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**Antinol**<sup>®</sup>



**2016**  
**Antinol**<sup>®</sup>

# **Case Study Contest**



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2016  
Antinol®  
Case  
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Contest

**1<sup>st</sup> Winning  
Awards**





**Effects of PCSO-524®  
on Inflammation Control  
in Cats with Chronic Renal  
Disease after Keratectomy  
and Conjunctival Pedicle  
Graft for Treatment of  
Corneal Sequestrum from  
Indolent Ulcer**

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## Abstract

A female spayed cat aged 13 years with chronic renal disease later affected with indolent ulcer, and consequently followed by corneal sequestrum. After azotemia was controlled, the cat was surgically treated with keratectomy that used conjunctival pedicle graft for suture closure. The cat received 4mg/kg Tolfenamic acid (Tolfedine®, Vétquinol, Best Agro; Thailand) for 3 days, 2.5 mg/kg Doxycycline monohydrate (Vibravet®, Zoetis, Thailand) for 2 weeks and 1 tablet per day of New Zealand Green-lipped mussel extract, PCSO-524®(Vetz Petz Antinol®, DKSH, Thailand)for long-term control of inflammation. The latter was used as an antioxidant and alternative to Non-steroid, which is a contradiction for chronic renal failure. The cat showed decreased severity of inflammation, normal clinical symptoms, and fine control of azotemia. It is concluded that PCSO-524®(Vetz Petz Antinol®) can be used to support long-term anti-inflammation treatment and reduce the damage in cats with medical contraindication due to chronic renal disease

### Key word :

Cat, chronic renal disease, indolent ulcer, PCSO-524®, Antinol®

## Case history

A female spayed domestic short hair cat aged 13 years and weight 4.6 kg was diagnosed with chronic renal disease and on continuous treatment for approximately 1 year. In January 2016, the cat started to show signs of blinking, red conjunctiva, watery eyes, and opaque cornea. The examination found indolent ulcer at the cornea that was not respond to corneal debridement,prophylaxis antibiotic and artificial tears. Surgical treatment was considered for replacement of medication and debridement, however, the cat was not ready for the operation due to uncontrolled azotemia from chronic renal failure. Preliminary steps were to perform corneal debridement with a sterilized cotton swab, applying antimicrobial eye drops and artificial tears, control inflammation and infection of the cornea. Later, it was found that the symptoms had developed into corneal sequestrum, mortification of the cornea. Two months later, the azotemia was under control and the corneal sequestrum was surgically removed.

## Diagnosis Plan and Results

### Diagnosis and treatment prior to the operation

The etiology of indolent ulcer was corneal ulcer which was continued for over 2 weeks without any response. Since the chronic renal disease was present prior to the corneal ulcer, treatment plan was consisting of medication, scrubbing of corneal epithelium with sterilized colon swab (debridement), antimicrobial eye drop, atropine sulphate eye drop to reduce ciliary muscle spasm, and artificial tears. Systemic treatment to control infection consisted of 2.5 mg/kg Doxycycline monohydrate (Vibravet® , Zoetis)for 2 weeks and 1 capsule per day of PCSO-524® (VetzPetz® Antinol®, DKSH Thailand).

Since the first visit at the ophthalmology clinic, the cat was put on a routine schedule for blood analysis, blood pressure measurement, and ultrasound examination of abdominal cavity to evaluate the condition of chronic renal disease during the azotemia therapy. The eye examination was scheduled weekly during the first month to assess cornea condition since indolent ulcer in cats can induce other dysfunctions of the cornea such as corneal sequestrum. Once the azotemia was controlled, operation would be performed.

The severity of inflammation was reduced after the medication treatment and debridement as observed from ameliorated red conjunctiva and less blinking. However, indolent ulcer, which was the cause of inflammation, still persisted and developed into corneal sequestrum that did not respond to medication so damaged part of the cornea must be surgically removed. Two months after the first visit, the corneal sequestrum was surgically treated after azotemia was controlled.

## Complete Blood Count Analysis Results

parameter	Ref.range	unit	Mth 4 <sup>th</sup> (6/5/2016)	Mth 6 <sup>th</sup> (25/7/2016)	Mth 7 <sup>th</sup> (24/8/2016)	Mth 8 <sup>th</sup> (24/9/2016)	Mth 9 <sup>th</sup> (21/10/2016)
RBC	4.60-10.20	10 <sup>6</sup> /μL	7.05	7.38	6.98	7.84	8.09
Hb	8.5-15.3	g/dl	11.05	12.5	11.8	12.6	13.0
Hct	26-47	%	37.3	37.3	39.2	41.3	45.6
MCV	38-54	fL	52.9	50.6	56.1	52.7	56.4
MCH	11.8-18.0	Pg	16.4	17.0	16.9	16.1	16.1
MCHC	29.0-36.0	g/dl	30.9	33.5	30.1	30.5	28.5
Platelet	100-518	10 <sup>3</sup> /μL	15.8	115	144	160	156
WBC	5.5-19.5	10 <sup>3</sup> /μL	5.7	6.47	8.12	7.64	5.55
Seg	3.12-12.58	10 <sup>3</sup> /μL	3.86	4.3	6.11	5.05	3.97
Lymph	0.73-7.86	10 <sup>3</sup> /μL	1.06	1.55	1.4	1.65	0.97
Mono	0.07-1.36	10 <sup>3</sup> /μL	0.03	0.16	0.03	0.19	0.13
Eos	0.06-1.93	10 <sup>3</sup> /μL	0.75	0.46	0.58	0.76	0.48
Baso	0.00-0.12	10 <sup>3</sup> /μL	0	0	0	0	0
SGPT	10-60		65	NA	NA	NA	NA
Crea	0.8-2.1	Mg/dl	3.3	3.1	3.3	3.0	2.8
BUN	5-30		29	30	24.4	25.6	23
Blood pressure	mmHg	mmHg	140	N NA	150	140	140

Remark: CBC-complete blood count, RBC-red blood cell, WBC-white blood cell, g-gram, dL-deciliter, mm3-cubic millimeter, SGPT- serum glutamic pyruvic transaminase, ALT-alanine aminotransferase, MCV-meancorpuscular volume, MCH-mean corpuscular hemoglobin, MCHC-mean corpuscular hemoglobin concentration, fL- femtoliter, pg-picogram, NA-not applicable

## Ocular Examination Results

parameter	Month 0		Month 4 <sup>th</sup>		Month 6 <sup>th</sup>		Month 8 <sup>th</sup>		Month 11 <sup>th</sup>	
	OD	OS	OD	OS	OD	OS	OD	OS	OD	OS
STT	17	22	18	19	19	20	17	15	16	15
IOP	16	14	20	17	21	18	22	18	19	18
Fluorescein Menace	-	+	-	-	-	-	-	-	-	-
PLR	+	+	+	+	+	+	+	+	+	+
conjunctiva	N	PLH	N	-(dilate) Mild PLH	N	N	N	N	N	N
Cornea	N	ulcer	N	graft	N	graft	N	graft	N	graft
Aqueous	clear	clear	clear	clear	clear	clear	clear	clear	clear	clear
Lens	clear	clear	clear	clear	clear	clear	clear	clear	clear	clear
fundus	normal	normal	normal	normal	normal	normal	normal	normal	normal	normal
Ocular pain score	0	3	0	0	0	0	0	0	0	0

Remark : STT-Schirmer tear test, IOP-intraocular pressure, PLR-pupillary light reflex, PLH-perilimbal hyperemia, OD-Ocular dexter, OS-Ocular sinister, N-normal

## Ocular pain score assessment The score was determined according to the following;

### Assessment by external appearance and blepharospasm(Clark et al., 2011):

0-normal eye opening; 1-75% eye opening; 2-50% eye opening and slightly watery eyes; 3-75% eye closed and moderately watery eyes; 4-100% eye closed and highly watery eyes

### Assessment by size and depth of corneal ulcer, response to inflammation in the anterior chamber, white blood cell in cornea, and keratomalacia(Ledbetter et al., 2009):

Size of corneal ulcer is measured by the proportion of corneal area dyed with fluorescein stain: 0-less than 25%; 1-26-50%; 2-51-75%; 3-more than 76%

Corneal ulcer depth is measured at the deepest point of the ulceration relative to total corneal depth: 0-less than 25%; 1-26-50%; 2-51-75%; 3-more than 76%

Anterior chamber reaction:0-no clinical symptoms; 1-slight aqueous flare; 2-moderate aqueous flare; 3-hypopyon

Corneal edema:The proportion of edema area of the cornea is measured: 0- not more than 25%; 1-25-50%; 2-51-75%; 3-more than 75%

Corneal leukocyte infiltration: 0-none; 1-slight infiltration; 2-moderate infiltration; 3-high infiltration

Keratomalacia: 0-none; 1-benign; 2-moderate, 3-severe

## Ultrasonic diagnosis: Chronic kidney disease

Decreased cortex-medulla differentiation and hyper-echoic parenchyma contour were diagnosed. The shape and size of the kidney were normal and no remarkable renal calculi, cyst abscess or tumor was found.

## Diagnosis and surgical treatment

Keratectomy was selected for surgical treatment in combination with conjunctival pedicle graft for enclosure suture of keratectomy. The corneal problem of the cat was chronic and causing large corneal sequestrum that approximately damaged 90% of the cornea. Consequently, keratectomized area was wide and deep and conjunctival pedicle graft was necessary for enclosure suture. Post-operative care included anti-inflammation, systemic antibiotic, and eye drops. The eye drops consisted of 0.5% Moxifloxacin (Vigamox®, Alcon) every 2 hours, 1% Aropine sulphate (1% Isopto atropine, Alcon)bid for pain relief and anti-spasm of ciliary muscle. Doxycycline (Vibravet®) was given at 2.5 mg/kg sid for 2 weeks and NSAIDs (Tolfenamic acid ; Tolfidine® Vétoquinol, Best Agro) at 4 mg/kg sid was given for 3 days. One capsule of PCSO-524®(Antinol®) sid had been given orally since prior to the operation. Subcutaneous fluid therapy was provided daily. Blood chemistry analysis was performed to evaluate azotemia condition. Eye examination was scheduled on day3, day7, day14, day28, and then every 2 months after the operation.

## Results after the surgical treatment

The severity of inflammation was reduced. The grafted conjunctival issue was still intact. The visual was normal and no additional disorders were observed. Physical examination showed normal health condition, appetite, defecation and urination. The cat gained some weight. Azotemia was less severe. Supportive fluid therapy every other day and 1 capsule sid of PCSO-524® was still continued.

## Discussion

Indolent ulcer (epithelial erosion) orrefractory ulcer is epithelial ulcer of cornea. The etiology of indolent ulcer is not clearly identified. Keratoconjunctivitis sicca, feline Herpesvirus-1 viral infection, continuous irritation from diseases of eyelid or eyelash, and deterioration from old age are suspected to cause detachment of epithelium basement membrane from cornea stroma. Consequently wide but shallow ulcers may exist for longer than 10-14 days. The treatment essentially includes removal of affected tissue, such as debridement using sterile cotton swab, Alger brush diamond burr, grid keratotomy, or superficial keratectomy with various grafts for corneal enclosure.

Corneal sequestrum is the necrosis of cornea of which the corneal tissue becomes dark brown to black. The disease is particularly found in cats with unknown cause. Other names include corneal necrosis, corneal sequestration, corneal mummification, corneal nigrum, focal degeneration, feline keratitis nigrum, primary necrotizing keratitis, isolated black lesion and chronic ulcerative keratitis. It commonly occurs following other corneal disorders such as chronic corneal ulcer in this case. Corneal disorders result in chronic inflammation and consequently cause pain, red and watery eyes, blinking, and constricted iris. Cats may be depressed, spend more time sleeping, or trying to wipe the eyes (Barnett and Crispin, 1998). The pain caused by disorders such as corneal ulcer, uveitis, or glaucoma was classified as severe pain out of 4 levels of pain; excruciating, severe, moderate, and mild (Wright, 2002).The detail of each classification can be added from specific symptoms or alteration of behavior post operation (Williams, 2016). The therapy necessarily includes continuous pain and inflammation treatment with anti-inflammation medication and cycloplegia for relief of pupillary constrictor muscle and ciliary muscle.

Renal failure occurs when kidney fails to maintain normal hemodialysis, filtration or excretory function, resulting in accumulation of uremic toxins, loss of electrolyte and acid-base balance. Consequently, azotemia occurs when blood urea nitrogen (BUN), or blood creatinine increases and maintenance of urine specific gravity is impaired (<1.040) (Lappin, 2001). The use of NSAID and steroid in renal failure cats is limited due to prohibition of cyclooxygenase (COX) which produces prostanoids, substance important for maintenance of electrolyte and acid-base balance and glomerular filtration rate. Therefore alternative anti-inflammation that has no adverse effects on kidney is necessary (Suemanotham, 2014).

PCSO-524® or Antinol® (VetzPetz® Antinol®, DKSH, Thailand) is oil extracted from New Zealand Green-lipped mussel (*Perna canaliculus*) using liquefied carbon dioxide. It can prevent or reduce severity of inflammation (McPhee et al, 2007; Coulson et al, 2013; Coulson et al., 2015). Other properties included gastroprotective, antihistaminic effect, antioxidant, anticytokines, and antiarthritis. Most of the extracted peptide from New Zealand Green-lipped mussel (*Perna canaliculus*) is anti-microbial, anti-oxidant, cohesive, and anti-hypertension substance (Coulson et al., 2015). Additionally, PCSO-524® assists in balance of intestinal flora (microbiota), sequence of internal and external inflammation of intestine, for example, rheumatoid arthritis, and osteoarthritis. Metabolism of intestinal bacteria will change or alter the nutrient structure resulting in contact of host and the changed component. This will increase or decrease the effect of nutrients on health. The understanding of association between extract from New Zealand Green-lipped mussel and the change of probiotics and pathogenic bacteria can help controlling internal and external inflammation of the intestine (Coulson et al., 2013; Coulson et al., 2015).

## Conclusion

Corneal sequestrum as a consequence of indolent ulcer in cats is common. It causes chronic keratitis or uveitis, resulting in pain or chronic discomfort that leads to the loss of eyeballs due to severe uveitis or staphyloma of cornea from detachment of sequestrum that expands throughout the cornea. Medication usually does not work well. Specific treatment includes operation that removes the affected corneal tissue in combination with various grafted enclosure and systemic and topical medication. In this case, the operation could not be performed in the beginning due to chronic renal disease of the cat. Anti-inflammation drugs are prohibited in this category; therefore PCSO-524® (Antinol®) and antibiotics were used for long term control of inflammation and control and prevention of inflammation, respectively.



