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Case Report | Open Access

Case Report: Diagnosis of Cerebello-Pontine Angle Meningioma through Magnetic Resonance Imaging in an Indian Leopard (*Panthera pardus fusca*)

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Abstract A rescued seven-year-old intact female Indian leopard (*Panthera pardus fusca*) with limited previous history and no known clinical parameters was observed showing severe incoordination and altered mentation. Conscious neurological exam was not feasible, but close observation was possible in a confined area. The leopard exhibited ataxia, right-sided head tilt without nystagmus, dysmetria, reduced jaw tone and disorientation. However, appetite, urine and bowel movements were found to be regular. MRI confirmed the presence of a large, well-circumscribed intracranial mass measuring 3.7x2.9x3.4 cm on the right cerebello-pontine angle region and involving parts of the temporal lobe, cerebellum, brain stem and petrous bone, consistent with a meningioma. The right-sided head tilt, ataxia, dysmetria along with Temporalis and Masseter muscle atrophy suggested involvement of cerebellum, cranial nerves fifth (V), eighth (VIII) and possibly seventh (VII).
Keywords *large felid; advanced diagnostic imaging; neurology; Indian wildlife*

1. Introduction

A rescued seven-year-old intact female Indian leopard (*Panthera pardus fusca*) with limited previous history and no known clinical parameters was observed showing severe incoordination and altered mentation. No obvious signs of illness or disease were apparent until two months since the date of capture and the animal appeared alert during this time.

The leopard weighed 50 kg and was anaesthetized using xylazine hydrochloride (Ilium Xylazil; Troy Laboratories Private Ltd, Smithfield, NSW 2164, Australia; 50 mg i.m.) and ketamine hydrochloride (Ilium Ketamil; Troy Laboratories Private Ltd, Smithfield, NSW 2164, Australia; 150 mg i.m.) for basic blood work and physical exam [1]. Following induction, supplemental doses of ketamine (50-75 mg) were used to maintain anesthetic depth as required [1]. Blood parameters were within normal ranges and general physical exam was unremarkable except for mild dehydration (5-6%) and severe unilateral atrophy of Temporalis and Masseter muscles on the right. Anesthetic recovery was uneventful after administration of yohimbine hydrochloride (Reverzine; Bayer Australia Ltd, 875 Pacific Highway, Pymble, NSW 2073, Australia; 5 mg i.v.). Conscious neurological exam was not

feasible, but close observation was possible in a confined area. The leopard exhibited ataxia, right-sided head tilt without nystagmus, dysmetria, reduced jaw tone and disorientation. However, appetite, urine and bowel movements were found to be regular.

Following a month of observation, the leopard was anaesthetized again for magnetic resonance imaging with xylazine (50 mg i.m.) and ketamine (150 mg i.m.). Anesthetic depth was maintained using two supplemental doses of ketamine (50-75 mg i.v.) throughout the procedure. Imaging (MRI; Philips Achiever 1.5T, Philips, Amsterdam, The Netherlands) of the head was performed with the leopard in left lateral recumbence. T1 and T2-weighted images were obtained in sagittal, transverse and dorsal planes. Contrast images were obtained by injecting Gadopentetate dimeglumine in saline (1%) (Magnevist; Bayer Schering Pharma, Berlin, Germany; 10 ml i.v.). Anesthetic revival was uneventful using yohimbine hydrochloride (5 mg i.v.), prior to releasing the leopard back into its enclosure. The following report details the imaging characteristics of a meningioma, as diagnosed using MRI and its associated clinical symptoms. This account appears to be a first in the field of Indian wildlife medicine and provides a comprehensive insight into a wild animal neurological anomaly and its diagnosis using advanced imaging techniques.

2. Diagnosis

MRI confirmed the presence of a large, well-circumscribed intracranial mass measuring 3.7x2.9x3.4 cm on the right cerebello-pontine angle region and involving parts of the temporal lobe, cerebellum, brain stem and petrous bone, consistent with a meningioma. The right-sided head tilt, ataxia, dysmetria along with Temporalis and Masseter muscle atrophy suggested involvement of cerebellum, cranial nerves V, VIII and possibly VII.

