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Short Communication

Identification of *Sarcocystis Sp.* in a Cat with Neurological Disorders

Albert M Lee[1], *Natalia S Hansseon*[1] *and AS Helal Hassenin*[2*]

[1]North American Veterinary Hospital, USA

[2]Veterinary Medicine, Zagazig University, Egypt

Abstract

Nervous signs in canine usually caused by toxoplasma and or viral infection but rarely exempt cases caused by sarcocystis. Adult male cat admitted to clinic with history of nervous signs with highly aggressive, biting himself, shaking head, lethargy.

This cat were diagnosed by taking spinal fluid showing merozites of sarcocystis and also serum samples positive Elisa titer for sarcocyst and negative for toxoplasma, with necropsy inflammatory central nervous system with neutrophilic pleocytosis. This considered first case of nervous signs in feline associated with sarcocystis. Cryptococcosis and Toxoplasmosis highly common in feline with different stages of clinical signs associated with nervous symptoms or no and cat considered main host for toxoplasma widespread infection everywhere and considered common zoonotic disease.

Keywords: Feline; Nervous signs; ELISA; Merozoites; PCR

Materials and Methods

Adult male cat was admitted to veterinary clinic and came at clinic with history of nervous signs ataxia, sever narrowing eye pupil, dullness, sever aggression, biting himself these signs go toward bad prognosis with circling, seizures, cat with known history queen healthy without any symptoms of sickness or nervous signs. Cat with routine vaccination, no travelling outside, usually indoor housed with no contact with other neighborhood cat or stray one or other animal species. Other 2 cat with known signs of ataxia, circling, constriction eye pupil also admitted to RUVTH but with no further diagnosis or treatment. Serum samples taken for detecting titer of and immunofluorescence were negative. Most common medication used symptomatically recommended by the veterinarian consisted of clavamox (25 mg/kg generic). But most nervous signs of pain persist with no improvement. Diagnostic (0.01 mg/kg IV every 8 hrs) and balanced isotonic electrolyte solution as good fluid therapy recommended (Normosol-R, Abbott Laboratories, Abbott Park, IL, disorders and toxin exposure. USA) and 6 ml of KCl at a rate of 4.4 mL/kg/h. discontinue administration of corticosteroids and anti-inflammatory medication.

Results

Physical examination of cat showed fever 102.8-103.7, with severe dehydration, eye pupil examination hard to know constriction .in active with abnormal posture, stretching muscles related to spinal reflexes with hyperesthesia cat with nervous. Head tilt toward right side with checking nerves by pins there is little or no sensation on cranial nerves so it may be considered as multifocal or diffuse central nervous system diseases.

Common diseases causing nervous signs in cat came in touch for differentiation them as feline immunodeficiency virus, toxoplasmosis, herpes virus and cryptococcosis however each disease need more ways for further diagnosis but also came in mind may be selinum deficiencies or vit k or may be metabolic. Diagnosis physical examination with neurological findings, eye pupil history of constriction.

Let saw samples results of Cerebrospinal Fluid (CSF) was drawn from cerebellum puncture quantity scanty to be used for counting Total Nucleated Cell (TNC) and protein identification. CSF was used in lab for diagnosis through many test first pathology as pathognomonic lesion for cyst and merozoites. Elevation in blood cell count related to parasitic infection different shapes of sarcocystis merozoites can be shown in Fig microcentrifuge tube for samples to detect density with high specificity is common.

Due to low quantity of CSF was taken, further diagnosis by serum for detection titer of Sarcocystis by Elisa. Serum samples positive Elisa titer for sarcocyst and negative for toxoplasma, with necropsy inflammatory central nervous system with neutrophilic pleocytosis. This considered first case of nervous signs in feline associated with sarcocystis. Cryptococcus and Toxoplasmosis highly common in feline with different stages of clinical signs associated with nervous symptoms or no and cat considered main host for toxoplasma widespread infection everywhere (Figures 1-3).

Pleocytosis was highly remarkable forcellularity subjective of the cytocentrifuged preparation and compared with identified cellularity of CSF within average. In contrary average level and mild level of neutrophilic pleocytosis was detected in Equine CSF infected with *S. neurona*. Mononuclear pleocytosis was very low and mild in cat's neuron cells infected with *T. gondii* [1-10] and predominance neutrophilia in our study case reacted to *Sarcocystis sp*. Infection Despite the absence of a TNCC, a l TNCC; however, higher level of pleocytosis should be not be cleared. Cytological detection and

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***Corresponding author:** AS Helal Hassenin, Zagazig University, HFQM+872, Shaibet an Nakareyah, Zagazig 2, Al-Sharqia Governorate 7120001, Egypt

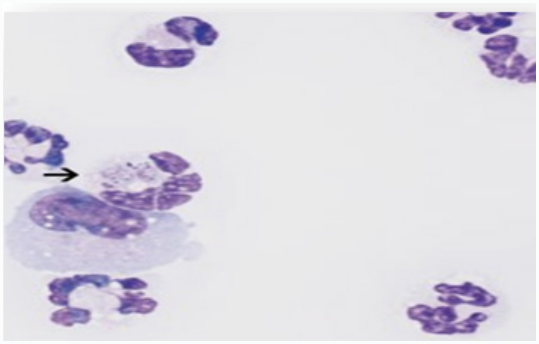

Figure 1: Shapes of Merozoites with different arrows pointing to it from CSF outside membrane CSF from cat with nervous signs.