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## Illustrations

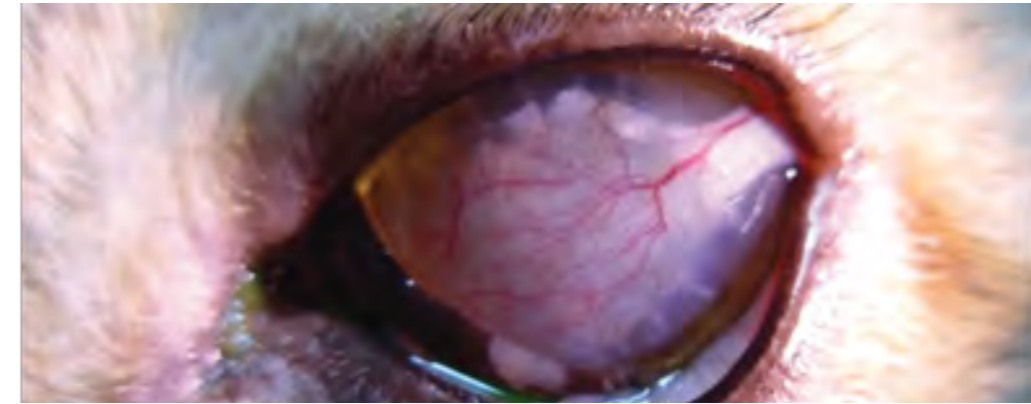


Figure 1.

One month post-operation. The keratectomy area was covered with grafted conjunctiva. The operated area was wide and deep therefore the chance of staphyloma was high. Conjunctival tissue was used to replace the damaged and removed corneal stroma collagen. The inflammation is nearly disappeared as observed from lacks of swollen and redness of conjunctiva, no tears, no blinking, inability to dye the cornea, and clear fluorescein aqueous. The pupil is dilated due to mydriatic administration.

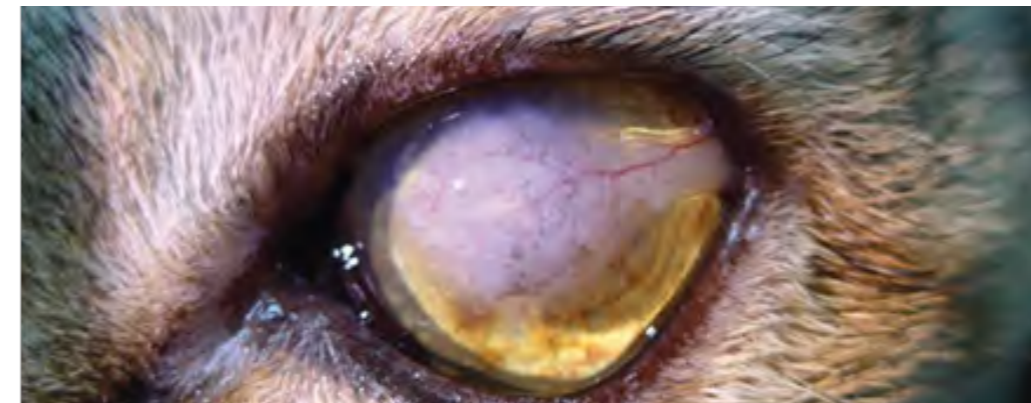
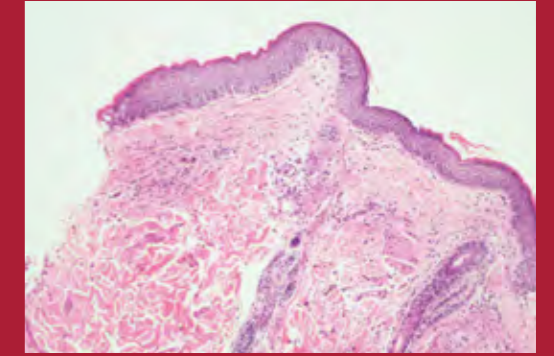


Figure 2.

Six months post-operation. Conjunctival pedicle graft that covers the cornea is thinner than before. The size of vessels at the grafted area is reduced. The grafted is left without removal. Overall appearance shows no inflammation of the cornea and other tissues. The cat is able to see through the area outside the graft.



**The Use of Cyclosporine  
and PCSO-524® in the  
Treatment of Alopecia  
and Dermatitis due  
to Sebaceous Adenitis  
in Rabbits**

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## Abstract

Female Holland Lop rabbit aged 9 years and 6 months was taken to the hospital for treatment of dermatitis. Clinical signs included alopecia with unknown cause, dry and course hair, scaling, dry and cracked skin. The laboratory examination consisted of superficial skin scraping, cellophane tape technique and dermatophyte test kit examination. External parasites, yeast, and fungi were not found. However, skin biopsy identified hyperkeratosis, follicular dystrophy, and decreased number of sebaceous gland. After sebaceous adenitis was diagnosed, the rabbit was treated with 5mg/kg cyclosporine sid and 1 capsule of PCSO-524® sid for more than 6 months in order to reduce the skin inflammation and hairrestoration. No adverse effects were found and the hair loss was replaced by new hair growth, softer hair and less scaling was observed.

### Key word :

Rabbits, exotic pets, sebaceous adenitis, PCSO-524®, Antinol®

## Case History

Intact female Holland Lop rabbit aged 9 years and 6 months, weighted 1.58 kg started to have alopecia about 2 months ago. The hair loss occurred around the eyes, under the chin, and ears. There was no itching but sneezing and nasal discharge was found. The rabbit was raised indoor with other 2 rabbits. Commercial diet, dry grass, and clean water were provided. The rabbit had a history of Cheyletiellosis before this visit and selamectin was administered once before being referred the exotic pet hospital.

## Physical examination

On the first day, the rabbit showed heart rate of more than 200 beats a minute, respiratory rate of 55 breaths per minute, 39.0C body temperature, pink mucous membrane, CRT of less than 2 seconds, and 2.5/5 Body condition score. General alopecia was found particularly at the back of the neck, legs, face, chin, around the eyes, ears and nose (Figure 2 and 3). At the lesion area, large non-adherent scaling was common along with exfoliative dermatitis. Hair loss was found in cluster and concurrently with dry and detached skin. Pododermatitis was found at the sole and digits.

## Diagnosis plan and results

### Differential diagnosis

Ectoparasite infestation, dermatophytosis, malassesia dermatitis, actinic keratosis, idiopathic sebaceous adenitis, thymoma-associated exfoliative dermatitis, seasonal alopecia, and autoimmune hepatitis-association exfoliative dermatitis were included in the tentative diagnosis.

### Diagnostic plan

Skin disease in rabbits is commonly caused by parasites, bacteria, fungi, immunity disorders, or imbalanced nutrition. The diagnosis should rule out those causes less common and less significant. The most common causes are ectoparasites and fungi. In this case, the diagnostic examination started from skin scraping, cellophane tape technique and fungi culture using a test kit (Dermatophyte Test Medium). When nothing was found, additional skin biopsy and other techniques, such as radiographic and hematological examination was employed (Palmeiro, 2013).

## Hematological results

Table 1. Hematological parameters prior to and after PCSO-524® administration (Quesenberry KE. 2000)

Hematologic	day60	day 150	Ref.
WBC (103 cell/mm <sup>2</sup> )	9.8	5.8	5.2-12.5
Neutrophils (%)	59	66	20-75
Lymphocytes (%)	36	30	30-85
Monocytes (%)	3	2	1-4
Eosinophils (%)	0	0	1-4
Basophils (%)	2	2	1-7
RBC (103 cell/mm <sup>2</sup> )	4.85	5.67	5.1-7.9
Hemoglobin (g/dL)	10.1	10.9	10.0-17.4
Hematocrit (%)	32.0	33.9	33-55
MCV (µm <sup>3</sup> )	66	59.8	57.8-66.5
MCH (pg)	20.8	19.3	17.1-23.5
MCHC (g/dL)	31.5	32.3	29-37
Platelets (103 cell/mm <sup>2</sup> )	484	418	250-650
Serumbiochemistry	day60	Day150	Ref.
BUN (mg/dl)	23	28	13-29
Creatinine mg/dl	1.43	1.38	0.5-2.5
AST (U/L)	32	31	14-133
ALT (U/L)	37	43	48-80
ALK (U/L)	114	70	4-16

## Treatment and outcome

On first day of the visit, day1, the rabbit was presented with alopecia and respiratory problems. The respiratory disorder was treated with 10 mg/kg Enrofloxacin (Baytril®) bid. Cheyletiellosis that was diagnosed prior to the visit was treated with 15 mg/kg selamectin once (Carpenter, 2013). Vitamin E and essential fatty acid (Dermaform-liquid®) 1.5 ml sid was given for 30 days in order to reduce the inflammation and increase skin hydration



Figure 1. Radiographic image from ventrodorsal position (1a) and lateral position (1b)

## Follow-up results

On day30 of the treatment, the skin condition was worse compared to the first day. Scale was larger and hair loss was increased, especially at the back of the neck, lateral body, around the eyes, face, and legs. The respiratory signs were improved as sneezing and nasal discharge disappeared. On days30, superficial skin scraping, cellophane tape technique and dermatophyte test kit examination were performed. Results are shown in table 2.

Test	Result
Superficial skin scraping	No parasite found
Cellophane tape technique	No parasite found, no malassezia spp. found
Dermatophyte test kit	Negative

Table 2. Laboratory results of skin tests

While waiting for dermatophyte test kit result, vitamin E and essential fatty acid (Dermaform-liquid®) was increased to 2 ml bid. The rabbit was scheduled for the next visit in 2 weeks. After 15 days, dermatophyte test kit showed negative result. Therefore skin biopsy was scheduled in the following week and hematological and radiographic examination was performed in order to assess the animal health prior to anesthesia for skin biopsy.

Hematological examination showed that white blood cell number was higher than normal and blood chemistry parameters were within normal range (Table 1). The radiographic images showed no unusual symptoms (Figure 1). Skin biopsy showed reduced number and size of sebaceous gland and abnormality of cells around hair follicles. There was infiltration of lymphocyte and monocyte around the hair follicles (Figure 4). Results of laboratory and histopathological examination led to the final diagnosis that the condition was sebaceous adenitis.

During day 60 to day 210, sebaceous adenitis was treated with 5 mg/kg cyclosporine (Neoral®) sid (Van, 2008) in combination with Green lipped mussel extract (PCSO-524®) sid. The rabbit showed improved clinical signs. Previous hair loss area was replaced with new hair growth. Scaling was decreased and pododermatitis was less severe (Figure 5, 6, 7, and 8)

## Discussion

Hair loss in rabbits occurs by various causes such as fungal and bacteria infection, ectoparasite infestation, malnutrition, and rare diseases; sebaceous adenitis and epitheliotropic lymphoma for example. In this case, there were 3 rabbits raised together with qualified commercial diet and dry grass. Also only 1 rabbit was affected, therefore malnutrition was ruled out. The skin examination including skin scraping, cellophane tape technique, and dermatophyte test kit showed negative result, therefore external parasitic infestation, fungal and yeast infection were ruled out. When all the mentioned tests fail to identify cause of the disease, skin biopsy is selected for further examination at the cellular level. In this case, histopathological examination showed abnormality of sebaceous gland in the size and shape and reduced number. The skin was dry due to impaired sebaceous gland, which is responsible for maintenance of skin hydration, and plenty of inflammatory cells infiltrating subcutaneous layer (Glose, 2016).

Sebaceous adenitis is a rare disease and there is not much information about its treatment in rabbits. Some studies reported that the disease is usually found with thymoma. Therefore, the diagnosis needs additional radiographic examination and observation of thymoma symptoms; such as exophthalmos and dyspnea (Morrisey, 2005). In this case, enlargement of thymus gland was not found.

Sebaceous adenitis was reported in dogs, cats, and humans (Glosk, 2016). The severity depends on chronicity of the disease and species of the animals. Currently, etiology of the disease is unknown but immunological disorder is suspected. (Van, 2008). The author used PCSO-524® in the rabbit with feline dosage. The experience in exotic pets suggested that long-term treatment of PCSO-524®, 1 capsule sid for longer than 6 months, has no adverse effects on animals. Hematological test results in this case showed that the number of white blood cells was decreased to normal level and no unusual blood chemistry parameters found after 6 months in the treatment (Table 2). PCSO-524® also showed greater improvement and more convenience when administering to the animal since only 1 capsule or 0.2 ml was needed compared to 2 ml of essential fatty acid (Dermaform-liquid®).

Sebaceous adenitis is a disease caused by impaired immunological system. Immunosuppressive drug such as cyclosporine may restore the damaged sebaceous gland so new hair growth was observed. In this case we used cyclosporine in combination with PCSO-524® and found new hair growth. Although the new hair growth did not expand to cover all the affected area, we found that the hair was softer than those when receiving only vitamin E and essential fatty acid (Dermaform-liquid®). The less severity of dermatitis and the softer hair could be the result of PCSO-524®, which consisted of omega-3, vitamin E, and more than 90 fatty acids, therefore the skin and hair condition was improved.

## Conclusion

PCSO-524® (Antinol®) in combination with Cyclosporine (Neoral®) for treatment of sebaceous adenitis in rabbits showed satisfactory clinical outcome. The apparent improvement included restoration of skin hydration, reduced hair loss, softer hair, and dramatically less scaling as shown in Figure 5-8. Pododermatitis was apparently less severe (Figure 9). Long-term use of PCSO-524® (Antinol®) had no adverse effects on the rabbit.