On dorsal planes, the lesion seemed hypo-intense on T1 and hyper to iso-intense on T2- weighted images (Figure 1a and 1b). Contrast MRI showed homogenous enhancement of the affected area and highlighted a dural tail (Figure 2).

Transverse planes revealed, a slight deviation of central axis away from midline towards the left, indicating a space-occupying lesion (Figure 3). Additionally, compression of the fourth ventricle and minimal dilatation of inferior horn of the lateral ventricle in the right temporal lobe was observed, illustrating a resistance to the outflow of cerebrospinal fluid. Furthermore, cranial nerves VII and VIII appeared homogenously enhanced with the mass, confirming their incorporation (Figure 4b). However, the extent of their dysfunction could not be ascertained due to lack of possibility for a cranial nerve exam.

Sagittal planes showed involvement of petrous bone and a slight compression of the pons, which resulted in ipsilateral trigeminal neuropathy (mass effect) (Figure 4a). Furthermore, cortical sulci, Sylvian fissures and basal cisterns seemed normal and uninvolved.

The aforementioned pathologies and associated clinical symptoms strongly pointed towards a right cerebello-pontine angle meningioma at the petroclival region of the brain, with involvement of cranial nerves V, VII and VIII.

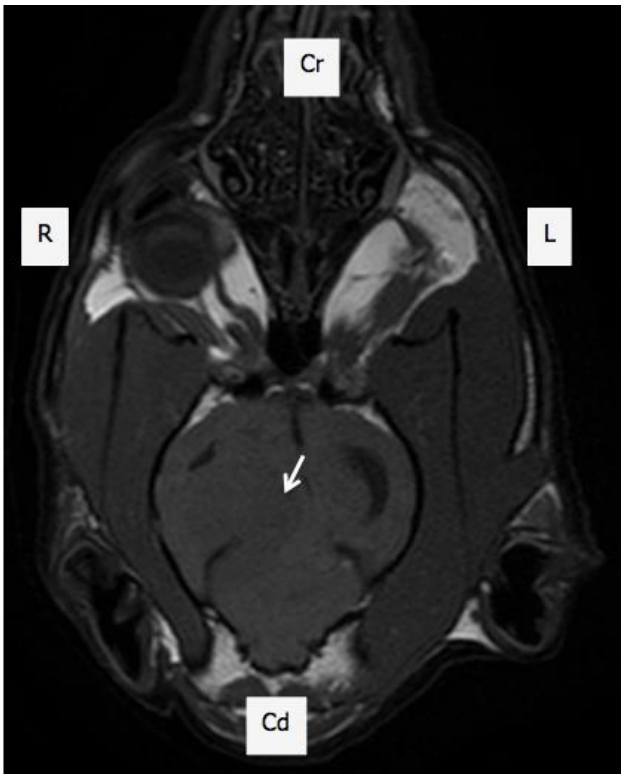

***Figure 1a**:* T1- weighted dorsal plane MRI of a 7-yr-old female leopard (*Panthera pardus fusca*) showing a well-defined hypo-intense area on the right cerebello-pontine region (white arrow), suspected to be a meningioma. Orientation of dorsal images is denoted by Cr= cranial, Cd= caudal, R=right and L=left

