Owner Information Sheet – *Hydrocephalus*

Background

In healthy dogs, cats and humans, the brain and spinal cord are surrounded by a thin layer of *cerebrospinal fluid* (CSF) that provides both physical and chemical protection for the nervous tissue. Cerebrospinal fluid is produced inside the brain and fills four cavities within the brain itself. These cavities are called the 'ventricles'. There is normally a constant equilibrium between the production and absorption of the CSF; if this balance is interrupted at any time in life, then an excessive amount of CSF can accumulate inside one or more of the brain ventricles and affect the surrounding brain tissue – this condition is called *hydrocephalus*. There are two forms of this disease – a congenital form that is primarily seen in young animals, and a less common acquired form.

Cause

Any disease or pathological condition that decreases or blocks CSF flow within the brain, that inhibits absorption of the CSF, or increases its production, can lead to the formation of hydrocephalus. Congenital hydrocephalus develops due to skull or brain abnormalities during development and is most commonly diagnosed in young miniature and toy breed dogs such as Yorkshire terriers, Maltese terriers or Chihuahuas; other breeds can also be affected. Acquired hydrocephalus can occur secondary to brain inflammation or any growth within the brain that either blocks CSF flow or (rarely) increases its production.

Clinical signs (symptoms)

Congenital hydrocephalus is most commonly diagnosed in young animals, between 2 months and 2 years of age. However, it can also present later in life in some cases. As the skull bones are often still developing while the disease is progressing, the increased volume of the brain due to accumulation of the CSF can lead to enlargement and deformation of the head. A characteristic feature of this condition can therefore be an enlarged, 'dome-shaped' skull and deviation of the eyes to point away from the nose. Puppies and kittens with hydrocephalus are usually smaller than the rest of the litter. Animals with congenital hydrocephalus can exhibit behavioural changes (such as aggression or dullness) and may also suffer from epileptic seizures. Other clinical signs include loss of vision, head pain and gait abnormalities. The severity of clinical signs is usually dependent on the degree of the imbalance between production and absorption of the CSF, and the location of the CSF accumulation.

Adult animals with acquired hydrocephalus can develop clinical signs very quickly after a blockage of CSF flow, with epileptic seizures, changes in behaviour, balance loss and blindness being common clinical signs.

Diagnosis

A clinical suspicion of hydrocephalus may be possible based on the animal age, clinical signs and neurological examination. However, further tests are required to confirm the diagnosis of hydrocephalus and to rule out other possible causes for the clinical signs. Imaging of the brain using magnetic resonance imaging (MRI) is the test of choice in these cases. In young animals without a fully developed skull, ultrasound imaging can sometimes be used to detect the accumulation of fluid. After the MRI scan, analysis of the CSF sampled via a thin needle under general anaesthesia may also help to determine the primary cause of the disease and rule out other conditions. Based on the test results, a neurologist will be able to assess the severity of disease and determine possible treatment options.

Treatment and prognosis

The treatment of hydrocephalus depends on the underlying cause. In acquired cases, this will frequently involve treatment of the primary cause. In congenital cases, there are two main forms of management: medical and surgical. Medial management involves the use of drugs to reduce any brain swelling and to decrease the production of CSF. Anti-epileptic drugs may also be used if the dog or cat has had seizures. Surgical management can be used to treat both acquired cases (e.g. to reduce the pressure behind a tumour that is blocking CSF flow) and congenital cases (i.e. to drain the CSF). A specific device (*ventriculo-peritoneal shunt*) is surgically implanted to drain the accumulated CSF from the brain into the abdominal cavity. The prognosis depends on the primary cause of the disease and the response to treatment. Post-surgical complications following ventriculo-peritoneal shunt placement can be relatively common (reported in around 20% of cases) and can include blockage of the shunt or infection.

Your veterinary neurologist or primary care veterinarian will discuss in more detail with you the prognosis for recovery and the expectations of treatment on an individual basis.

If you have any concerns about your dog or cat, or their treatment, do not hesitate to contact your veterinarian.

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