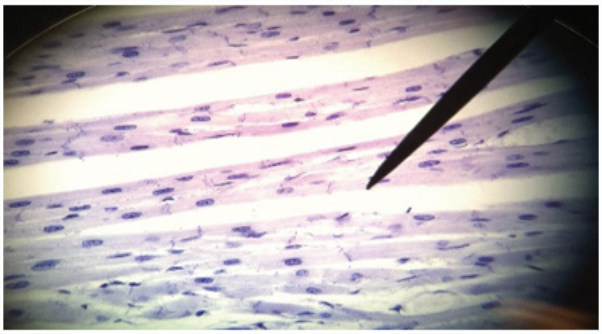

Figure 2: Neutrophilic and Mono cellular infiltration in CSF samples.

pathological studies not recommended although could be helpful in other cases of protozoal diseases and animal species variation [11-15].

Encephalomyelitis could be related to secondary infection combined with other fungal or bacterial diseases but not detected in CSF isolates. Variable level of pleocytosis in different infection common in protozoal diseases and related to different animal species. Mild level of TNCC in CSF from infected feline with toxoplasma (.05-.07 mL) [6,16-20] but with higher level up to 1550/mL was reported in a in canine Neospora infection in pets [21-26]. Similarly, protein level variation can be considered with higher to lower level with variable level of infection and protozoal detection in clear samples collected from diseased dog and cat.

Detection different stages of cellular inflammation were not clear and large number of neutrophils in counts may be combined with other types of sarcocystis. However, many blood count and chemical changes should be done related to infection is uncountable by scientist is. Idiosyncratic huge number of neutrophils showed related to drug and medication used for treated infected case. Impacting of Monocytosis on aggravated neural cells as conducted huge neutrophils necrocytosis conduction aggregated nervous signs in cat.

Hepatotoxicosis and high level of ALTeun obvious by many tests. But it could be result of drug and medication trimethoprim sulfonamide that commonly causes of hepatocellular inflammation. Idiopathic hepatocellular toxicity was reported in Dog cases combined with sulfa medication [27,28]. Some fungal infection diagnosed with cellular perforation and hepatotoxicity in humans [29]; however, hepatocellular perforation and acute liver toxicity not clear and mostly non common cases and this related to ALT with in average level during drug course medication.

Some researchers reported that hepato-atrophy and hepatotoxicity in other animal cases infected with different species of sarcocyst as well as recorded in equine and pets [18].

There is no published data To the authors' knowledge for actual medication of Sarco cystinfeline. But some medication was used in other animal for treat sarcocystis infection in equine; ponazuril medication was given with dose of (4 mg/kg -12 mg/kg) up to 3-4 weeks course of treatment 31 and used as therapy for treatment other protozoal infections. In pets [16,30-34]. Valuable use of anti- protozoal medication in pets with average of 7.5 mg/kg-10 mg/kg [16] and doses 430 mg/kg within average of 50 mg/kg have been demonstrated with better safety and improvement in drug efficacy in research group of cases [34] related to these findings, preferred dose of 50 mg/kg was given up to one week and given little medication up on leaving clinic. Out range of protocol used for some medication used for treatment of protozoal infection in cats need to be approved by FDA. So ponazuril good efficacy for treatment of toxoplasma in cat however was used in equine for treatment sarcocyst [23].

Serum genomic sequences using PCR and rRNA gene obtained outlined from previous molecular-analysis studies following primers and protocols according to gene bank data base (National Center for Biotechnology Information, Bethesda, MD, USA). In combination with detection protozoal merozoites and clear symptoms of neurological disorders with visibility lower serum titer up to 32-fold reduction in convalescent titers drug administration and corticosteroids and antiprotozoal medication kind of sort that infection (Table 1).

Conclusion

Sarcocystis-associated neurologic disease is the first case and can be diagnosed by clearance of merozoites in the CSF. Confirmation of diagnosis was by a positive serum titer and genetic evaluation

Figure 3: A-C) cat with different nervous signs with extended feet, extended head and neck, abnormality tail shape.

Table 1: Primers & sequences for sarcocyst.