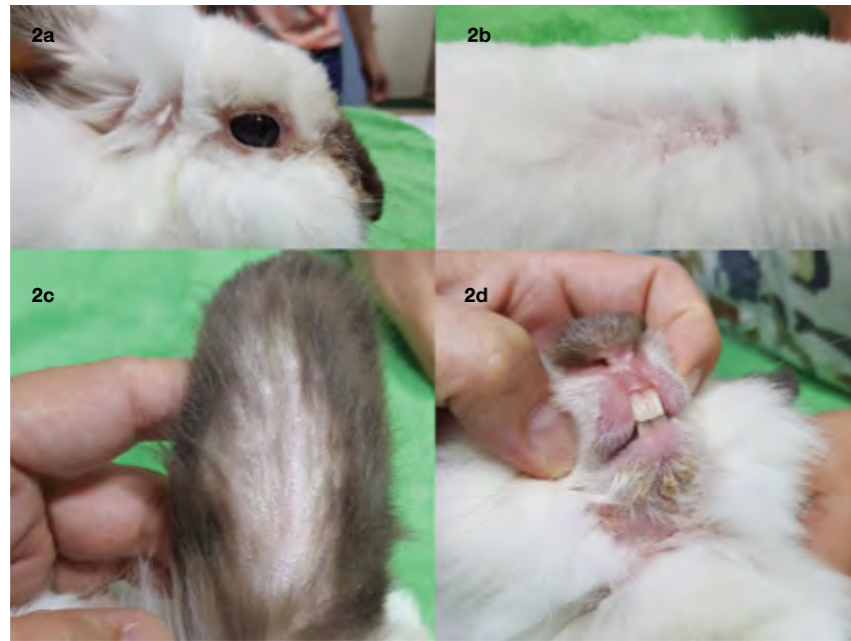


Figure 2. Abnormality of skin on day1 of the treatment (2a-2d)



Figure 3. Abnormality of skin on day1 of the treatment (3a-3b)

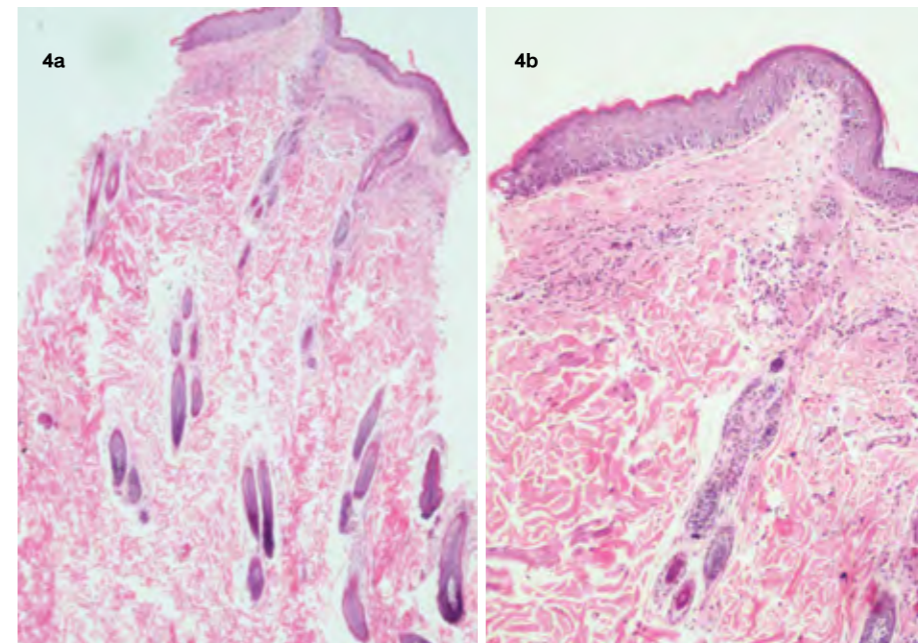


Figure 4. Histopathological finding of mild degree of mononuclear cells presented in the sub-epidermis with congestion, moderate number of macrophages and lymphocytes presented around the blood vessel in deep dermis, decreased number and malformation of sebaceous gland and hyperplasia of fibrous tissue in dermis layer.

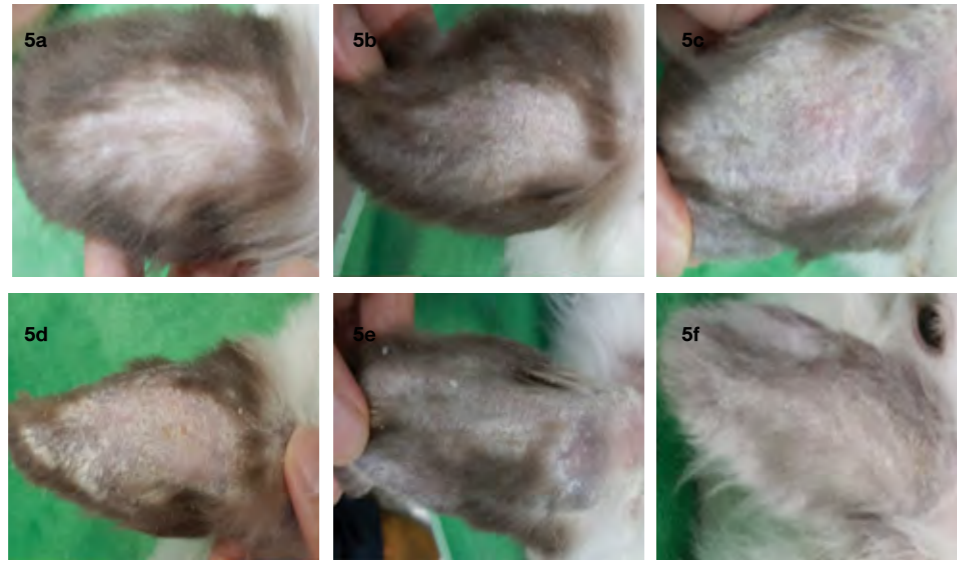


Figure 5. Treatment outcome from day1 to day150 after the treatment; 5a:day1, 5b: day30, 5c: day45, 5d: day90, 5e: day120, 5f: day150

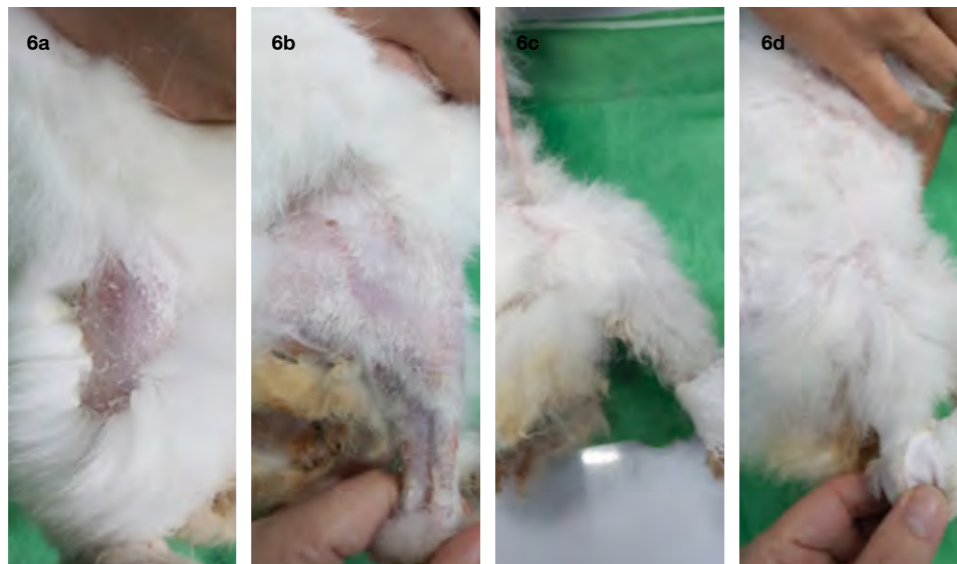


Figure 6. Treatment outcome from day1 to day150 after the treatment; 6a: day1, 6b: day30, 6c: day120, 6d: day150

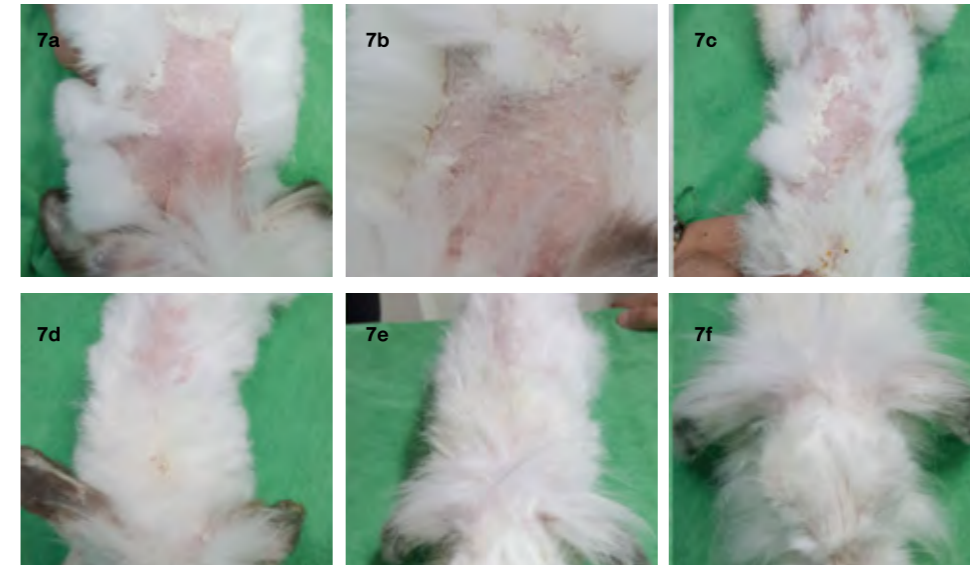


Figure 7. Treatment outcome from day1 to day150 after the treatment; 7a: day1, 7b: day30, 7c: day45, 7d: day90, 7e: day120, 7f: day150



Figure 8. Treatment outcome; 8a: day30, 8b: day90

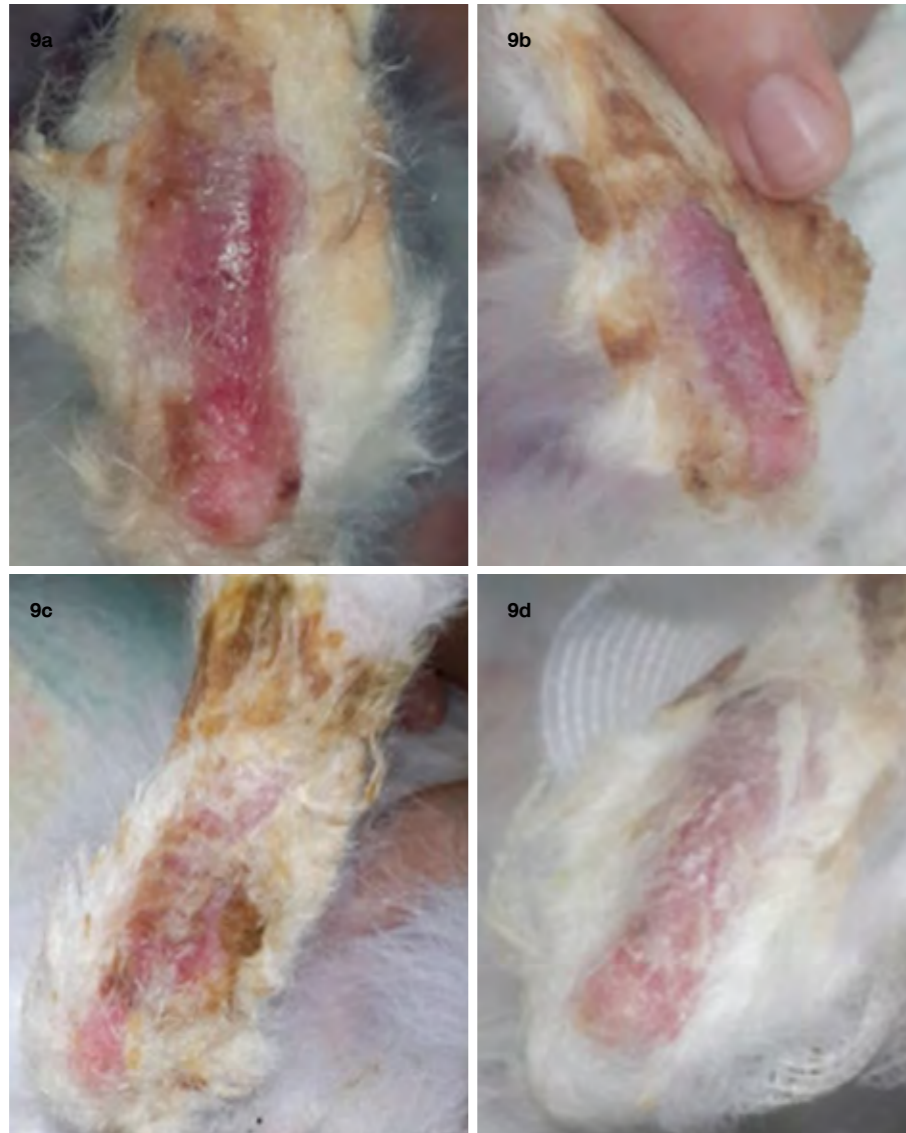


Figure 9. Treatment outcome; R1: right leg prior to PCSO-524 administration, R2: right leg after 60 days of PCSO-524 administration, L1: left leg prior to PCSO-524 administration, L2: left leg after 60 days of PCSO-524 administration (courtesy of the owner).

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**Use of PCSO-524®  
in Combination with  
Prednisolone for  
Treatment of Spinal  
Cord Injury from Disc Pro-  
trusion in Dogs**

**Kanokwan Kerdwut <sup>1</sup>**  
**Pichnan Leeharatanarak <sup>2</sup>**  
**Wutiwong Teerapan <sup>3</sup>**  
**Pakatorn Lewchalermwong <sup>4</sup>**  
**Anchulee Dulyachat <sup>5</sup>**

**Faculty of Veterinary Medicine,  
Kasetsart University**

## Abstract

Male Shih tzu dog aged 9 years and 1 month was diagnosed with limb paralysis after jumping 4 days prior to the hospital visit. The dog showed weak response of forelimb reflex and severe neck pain. X-ray examination showed block vertebrae at C3 and C4. Magnetic resonance imaging (MRI) examination found mild disc protrusion, compression on spinal cord and myelopathy at C4 and C5 with compression on the right dorsal lamina. Prednisolone and gabapentin were prescribed to reduce inflammation and pain, respectively. Follow-up examination showed that the dog had improved neurological signs and the limb paralysis was at level 2. However, weakness of all 4 legs was still present, particularly on the right side. The dog fell on the right more often than the left while walking. Reflex response of left forelimb was better than that of right forelimb. Neck pain was decreased. The dog had polydipsia and polyuria. Hematological examination found that alkaline phosphatase (ALK) highly increased compared to value on the first day; therefore dosage of prednisolone was reduced. Follow-up after reduction of prednisolone showed that the dog fell more often while walking and slight neck pain was present. Prednisolone dosage was then increased and PCSO-524® was prescribed to reduce inflammation of the spinal cord. Later examination found that the dog could walk without falling, both forelimbs showed normal reflex, and signs of neck pain disappeared. Termination of prednisolone was then started without any recurrent clinical signs. After continuous treatment with PCSO-524® for 6 weeks, the dog could walk normally, both forelimbs showed normal reflex, and the ALK level was nearly back to the level prior to the treatment.