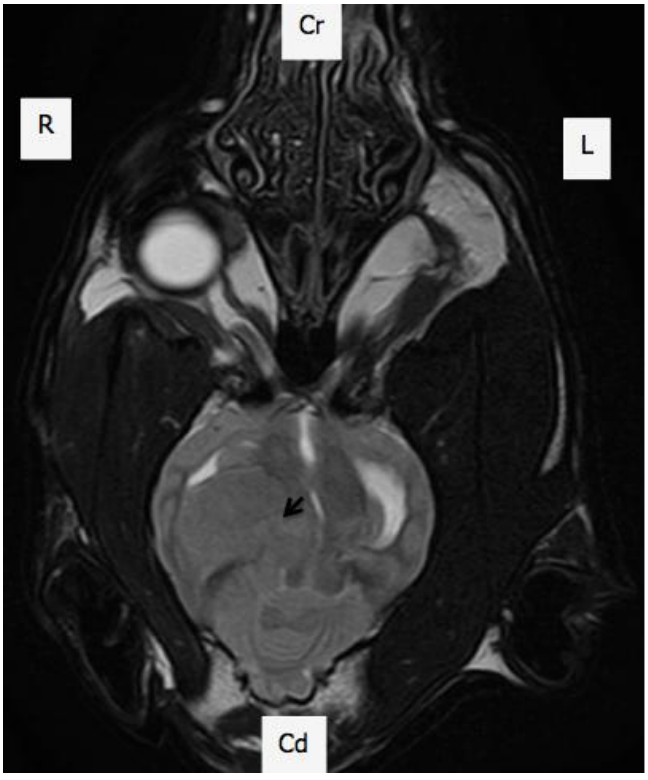

***Figure 1b**:* T2- weighted dorsal plane MRI of a 7-yr-old female leopard (*Panthera pardus fusca*) showing a well-defined hyper to iso-intense area on the right cerebello-pontine region (black arrow), suspected to be a meningioma. Orientation of dorsal images is denoted by Cr= cranial, Cd= caudal, R=right and L=left

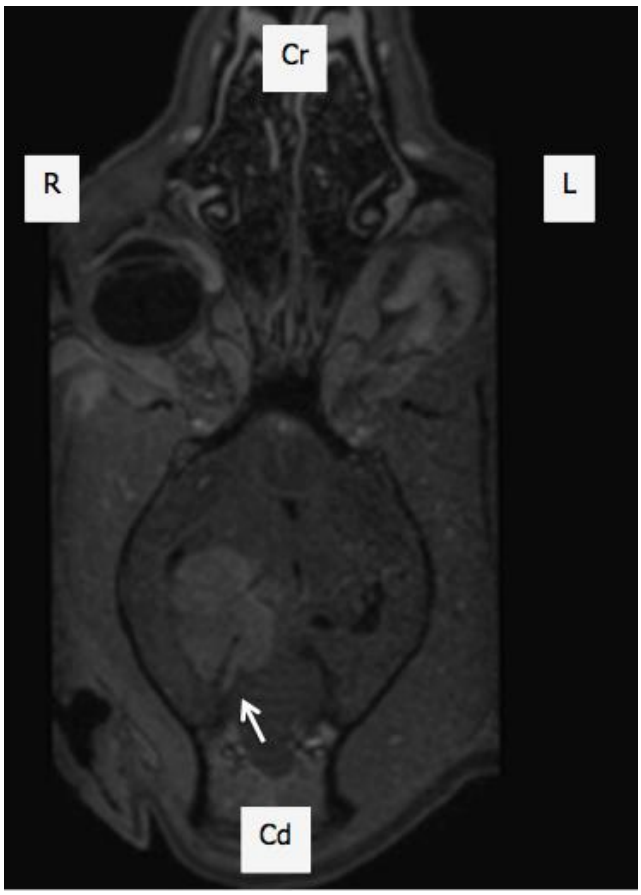

Figure 2: Dorsal contrast MRI of a 7-yr-old female leopard (*Panthera pardus fusca*) showing homogenous enhancement of an intra-cranial mass with a dural tail at the right tentorial region (white arrow), indicating a possible meningioma. Orientation of dorsal images is denoted by Cr= cranial, Cd= caudal, R=right and L=left

