

HYDROCEPHALUS INDUCED SEIZURES IN A PUPPY WITH AN OPEN FONTANELLE: DIAGNOSIS BY RADIOGRAPHIC EXAMINATION

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ABSTRACT

Open fontanelle is a soft spot located on top of the head in a newborn due to incomplete fusion of the cranial bones. They are the normal structure in young puppies, especially in small breeds and get hardened by 9-12 weeks of age following fusion of growth plates in the skull. The aim of our study was to describe the presence, diagnosis and management of open fontanelle. A puppy was presented with the history of swelling over the frontal region, intermittent seizures for the past two weeks. Clinical examination revealed a swelling over the mid-frontal region of head. Radiographic examination of skull revealed hydrocephalus with open fontanelle.

Key words: Puppy, Open fontanelle, Seizures, Radiography.

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INTRODUCTION

A fontanelle is colloquially called as a 'soft spot' on the newborn puppy's skull and it is considered a normal occurrence. An open

fontanelle is when the soft spot on a puppy's head remains open and does not close as they grow up. As the puppy's soft spot on the head does not close as they get older and instead stays open, this condition is known as an open fontanelle. This is very common in small toy breeds like Chihuahuas, Pomeranians and Yorkies (Kiviranta *et al.*, 2021). The fontanelle is an opening in the skull that allows the puppy brain to grow and develop. It is typically closed by bone around 3 months of age. An open fontanelle can be caused by genetics, malnutrition or trauma. In breeding or breeding

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of two dogs with the same genetic trait could also be a probable cause for its incidence.

Trauma is also found to be one of the common reasons when the puppy falls from greater heights or hits on the head. Clinical signs seen are usually consistent with neurologic signs. Fifteen of the 23 brains of dogs with hydrocephalus that were examined ultrasonographically through the bregmatic fontanelle or a surgical craniotomy, had abnormal neurologic signs while others were normal (Hudson *et al.*, 1990). Grossly, changes in the morphology of congenital hydrocephalus included an enlarged, dome shaped head and persistence of fontanelles with open cranial sutures. However, if skull sutures closed before the formation of hydrocephalus, no gross morphological malformation of skull occurred (Thomas, 2010; Hecht and Adams, 2010). The open fontanelle can lead to various issues since the skull is not fully closed, and makes the brain unprotected and prone to injury resulting in neurological conditions, meningitis and some life-threatening conditions. So, the present study described the diagnosis and treatment of open fontanelle in a young puppy.

CASE HISTORY, CLINICAL OBSERVATIONS AND RADIOGRAPHIC DIAGNOSIS

A two-month old Lhas Apso cross breed was presented to Madras Veterinary College outpatient ward with the history of intermittent seizures and swelling overhead region. On physical examination, a soft round swelling on the top of skull was appreciated

(Fig 1) and mild tetra-ataxia was observed. Detailed clinical examination revealed that the patient was neither bright nor responsive, an elevated temperature of 41°C and an increased heart rate was noticed. Whole blood was collected for CBC examination and serum biochemistry which revealed normalcy except for leukocytosis. Radiographic evidence of incomplete closure of skull suture with open fontanel was noticed (Fig 2). There was a radiolucent discontinuity (arrow) with opacity in the bony cranium. It is caudal and cranial to the radiopaque frontal bone. The case was diagnosed as an open fontanelle in this puppy.

TREATMENT AND DISCUSSION

The puppy was treated with Inj. Diazepam at 0.5 mg/kg body weight IV, inj. Ceftriaxone at 20 mg/kg body weight IV, Inj. Dexamethasone sodium phosphate @ 0.4 mg/kg BW IM and inj. Furosemide was given at 2.2 mg/kg body weight IV for next three days. Animal showed mild improvement on 4th day of treatment. So, the owner was advised to give the following medication like Phenobarbital (Gardenal 20.0 mg/ml) @ 2.0 mg/kg, BID, PO and supportive treatments for further 30 days. After one month of treatment, the pet had rare seizures and improvement was noticed.

The incomplete closure of fontanelle in this patient had led to hydrocephalus resulting in neurologic signs consistent with seizures, which is in accordance with Steven *et al.* (2012). Phenobarbital, a standard anticonvulsant (Boothe, 1998) was administered to efficiently control seizures in the patient. Intravenous administration of diazepam at 0.25 - 0.5



Fig.1. Gross photograph of a puppy with dome shaped head



Fig. 2. Left lateral radiograph of the skull of two month old puppy with hydrocephalus.

mg/kg plays as first line of drug to control status epilepticus were reported by Fenner (1995) and Walker (2005). Hudson *et al.* (1990) reported that hydrocephalus with open fontanelle in Chihuahua showed neurologic signs characteristic of convulsions, for which a diuretic (Furosemide) was administered intravenously to support drainage of excess fluid accumulated in the cranium through excretion which resulted in reducing intra cranial pressure.

CONCLUSION

In conclusion, a single open fontanelle was diagnosed to be present in cross - bred toy puppy. They were located on the dorsal,

surfaces of the cranium and might not be identified by palpation alone. Radiography was the diagnostic tool used to identify the open fontanelle. Any case of open fontanelle with hydrocephalus which led to clinical signs of epilepsy should be considered as an emergency and be treated with a combination of Phenobarbital, Diazepam, Furosemide and supportive therapy with close monitoring.

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