NEUROLOGY

Hydrocephalus

by Anthony Conte, DVM

Hydrocephalus is an increased accumulation of cerebrospinal fluid (CSF) within the cranial vault. Most often the fluid accumulation is restricted to the ventricular system (i.e. lateral, third, fourth ventricle) and termed 'internal hydrocephalus.' Normally, the ventricular system produces cerebrospinal fluid that circulates through and around the brain and spinal cord (similar to how our blood circulates through our bodies), and then drains/is absorbed through systemic circulation. With hydrocephalus, there is an overabundance of CSF due to either the lack of normal drainage or overproduction, which causes dilation of the ventricular system leading to pressure on the brain. Hydrocephalus can be divided into two etiological categories: congenital and acquired.

Congenital hydrocephalus, also known as communicating hydrocephalus, is present at birth and is often associated with a domed-shaped head and a palpable, open fontanelle (soft spots in the skull or gaps between the skull's growth plates). Congenital hydrocephalus can be caused by abnormal absorption of the spinal fluid or an inability for it to move/circulate appropriately. The brain makes spinal fluid at a consistent rate, so when it cannot flow appropriately, or get reabsorbed appropriately, this causes a backup of the fluid–similar to kinking a garden hose. The increase in fluid accumulation causes high pressure within the brain and skull (intracranial hypertension), and leads to brain dysfunction.

Acquired hydrocephalus, also referred to as obstructive or non-communicating hydrocephalus, occurs when the flow of CSF is blocked by a mass, infection or some other abnormality. Obstructive masses often result in dilation of one lateral ventricle or dilation of the third or fourth ventricle. The most common site of obstruction is the mesencephalic aqueduct (the area in the brain that connects the third ventricle to the fourth ventricle).

Clinical signs of hydrocephalus vary from no clinical signs to marked neurological impairment. Neurological signs associated with hydrocephalus reflect forebrain dysfunction and can include dull mentation, head pressing, seizures, restlessness, visual impairment, circling, a spastic gait, dementia, and learning disabilities (e.g. housetraining may be difficult). Divergent strabismus ("setting sun sign," i.e. eyes that appear to gaze downward and away from each other) may occur in affected dogs.

Treatment of hydrocephalus may be surgical or medical. Surgery consists of placing a ventriculoperitoneal shunt (VP shunt) that drains the excess fluid from the brain into the abdomen, where it can be absorbed. This helps alleviate the extra pressure on the brain and can reduce some of the symptoms of hydrocephalus, and prevent progression as the pet ages. VP shunts sometimes require revision later in life if there are issues with blockages, breaking or migration of the shunt tubing, or infections.

Hydrocephalus can also be treated with medical management. This typically consists of a combination of medications to help slow down spinal fluid production (omeprazole), and steroids (prednisone) to help control clinical signs. If seizures are present, anti-seizure medications will also be prescribed.

Prognosis in dogs and cats with congenital hydrocephalus is variable but is considered to be guarded. The prognosis for surgical clinical improvement long-term is roughly 50% to 90%.