



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 wave form 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.

The ID numbers that did not return results as favorable included ID 14, ID 15 and ID 24. For ID 14, the EVD received a 3% sodium chloride IV drip at 60 ml/hr, an IV bolus of 23.4% and had bilateral EVD's placed to 0 mmHg and leveled at the tragus. ID 15 received hypertonic saline solution and was placed at 0 mmHg and leveled at the tragus. ID 24 was not favorable due to the ICP numbers on both open/monitor and clamped being out of the normal range for intracranial pressure.



Showcasing exact match of clamped versus open/monitor



Showcasing trending of clamped versus open/monitor

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

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