BIOIMPEDANCE PROBE (BIP) NEEDLE IN SPINAL ANESTHESIA

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INTRODUCTION Spinal anesthesia is relatively safe procedure, but some serious complications, even death, occur [1]. Physician is also challenged by anatomic alternations and obesity [2]. A needle guidance, based on for example bioimpedance [3], could increase accuracy and ease the puncture. Here bioimpedance-based tissue-sensing technology is applied for detecting cerebrospinal fluid (CSF).

OBJECTIVES Feasibility of the Bioimpedance Probe (BIP) Needle to detect CSF in lumbar punctures is tested in clinical study. The study provides bioimpedance data for CSF detection model tuning and further development of the needle guidance method.

METHODS BIP Needle consists of a common spinal needle and a removable BIP stylet, which is an insulated electrode wire with special handle. It enables real-time measurement of bioimpedance spectra in bipolar fashion between the electrode wire and needle cannula. In this clinical study, spinal anesthesia punctures were performed with BIP Needle connected to bioimpedance analyzer and tissue classification software (analyzer and needle in the image). When the device detected CSF, it provided a feedback and an experienced anesthesiologist (K.A.) evaluated the performance. Needle location was verified with traditional CSF test. Number of patients in this initial model tuning phase was 10.

RESULTS CSF was detected in all 10 cases. Brief false detections occurred in two cases, but offline analysis showed that model tuning will increase specificity without reducing the sensitivity. Epidural space differentiated from surrounding tissues as fatty tissue, but the variation between individuals was high.

CONCLUSIONS BIP Needle reliable detected CSF in spinal anesthesia in all cases. The recorded data will be utilized for model tuning and the method will be further tested with higher number of patient. BIP Needle has potential to be used as a needle guidance method for spinal anesthesia, and improve accuracy and speed up the procedure.

IMAGE

REFERENCES
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