Primer	Gene Sequences 50-30	Target	Reference
A	AACCTGGTTGATCCTGCCAGT	ssurDNA	Soggin et al. [2]
B	GATCCTTCAGCAGGTTCACCTAC	ssurDNA	Soggin et al. [2]
AN	GCTTGTCTTAAAGATTAAGCCATGC	ssurDNA	Schoelkopf et al. [1]
BN	CGACTTCTCCTTCCTTTAAG	ssurDNA	Schoelkopf et al. [1]
JNB69	CCTACCGATTGAGTGTTCCGGTGAAT	ITS-1	Tanhauser et al [3]
JNB70	GCGTTCAGAAATCTGATGATTCCCTGA	ITS-1	Tanhauser et al. [3]

to different sarcocyst species. Clinical progression of this case also explained and stages of disease through improvement in clinical signs and a 32-fold decrease in serum titer. Due to confusion of therapy used in protozoal treatment with different protocols approved by FDA related to duration safety and efficacy of drug need more research document stated for used in sarcocyst infection in feline species. Hepatotoxicity & hepatocellular infiltration with neutopilia in central nervous systems more accurate for disease identification.

Variation in the treatment protocol, conclusions regarding therapeutics and duration of treatment cannot be drawn and the optimal treatment protocol for *S. neurona* in cats remains to be determined. However, clinicians and cytopathologists should include *Sarcocystis* sp. as a differential diagnosis for feline inflammatory central nervous system disease characterized by neutrophilic pleocytosis.

