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Evaluation of steroid responsive meningitis arteritis (SRMA) by cerebrospinal fluid analysis in a dog

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Abstract
This report describes the case of a spitz dog with steroid responsive meningitis arteritis. The study was for a period of five months (February to June 2017). A four year old male spitz was presented to the Small animal outpatient unit of the Department of Clinics, Madras Veterinary College, Chennai-7 with a history of anorexia which lasted for 3 days, pyrexia, cervical pain and ataxia. The dog was initially stabilized with antibiotics, antipyretics and supplements. Subsequently, routine haematobiochemical analysis was performed. Serum biochemical values revealed lower levels of albumin (1.90 g/dl). The dog appeared to recover but the condition took a regress. Cerebrospinal fluid analysis revealed severe neutrophilia and few lymphocytes. The cerebrospinal fluid was subjected for cytology and bacteriological culture to rule out actual cellularity and bacterial meningitis. Cerebrospinal fluid was slightly turbid with 90 mg/dl protein content and 80% neutrophils with 20% lymphocytes. The dog was diagnosed with steroid responsive meningitis arteritis based on cytology and as the culture result was negative. It was placed on corticosteroid treatment. The dog recovered significantly and post treatment analysis was uneventful.

Keywords: Dog, Steroid responsive meningitis arteritis, cerebrospinal fluid, cervical pain, cytology

1. Introduction
Steroid responsive meningitis arteritis (SRMA) is an inflammatory immuno-pathological condition [1]. It is the most common type of meningitis in dogs. It was first recognized as polyarteritis in young laboratory beagle breeds of dogs. It was earlier named as Canine pain syndrome, necrotizing vasculitis. Particular breeds of dogs like Boxers, Beagles are most often affected. However, sex predilection has not been reported. Age predilection of less than 2 years has been reported earlier. The common signs are waning and waxing cervical pain, pyrexia and lethargy in this non-infectious inflammatory acquired brain disorder. The chief pathological disorder described in these cases is due to the vasculitis of the meningeal arteries and the characteristic non suppurative inflammation of the cerebrospinal fluid. At times, subclinical coronary arteritis may develop [2].

Cerebrospinal fluid examination is the most reliable diagnostic test available for identifying CNS inflammation [3]. Cerebrospinal fluid analysis usually reveals marked neutrophilic pleiocytosis with an associated increase in protein concentration. The disease presents two clinical forms: the more typical acute form and the less common atypical (or chronic) form. The acute condition is characterized by pleiocytosis with polymorphonuclear cells in the CSF. The atypical form is associated with mixed or mononuclear pleiocytosis in the CSF. The etiology of the disease is obscure but elevated serum and CSF Immunoglobulin A (Ig A) levels have been found in both forms [4-6]. Estimation of serum and CSF IgA has been reported as an useful marker in the differentiation of other canine neurological manifestations. However, the detection of IgA may not prove satisfactory since it may also be associated with primary or secondary inflammation [2, 3]. Long-term immunosuppressive corticosteroid therapy is required to obtain significant clinical improvement and remission of the disease.

Prognosis of the case depends on the clinical stage of the disease as well as the initiation of the treatment regimen with immunosuppressive drugs. Dogs usually respond to the treatment within a few days. But, the treatment protocol is usually extended for a period of months. Post treatment haematobiochemical and CSF estimations are essential to analyze the prospect of the treatment regimen and successful clinical management of the case [7].

Hence, the present objective of the study was to diagnose the case of steroid responsive meningitis arteritis (SRMA) in a spitz dog, its clinico-pathological evaluation through cerebrospinal fluid analysis and its successful therapeutic management.

2. Materials and methods

A four year old male spitz was presented to the Small Animal Outpatient Unit of Department of Clinics, Madras Veterinary College, Chennai – 7. This study was conducted for a period of five months from February to June 2017. The dog was presented with a history of anorexia which lasted for 3 days, pyrexiand unable to move. Initially, the dog was stabilized with Inj. Cefotaxim @ 50mg/kg body weight intravenously, Inj. Meloxicam @ 0.3mg/kg body weight intravenously and Inj. Tribivet @ 1 ml intramuscularly and was continued for the next day. On the first day, haematobiochemical and urinalysis was performed. After two days, the condition was in a state of relapse. Hence, cerebrospinal fluid collection was performed under general anaesthesia for analysis. In order to rule out bacterial meningitis, the CSF was given for bacteriological culture.