### Keywords:

Disc protrusion, prednisolone, PCSO-524®, myelopathy, block vertebrae

## Case history

Intact male Shih Tzu aged 9 years and 1 month weighted 9 kg was admitted to veterinary hospital at Kasetsart University, Bang Khen campus. Clinical history was inability to walk since 4 days ago after jumping over a door sill. Prior to the admission, the dog was treated at a veterinary clinic but there was no response and the given medication was not known. The dog had normal appetite.

## Physical and neurological examination

Physical examination showed paralysis of 4 limbs at level 4 (Figure 5). Forelimb reflex was impaired. The dog could not control urination and defecation. The spasm and severe pain of neck muscle was observed. Response to pain was normal for all 4 limbs. Lung and heart sound and mucous color were normal.

## Diagnosis plan and results

Blood chemistry analysis showed that alanine aminotransferase (ALT) and alkaline phosphatase (ALK) were higher than normal (420 IU/L and 438IU/L, respectively). X-ray examination identified block vertebrae at C3 and C4 (Figure 1)



Figure 1. X-ray image showed block vertebrae at C3 and C4 (red arrow)

## Treatment outcome and Follow-up results

Preliminary physical, neurological, hematological and radiographic examinations provided evidence that the dog was suffered from dislocation of vertebral disc. Prednisolone (Prednisolone Olan®, Olan-Kemed Co., Ltd., Bangkok, Thailand) 0.5 mg/kg bid, gabapentin (VULTIN 100®, Unison Laboratories Co., Ltd) 10 mg/kg bid, 1 tablet of vitamin B complex (RE-B FORT®, Unison Laboratories Co., Ltd) sid, 1 tablet of acetylcysteine (MUCOMIX®, Samarth Lifesciences PVT., Ltd Samutprakarn, Thailand) 600 mg sid as anti-oxidant, 1 tablet of vitamin E (Natural VITAMIN E®, Mega Lifesciences Ltd., 200 mg sid, 1 tablet of sucralphate (Ulsanic TM, Siam Bheasach Co., Ltd. Bangkok, Thailand) 1 g bid as stomach-lining protector, and 1 tablet of samarin (Samarin®140, Berlin Pharmaceutical Industry Co., Ltd) 140 mg sid as liver supplement were prescribed. Four days after the treatment, the dog showed no signs of improvement; therefore, magnetic resonance imaging (MRI) examination was used for further diagnosis.

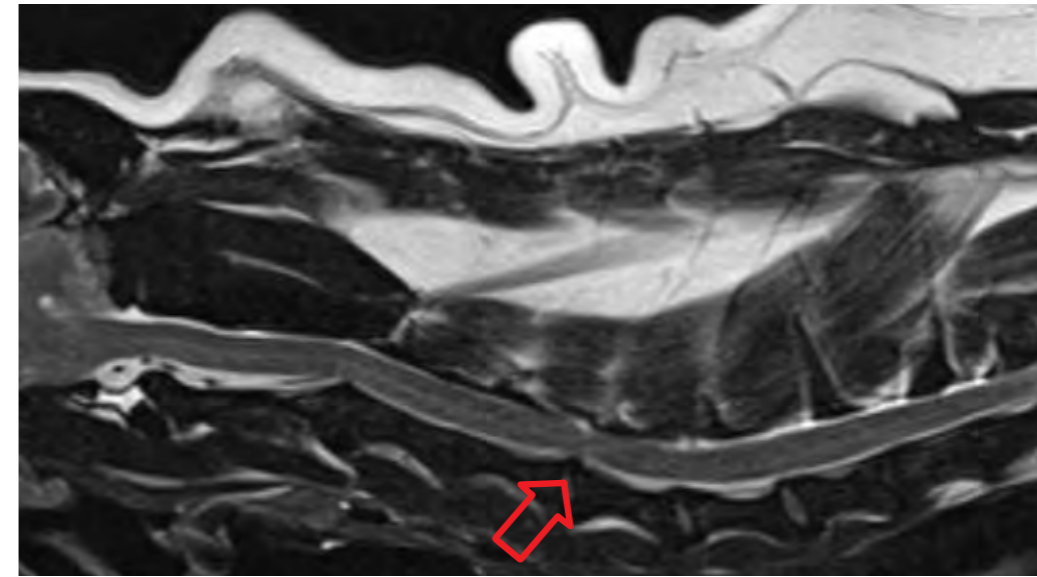


Figure 2. MRI (T2W) image showed compression of spinal cord from prolapsed vertebral disc at C4-C5 (red arrow)

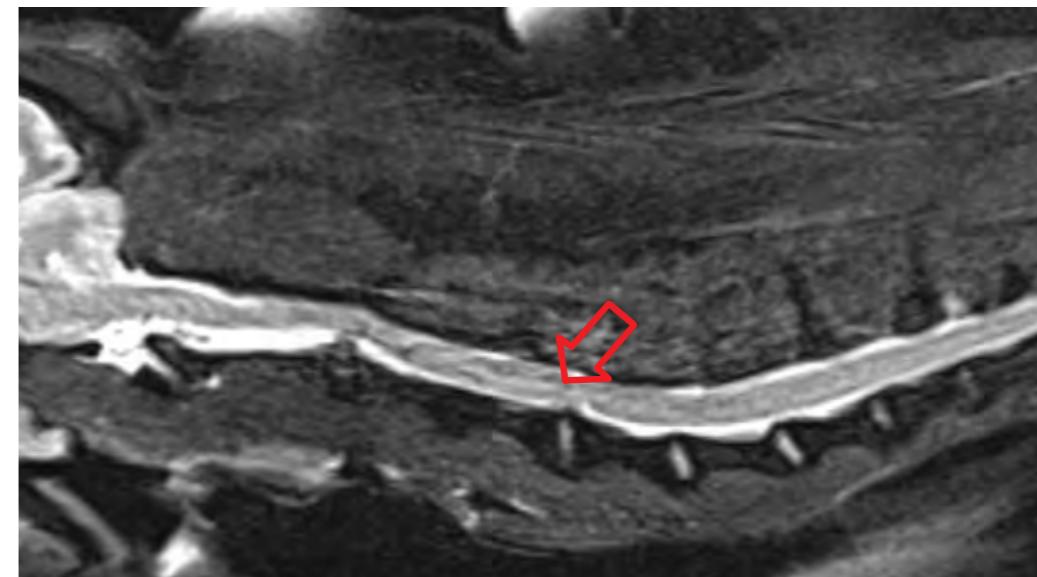


Figure 3. MRI (STIR) image showed inflammatory lesion of spinal cord (myelopathy) at the red arrow



Figure 4. MRI image showed compression of spinal cord from prolapsed vertebral disc at C4-C5 with compression on the right dorsal lamina (red arrow)

MRI images showed dislocation of vertebral disc and mild compression of spinal cord (Figure 2), myelopathy (Figure 3), and compression of the right dorsal lamina (Figure 4). Prescription after the MRI diagnosis included 20% mannitol (Manital 20%, A.N.B. Laboratories Co., Ltd. 557 Ramintra Road, Bangkok, Thailand) 0.5 mg/kg, intravenous injection of furosemide (H-Mide®, L.B.S. Laboratories Ltd., Bangkok, Thailand) 0.07 mg/kg sid to reduce edema of the spinal cord, prednisolone 0.5 mg/kg bid, gabapentin 10 mg/kg tid, and diazepam (Sipam TM, Siam Bheasach Co., Ltd., Bangkok, Thailand) 0.5 mg/kg bid as muscle relaxant for neck pain relief.

After 1 week of follow-up, the dog showed improvement of clinical signs and the limb paralysis was at level 2. However, weakness of all 4 legs was still present, particularly on the right side. The dog fell on the right more often than the left while walking. Reflex response of left forelimb was better than that of right forelimb. Neck pain was decreased. The dog had polydipsia and polyuria. Hematological examination found that alkaline phosphatase (ALK) highly increased (2040 IU/L) compared to value on the first day as a result of long and continuous use of steroid. Therefore dosage of prednisolone was reduced to 0.5 mg/kg sid. Diazepam use was terminated and same (SAmE225®, Laboratories a division of FoodScience Co., Ltd., USA) 225 mg 1 tablet sid as liver supplement, and ursodeoxycholic acid (Ursolin®, Berlin Pharmaceutical Industry Co., Ltd., Bangkok, Thailand) half tablet sid were added.

The owner was suggested to limit mobilization of the dog. Three weeks after dosage of prednisolone was reduced, the movement of the dog was worse, falling was more often and the neck pain was slightly present. Prednisolone then was increased to 0.5 mg/kg bid for 1 week and down to sid in the following week in combination with 1 capsule of PCSO-524® (Antinol®, MDMC CO.,Ltd) sid.

The follow-up examination showed better movement of the dog, no falling, better reflex of the forelimbs, and no neck pain. Prednisolone was then reduced to 0.25 mg/kg sid and continued every other day for another week in combination with PCSO-524® for 4 weeks. By the end of treatment course, the dog could walk normally without falling, both forelimbs showed normal reflex, and the ALK level was nearly back to the level prior to the treatment (ALT 239 IU/L, ALK 508 IU/L).

The table of hematological results showed that ALK increased during 31 days of the treatment as a result of continuous prednisolone administration and decreased after prednisolone dosage was reduced.

ผลเลือด	10/11/2016 (Day 1)	22/12/2016 (Day 12)	10/01/2017 (Day 31)	24/01/2017 (Day 45)	20/02/2017 (Day 72)	ค่าปกติ
HGB	18.3	17.4	18.6	18.2	-	10-18gm%
PCV	51.00	49.8	49.5	51.4	-	35-55%
RBC	7.58	7.26	7.37	7.33	-	5-9X 10 <sup>6</sup> /cumm
WBC	16,300	8,050	8,000	8,920	-	6,000-17,000X 10 <sup>6</sup> /cumm
SEGS	14,670	6,520.5	6,800	6,511.6	-	3,000-11,400
LYMPH	1141	483	880	1,784	-	1,000-4,800
MONO	489	563.5	-	356.8	-	150-1,350
EOS	-	483	320	267.6	-	100-750
PLATELETS	337	383	401	359	-	200-500X10 <sup>3</sup> /μl
PROTEIN	8	6.2	7	7	-	6-7.5gm%
BUN	9	12	13	13	-	10-26mg%
CREATININE	0.72	0.58	0.63	0.63	-	0.5-1.3mg%
ALT SGPT	420	367	398	308	239	6-70 37° C IU/L
ALK PHOS	438	2,070	1,888	1,178	508	8-76 37° C IU/L
TP	8.1	-	-	-	-	5.3-7.8gm%
ALBUMIN	4.3	-	-	-	-	2.3-3.2gm%

## Discussion

Disorders of vertebrae such as hemivertebrae, butterfly vertebrae, and block vertebrae are genetic disorders. The deformed structure can affect vertebral stability and influence degeneration of the disc. The MRI examination in this case showed disc protrusion that caused compression of the spinal cord called Hansen type II IVDD (disc protrusion) at C4-C5. The lack of vertebral stability and the pressure that was higher than normal while the dog was jumping must have caused the protrusion since the block vertebrae was at C3-C4.

This case study found that use of prednisolone in combination with other medications for treatment of myelopathy due to disc protrusion and compression during the first 6 week of the incident may show no progressive results. Collapse while walking, neck pain, and abnormal reflex of forelimbs still remained. Recovery of neurological disorders usually takes 3-4 weeks. The attending veterinarian suggested spinal decompress operation but the owner preferred the medication treatment in addition to the fact that liver enzyme of the dog was high. Therefore PCSO-524® was prescribed in combination with prednisolone. The mechanism of PCSO-524® includes anti-inflammation. Omega-3, which is the main ingredient of PCSO-524® has neuroprotective effect in acute neurological injury and may have effect on central nervous system in which long-chain polyunsaturated fatty acid (PUFA) consists of omega-3 and 6 unsaturated fatty acid. The property of PCSO-524® may improve the neurological disorder in this case. However, further studies in other cases are needed

## Conclusion

After 6 weeks of prednisolone treatment for spinal cord injury due to disc protrusion, the dog showed improvement of neurological signs. Walking was restored, less neck pain was observed, but falling particularly on the right still remained. The falling was more frequent when prednisolone was reduced therefore PCSO-524® was prescribed in combination with prednisolone. After 6 weeks, no signs of falling and neck pain were observed and normal reflex of forelimbs was restored. Prednisolone was reduced and eventually terminated without recurrence of any clinical signs. The chance of getting adverse effects from long-term use of steroid was therefore eliminated.

