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Case Study Contest



**Use of PCSO-524®
(Antinol®) for Treatment
of Nervous Disorder
Caused by Car Accident
and Hip Osteoarthritis
in Geriatric Cats**

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Abstract

Male castrated Persian cat aged 12 years was injured at the rear body in an automobile accident causing paralysis of the hind limbs. X-ray examination found luxation of both pelvic joints and osteoarthritis of hip joint. Nervous disorder of the hind limbs was diagnosed from the absence of the motor and deep pain sensory impulse. MRI examination found no spinal cord damage. The treatment included electrical stimulation at the hind limb muscle in combination with long-term administration of PCSO-524® (Antinol®). The hind limbs were functional normally at the end of the treatment and blood chemistry examination at 32 weeks after the treatment showed normal liver and kidney indicators.

Keywords:

PCSO-524®, (Antinol®), geriatric cat, nervous disorder, hip osteoarthritis, electrical stimulation

Case history

Male castrated Persian cat aged 12 years, weighted 4.5 kg., kept indoors, vaccinated on routine schedule and with no underlying diseases was referred to the hospital on 7 of July 2016 for rear body injury from an automobile accident.

Physical examination

The cat was conscious. Heartbeat, lung sound and respiration were normal. Mucous membrane was slightly pale. Pelvis was swollen and bruised and the cat was unable to move the hind limbs. Examination of neurological system showed negative deep pain reflex, which indicated paralysis condition in concurrent with lower motor neuron (LMN) system impairment (Simon et al., 2013). Sensory reception of the 2 forelimbs was normal. X-ray examination, complete blood count and blood chemistry analysis were performed.

Radiographic findings

Radiographic images of the pelvis and rear body part on plain film showed luxation of pelvic bone at both sacroiliac joints and the lumbar section of vertebral column. Other diagnoses included fracture of pubis, osteoarthritis of hip joint, and no fracture of lumbar vertebrae (Figure 1). Images of abdominal cavity obtained from radiographic examination with iodinated contrast media (Iohexal) (Ruth et al., 2001) in order to perform positive contrast cystography (Ruth et al., 2001) did not show damage of the urinary system (Figure 2).

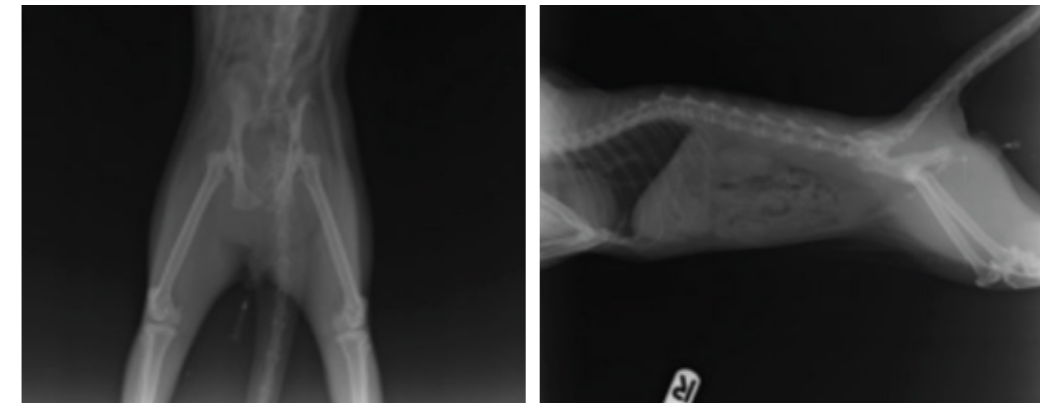


Figure 1. Left: Ventro-dorsal radiographic examination of the cat on plain film showed luxation of the pelvic joint and hip osteoarthritis on both sides. Right: The lateral position examination did not find damage of the lumbar vertebrae.

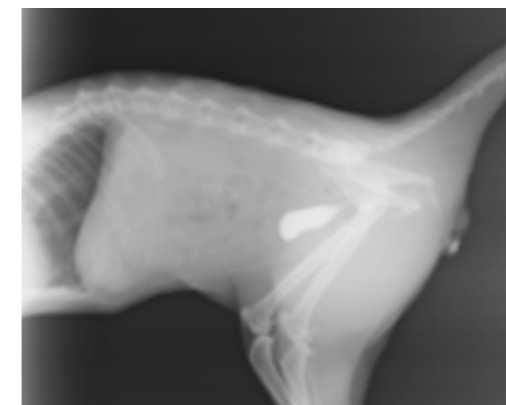


Figure 2. Radiographic findings from contrast cystography examination using iodinated contrast media.

Laboratory results

There was mild anemia, normal white blood cell and platelet count. Blood chemistry analysis showed normal liver function but slightly damaged kidney as indicated from normal SGPT and slightly higher than normal creatinine and BUN (Table 1).