3. Results

On physical examination, the dog had pyrexia (41 ^{o}C), cervical pain and rigidity and the gait was ataxic. Thorough neurological examination revealed extreme pain on palpation of the neck whereas the remaining parameters pertaining to proprioception, cranial nerve and spinal reflex tests were normal. The bacteriological examination of the CSF proved out to be negative (Fig. 3 and 4). The urinalysis results were within the normal range. The following are the results pertaining to the serum hematological and biochemical changes, cerebrospinal fluid analysis (Table 1, 2).

Table 1: Haematobiochemical values observed during the present study

Sl. No.	Parameter	Value
1.	Hb (g/dl)	12.2
2.	PCV (%)	35
3.	RBC	6.5
4.	WBC (x10^{9}/l)	29
5.	Platelets (g/dl)	300
6.	Neutrophils %	70
7.	Band neutrophils %	NIL
8.	Lymphocytes %	27
9.	Monocytes %	2
10.	Eosinophils %	1
11.	Blood Urea Nitrogen mg/dl	12.7
12.	Creatinine mg/dl	0.50
13.	Alanine amino transferase (ALT) IU/L	65
14.	Total protein g/dl	7.40
15.	Albumin g/dl	1.90
16.	Total bilirubin mg/dl	0.75

Table 2: Cerebrospinal fluid analysis observed during the present study

Sl. No.	Parameter	Result
1.	Physical character	Slightly turbid
2.	Protein mg/dl	90
3.	Total nucleated cell count	646
4.	Cytology	80% neutrophils with 20% lymphocytes

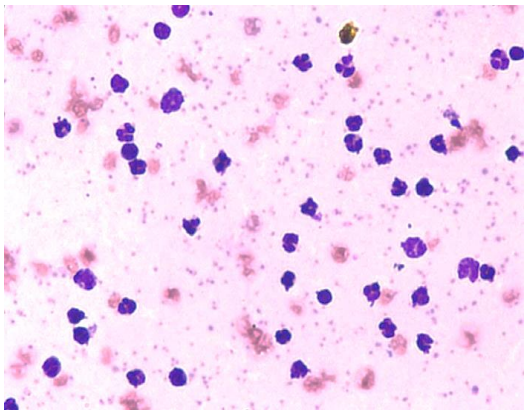

Fig 1: Dog - Cerebrospinal fluid cytology – 80% neutrophils (x10). Leishman Giemsa stain.

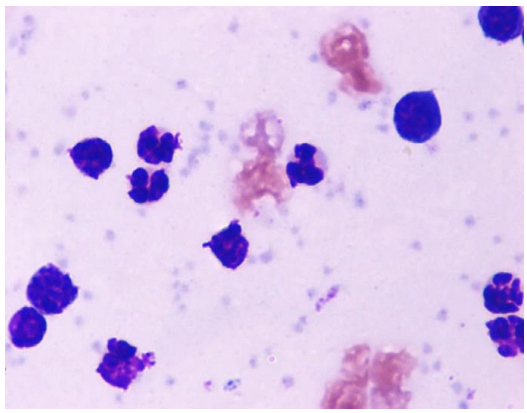

Fig 2: Dog - Cerebrospinal fluid cytology - more neutrophils and few lymphocytes per high power field (x 100). Leishman Giemsa stain.

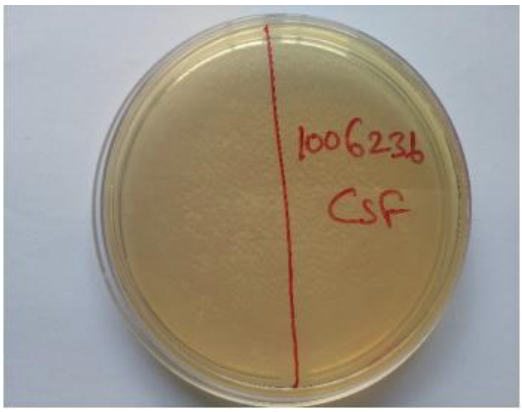

Fig 3: Dog - Cerebrospinal fluid – Culture examination – Absence of growth in nutrient agar

