External Ventricular Drain: Adequate Trending of Intracranial Pressure Using the Open/Monitor Method

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Introduction
External ventricular drain’s (EVD) are life saving tools used in the Neuroscience Critical Care Unit. Current practice uses a clamped method or an open method as method for measuring intracranial pressure (ICP) or draining CSF. In this comparative study using fluid dynamics along with Pascal’s law, we look to determine if using an open/monitor position is effective for trending and measuring intra hourly ICP’s.

Methods
Fifty patients were assessed during a three month period. Patients were enrolled in the study upon placement of an EVD and a current order from the provider to keep the EVD at continuous drain. Nurses placed the stop-cock in the null position and assessed the patients ICP hourly. Open/monitor position is described with the EVD stop cock facing away from the transducer. Clamped position is described with the EVD stop cock facing up. Hourly documentation of the open/draining reading and the clamped reading were documented on the study form. A waveform analysis of both methods was placed on the measuring tool daily.

Results
• A total of 1,053 sets of data from 50 patients were analyzed.
• The data was analyzed using SPSS. An interpretation of Kappa for EVD device agreement resulting in fair agreement.
• The average absolute difference between the two measuring methods was approximately 1.63.
• The open/monitor method compared to the clamped method agreed 97.6% of the time. Of the 2.4% that did not agree, results came from the same three patients.
• 95 instances (or 9% of the time) of the two methods produced a difference of measurement greater than 3. 38% of the time there was no difference and 53% of the time the difference between measurements was 3 or less.
• Of the 50 sets of data collected, 6 were traumatic injuries, 44 were not; 28 had the EVD placed on the left and 23 had the EVD on the right; 6 patients received hypertonic solutions intravenously and 44 did not have any hypertonic solutions; no intrathecal medications were given.

Discussion
The research hypothesis was to determine the appropriateness for trending of intracranial pressure waveform and number determination. Trending is appropriate for patients who are neurologically critically injured and need constant pressure monitoring.

Conclusions
Using the open/monitor position on the external ventricular drain allows for close trending of intracranial pressure. Waveform analysis concluded similar wave forms with the open/monitor and clamped methods with the clamped methods being more accurate for interpretation of compliance. The absolute average between the clamped drain reading and the open/monitor placement was 1.6268. A difference of no greater than three was adequate for monitoring and treating patients for increased intracranial pressure.

References