## Illustrations



Figure 5. Paralysis of 4 limbs prior to the treatment

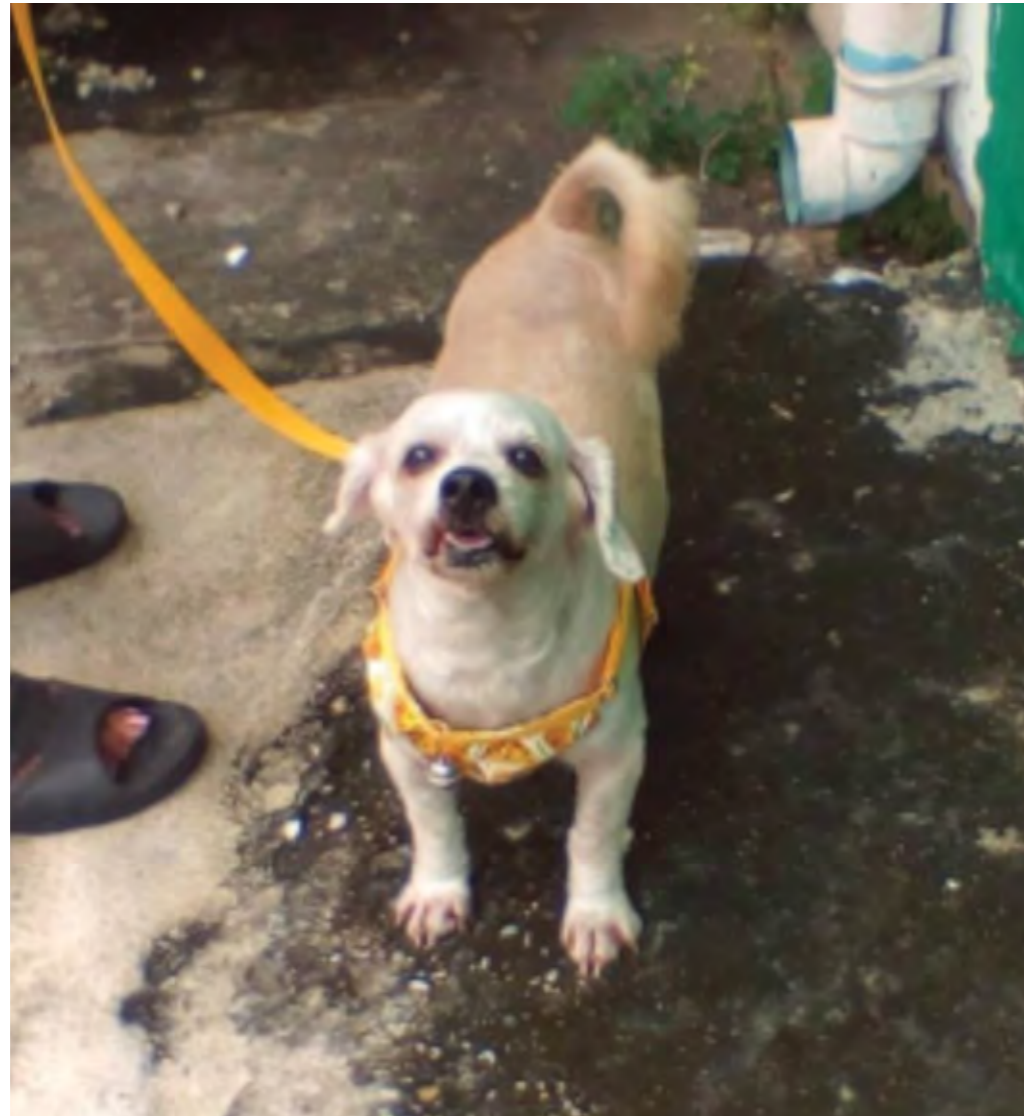


Figure 6. The dog could stand, walk and run normally

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**Effects of PCSO-524®  
on Treatment of Cranial  
Cruciate Ligament  
Rupture in Dogs after  
Tibial Plateau Leveling  
Osteotomy (TPLO) and  
Physical Rehabilitation**

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## Abstract

Male Labrador Retriever dog aged 3 years was suffering from left hind limb pain. Hematological parameters were normal. Radiographic image showed swollen left stifle joint and mild osteoarthritis. Cranial cruciate ligament rupture was diagnosed. Firocoxib 5 mg/kg sid for 2 weeks and 2 capsules of ANTINOL® bid for 1 month were prescribed. Tibial Plateau Leveling Osteotomy (TPLO) was operated on the dog. Post operation care included Firocoxib 5 mg/kg sid for 2 weeks and 2 capsules of ANTINOL® bid in combination with physical rehabilitation using laser stimulation and later exercise therapy was added. Clinical signs were improved as indicated by lameness score, muscle mass and range of motion. Fivemonths after the operation, the dog expressed signs of right hind limb pain and radiographic image showed swollen right stifle joint and mild osteoarthritis of left stifle joint. Partial tear of cranial cruciate ligament was diagnosed. The dog was treated for thrombocytopenia until recovered before Tibial Plateau Leveling Osteotomy (TPLO) was operated on the right knee 3 months later. Radiographic examination post operation showed increased inflammation of both stifle joints. Surgical treatment was used in combination with medication which included NSAIDs during the first 2 weeks post operation, ANTINOL®, and physical rehabilitation in order to reduce pain and inflammation. The treatment gave satisfactory results. The dog was able to use its legs without lameness, muscle was stronger, stifle angle was better and general health was improved.

### Keywords:

Cranial cruciate ligament rupture, ANTINOL®, postoperative management, Tibial Plateau Leveling Osteotomy (TPLO), rehabilitation

## Case history

Male Labrador Retriever dog aged 3 years was suffered from left hind limb pain. The dog was unable to bear body weight on left hind limb and eventually stopped using left hind limb. No history of accident was known. Preliminary treatment of carprofen 2.2 mg/kg bid for 1 week did not improve clinical signs. Physical examination found lameness score of 4/5, swollen left knee that caused pain when extended or adducted, positive sit test, positive cranial drawer sign, positive tibial compression test. Hematological test results were normal. Radiographic image showed swollen left stifle joint and mild osteoarthritis.

### Diagnosis plan and Results



The dog was diagnosed with cranial cruciate ligament rupture. Firocoxib 5 mg/kg sid for 2 weeks and 2 capsules of ANTINOL® bid for 1 month were prescribed. Tibial Plateau Leveling Osteotomy (TPLO) was operated on the dog. Post operation care included Firocoxib 5 mg/kg sid for 2 weeks and 2 capsules of ANTINOL® bid in combination with physical rehabilitation using laser stimulation and later exercise therapy was added. The dog showed improvement of clinical signs after the treatment (Table 1).

Table 1. Lameness score, muscle mass and Range of motion of left stifle prior to and post operation

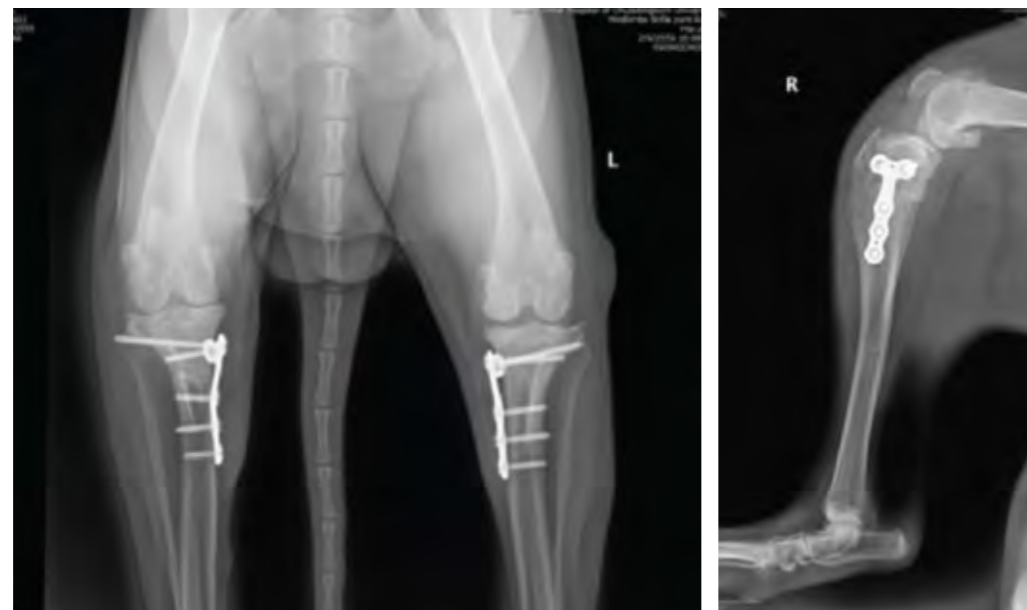
Left hind limb	Lameness score	Muscle mass	Range of motion of left stifle
Prior to operation	5/5	43.1 cm	Flex 67° Extend 135°
2 months post operation	2/5	43.8 cm	Flex 60° Extend 135°
4 months post operation	No lameness	44.6 cm	Flex 58° Extend 145°

## Examination results and surgical treatment

Fivemonths after the operation, the dog expressed signs of right hind limb pain and was unable to bear weight. There was no accident history. Physical examination found lameness score of 3/5, pain of stifle joint when extended or adducted, positive sit test, positive cranial drawer sign, positive tibial compression test and thrombocytopenia. Radiographic image showed swollen right stifle joint and mild osteoarthritis of left stifle joint.



Partial tear of cranial cruciate ligament was diagnosed. The dog was treated for thrombocytopenia until recovered before Tibial Plateau Leveling Osteotomy (TPLO) was operated on the right stifle joint 3 months later. Radiographic examination post operation showed increased inflammation of both stifle joints.



Post operation care included Firocoxib 5 mg/kg sid for 2 weeks and 2 capsules of ANTINOL® bid in combination with physical rehabilitation using laser stimulation and later exercise therapy was added. The dog showed improvement of clinical signs after the treatment (Table 2).

Table 2. Lameness score, muscle mass and Range of motion of right stifle prior to and post operation

Right hind limb	Lameness score	Muscle mass	Range of motion of left stifle
Prior to operation	5/5	40 cm.	Flex 70° Extend135°
2 months post operation	3/5	40.5 cm.	Flex 66° Extend135°
4 months post operation	2/5	40.8 cm.	Flex 62° Extend140°
8 months post operation	1/5	41.5 cm.	Flex 55° Extend145°
16 months post operation	No lameness	43.2 cm.	Flex 52° Extend150°

Radiographic image taken 15 months post operation showed osteoarthritis of both stifle joints



## Discussions

Cranial cruciate ligament is the ligament that connects lateral femur with the intercondylar of tibia. Cranial cruciate ligament rupture is frequently caused by injury of the hind limbs. Etiology and pathogenesis of the rupture is not clear. Some studies suggested that important etiology is chronic degeneration of stifle joint (Vasseur et al., 1985; Hayashi et al., 2003a), for example, abnormal limb structure can cause degenerative joint disease and put too much pressure on cranial cruciate ligament leading to chronic degeneration and rupture of the ligament. The most common and widely accepted treatment is adjusting angle of tibia called Tibial Plateau Leveling Osteotomy (TPLO) in combination with medication and physical rehabilitation. Medical treatment included pain reliever and anti-inflammatory drugs, NSAIDS, and nutraceutical drug such as ANTINOL®. ANTINOL® is extract product from New Zealand Green-lipped mussel and consisting of 6 lipid ingredients, 10 marine ingredients, and over 90 essential fatty acids. It is effective for treatment of inflammation, pain of joints and other parts of the body without any adverse effects. For the most effective treatment outcome, physical rehabilitation is concurrently used with pain relief medication and nutraceutical such as ANTINOL® post operation. The objective of ANTINOL® use is to reduce inflammation that occurs after the operation, for example, soft tissue inflammation affected from the operation and inflammation of joint. Physical rehabilitation is used to shorten the process of inflammation, reduce pain, and help animals regain the leg movement and quality of life. The physical rehabilitation is categorized as 1) Use of tools and equipments to reduce joint pain and inflammation, for example, laser, ultrasound and electrical stimulation 2) Exercise to restore the leg ability to bear weight and to strengthen the muscle after the inflammation is reduced.

## Conclusion

Cranial cruciate ligament rupture is mostly caused by chronic degeneration of stifle joint, for example, abnormal limb structure can cause degenerative joint disease and put too much pressure on cranial cruciate ligament leading to chronic degeneration and rupture of the ligament. The most common and widely accepted treatment is adjusting angle of tibia called Tibial Plateau Leveling Osteotomy (TPLO) in combination with medication and physical rehabilitation. Medical treatment includes pain reliever and anti-inflammatory drugs, NSAIDS, and nutraceutical drug such as ANTINOL®. ANTINOL® is used to reduce inflammation and pain of joint and other parts of the body. It is safe and can be used for long-term treatment without any adverse effects. Therefore appropriate for treatment of inflammation that occurs after the operation, for example, soft tissue inflammation affected from the operation and inflammation of joint. For the most effective treatment outcome, physical rehabilitation is concurrently used with pain relief medication and nutraceutical such as ANTINOL® post operation. Physical rehabilitation is used to shorten the process of inflammation, reduce pain, and help animals regain the leg movement and quality of life.

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## **The Treatment of Medial Coronoid Disease in a Seven Months Old Labrador Retriever**

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## Abstract

Labrador retriever dog aged 7 months with history of right forelimb pain for 1 month was diagnosed as Medial Coronoid Disease (MCD) on both sides. Radiographic and Computed Tomography (CT) examinations found subtrochlear sclerosis on left elbow. Arthrotomy was operated on the dog using subtotal coronoid ostectomy technique on the medial side of both elbows. Long-term treatment included physical rehabilitation, and nutrition therapy including administration of PCSO-524® and glucosamine/chondroitin sulfate. The dog was followed-up for 6 months for orthopedic examination and assessment by force plate gait analysis. Two months after the operation, right forelimb could bear body weight, however left forelimb was still lame with lameness score of 1/4. Comparison of radiographic image showed that the left and right elbow was affected from moderate and mild osteoarthritis, respectively. Treatment success for MCD depends on early and accurate detection of the disease and appropriate treatment plan. Multimodal plan consisting of surgical treatment, medication, nutrition therapy and physical rehabilitation, is proposed.

### Keywords:

Coronoid process, MCD, PCSO-524®, glucosamine, elbow dysplasia, gait analysis

## Case history

Intact male Labrador Retriever dog aged 7 months was referred the veterinary hospital at Kasetsart University. The dog had suffered with pain of the right forelimb for 1 month. The dog exercised less due to pain. Non-steroidal anti-inflammatory drug; NSAIDs, was given daily for 7 days, discontinued for 7 days and repeat the step again. The clinical signs improved only during the week of medication. The dog still could not fully exercise.

Force versus time curve

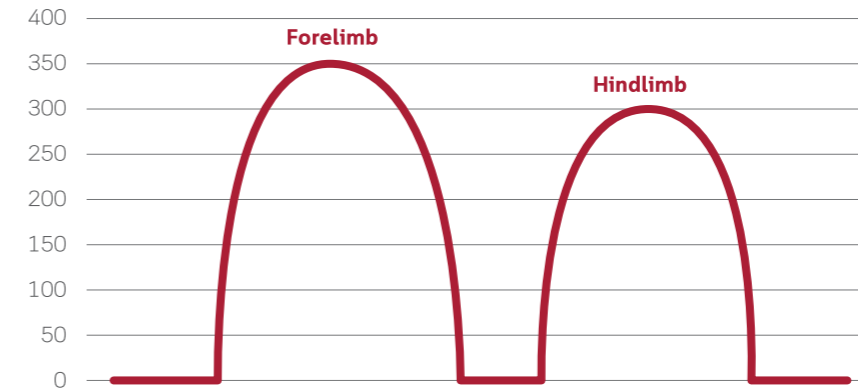


Figure 1. Force versus time curve: The peak of each curve is PVF of each limb when the foot touching the floor

## Physical and orthopedic examination

The dog was cheerful, mucous membrane color was normal, no sign of dehydration, lung and heart sound was normal. There was pain of both forelimbs. When right forelimb touch the floor, head bobbing and lameness score of 3/4 was observed (Table 1 and VDO 1). Palpation examination found joint effusion of both elbows. The dog showed sign of pain and squealed when the elbows were extended or pressing on medial coronoid process of the elbows.