Table 1. Hematological and blood chemistry analysis results

	Day1	Week2	Week4	Week8	Week28	Week32	Week24	Ref ¹⁾
RBC (x10 ⁶ /μl)	7.55	6.19	6.37	-	8.6	8.24	8.06	5.5-8.5
Hb (g/dl)	9.0	8.1	8.3	-	-	10.1	9.9	12-18
Hct (%)	25.7	24.9	22.9	29	28.6	27.3	28.7	37-55
MCV (fl)	34	40.2	35.9	-	33.3	33.1	35.6	60-72
MCH (pg)	11.9	13.1	13.0	-	12.2	12.3	12.3	22-25
MCHC (g/dl)	35	32.5	36.2	-	36.7	37.0	34.5	34-38
Platelets (x10 ³ /μl)	209	435	421	-	65	40	71	150-900
WBC (x10 ³ /μl)	6.72	22.0	10.62	-	7.25	9.93	9.33	6-17
Neutrophils (x10 ³ /μl)	3.42	16.50	8.28	-	4.71	6.72	6.34	3-11.5
Band (x10 ³ /μl)	-	-	-	-	-	-	-	0-0.3
Eosinophils (x10 ³ /μl)	0.33	0.28	0.63	-	1.16	1.09	0.93	0.1-1.2
Lymphocytes (x10 ³ /μl)	2.95	2.6	1.69	-	1.16	1.89	1.96	1-4.8
Monocytes (x10 ³ /μl)	-	-	-	-	0.22	0.198	0.09	0.2-1.4
SGPT (IU/l)	31.8	-	25.2	-	-	59.2	97.6	10-120
BUN (mg/dl)	43.9	30.1	-	33.6	27.4	27.9	39.4	7-28
Creatinine (mg/dl)	1.7	1.1	0.8	1.1	1.1	1.0	1.2	0.9-1.7
Total protein (g/dl)	6.8	7.2	-	8.4	-	-	-	6.0-8.5
Blood parasite	Not found	- ²⁾	-	-	-	-	-	-

¹⁾Benjamin, 1981 ²⁾ (-) = Not performed

Treatment and treatment plan

Week 1 - week 2:

Supportive treatment; fluid therapy to increase circulation, antibiotics, and opioid pain killer, were given. During this early stage, the cat still lost sensory reception of hind limbs. Motor neuron response was only LMN sign (paralysis with LMN system and negative deep pain). Edema of hind limbs was found. The cat was unable to control urination and defecation so urine catheterization was applied.

Week 3:

General clinical signs were improved. The cat showed less pain and was able to use forelimbs normally. The hind limbs remained paralyzed and standing on his own was not feasible (Figure 3). The cat had paralysis with positive deep pain positive. Superficial pain and proprioception reflex was negative. Muscle mass of the hind limbs was decreased (Darryl et al.,2013) (Figure 6). Neuromuscular electrical stimulation; NMES, was applied 2-3 times per week (Debora, 2002).Gabapentin (Neurontin®)pain killer and vitamin B complex (vitamin B1, 2, 6, and 12; Neurobion®) for neurological supplement were prescribed(Burnakis et al., 2009) (Robertson,2008).



Figure 3. Measurement of the cat for wheel chair assembling needed hind limb support when standing.

Week 4 - week 5:

Both hind limbs remained paralyzed. Superficial pain and proprioception reflex remained negative. Hematological and blood chemistry test showed normal parameters. Further diagnosis was performed using (Magnetic Resonance Imaging; MRI) (Simon et al., 2013). The MRI result did not show spinal cord injury (Figure 4). Only sacroiliac joint was identified (Figure 5).

