

Short Communication

TREATMENT OF TRAUMA INDUCED SEIZURES ASSOCIATED WITH MOLERA IN A CROSSBRED CHIHUAHUA DOG

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ABSTRACT: In the present case, a 7-year-old male intact crossbred Chihuahua was presented with rotary nystagmus, severe tetra-ataxia and dull appearance after a fall onto his head while trying to jump up. Patient had seizures and was neither bright nor responsive. The patient was treated with a combination of anticonvulsants, sedative, diuretic and steroidal anti-inflammatory agent. Within 24 hours the condition of patient rapidly improved and there was no history of recurrence of seizures in two months post therapy.

Key words: Open fontanelle, Seizures, Chihuahua.

Fontanelle is the soft membranous suture between cranial bones that constitute the calvarium of a fetus and infant. This implies that there is no hard protective cranial bone, at the point of these sutures, protecting the brain tissue, which naturally predisposes them to trauma induced brain injury.

Chihuahua is a miniature breed of dog with a characteristic congenital open fontanelle (otherwise referred to as molera in adult) and a large, domed-shape calvarium that have been considered breed standard. Chihuahua and other toy breeds like Yorkshire and Maltese terriers are said to be predisposed to hydrocephalus (Hudson *et al.* 1990, Kornegay 1990, Fenner 1995). Grossly, changes in the morphology of congenital hydrocephalus include an enlarged, dome-shaped head and persistence of fontanelles with open cranial sutures. However, if skull sutures have closed before the formation of hydrocephalus, then no gross morphological malformation of skull occurs (Thomas 2010, Hecht *et al.* 2010).

Clinical signs seen are usually consistent with neurologic signs (Hudson *et al.* 1990). 15 of the 23 brains of dogs with hydrocephalus that were ultrasonographically examined, through the bregmatic fontanelle or a surgical craniotomy, had abnormal neurologic signs while others were normal (Hudson *et al.* 1990).

A retrospective study on 259 client-owned dogs revealed that 3.5% of dogs that sustained head trauma

developed in-hospital seizures. Among these, 10% of dogs with traumatic brain injury had in-hospital seizures. It was concluded that any dog with head trauma might experience seizures at greater rate than those that did not have head trauma (Steven *et al.* 2012). The present report explains a timely management of trauma induced seizures associated with molera in a male intact Chihuahua mix that had head injury after a fall onto his head.

Case history

A 7-year-old male neutered Chihuahua weighing 4.5kg was reported with history of enlarged cranium and open fontanelle of about 2-3cm wide. There was also history of occasional seizures and mild tetra-ataxia. The patient had been on medications, which included Prednisolone 5 mg ¼ POq 72 hrs and Phenobarbital 16.2 mg ½ POq 12 hrs before presentation to the Uniontown Veterinary Clinic, Ohio, USA. The patient was presented for possible head trauma. Owner explained that the dog tried to jump up but fell backwards onto his head and then began seizures every hour until presentation.

Clinical examination

On presentation, patient's eyeballs were observed to make uncontrolled movement repetitively and involuntarily, consistent with rotary nystagmus. There was severe tetra-ataxia and dull appearance. Patient had seizures and was neither bright nor responsive.

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Radiographic evaluation

The radiograph in Fig.1 below is the left lateral radiograph of the skull of the patient. There is a radiolucent discontinuity with characteristic concavity (B) covered with soft tissue opacity in the bony cranium. It is caudal and cranial to the radiopaque frontal bone (C) and radiopaque parietal bone (A) respectively. All other radiographic features are within normal limit. The radiolucent concavity with some degree of soft tissue opacity in the bony cranium is consistent with fontanelle that failed to close and ossify.

Treatment

At noon, Phenobarbital (West-ward 445®) at 5 mg per kg b.wt was administered intravenously immediately after clinical examination of the patient with seizure at presentation. Diazepam (Valium®) at 0.5 mg per kg b.wt was injected intravenously post seizure. Dexamethasone Sodium Phosphate (Decadron®) at 0.4 mg/kg b.wt along with Furosemide (Salix®) at 2.2 mg/kg b.wt was also administered intravenously.

After being sedated and rested, 5 hours later, grand mal seizure recurred for a duration of 1 minute, but it was managed with the intravenous administration of Diazepam (Valium®) at 1 mg/kg b.wt together with oral administration of Phenobarbital (West-ward 445®) at 5 mg per kg b.wt.

5 hours later, Diazepam (Valium®) at 0.5 mg/kg b.wt and Dexamethasone Sodium Phosphate (Decadron®) at 0.4 mg/kg b.wt were administered intravenously. At this point, the patient was standing and appeared better. 6 hours later, a-less-than 30 seconds grand mal seizure recurred and resolved without medication. In the next 2 hours, the patient was bright, alert and responsive, and was eating and drinking well, but exhibited minimal ataxia prior to fall. Seizures and nystagmus resolved. At this point, intravenous administration of Phenobarbital (West-ward 445®) at 5 mg per kg b.wt every 12hrs was instituted before the patient was discharged from the hospital.

At three months post trauma, the pet returned to normal activity, and had rare seizure once in 3 months with slight tetra-ataxia.

Owing to incomplete closure of fontanelle in this patient, a fall onto his head led to trauma that resulted in neurologic signs consistent with seizures, which is in consonance with Steven *et al.* (2012). Patient's eyeballs made repetitively and involuntarily uncontrolled movements consistent with rotary nystagmus. There was quick loss of consciousness and sudden tense of skeletal muscles consistent with tetra-ataxia. This is the tonic phase of the seizure. Rapid contraction and relaxation of



Fig. 1. Left lateral radiograph of the skull of the patient showing the molera (B) and the large, dome-shaped calvarium (A and C).

patient's muscles resulted in convulsions. This is the clonic phase, hence, tonic-clonic seizure (grand mal seizure) that was observed in this patient, and the need for an effective anti-convulsant. Phenobarbital, a standard anticonvulsant (Boothe 1998) was administered to effectively abolish convulsion in the patient. Intravenous administration of Phenobarbital is in consonance with Dewey (2006) for therapeutic use, and it was enough to eliminate seizure in this patient.

Status epilepticus has been reported to be treated with intravenous diazepam as first line of therapy (Walker 2005). Intravenous administration of diazepam in conjunction with Phenobarbital was enough to achieve sedation, anti-convulsion and muscle relaxation in this patient. For seizures secondary to central nervous system trauma, intravenous administration of diazepam at 0.25-0.5 mg/kg has been reported to be effective (Fenner 1995). Due to the fact that diazepam is known to have a short half-life of 2-4 hours in dogs (Mark 2016), 5-hour intervals were given between first, second and third administration.

Since hydrocephalus is consistent with open fontanelle in Chihuahua that results in neurologic signs characteristic of epilepsies (Hudson *et al.* 1990), a diuretic (Furosemide) was administered intravenously to aid drainage of excess fluid contained in the cranium through excretion, thereby, reducing pressure on the brain tissue.

Any case of open fontanelle with epilepsy should be considered as an emergency and be treated with a combination of Phenobarbital, Diazepam and Furosemide with close monitoring.

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