Table 1. Criteria for lameness score (5)

Clinical Signs	Score
Normal standing, walking and running	0
Normal standingbut showing slight pain when running	1
Normal standingbut showing slight pain when walking	2
Normal standingbut showing apparent pain when walking	3
Abnormal standing position and showing apparent pain when walking	4

# Diagnosis plan and Results

## Force plate gait analysis

Measurement of weight bearing on the legs was performed using force plate. The dog was on leash and running pass the force plate at 1.9-2.1 m/s when peak vertical force (PVF) was recorded. Both forelimbs showed less PVF than the standard (107±9 to 115±9 %body weight) (6) and the right forelimb showed less PVF than the left forelimb (Table 2).

Table 2. PVF from force plate gait analysis prior to the treatment

Date	Body weight (kg)	Velocity (m/s)	PVF (%body weight)			
			Right Forelimb	Left Forelimb	Right Hindlimb	Left Hindlimb
10/8/2016	24	24	62.4	68.62	93.88	94.33

## Radiological diagnosis

Radiological examination of both elbows found mild sclerosis at both proximal ulna (Figure 2). Computed Tomography (CT) examination was used to confirm the diagnosis. CT examination identified radiolucent fissure line at medial coronoid process of the right elbow and heterogeneous coronoid aspect and mild sclerosis at medial coronoid process of the left elbow (Figure 3). It was concluded that the dog had Medial Coronoid Disease (MCD) on both elbows. Additionally the lesion on left elbow had started to develop into DJD.

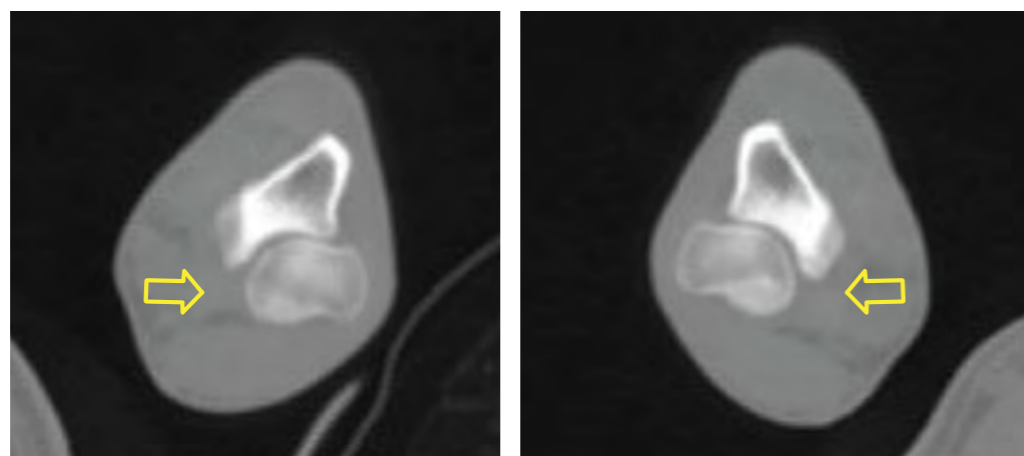
## Treatment

### Surgical treatment

One month after the first visit, arthrotomy was operated on the dog using muscle separation and subtotal coronoid ostectomy technique at the medial side of both elbows.



Figure 2. Extended lateral view of radiographic image showed mild sclerosis at proximal ulna of both elbows (arrows)



Left elbow

Right elbow

Figure 3. Left elbow: heterogeneous coronoid aspect and mild sclerosis of the medial coronoid process (dotted arrow). Right elbow: Radiolucent fissure line of the medial coronoid process (solid arrow).

## Physical rehabilitation

Post-operative care:

- Cold compression on both elbows 15 minutes per day for 3 days
- Exercise limitation during the first week post operation

Seven days post operation:

- Ultrasonography massage on both elbows once a week for 4 weeks
- Continuous walking on leash 15-30 minutes per day

Two weeks post operation:

- Continuous weekly swimming

Two months post operation:

- Laser (class IV) stimulation on left elbow once a week for 4 weeks

## Medication

Prior to operation:

- PCSO-524® 2 capsules per day for 1 month

Post operation:

- Cephalexin 25 mg/kg bid for 7 days
- Carprofen (Rimadyl®) 2.2 mg/kg bid for 7 days and when in pain
- PCSO-524® 2 capsules per day continuously
- Glucosamine/chondroitin sulfate (Synoquin®) 2 tablets per day for 1 month then 1 tablet per day continuously

## Result and Follow up

Two months after the operation, the dog remained showing sign of pain on left forelimb. The dog exercised more often, walking and running was improved. Physical examination showed head bobbing when left forelimb touching the floor (VDO 2) and lameness score of 3/4. Palpation examination found sign of pain when left elbow was fully extended, however, no pain when pressing on medial coronoid process. Right elbow was normal. Examination by force plate gait analysis found that left forelimb showed PVF less than the standard while PVF of right forelimb was nearly normal (Table 3)

Table 3. PVF from force plate gait analysis prior to and after the treatment

Date	Body weight (kg)	Velocity (m/s)	PVF (%body weight)			
			Right Forelimb	Left Forelimb	Right Hindlimb	Left Hindlimb
10/8/2016	24	1.98	62.4	68.62	93.88	94.33
26/10/2016	31.15	2.07	92.65	77.08	87.96	86.1
18/2/2017	33.5	2.00	110.15	88.96	89.25	86.3

Six months after the operation, pain and lameness disappeared as observed by the owner. The dog was able to walk, run, or swim for 1 hour continuously. The owner decided to decrease swimming frequency to once every 2-3 weeks and terminate glucosamine/chondroitin sulfate at the fourth month after the operation. PCSO-524® was continued daily. Physical examination showed head bobbing of the dog when left forelimb touching the floor (VDO 3) and lameness score of 1/4. Palpation examination found no pain of the right elbow. The left elbow was still in pain when fully extended. Force plate gait analysis showed increased PVF of the left forelimb compared to that of the second month after operation. However, it was less than PVF of the right forelimb and less than the standard as well. The right forelimb PVF was at normal standard (Table 3).

Radiographic image taken 6 months after the operation showed moderate osteophyte formation at the medial condyle of humerus and medial coronoid process of left elbow. Mild osteophyte formation at the medial coronoid process of the right elbow was also found (Figure 4).

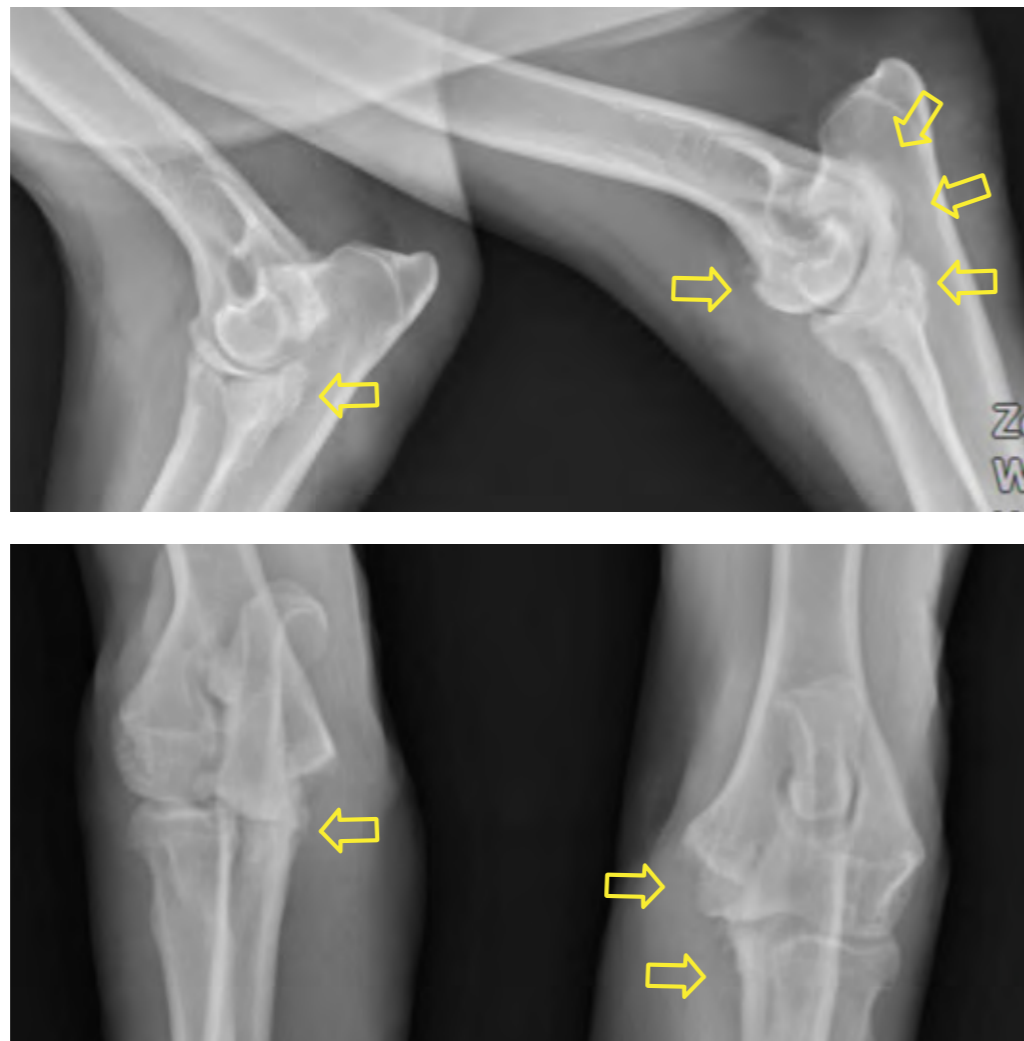


Figure 4. Top: Lateral view of elbow joint. Bottom: Anterior-posterior view of elbow joint. Moderate osteophyte formation was present on the left elbow at the medial condyle of humerus and medial coronoid process (dotted arrow). Mild osteophyte formation at the medial coronoid process was present at the right elbow (solid arrow)

Hematological examination did not find any abnormality during 6 months of the follow-up (Table 4).

Table 4. Comparison of hematological parameters prior to and 6 months after the operation

	9/8/2016	21/8/2017	27/10/2016	18/2/2017	Unit
PCV	45.7	43.6	47.7	48	%
RBC	6.65	6.42	6.72	7.03	* 106/uL
MCV	68.8	68	71	68.28	fL
MCH	21.9	21	24.4	35.21	Pg
MCHC	31.9	30.9	34.3	24.64	g/dl
Platelet	241	202	198	200	* 103/uL
WBC	8.4	9.9	25.4	8.78	* 103/uL
BUN	-	-	-	11	mg/dl
Creatinine	1.15	0.91	1.1	0.9	mg/dl
ALT	38	28	68	57	U/L
ALK	-	-	-	51	U/L
Total protein	-	-	-	6.7	mg/dl
Albumin	-	-	-	3.7	mg/dl



## Discussion

MCD is common in Labrador retriever dogs especially during the growing period. The most effective diagnosis is CT and arthroscopy. Conservative treatment may improve clinical signs of the disease but the most accepted treatment is operation to remove cartilage flap at the medial coronoid process. The operation can be arthrotomy or arthroscopy, which is regarded as non-invasive technique appropriate for both diagnosis and treatment.

Arthrotomy performed at the right elbow in this case resulted in better treatment outcome compared the left elbow. PVF of the right elbow was nearly normal within 2 months after the operation while pain remained on the left elbow for 6 months. Suspected cause of the difference is subtrochlear sclerosis of the left elbow that developed into early DJD prior to the operation. Although cartilage flap which was the cause of joint inflammation was removed, DJD still persisted. Early treatment before development of DJD with elimination of other factors that may cause leg pain, such as joint incongruity is the key for treatment success (7).

The dog received multimodal treatment consisting of operation, medication, nutrition therapy which was long-term use of (PCSO-524®), extract from New Zealand Green-lipped mussel, in combination with short-term glucosamine/chondroitin sulfate (Synoquin®) and continuous physical therapy.

Assessment of clinical signs suggested adjustment of treatment plan during the 6 months follow-up until the treatment satisfactory was met. The plan started from operation to remove cartilage flap that caused joint inflammation followed by reduction of inflammation using anti-inflammatory drugs; NSAIDs and physical rehabilitation. Additional nutrition therapy was used to reduce inflammation and supply substrate for cartilage development. During 6 months of follow-up, no adverse effects were observed from clinical signs and hematological examination.

The main ingredient of PCSO-524® is eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which is omega-3 fatty acid that can adjust the balance of omega-6 and omega-3 in the body. Omega-6 produces inflammation inducer substances, prostaglandins, thromboxanes series 2 and leukotrienes series 4, which induce severe inflammation. On the other hand, omega-3 produces eicosanoid of prostaglandins, thromboxanes series 3 a

ndleukotrienes series 5, which induce less inflammation. Supplementation of omega-3 therefore adjusts the balance by reducing omega-6 resulting in decreased inflammatory mechanism of the body (8, 9). PCSO-524® is consisted of eicosatetraenoic acid (ETA), omega-3 fatty acid of which structure is similar to arachidonic acid. It is possible that ETA binds with active binding site of enzymes that use arachidonic acid as substrate, therefore PCSO-524® has anti-inflammation effect (8, 10).

Glucosamine and chondroitin sulfate are amino monosaccharide that is substrate and component of glycoprotein proteoglycans and glycosaminoglycans (GAGs) in joint cartilage (11, 12). There are reports stating that glucosamine/chondroitin sulfate can prevent inflammation of articular membrane, stimulate cartilage metabolism, and prohibit cartilage degradation (13, 14).

DJD is a chronic inflammation on continuous development (15). It occurs when degenerative rate of the cartilage is higher than formation rate (16). Inflammation occurs in joint is the main factor that influence degeneration of the joint cartilage. Treatment of DJD essentially includes controlling of inflammatory process and promoting joint cartilage growth. Objective of physical rehabilitation is to restore muscle and joint so that they can properly function again. The dog in this case received physical rehabilitation that consisted of 1) Cold compression after operation in order to reduce blood circulation, oxidative metabolism, and muscle spasm. The result is to decrease inflammation and cartilage degeneration and the cold can relieve pain in targeted area. 2) Ultrasonography massage to generate deep heat at the elbow area. This will increase flexibility of connective tissue for better extension of joint. 3) Walking is to enhance body balance, muscle strength and endurance. 4) Swimming to strengthen muscle and cardiovascular system since the buoyancy helps support body weight of the dog and creates resistance when the dog moves. 5) Laser (class IV) beam to reduce pain and stimulate cartilage healing (17). Various techniques of physical rehabilitation were selected and applied at appropriate time period to maximize the treatment efficacy.