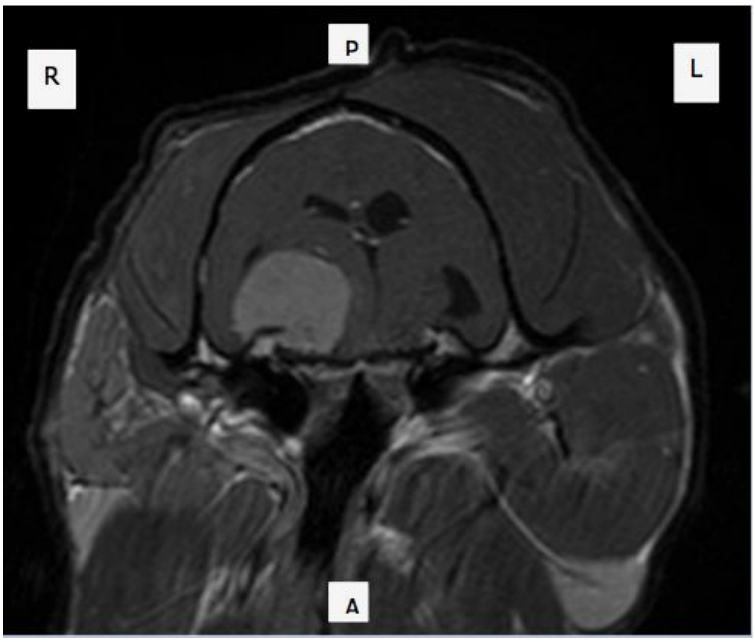

Figure 3*:* Transverse contrast MRI of a 7-yr-old female leopard (*Panthera pardus fusca*) showing shift in midline axis towards the left and dilation of inferior horn of the lateral ventricle of the right temporal lobe, due to an intra-cranial space-occupying lesion. Orientation of transverse images is denoted by A= anterior, P= posterior, R=right and L=left

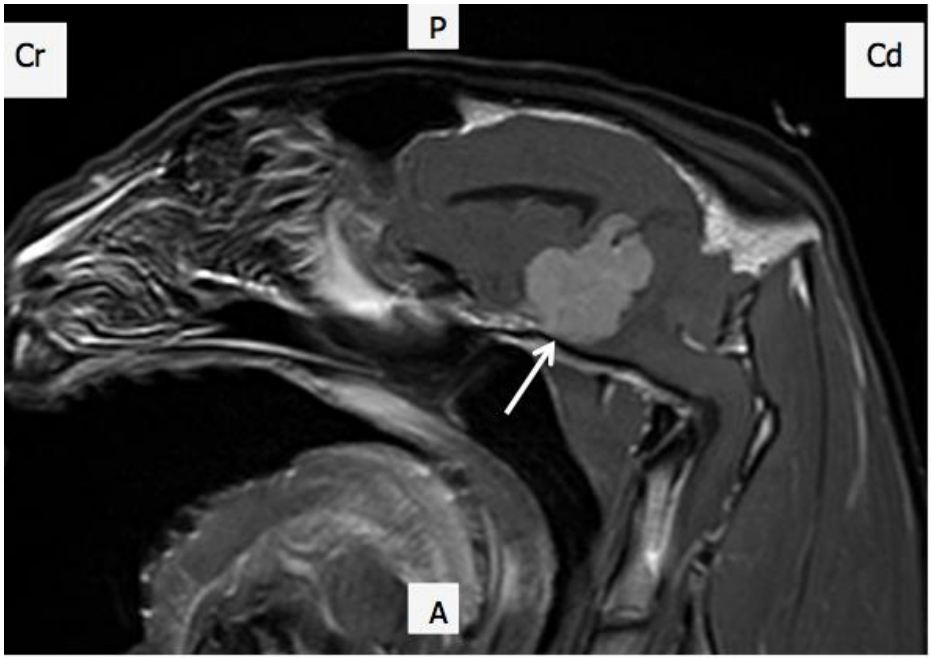

***Figure 4a**:* Sagittal contrast MRI of a 7-yr-old female leopard (*Panthera pardus fusca*) showing mass effect on the pons with involvement of petrous bone at the petroclival region due to a space-occupying cerebello-pontine angle lesion (white arrow). Orientation of sagittal images is denoted by A= anterior, P= posterior, Cr= cranial and Cd= caudal

