed diaphragm) and upper chest wall (unparalyzed upper intercostals); the paralyzed lower chest wall however does not move initially. Later into inspiration, the expanding lungs from inside passively move the lower chest outwards. Hence there develops a delayed moving band of lower chest wall with inspiration; the junction of the delayed band and the normally moving upper chest wall is the sensory level.

Method: IRB approval and informed consent was obtained for this single-blinded prospective study in 70 matched patients undergoing a low to mid-thoracic spinal anesthetic. Sensory level was assessed by the temperature method using ice by the unblinded primary anesthesiologist while a blinded anesthesiologist subsequently assessed the differential chest and abdominal movement. The resulting two levels were analyzed using Pearson correlation.

Results: Mean sensory levels were thoracic (T) 5.471 ± 1.657 SD and (T) 5.729 ± 1.372 SD for the temperature method versus the new observational method respectively. A correlation coefficient of 0.85 ($R^2=0.72$ $p < 0.05$) was observed for the two measured values. The exact dermatome level could therefore be predicted 72% of the time. On the other hand the observational method was within one dermatome level of the standard temperature method as determined by the 95% confidence interval.

Conclusion: A new observational method of determining sensory block level after spinal blockade correlates to within one dermatome at a 95% confidence interval compared to the standard temperature method. Differential motor blockade correlates with sensory level after spinal anesthesia. The measurement difference of one dermatome level as reported in this study is acceptable in clinical practice considering both techniques have some variability. The observational method has the advantage of being objective and may be useful in uncooperative or sedated patients or following surgical skin prepping.

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