# Acknowledgement

The author would like to thank Asst.Prof.Dr. Monchanok Wijarnsorn, DVM, orthopedic surgeon who performed the operation on this case and Mr. Sarawut Yangtara, veterinary technician for the Companion Animal Medicine Department, Faculty of Veterinary Medicine, Kasetsart University, for assistance in force plate gait analysis

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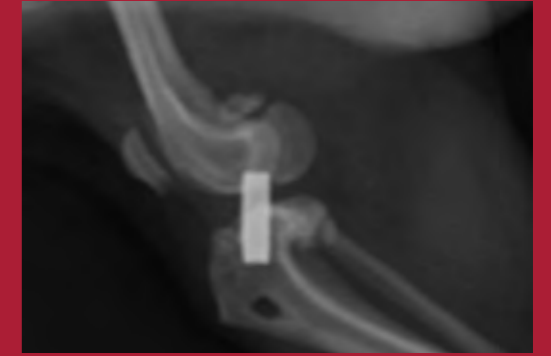
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**A Study of Efficacy  
and Safety of  
PCSO-524®(Antinol®)  
in Treatment of Medial  
Patellar Luxation and  
Cranial Cruciate Ligament  
Rupture in a Yorkshire  
Terrier Dog**

**Kanok Bamrungsri, DVM  
Chaengwattana Animal Hospital**

## Abstract

Male Yorkshire terrier dog aged 7 years weight 2.5 kg suffered from lameness of left Hind limb. Examination found medial patellar luxation of grade 3 and chronic cranial cruciate ligament rupture. PCSO-524® (Antinol®) 100 mg per day, double size of recommended dose for dogs weighed less than 20kg, was prescribed. Examination of lameness score and pain on palpation showed improvement after PCSO-524® (Antinol®) treatment. Radiographic images taken before and after 45 days treatment with PCSO-524® (Antinol®) did not find progress of the lesion. Hematological and biochemistry parameters after 45 days treatment with PCSO-524® (Antinol®) indicated that the medication was safe to use.

### Keywords:

Dogs, medial patellar luxation, cranial cruciate ligament rupture, PCSO-524® (Antinol®)

## Introduction

Patellar luxation is common in dogs. It is estimated that 66% of dogs under the age of 2 years acquire the disorder. Genetic disorder accounts for 82% of the incidence. Small breed dogs, such as Poodle, Pomeranian, and Yorkshire terrier are most at risk. The most common form is medial patellar luxation, which is identified at 82-92%. The damage caused by luxation includes lameness, pain, impaired limb movement, and most importantly, cranial cruciate ligament rupture that may develop into osteoarthritis or degenerative joint disease (Korakot, 2013). Principle diagnosis is done by patellar palpation. Radiographic examination is only used to evaluate the luxation degree especially 3 and 4 grade, assess the alignment of humerus and tibia, and categorize the osteoarthritis (Korakot, 2013). Treatment of patellar luxation is operation to restore the patella position back to normal position as much as possible. Prognosis is excellent and the treatment success is 90% in case of non-complicated luxation. Medication treatment is unable to eliminate the cause of problems but used to relieve pain and prevent recurrence of the luxation (Korakot, 2013).

PCSO-524® (Antinol®) is extracted from New Zealand Green-lipped mussel that is a popular nutraceutical in humans (Kongwut, 2015). It is used as supplementation for osteoarthritis in dogs to relieve pain and inflammation, replace use of steroids or NSAIDs, which in case of long-term use can cause adverse effects such as peptic ulcer and bleeding disorders. It is reported that 70% of dogs treated with PCSO-524® (Antinol®) for 6 weeks continuously showed improvement of clinical signs. Examination of biological markers for osteoarthritis showed recovery of the disease. Long-term use of the extract for more than 6 months has no adverse effects on animals (Sirintorn, 2012). The extract is in the form of capsule, each consists of 50 mg oil extracted from New Zealand Green-lipped mussel (*Perna canaliculus*), 0.225 mg vitamin E, olive oil, gelatin, and glycerin (Soontornvipart, 2015). The recommended dosage is 1 capsule per day for dogs under 20 kg (Sirintorn, 2012).

## Case history

Male Yorkshire terrier dog aged 7 years weight 2.5 kg had a history of operation for medial patella luxation and cranial cruciate ligament rupture at the age of 4 years. In that incidence, medial patellar luxation of the right leg was evaluated at grade 3, and grade 2 for the left leg and cranial drawer sign was identified from both legs. However, the owner decided to operate only on the right leg. That operation used Wedge resection sulcoplasty to fix the medial patella luxation and extracapsular stabilization by anchoring the lateral fabellar and tibial tuberosity for the cranial cruciate ligament rupture.

At the age of 5 years, the dog was diagnosed with tracheal stenosis of which clinical signs included chronic coughing, cyanotic mucus membrane, and normal lung and heart. After 1 month of treatment with antibiotics and bronchodilator, the dog recovered. However, the dog since then must keep continuing aminophylline 11 mg/kg every 12 hours and administration of bronchodilator using nebulizer in an oxygen chamber when necessary.

At the age of 6 years, the dog was admitted with clinical signs included depression, vomiting, and acute renal failure. Supportive and fluid therapy was given until hematological and biochemistry parameters were normal. Routine checking on blood parameters was scheduled to monitor azotemia and the dog was put on renal diet k/d until present.

## Physical Examination

Seven years old dog was admitted with lameness of left hind limb and pain when palpated. Physical examination showed 101F body temperature, body condition score of 3/5, heart rate of 100 beats per minute, respiratory rate of 22 breaths per minute, dyspnea when nervous. Medial patellar luxation and cranial cruciate ligament rupture of the left leg was diagnosed.

## Diagnostic plan and Results

Examination of the left leg found muscular dystrophy, lameness, weight bearing score of 2/5, positive cranial drawer test, medial patellar luxation of grade 3, thickening of medial articular capsule above proximal tibia (medial buttress), and joint dysfunction. Examination of the right leg also found muscular dystrophy, positive cranial drawer test, medial patellar luxation of grade 3, thickening of medial articular capsule above proximal tibia (medial buttress), and joint dysfunction. Radiographic examination showed normal hipbone and medial patellar luxation on both sides. Final diagnosis was medial patellar luxation of grade 3 and cranial cruciate ligament rupture of both legs.

## Treatment and outcome

Due to previous history of tracheal stenosis that must be treated with aminophylline 11 mg/kg bid every day and acute renal failure of the dog, the owner decided to avoid anesthesia and operation, and also treatment with NSAIDs or steroids. Prior to this admission, the dog was treated with PCSO-524® (Antinol®) at the recommended dosage, 1 capsule per day for dogs under 20 kg for 10 days but the lameness and pain of the left leg still remained. Therefore dosage of PCSO-524® (Antinol®) was increased in this study to 1 capsule bid and clinical signs were monitored for efficacy and safety of the treatment.

The results showed that lameness score and pain on palpation significantly improved after 10 days of PCSO-524® (Antinol®) treatment at double dosage. The weight-bearing score did not change and remained stable throughout the treatment period (Table 1). During 45 days treatment of PCSO-524® (Antinol®), hematological test showed normal parameters (Table 2) and blood chemistry test showed normal ALT(SGPT), ALP, BUN, Creatinine andCholesterol (Table 3).

Radiographic examination after 45 days of treatment did not find any significant change and showed no progress of the disorder.

## Discussion

The treatment in a dog suffered from grade 3 medial patellar luxation and cranial cruciate ligament rupture of both legs with PCSO-524® (Antinol®) at double dosage showed satisfactory outcome. Lameness of the left leg showed less pain on palpation. This is consistent with suggestion from Soontornvipart (2012) who used PCSO-524® (Antinol®) for osteoarthritis and degenerative spinal disease that the dosage should be doubled if prior treatment with recommended dosage did not improve clinical signs within 5 days. The double dosage can be reduced to recommended dosage when the pain is relieved. A clinical trial in dogs using PCSO-524® (Antinol®) for osteoarthritis and degenerative spinal disease showed improvement of clinical signs in most of the cases. The owners were satisfied with the treatment success. Radiographic images showed improvement in some dogs, however, some dogs showed worse images but improved clinical signs (Mongkon and Soontornvipart, 2012).

Normal hematological and blood chemistry parameters after 45 days treatment with PCSO-524® (Antinol®) indicated that it is safe to use for long term (Table 2 and 3). This agreed with a study of JamikornandYibchok-anun (2014) that PCSO-524® (Antinol®) was given at the recommended dosage and 3 and 5 times of the dosage for 8 weeks. The study found that visual, nervous, muscular, and integument system was normal, no change of behavior, and normal liver and kidney function.

## Conclusion

PCSO-524® (Antinol®) used as a nutraceutical treatment can reduce pain in dogs affected from medial patellar luxation and cranial cruciate ligament rupture that operation is not feasible. The treatment is safe for long-term use and adverse effects have not been found. If the animals do not respond to treatment at regular dosage after 5 days, the dosage can be increased until the symptoms are relieved then the dosage can be reduced according to recommendation of veterinarians.

## Tables and Figures

Table 1. Physical examination results before and after receiving 1 capsule bid of PCSO-524® (Antinol®) for 45 days

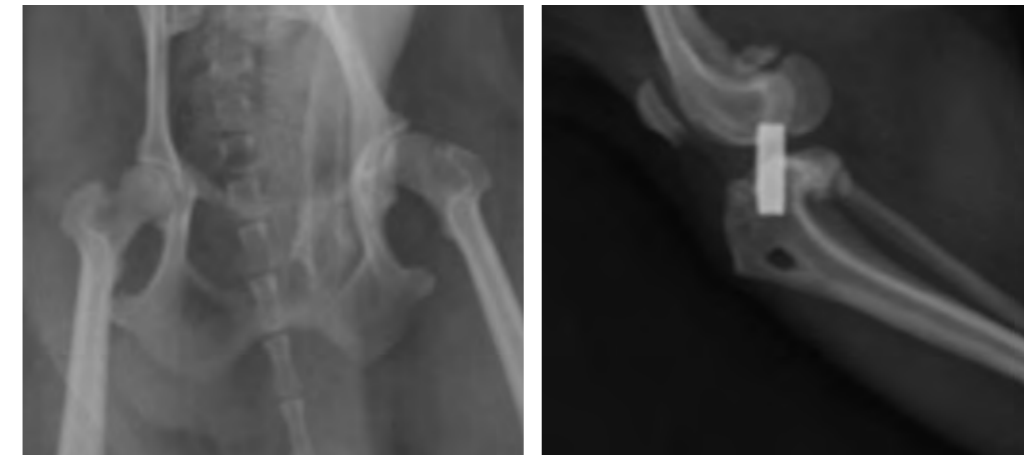
Examination	Day0	Day45
Left limb		
Lameness Score	4	2
Weight-bearing Score	2	2
Pain on palpation	3	1
Right limb		
Lameness Score	1	1
Weight-bearing Score	2	2
Pain on palpation	1	1

Table 2. Hematological test results after receiving daily 2 capsules of PCSO-524® (Antinol®) for 15 days

ค่าทางโลหิตวิทยา	หน่วย	ค่าปกติ	Day0	Day15	Day30	Day30
RBC	x10 <sup>6</sup> /ul	5.5-8.5	6.6	6.4	6.0	6.0
Hemoglobin	g/dl	12.0-18.0	15.8	15.2	12.3	12.3
Haematocrit	%	37.0-55.0	44	43	37	37
WBC	Cell/mm <sup>3</sup>	6.0-17	8000	7000	10500	10500
Neutrophils	%	60-77	79	84	82	82
Bands	%	0-3	0	0	0	0
Eosinophils	%	2.0-10.0	6	0	1	1
Lymphocytes	%	12.0-30.0	14	13	14	14
Monocytes	%	3.0-10.0	1	3	3	3
Platelet	x10 <sup>3</sup> /ul	200-500	246000	228000	242000	242000

Table 3. Biochemistry test results after receiving daily 2 capsules of PCSO-524® (Antinol®) for 15 days

ค่าทางเคมีคลินิก	หน่วย	ค่ามาตรฐาน	Day0	Day7	Day14	Day30
ALT(SGPT)	Units	5.0-50.0	50	42	48	34
Alkaline Phosphatase	IU/Ls	20.0-120.0	102	87	65	39
BUN	mg%	10.0-22.0	18	12	14	16
Creatinine	mg%	0.4-1.5	1.1	1.3	0.9	1.1
Cholesterol	mg%	125-300	198	185	149	237



Before

After

Figure 1. Radiographic image of ventro-dorsal position before and after 45 days after receiving 2 capsules per day of PCSO-524® (Antinol®). The images showed physical characteristics of hip joint. No obvious change occurred after 45 days of the treatment.



Before

After

Figure 2. Radiographic image of ventro-dorsal position before and after 45 days after receiving 2 capsules per day of PCSO-524® (Antinol®). The images showed physical characteristics of medial patellar luxation and cranial cruciate ligament rupture of both limbs. No obvious change occurred after 45 days of the treatment





Figure 3. Radiographic image of ventro-dorsal position before and after 45 days after receiving 2 capsules per day of PCSO-524® (Antinol®). The images showed physical characteristics of right hind limbs with medial patellar luxation and cranial cruciate ligament rupture of both limbs. No obvious change occurred after 45 days of the treatment.



Figure 4. Radiographic image of ventro-dorsal position before and after 45 days after receiving 2 capsules per day of PCSO-524® (Antinol®). The images showed physical characteristics of left hind limbs with medial patellar luxation and cranial cruciate ligament rupture of both limbs. No obvious change occurred after 45 days of the treatment.