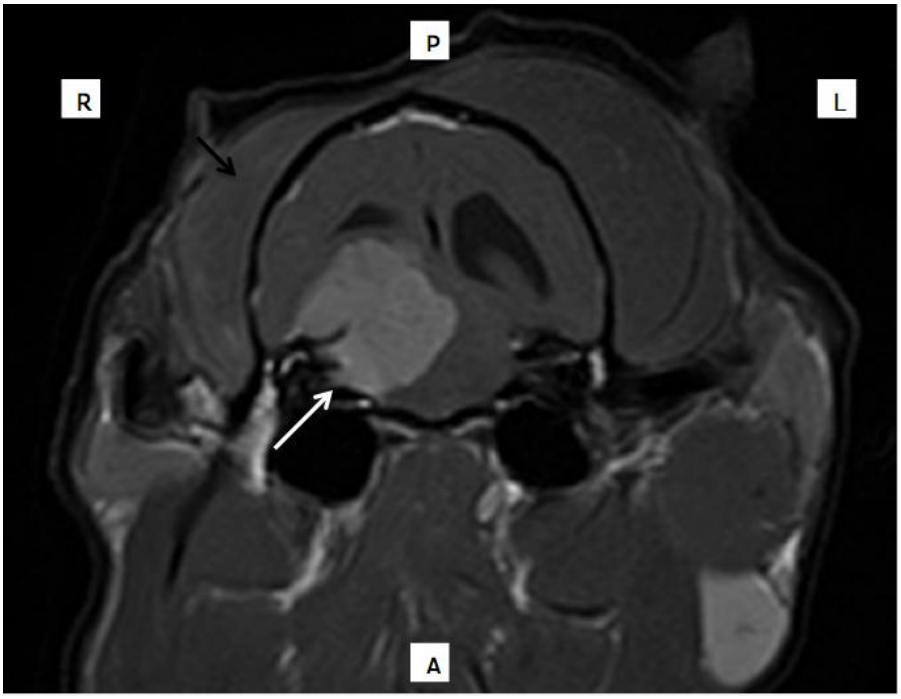

***Figure 4b**:* Transverse contrast MRI of a 7-yr-old female leopard (*Panthera pardus fusca*) showing homogenous enhancement of cranial nerves VII and VIII with the rest of the cerebello-pontine angle mass (white arrow). Severe atrophy of the Temporalis muscle can be appreciated on the right (black arrow), due to mass effect on the pons. Orientation of transverse images is denoted by A= anterior, P= posterior, R=right and L=left.

3. Discussion

Diagnostic imaging descriptions of brain tumors in large wild-caught felids are limited, if any. However, meningiomas are among the most common intracranial neoplasm in domestic cats and sufficient data regarding location, associated symptoms and diagnostic features of these lesions in this species has been documented in literature [4, 9]. Therefore, information for diagnosis of intracranial tumors in wild felids can only be extrapolated from that of small animals.

Meningiomas are slow growing tumors that carry an insidious onset of clinical signs in a patient, with most showing up only one to three months before diagnosis [3]. Moreover, older felines (10-years or above) are commonly affected and a majority of meningiomas occupy supratentorial locations [5]. However in this case, the tumor appeared to affect a relatively younger feline and was found to be infratentorial.

Interpretation of images for this case was largely based on comparison with scientifically accepted descriptions of similar pathologies in small animals, as described. In MRIs, meningiomas in cats are almost always extra-transverse with or without a dural tail and possess marked homogenous contrast enhancement [8]. Lesions are usually reported as being well-margined with decreased signal intensity on T1-weighted and increased signal intensity on T2- weighted images. In most cases, a 'mass effect' can be observed depending on location and peri-tumor edema build up, due to compression of dependent parts; thereby allowing for initial localization of the tumor on physical exam [7]. Similar lesions were appreciated in this case and were sufficient to arrive at a tentative diagnosis at the least. Though imaging may provide sufficient diagnostic insight, confirmation and prognosis of the disease must be sought through histopathological investigation alone [6]. Histologically, meningiomas can be classified into three grades, depending on incidence and severity- Grade I (benign), Grade II (atypical) and Grade III (malignant) [6]. However, owing to the lack of neurosurgical expertise and the endangered status of the animal, neither a biopsy for histopathology nor surgical intervention for cure could be carried out on the patient in concern [2]. Therefore, palliative treatment is being accorded till invasive techniques become feasible in the region.

A handful of reports regarding occurrence of meningiomas in wild and large felids are available, but most of them are isolated incidental postmortem findings that have been described histologically [10]. This clinical case is the first magnetic resonance imaging description of a meningioma in a wild leopard, with an account of associated clinical symptoms, in the Indian subcontinent.

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