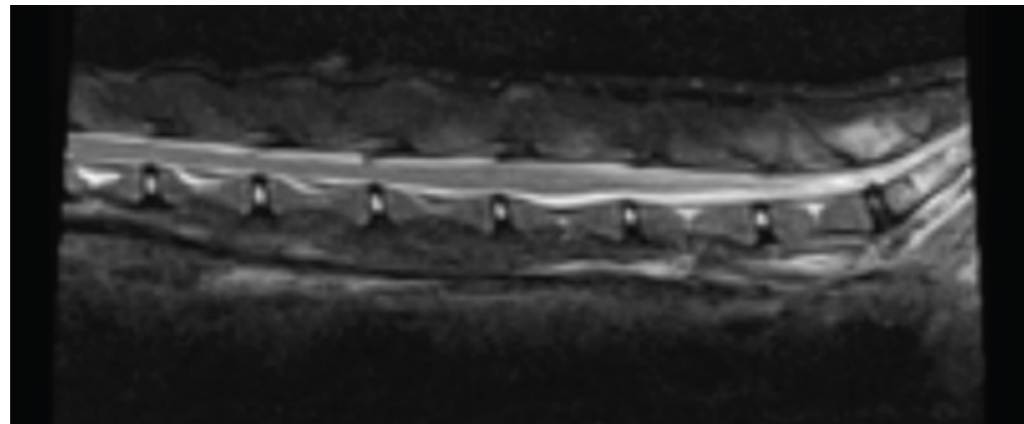


Figure 4. MRI image of lumbo-sacral vertebrae

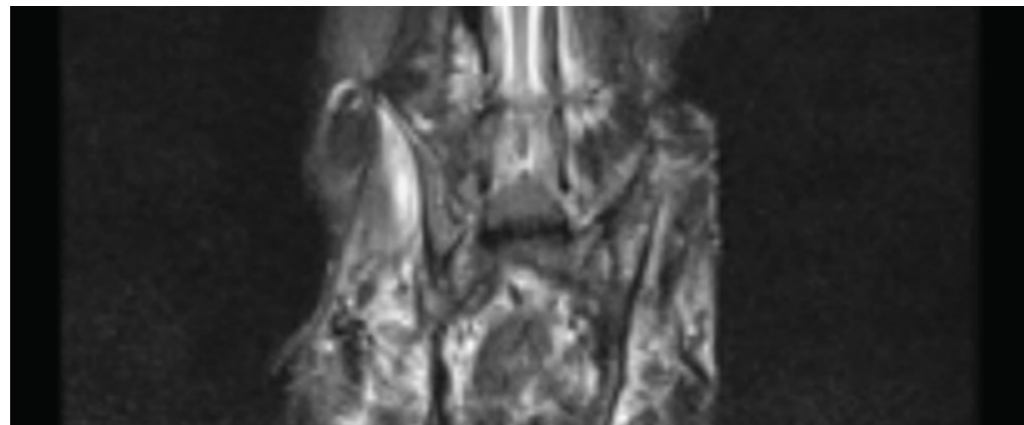


Figure 5. MRI image of sacro-iliac joint

Week 6 - week 10:

According to MRI image interpretation, the veterinarian prescribed Antinol® 1 capsule bid and kept continuing gabapentin and NMES electrical stimulation twice a week.

Week 11 - week 16:

The cat showed improvement of using hind limbs. Superficial pain and proprioception reflex became positive at some walking steps. NMES electrical stimulation twice a week was continued. The owner was advised to give the cat physical therapy at home. Antinol® was continued but gabapentin was terminated.

Week 17 and following weeks:

Measurement of thigh circumference (Darryl et al., 2013) showed increased muscle mass when compared between week 32 and the early stage (Table 2; Figure 6). This indicated that the cat had improvement on using hind limbs. Neurological examination of hind limbs found superficial pain and positive proprioception reflex (Table 3). NMES electrical stimulation was discontinued. Antinol® dosage was reduced to 1 capsule per day. Hematological and blood chemistry analysis was scheduled every 1-2 months to follow up on liver and kidney function. Nothing indicated adverse effect of Antinol® (Table 1). Radiographic image of the pelvis in week 32 (Figure 7) showed bone healing of the pelvis and steady state of osteoarthritis of hip joint.



Figure 6. Measurement of left hind limbs on week 32 at 1/3 distal point (Darryl et al.,2013)

Table 2. Thigh circumference of hind limbs

	Week 3	Week 16	Week 32
Right hind limb	12 cm	14.5 cm	16 cm
Left hind limb	12.5 cm	14.5 cm	15.5 cm

Table 3. Results of sensory system examination of the hind limbs

	Week 1	Week 3	Week 16	Week 32
Right hind limb				
Proprioception	-	-	+/-	+
Superficial pain	-	-	+	+
Deep pain	-	+	+	+
Left hind limb				
Proprioception	-	-	+/-	+
Superficial pain	-	-	+	+
Deep pain	-	+	+	+