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References

1. Schoelkopf L, Hutchinson CE, Bendele KG, et al. New ruminant hosts and wider geographic range identified for Babesia odocoilei (Emerson and Wright 1970). J Wildl Dis. 2005;41(4):683-90.
2. Soggin ML. Amplification of ribosomal RNA genes formolecular evolution studies. In: Innis MA, ed. PCR Protocols: A Guide to Methods and Applications. New York, NY: Academic Press; 1990:307-14.
3. Tanhauser SM, Yowell CA, Cutler TJ, Greiner EC, MacKay RJ, Dame JB. Multiple DNA markers differentiate Sarcocystis neurona and Sarcocystis falcatula. J Parasitol. 1999;85(2):221-8.
4. Altschul SF. Amino acid substitution matrices from an information theoretic perspective. J Mol Biol. 1991;219(3):555-65.
5. Huang X, Miller M. A time-efficient, linear-spacelocal similarity algorithm. Adv Appl Math. 1991;12(3):337-57.
6. Singh M, Foster DJ, Child G, Lamb WA. Inflammatory cerebrospinal fluid analysis in cats: clinical diagnosis and outcome. J Feline Med Surg. 2005;7(2):77-93.
7. Dubey JP, Higgins RJ, Barr BC, Spangler WL, Kollin B, Jorgensen LS. Sarcocystis associated meningoencephalomyelitis in a cat. J Vet Diagn Invest. 1994;6(1):118-20.
8. Gillis KD, MacKay RJ, Yowell CA, Levy JK, Greiner EC, Dame JB, et al. Naturally occurring Sarcocystis infection in domestic cats (Felis catus). Int J Parasitol. 2003;33(8):877-83.
9. Dubey JP, Saville WJ, Lindsay DS, Stich RW, Stanek JF, Speert CA, et al. Completion of the life cycle of Sarcocystis neurona. J Parasitol. 2000;86(6):1276-80.
10. Rossano MG, Murphy AJ, Vrable RA, Vanzo NE, Lewis SK, Sheline KD, et al. Crosssectional study of serum antibodies against Sarcocystisneuronain cats tested for antibodies against Toxoplasma gondii. J Am Vet Med Assoc. 2002;221(4):511-4.
11. Stanek JF, Stich RW, Dubey JP, Reed SM, Njoku CJ, Lindsay, DS et al. Epidemiology of Sarcocystis neurona infections in domestic cats (Felis domesticus) and its association with equine protozoal myeloencephalitis (EPM) case farms and feral cats from a mobile spay and neuter clinic. Vet Parasitol. 2003;117(4):239-49.
12. Dubey JP, Benson J, Larson MA. Clinical Sarcocystis neurona encephalomyelitis in a domestic cat following routine surgery. Vet Parasitol. 2003;112(4):261-7.
13. Forest TW, Abou-Madi N, Summers BA, Tornquist SJ, Cooper BJ. Sarcocystis neurona-like encephalitis in a Canada lynx (Felis lynx canadensis). J Zoo Wildl Med. 2000;31(3):383-7.
14. DeLucia PM, Cheadle MA, Greiner EC. Prevalence of Sarcocystis sarcocysts in nine-banded armadillos (Dasypus novemcinctus) from Florida. Vet Parasitol. 2002;103(3):203-5.
15. Cheadle MA, Tanhauser SM, Dame JB, Sellon DC, Hines M, Ginn, PE, et al. The nine-banded armadillo (Dasypus novemcinctus) is an intermediate host for Sarcocystis neurona. Int J Parasitol. 2001;31(4):330-5.
16. Dubey JP, Greene CE. Enteric coccidiosis. In: Greene CE, ed. Infectious Diseases of the Dog and Cat. 3rd ed. St. Louis, MO: Saunders Elsevier; 2006:775-84.
17. Elsheikha HM, Kennedy FA, Murphy AJ, Soliman M, Mansfield LS. Sarcocystosis of Sarcocystis felis in cats. J Egypt Soc Parasitol. 2006;36(3):1071-85.
18. Allison R, Williams P, Lansdowne J, Lappin M, Jensen T, Lindsay D. Fatal hepatic sarcocystosis in a puppy with eosinophilia and eosinophilic peritoneal effusion. Vet Clin Pathol. 2006;35(3):353-7.
19. Elsheikha HM, Soltan DM, el-Garhy MF. Inference of molecular phylogeny of Sarcocystis felis (Sarcocystidae) from cats based on nuclear-encoded ribosomal gene sequences. J Egypt Soc Parasitol. 2006;36:441-53.
20. Anderson AJ, Greiner EC, Atkinson CT, Roelke ME. Sarcocysts in the Florida bobcat (Felis rufus floridanus). J Wildl Dis. 1992;28(1):116-20.
21. Greiner EC, Roelke ME, Atkinson CT, Dubey JP, Wright SD. Sarcocystis sp. in muscles of free-ranging Florida panthers and cougars (Felis concolor). J Wildl Dis. 1989;25(4):623-8.
22. Dubey JP, Chapman JL, Rosenthal BM, Mense M, Schueler RL. Clinical Sarcocystis neurona, Sarcocystis canis, Toxoplasma gondii, and Neospora caninum infections in dogs. Vet Parasitol. 2006;137(1-2):36-49.
23. Dubey JP, Lindsay DS, Saville WJ, Reed SM, Granstrom DE, Speer CA. A review of Sarcocystis neurona and equine protozoal myeloencephalitis (EPM). Vet Parasitol. 2001;95(2-4):89-131.
24. Mac Williams P. Cerebrospinal fluid. In: Schrefer JA, ed. Diagnositc Cytology and Hematology of the Horse. 2nd ed. St. Louis, MO: Mosby; 2002:171-9.
25. Dubey JP, Lappin MR. Toxoplasmosis and neosporosis. In: Greene CE, ed. Infectious Diseases in the Dog and Cat. 3rd ed. St. Louis, MO: Saunders Elsevier; 2006:754-75.
26. Gaitero L, Anor S, Montoliu P, Zamora A, Pumarola M. Detection of Neospora caninum tachyzoites in canine cerebrospinal fluid. J Vet Intern Med. 2006;20(2):410-4.
27. MacKay RJ. Equine protozoal myeloencephalitis.Vet Clin North Am Equine Pract. 1997;13(1):79-96.
28. Trepanier LA, Danhof R, Toll J, Watrous D. Clinical findings in 40 dogs with hypersensitivity associated with administration of potentiated sulfonamides. J Vet Intern Med. 2003;17(5):647-52.
29. Aygun C, Kocaman O, Gurbuz Y, Senturk O, Hulagu S. Clindamycin induced acute cholestatic hepatitis. World J Gastroenterol. 2007;13(40):5408-10.
30. Davis CR, Barr BC, Pascoe JR, Olander HJ, Dubey JP. Hepatic sarcocystosis in a horse. J Parasitol. 1999;85(5):965-8.
31. Furr M, Kennedy T, MacKay R, Reed S, Andrews F, Bernard B, et al. Efficacy

ofponazuril 15% oral paste as a treatment for equine protozoal myeloencephalitis. Vet Ther. 2001;2(3):215-22.

32. Swinger RL, Schmidt KA Jr, Dubielzig RR. Keratoconjunctivitis associated with Toxoplasma gondii in a dog. Vet Ophthalmol. 2009;12(1):56-60.

33. Charles SD, Chopade HM, Ciszewski DK, Arther RG, Settje TL, Reinemeyer CR. Safety of5% Ponazuril (toltrazuril sulfone) oral suspension and efficacy against naturally acquired Cystoisospora ohioensislike infection in Beagle puppies. Parasitol Res. 2007;101:S137-44.

34. Reinemeyer CR, Lindsay DS, Mitchell SM, Mundt HC, Charles SD, Arther RG, et al. Development of experimental Cystoisospora canis infection models in Beagle puppies and efficacy evaluation of 5% Ponazuril (Toltrazuril sulfone) oral suspension. Parasitol Res. 2007;101:S129-36.

35. Dubey JP, Lindsay DS, Saville WJ. Serologic responses of cats against experimental Sarcocystis neurona infections. Vet Parasitol. 2002;107(3):265-9.