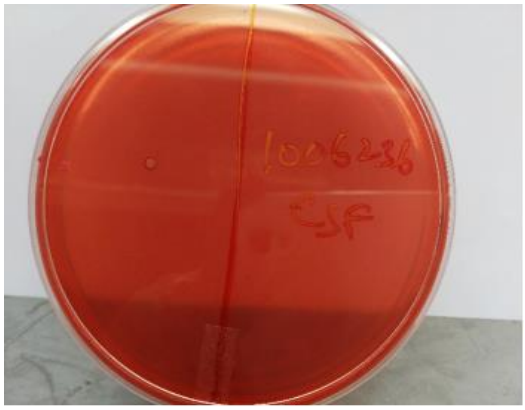

Fig 4: Dog - Cerebrospinal fluid – Culture examination – Absence of growth in mannitol salt agar

4. Discussion

The present case describes the occurrence of Steroid Responsive Meningitis and Arteritis (SRMA) in spitz breed dog. In this case, a slight reduction in the hemoglobin and packed cell volume values were noted which can be tolerated at either of the limits. In cases reported by Lorenz and Kornegay (2004) [7], there was no significant change in haematobiochemical values apart from marked leukocytosis which is evident in this case. SRMA is one neurological disease in which most affected dogs reveal leukocytosis with a left shift [6] but in this case, there was only leukocytosis and no left shift.

The serum biochemical values were all within the normal limits except low level of albumin which is in accordance with the result obtained by Navarro-cubas *et al.* (2011) [8]. But, previous reports revealed changes in the levels of creatine kinase which could be attributed to necrotizing vasculitis, polyarteritis, canine pain syndrome and canine juvenile polyarteritis syndrome which include the same disease, described histopathologically as vasculitis of the central nervous system [9, 1].

However, apart from the physical and neurological examination, hematobiochemical and CSF alterations, serum and CSF IgA titers as well as C - reactive protein must be evaluated in order to confirm the case as explained by earlier reports [2]. But they have also added that the estimation of immunoglobulin titers are most warranted only with the cases pertaining to relapse in the SRMA as part of chronic condition in order to differentially diagnose from the other clinical conditions. The standard reference range for IgA in normal canine patients is equivocal and patients with other inflammatory central nervous system diseases can cause increased IgA concentrations within serum and CSF [4, 5]. Similarly, IgA has also been found to be normal in cases of SRMA [10, 11]. Therefore diagnosis of SRMA tends to be provisionary and the deficiency of a specific marker causes management discouraging.

Hence from the above results, the case was diagnosed as steroid responsive meningitis and arteritis. The dog was placed under corticosteroid therapy. It was prescribed Prednisolone at an initial dose rate of 4mg/kg body weight. After two days, the dose rate was reduced to 2 mg/kg body weight and later maintained at 1 mg/kg body weight for a month as per the treatment regimen previously followed [12, 4, 6]. Failure to comply with such a regime can result in a high mortality rate. No reported alternative method exists that allows modification of the treatment regime based on patient response [13].

The dog recovered uneventfully and during the post treatment checkup; physical and neurological examination conclusions were normal. To re-evaluate, haematobiochemical and CSF analysis was performed. The results were closer to the normal limits. In order to prevent the recurrence, the dog was maintained on Prednisolone therapy @ 0.5 mg/kg/body weight per day day for one month. The treatment protocol was prescribed as per earlier guidelines reported by authors [12, 4, 6].

5. Conclusion

To conclude, the spitz dog was presented with clinical signs of anorexia, pyrexia and inability to move. The dog was stabilized and further haematobiochemical analysis was carried out. In this case, diagnosis through cerebrospinal fluid examination played a key component in narrowing down the diagnosis. The cerebrospinal fluid analysis results were imminent in the present case and therapeutic management with corticosteroids yielded in successful management of the case. Long term corticosteroid therapy is essential in obtaining clinical improvement and subsidence of the condition. Hence, the present case describes the clinico-pathological evaluation of steroid responsive meningitis and arteritis by cerebrospinal fluid analysis in a dog and its successful therapeutic management.

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