



Milo is an 8-month-old neutered male Boxer.

### MEET MILO

Milo presented to BVNS Woodstock in July of 2019 for a 3-day history of neck pain and lethargy. Neurologic exam findings included a dull / depressed mentation, low head carriage, and cervical hyperesthesia (neck pain) appreciated during direct palpation and range of motion testing. Cranial nerve examination, spinal reflexes, and proprioceptive testing was normal.

### DIFFERENTIAL DIAGNOSES

- SRMA
- GME / MUE
- Diskospondylitis
- Infectious meningomyelitis
- Neoplasia

### RECOMMENDATIONS

- Cervical spinal MRI
- CSF analysis
- +/- Infectious disease testing (serum, CSF, urine)
- +/- C-reactive protein

### DIAGNOSTIC RESULTS

- Cervical spinal MRI
  - Meningeal thickening / contrast enhancement
- CSF analysis
  - Appearance: Xanthochromic, turbid / cloudy
  - Protein: 100-300 mg/dL (normal < 30 mg/dL)
  - Cytology: 93% non-degenerative neutrophils
  - Neutrophilic pleocytosis
- CSF bacterial culture
  - Negative
- Toxoplasma / Neospora serology
  - Negative
- Cryptococcus antigen
  - Negative
- C-reactive protein
  - 128.0 mg/L (H)
- § Range 0-12.0 mg/L

**DIAGNOSTIC CONCLUSIONS:** MRI / CSF analyses combined with signalment and clinical findings were consistent with steroid responsive meningitis arteritis (SRMA).

## TREATMENT

- Prednisone [2 mg/kg BID for 2 days, then 1 mg/kg BID for 2 weeks]
- Further tapering of dose every 6 weeks
- Doxycycline 10 mg/kg SID
- Clindamycin 15 mg/kg BID [Discontinued with negative protozoal serology]
- Gabapentin 10 mg/kg TID as needed for pain

## CLINICAL FOLLOW-UP

- Clinically normal at 2 weeks, 1 month, 3 months, and 6 months
- Prednisone taper completed at 6 months

## FINAL DIAGNOSIS: STEROID-RESPONSIVE MENINGITIS -ARTERITIS

**Steroid-responsive meningitis-arteritis**, also known as sterile meningitis, immune-mediated meningitis, and beagle pain syndrome, is a common cause of meningitis in young large breed dogs. Dog typically are less than 2 years of age with the majority (>75%) being less than 12 months old. Commonly affected breeds include boxers, Bernese mountain dogs, beagles, and golden retrievers among others. Clinical signs usually include an acute onset of neck pain and fever with an otherwise unremarkable neurologic examination. Diagnosis is achieved through a spinal fluid analysis and exclusion of other infectious and neoplastic etiologies with advanced imaging (i.e. MRI). Typical spinal fluid in these patients includes an increased number of white blood cells (pleocytosis), more specifically neutrophils, and an elevated CSF protein. Serum and CSF IgA is often elevated in SRMA.

This disorder is thought to arise from an aberrant immune response in which histopathology shows inflammatory infiltration of the leptomeninges and associated meningeal arteries. Treatment for this disease includes immunosuppression with corticosteroids and symptomatic treatment of pain with analgesics. Prognosis is generally good; however, clinical recurrence / relapse is not uncommon (up to 48% of patients). Azathioprine has recently been studied in cases of treatment-naïve SRMA. In this particular study, the relapse rate was lower than previously published cases (19%). C-reactive protein (CRP), an acute phase serum protein, is released from the liver in response to systemic inflammation. This biochemical marker is often elevated in dogs with SRMA, and may be monitored to track the disease progression, response to therapy, and evaluate suspected clinical relapses. Additionally, persistently elevated CRP levels warrants continuation of therapy.

### Take-Home Points from Dr. Neary

1. Cervical spinal pain and fever are the hallmark clinical findings in SRMA in large breed dogs < 2 years of age.
2. Elevated neutrophils in the CSF (neutrophilic pleocytosis) are common in autoimmune and infectious conditions of the spinal cord. CSF bacterial culture is imperative to rule out bacterial meningitis before starting immunosuppressive doses of steroids.
3. C-reactive protein (CRP) is a marker of inflammation that is commonly markedly elevated in dogs with SRMA.
4. Azathioprine may be helpful as an adjunct therapy in SRMA.



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