# Neurocritical Care Unit Case Study:
# Pupillometer Use in Middle Cerebral Artery Syndrome

Case Study: Neurocritical Care Unit

## CLINICAL BACKGROUND

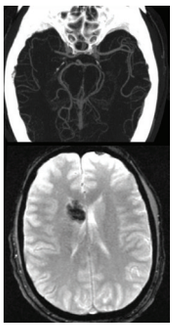
A 32 year old male presented with acute onset of right Middle Cerebral Artery (MCA) Syndrome. The patient received tPA at hour 3 and was subsequently intubated and transferred to a comprehensive stroke center (CSC).

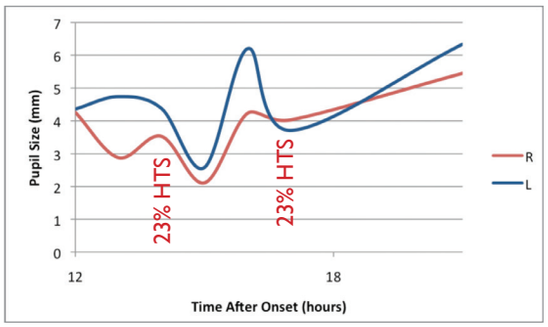
Upon admission to the Neurocritical Care Unit (NICU), his pupils were 4 mm in size bilaterally, with brisk and equal reactivity. He also had an eye opening apraxia and right gaze preference. Further he had a left hemianopsia, left facial droop, left arm extensor posturing, and triple flexion of the left leg.

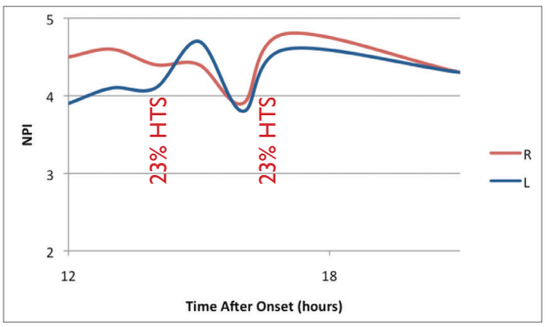
The figure 1A shows abrupt narrowing of the distal right M1 segment of the MCA with only a trickle of flow beyond it. Figure 1B shows a small area of reperfusion hemorrhage after tPA in the right caudate.

Figure 1A

Figure 1B

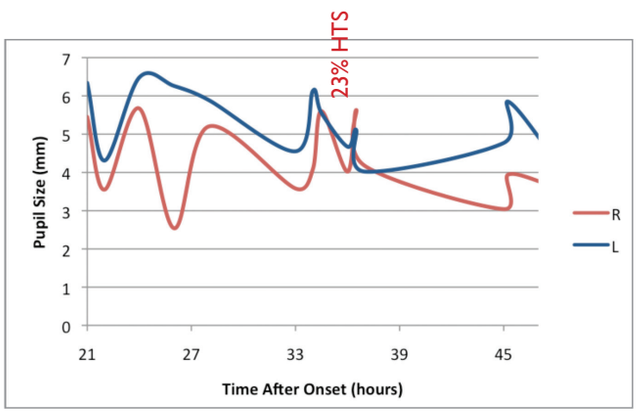


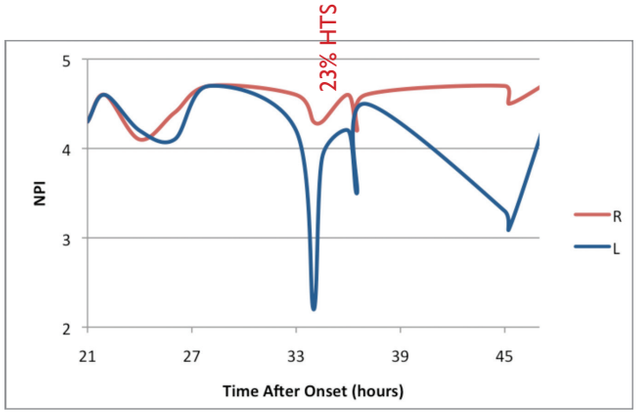



## CLINICAL NOTES

Upon admission to the NICU for post-tPA care, the patient received intravenous (IV) hypertonic saline (HTS) and was closely watched for malignant cerebral edema. Pupil assessment with a penlight revealed equal pupils, 4 mm in size, and briskly reactive. At hour 12, propofol was suspended for the neurological exam and the patient followed commands intermittently with his right side. Pupillometry was initiated.

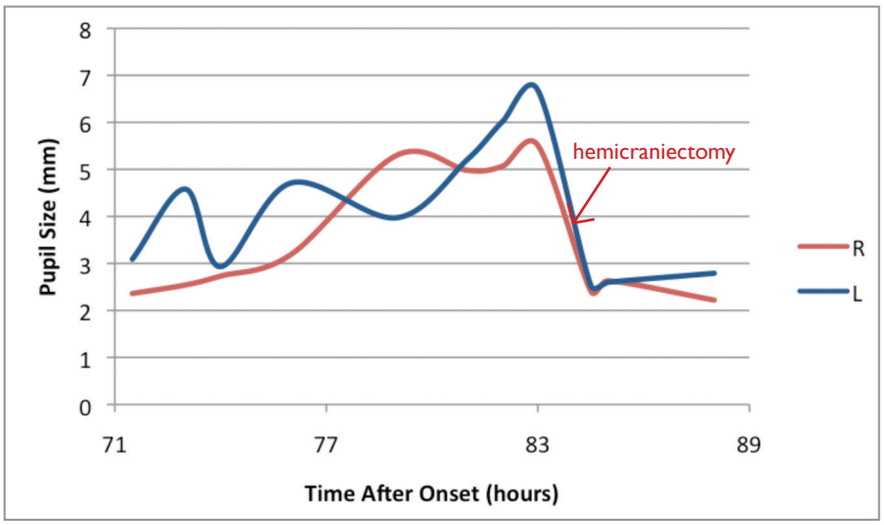



Pupil examination using the NPi-100 Pupillometer showed anisocoria and a L > R pupil dilation with a corresponding drop in Neurological Pupil index (NPi™). Improvement in the NPi™ and pupillary size consistently occurred multiple times after 23% HTS boluses were administered. This response of the pupils was not apparent on bedside exam with a penlight. At hour 34, the patient presented with a plegic left leg but continued to follow commands. Pupillometry measurements showed a L > R pupil dilation with abnormal NPi™ measurements.

NEUROPTICS

At hour 47, continued pupillometry measurements showed bilateral pupil dilation and worsening NPi™ readings, which improved transiently with HTS boluses. Again, this was not evident on bedside assessment with a penlight. A follow-up CT scan revealed worsening midbrain compression, effaced cistern and a midline shift of 11 mm. At hour 72, the patient stopped moving his arm. Upon continued neurological monitoring, right pupil miosis was determined, followed by progressive bilateral mydriasis, which finally became evident on bedside routine pupil exam. Right ptosis was observed and the nursing assessment reported "sluggish pupil". At hour 76, a CT scan showed an effaced left cistern and trapped temporal horns with a 13 mm. shift. A hemicraniectomy was done by Neurosurgery Service. Post-hemicraniectomy, pupil size and NPi™ readings returned to normal.




## SUMMARY

Non-invasive quantitative pupillometry provides accurate, objective and trendable measurement of pupil reactivity and pupil size and can detect subtle changes in pupillary response that may have significant clinical implications. Simple and non-invasive neurological monitoring with the NPi™ pupillometer provides the clinician important information to assist in managing the critically ill patient with neuronal injuries in the ICU.



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