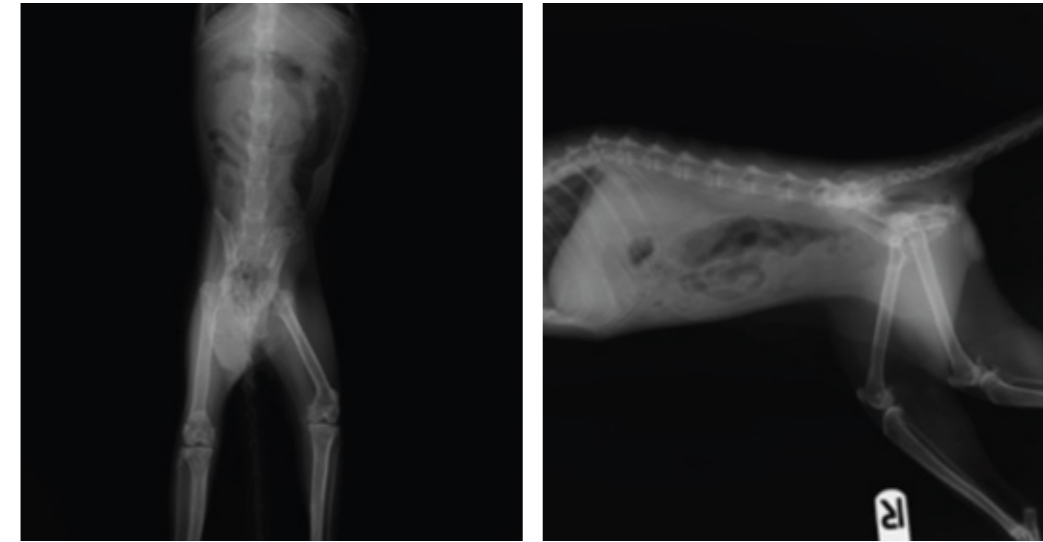


Figure 7. Radiographic image of week 32

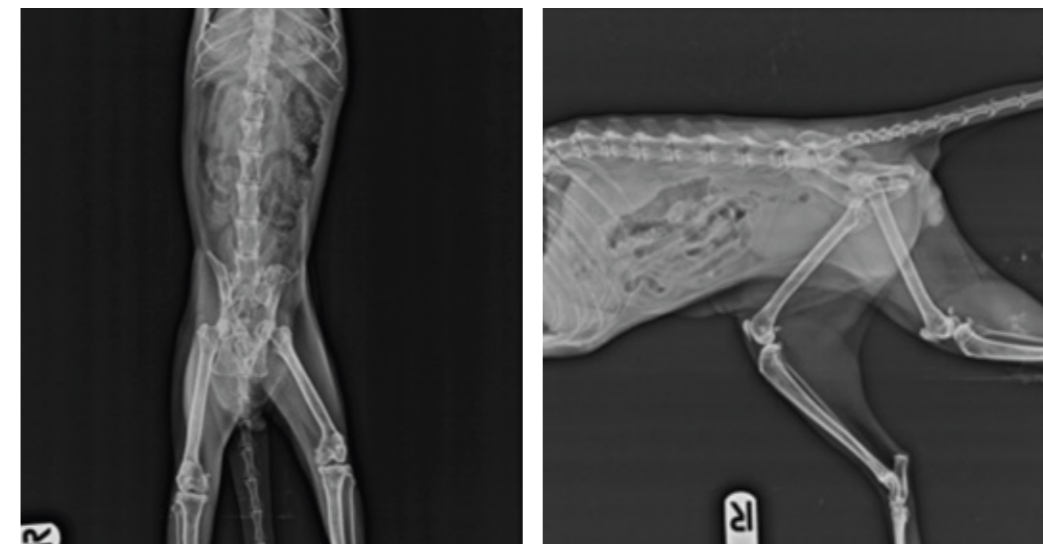


Figure 8. Radiographic image of week 42

Discussion and conclusion

Use of anti-inflammatory drugs for neurological inflammation concurrent with osteoarthritis in this case is limited due to geriatric patient and blood chemistry parameters for kidney function were high in the early stage (Table 1). Anti-inflammatory drugs such as steroids or NSAIDs that cause adverse effects on liver and kidney are not appropriate for the case. Steroid was prohibited completely in this cat.

There are studies reporting use of New Zealand Green-lipped mussel (*Perna canaliculus*) extract to control inflammation (Pollard et al., 2006) and relieve osteoarthritis pain (Kendall et al., 2000) in humans. There are reports of successful treatment that used the extract, for example, treatment of canine osteoarthritis and degenerative spinal disease (Soontornvipart., 2012) and a comparison study of PCSO-524® and NSAIDs as pain killer in dogs (Kwananocha et al., 2016). Therefore, the veterinarian decided to use PCSO-524® (Antinol®) for anti-inflammatory effect. The safety is estimated at similar level to the use of fatty acid from marine fish (Messonnier, 2001) but PCSO-524® is more effective in osteoarthritis pain relief when compared to marine fish oil (Marek et al., 2013). Neurontin® was used in combination with the extract to reduce neurological pain in the early stage. The physical therapy using electrical stimulation to restore muscle and nerve function of the hind limbs showed good response and eventually the cat was able to use the hind limbs (Table 2 and 3). Continuous use of PCSO-524® (Antinol®) in this study did not cause any adverse effect on liver and kidney function and was consistent with a study of (Jamikorn et al., 2014). The owner of this case temporarily discontinued PCSO-524® (Antinol®) for 1 week and the lameness re-emerged before disappeared again after the owner continued the use.

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