

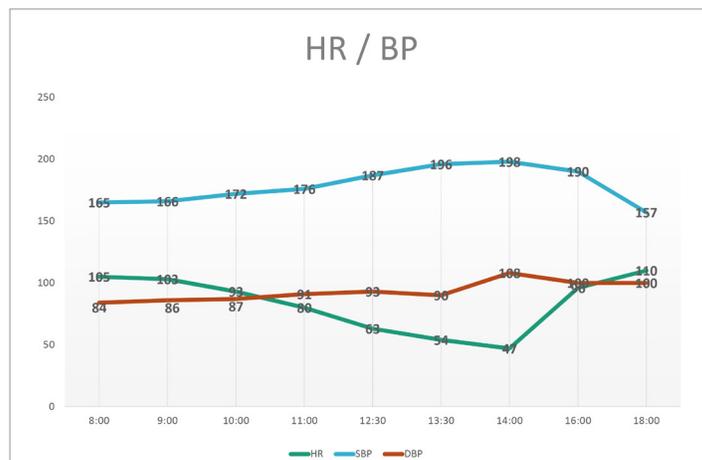
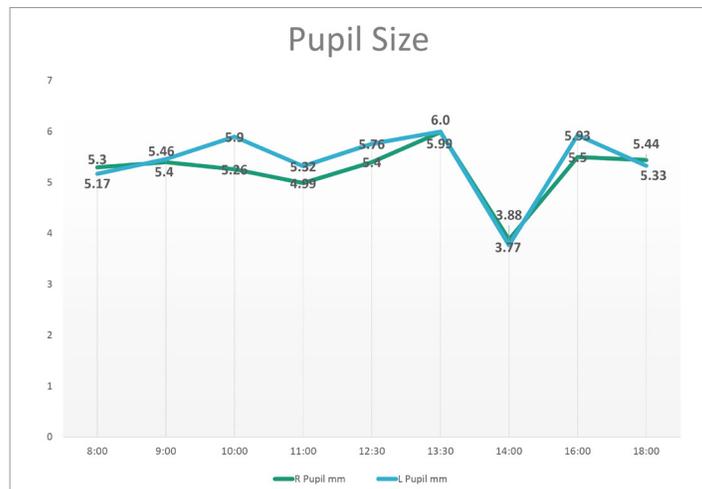
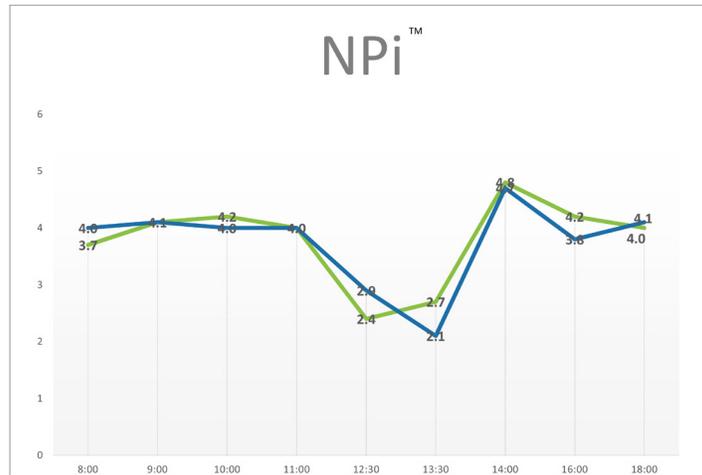
Neurocritical Care Unit Case Study: Pupillometer Use in Subarachnoid Hemorrhage

CLINICAL BACKGROUND

A 30 year-old female was admitted to the Neuro Intensive Care Unit (NICU) through the Emergency Department (ED) with a Grade IV aneurysmal subarachnoid hemorrhage (aSAH) due to a cerebral aneurysm rupture. Upon admission to the NICU, the patient's baseline pupillary reactivity measurement resulted in normal Neurological Pupil index (NPi™) readings bilaterally with a left pupil NPi™ of 4.0 and a right pupil NPi™ of 3.7. The patient began experiencing symptoms of severe cerebral vasospasm and the attending staff implemented multiple interventions accordingly. The patient was sedated using propofol.

CLINICAL NOTES

At 11:30 am, left pupil NPi™ abruptly declined to an abnormal measurement of 2.5, a deviation from previous normal readings of 4.0. Over the course of the next 120 minutes, pupillometry measurements continued to show abnormal readings and dropped to a right pupil NPi™ of 2.7 and a left pupil NPi™ of 2.1. At 13:30, continued abnormal and slow pupillary response was noted and corresponded with both a drop in the patient's heart rate (HR) from 80-100 beats-per-minute (bpm) to 63, 54, and 47 bpm respectively, and an increase in systolic blood pressure (SBP) from 170 mm Hg to a high of 198 mm Hg. As the patient's vital signs and pupil reactivity destabilized, NICU nursing staff continued to closely monitor the patient and conducted pupillary reactivity measurements every 30 minutes, suspending propofol therapy



for the examination periods. After an additional 90 minutes of neurological instability, the patient's NPi™ returned to baseline readings of 4.0 bilaterally. Following a return to baseline for the patient's NPi™, SBP and HR also steadily improved and the patient's condition stabilized.

DISCUSSION

The use of quantitative, infrared pupillometry in the neurological care of the critically ill patient with neuronal injuries provides trendable, objective and quantitative measurements of pupil size and reactivity. Traditional pupil monitoring by subjective pupillary assessment using a penlight results in a 30-40% inter-observer disagreement in pupillary reaction.¹ The NPi™ has proven itself to be a reliable, sensitive measure of pupillary reactivity.

SUMMARY

Even in the absence of intracranial pressure monitoring or diagnostic imaging, the pupillometer proved beneficial in the detection of pupillary and intracranial changes that correlated with hemodynamic changes in this patient. These changes in the patient's condition prompted a heightened awareness to this transient cerebral event, resulting in more frequent and comprehensive patient assessment by the nursing staff.

REFERENCES

1. Du R, Meeker M, Bachetti P, Larson MD, Holland MC, Manley GT. Evaluation of portable infrared pupillometer. *Neurosurgery* 2005; 57:198-203.

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