

Relationship between Differential Distribution of Blood Flow to Blocked or Unblocked Areas and the Extent of the Sensory Block in Spinal Anesthesia.

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Background

Not only the sensory blocks but also the sympathetic blocks are produced by spinal anesthesia with a local anesthetic. Differential distribution of blood flow to blocked or unblock areas may occur due to the differential vasodilation following spinal anesthesia. The states of the sensory block and the sympathetic block vary considerably in a short time. Changes of blood flow measured simultaneously in the unblocked finger and the blocked toe have not been reported. We compared the changes in perfusion index (PI) and pleth variability index (PVI) of the finger and the toe with the extent of the sensory block.

Methods

Six patients (aged 53-77 yr) undergoing endoscopic urologic procedures under spinal anesthesia were enrolled in this study. A pulse oximeter (Radical-7, Masimo Corp., Irvine, CA) was applied to the index finger of one hand and the second toe of the downside foot in the lateral position. In the lateral position, patients received 10 mg of hyperbaric bupivacaine through a 25-gauge spinal needle. Patients were placed in the supine position immediately after withdrawing the spinal needle. PI and PVI calculated from Radical-7 were recorded and maximum cephalad sensory blockade to cold was measured. Fifteen minutes after spinal anesthesia, patients were placed in the lithotomy position. PI and PVI were monitored continuously and the lithotomy position was kept throughout the surgery. Changes in PI and PVI were expressed as percent changes over baseline values.

Results

The anesthesia level checked by cold test 5 min and 15 min after spinal anesthesia was between T6- T10 and between T4-T5, respectively. As shown Fig. 1, PI at the toe increased soon after induction of spinal anesthesia and reach a plateau within 4 min. On the other hand, PI at the finger did not change. The further increase in PI at the finger occurred after the postural change and the increased PI of the finger remained throughout the surgery. PVI at the finger and the toe did not change immediately after spinal anesthesia (Figure 2). However, PVI at the toe decreased immediately after patients were placed in the lithotomy position. Vasopressors were not administered because blood pressure was maintained within 15% of baseline.

Conclusions

Spinal anesthesia produces differential distribution of blood flow to blocked or unblocked areas. PI at the toe changes in response to vasodilation after spinal anesthesia more quickly than development of the sensory block.