

Some shunts used after epilepsy surgery may risk chronic headaches

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Surgeons who observe persistent fluid buildup after disconnecting epileptic and healthy brain areas should think twice before installing low-

pressure nonprogrammable drainage shunts, according to a study co-authored by Rutgers pediatric and epilepsy neurosurgeon Yasunori Nagahama that found chronic headaches could result from these procedures.

The study in *Operative Neurosurgery* followed 70 children who underwent a connection-severing surgery known as functional hemispherotomy for [intractable epilepsy](#) between 1994 and 2018 to see if inserting permanent drainage shunts after surgery increased the brain's tendency to shift across the skull after surgery.

Epilepsy afflicts about 3.4 million Americans, according to the Centers for Disease Control. Various surgeries can help the 1 million people whose seizures can't be controlled by medication. Hemispherotomy often eliminates seizures in juvenile patients whose epilepsy affects one side (or hemisphere) of the brain by removing some tissue and severing connections between the healthy and overactive hemispheres. However, tissue removal reduces local pressure, causing the remaining brain tissue to shift toward the low-pressure zone. This shift can cause persistent headaches and other problems.

The study is the first to examine whether shunts, which allow excess cerebrospinal fluid to drain into the [abdominal cavity](#), increase brain shift and, if so, whether certain types of shunts increase it more than others.

The study's initial measurements of average midline brain shift were comparable in shunted and nonshunted patients, but final measurements were 16.3 millimeters in shunted kids and 9.7 millimeters in nonshunted kids. Further investigation by Nagahama and colleagues from the University of California, Los Angeles suggests insufficient pressure in some shunt opening valves created the increased brain shift.

Patients whose shunts required above-average pressure to open their valves and drain fluid fared comparably to nonshunted patients. Patients whose shunts had below-average [valve](#) opening pressure experienced an average brain shift of 18.7 millimeters. Researchers also found that nonprogrammable [shunt](#) valves were associated with elevated brain shift—18.9 millimeters—while programmable valves weren't.

"The finding that shunts as a whole increase midline brain shift is interesting but not actionable," said Nagahama, the director of pediatric epilepsy [surgery](#) at Rutgers University's Robert Wood Johnson Medical School. "You have to install shunts when there's chronic cerebrospinal fluid buildup."

"The second finding—that some types of shunts were associated with increased brain shift while others were not—is certainly an area for further research and possibly something for surgeons to consider in choosing shunts for this patient population," the assistant professor added.

Nagahama said the study findings make intuitive sense. The brain naturally shifts from high-pressure areas to low-pressure areas until the pressure equalizes. Removing fluid further reduces pressure in an area that's already missing brain tissue and thus increases brain shift. Shunts with valves that only open at higher pressures reduce the pressure differentials and reduce brain shift.

"Efforts to reduce brain shift should naturally focus on reducing pressure differences across the [brain](#) cavity," said Nagahama, who specializes in [epilepsy](#) surgeries, including functional hemispherotomy.

More information: H. Westley Phillips et al, Midline Brain Shift After Hemispheric Surgery: Natural History, Clinical Significance, and Association With Cerebrospinal Fluid Diversion, *Operative Neurosurgery*

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