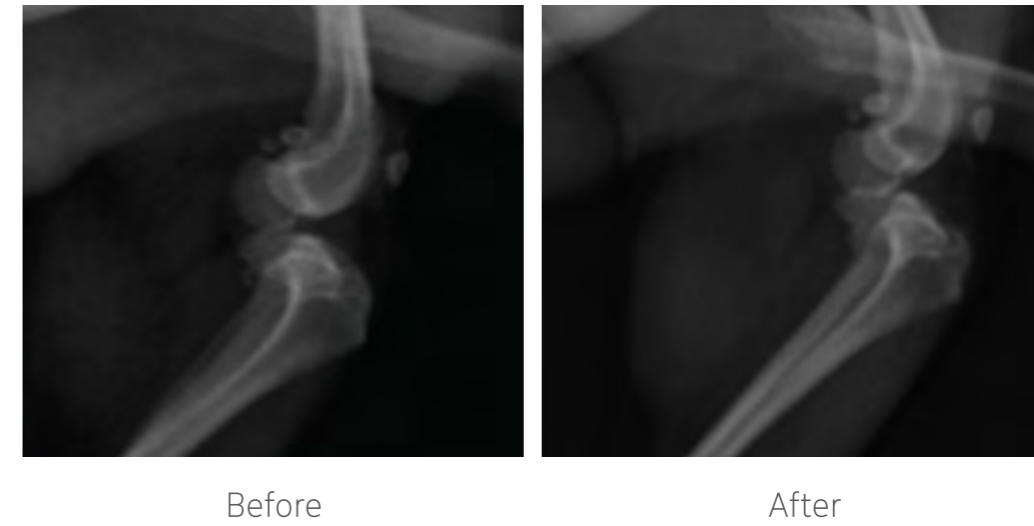


Figure 5. Radiographic image of lateral position before and after 45 days after receiving 2 capsules per day of PCSO-524® (Antinol®). The images showed physical characteristics of left hind limbs with medial patellar luxation and cranial cruciate ligament rupture of both limbs. No obvious change occurred after 45 days of the treatment.

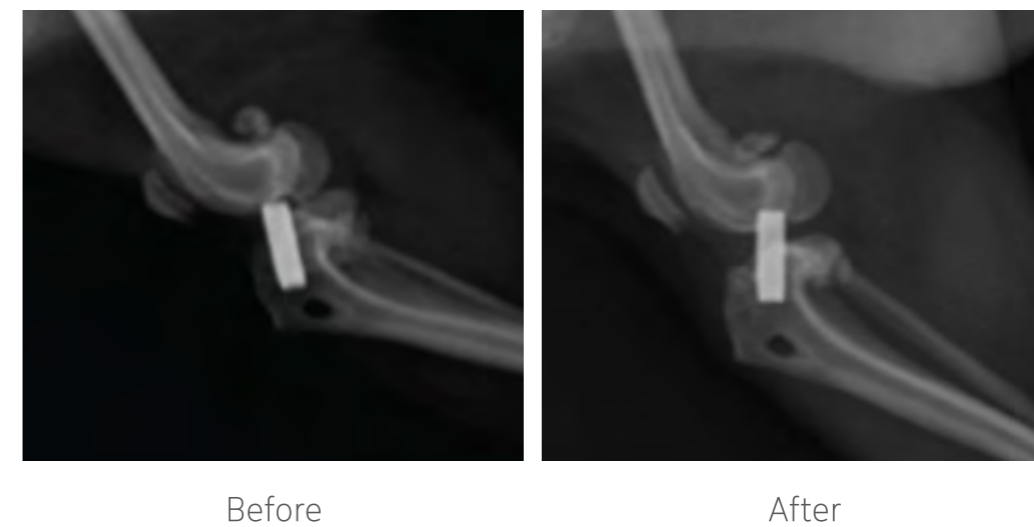


Figure 6. Radiographic image of ventro-dorsal position before and after 45 days after receiving 2 capsules per day of PCSO-524® (Antinol®). The images showed physical characteristics of right hind limbs with medial patellar luxation and cranial cruciate ligament rupture of both limbs. No obvious change occurred but the bone sclerosis was decreased, which may be the effect of position arrangement when taking the images.

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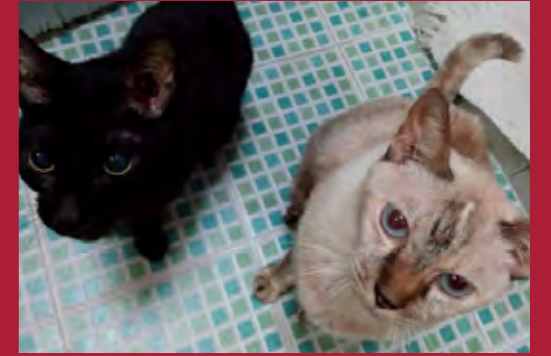
## Illustrations

Figure 6. Weight bearing of hind limbs on day 0 and day 45



Day 0

Day 45



**Effects of  
PCSO-524® (Antinol®)  
Supplementation during  
12 Months Follow-up  
in 2 Cats with Cystitis  
and Chronic Renal  
Disease**

**Roungrut Puttironkwat, DVM, PhD  
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## Abstract

Two female cats, spayed, lived in the same house, aged 17 years weighted 2.2 kg and 10 years 4.4 kg, were having chronic renal failure and concurrent cystitis. Senility was suspected etiology of chronic renal failure in the first cat. However, cystitis occurred by an unknown cause. Clinical signs of cystitis included urinary retention, polyuria but low urine output, and hematuria. Chronic renal failure in the second cat was caused by hydronephrosis of both kidneys and bladder stone which was identified by hypoechoic of urinary bladder. The second cat did not show any clinical signs of lower urinary tract. Both cats showed signs of uremic syndrome; polydipsia, polyuria, anorexia, weight loss, coarse hair, depression, halitosis, and vomiting. Both cats were treated with fluid therapy intravenously in the early period and later subcutaneously. The diet was changed to diet formulated for cats with renal failure (Hill's Prescription diet k/d) for both cats. Avastamine (RenAvast™) 1 capsule bid for 1 month, Cystaid® cat (Acetyl D-Glucosamine: NAG125 mg) 1 capsule bid for 1 month, and PCSO-524® (Vetz Petz Antinol®) 1 capsule sid continuously were prescribed for the first cat. The second cat received only PCSO-524® (Vetz Petz Antinol®) 1 capsule sid continuously. The treatment results showed general health improvement, weight gain (2.6 kg and 5.1 kg in the first and second cat, respectively), less hair loss, decreased degree of polydipsia and polyuria, and improvement of blood parameters. No adverse effect of the continuous treatment was found after 18 and 13 months in the first and second cat, respectively.

### Keywords:

Antinol®, PCSO-524®, chronic renal failure, cystitis, feline idiopathic cystitis, cat

## Case history

Two spayed Domestic short hair cats aged 17 and 10 years were individually taken to veterinary hospital a few months apart. The cats were living together and strictly kept indoors, fed with pellet diet, regularly given spot-on treatment for ectoparasitic and endoparasitic control. The cats were vaccinated only in the early life. Examination for Feline Immunodeficiency Virus/Feline Leukemia Virus (FIV/FelV) using a test kit showed negative result. Symptoms of the first cat included polyuria, urinary retention, low urine output, red and cloudy urine, depression, cachexia, weight loss, coarse hair and vomiting. The cat also had eating and drinking disorder for 2 weeks, halitosis, decayed teeth, gingivitis, and occasionally sticky saliva. The second cat was presented with symptoms included weight loss from 6.3 kg to 4.4 kg in 3 weeks, coarse hair, anorexia, cachexia, polydipsia, polyuria, large urine output, clear urine, halitosis, and vomiting.

## Physical examination

Physical examination of the first cat found 2.2 kg body weight, coarse hair, severe hair loss, body condition score (BCS) of 2/5, halitosis, gingivitis, decayed teeth particularly at the lower canine teeth, normal lung and heart sound, normal mucous membrane. Palpation found small urinary bladder and pain when palpated. No abnormal mass was found when palpating the neck. The second cat weighted 4.4 kg, had coarse hair, severe hair loss, body condition score (BCS) of 3/5, dry mucous membrane, normal lung and heart sound, capillary refill time (CRT) less than 2 seconds. Neck palpation did not find abnormal mass.

## Diagnostic plan

Tentative diagnosis identified more than 1 disease for the old cats. The most dominant symptoms in the first cat indicated lower urinary tract problem, therefore diagnostic plan was to exam urine, explore urinary bladder using x-ray or ultrasound. Kidney degeneration, chronic renal failure, or endocrine problems commonly found in old cats such as hyperthyroidism were suspected cause of anorexia and weight loss and needed blood test for further diagnosis. The examination in the second cat was focused on systems other than gastrointestinal system since dominant symptoms were weight loss, anorexia, polydipsia, polyuria, and vomiting. Disorders caused by excessive metabolism due to hormone imbalance or loss via kidney and gastrointestinal tract. Diagnostic plan for the second cat therefore included blood test to detect problems hormone function, liver or kidney. Testing for thyroid hormone was not performed at this point since physical examination did not find enlargement of thyroid gland. Blood test, urinary analysis, and ultrasonography examination were selected for the diagnosis.

## Laboratory results

The samples were submitted to a private laboratory. Ultrasonography examination was performed at Prasuatorn veterinary hospital, Mahidol University.

## Complete blood count and blood chemistry profiles

Creatinine and blood urea nitrogen were high in both cats so azotemia was diagnosed. Increased protein level could be the effect of dehydration or inflammation with thrombocytopenia.

Complete blood count and blood chemistry profiles

Complete blood count and blood chemistry profile of the first cat

Parameter	Reference range	Day 0 (15/07/2015)	Day 3 (18/07/2015)	Month 1 (02/08/2015)	Month 7 (21/03/2016)	Month 16 (04/12/2016)
RBC	5.5-10X10 <sup>6</sup> cells/mm <sup>3</sup>	9.3	7.5	6.5	6.2	7.3
Haemoglobin	8-15g/dl	14.3	11.8	10.1	10.8	11.7
Haematocrit	24-45%	45.1	36	31	31	37
WBC	5500-19000 cells/mm <sup>3</sup>	9600	10600	9600	5400	6300
Neutrophils	33-75%	81	73	73	72	76
Band	0-3%	0	0	0	0	0
Eosinophils	2-12%	4	4	7	10	4
Lymphocytes	20-55%	12	22	19	15	17
Monocytes	1-4%	3	1	1	3	3
MCV	fL	48	47.9	48	52.6	51.4
MCH	Pg	15.4	15.7	15.5	16.1	16.0
MCHC	g/dl	31.8	32.8	32.3	30.6	31.2
Platelet count	300-600X 10 <sup>3</sup> cells/mm <sup>3</sup>	161	188	238	184	128
Icterus index		Normal	Normal	Normal	Normal	Normal
SGPT (ALT)	10-60 unit	31	30	-	53	40
Creatinine	1.3-2.1 mg%	4.5	3.0	2.3	2.3	2.3
Blood urea nitrogen	5-30 mg%	84	41	30	49	47
Plasma protein	6-87.5 mg%	10.6	10.0	NA	NA	NA
Albumin	2.6-3.9 g/dl	3	NA	NA	2.2	2.3
Blood pressure	mmHg	150	NA	140	NA	NA
Body weight	kg	2.2	2.2	2.3	2.4	2.6

Complete blood count and blood chemistry profile of the second cat

Parameter	Reference range	Day 0 (19/10/15)	Day 5 (24/10/15)	Month 3 (6/1/16)	Month 13 (4/12/16)
RBC	5.5-10X10 <sup>6</sup> cells/mm <sup>3</sup>	9.2	NA	7.94	5.4
Haemoglobin	8-15g/dl	15.9	NA	12.8	9.2
Haematocrit	24-45%	47	NA	40.1	27
WBC	5500-19000 cells/mm <sup>3</sup>	13300	NA	9200	11600
Neutrophils	33-75%	75	NA	94	78
Band	0-3%	0	NA	0	0
Eosinophils	2-12%	4	NA	0	1
Lymphocytes	20-55%	18	NA	6	17
Monocytes	1-4%	3	NA	0	4
MCV	fl	51.6	NA	50	57.9
MCH	Pg	17.2	NA	16.2	17.6
MCHC	g/dl	33.3	NA	32	30.4
Platelet count	300-600X 10 <sup>3</sup> cells/mm <sup>3</sup>	172	NA	154	238
Icterus index		Normal	NA	NA	Normal
SGPT (ALT)	10-60 unit	151	NA	77	69
Alkaline phos	1.3-2.1 mg%	16	NA	67	NA
Creatinine	1.3-2.1 mg%	4.3	3.1	2.9	2.6
Blood urea nitrogen	5-30 mg%	112	50	41	40
Plasma protein	6-87.5 mg%	NA	NA	10.2	NA
Albumin	2.6-3.9 g/dl	NA	NA	3.3	NA
Blood pressure	mmHg	150	NA	NA	NA
Body weight	kg	4.4	4.4	4.6	5.1

Remark: CBC-complete blood count, RBC-red blood cell, WBC-white blood cell, g-gram, dl-decilitr, mm<sup>3</sup>-cubic millimeter, SGPT- serum glutamic pyruvic transaminase, ALT-alanine aminotransferase, MCV-meancorpuscular volume, MCH-mean corpuscular hemoglobin, MCHC-mean corpuscular hemoglobin concentration, fl- femtoliter, pg-picogram, NA-not applicable

## Urinalysis results

The urine samples from both cats were collected with cystocentesis technique on the first day of their visits at Prasuatorn veterinary hospital. The urine examination was not repeated throughout the treatment period.

First cat: Date of cystocentesis was 15/07/2015

Supernatant		Sediment	
Color	Yellow	WBC	Yfound
Transparency	Slightly	RBC	-
Specific gravity	1.019	Amorphous	-
pH	5	Mucous	-
Leucocyte	3+	Bacteria: cocci	Found
Nitrogen	-	Bacteria: rod	Found
Protein	-	Fungus	-
Glucose	N	Epithelium/HPF	-
Ketone	-	Cast/LPF	-
Urobilinogen	N	Crystal/HPF	Calcium phosphate
Bilirubin	-		
Erythrocytes	4+		

Results of the second cat

Supernatant		Sediment	
Color	Yellow	WBC	0-1/HPF
Transparency	Slightly	RBC	5-100/HPF
Specific gravity	1.022	Amorphous	few
pH	7	Mucous	-
Leucocyte	3+	Bacteria: cocci	Found
Nitrogen	-	Bacteria: rod	Found
Protein	3+	Fungus	-
Glucose	4+	Epithelium/HPF	Squamous (1-2)
Ketone	-	Cast/LPF	-
Urobilinogen	N	Crystal/HPF	-
Bilirubin	-		
Erythrocytes	4+		
Urine protein	41	Urine creatinine	132.4
Urine protein/ creatinine ratio	0.309		

Remark: HPF-high power field, LPF-low power field, RBC-red blood cell, WBC-white blood cell, N-normal

## Ultrasonography results

### The first cat:

Due to unavailability of the ultrasonography examination of the first day of the visit, the cat was scheduled for the examination 5 days after cystitis was treated (20/07/15). The result indicated that the cat was having cystitis without cystic calculi, chronic kidney disease, atrophic kidneys, and very limited renal blood flow. Other organs such as liver, gall bladder, and pancreas were normal. The ultrasonography examination was repeated again 9 months later (05/04/2016) to follow up on chronic renal failure. The latter examination found chronic kidney disease, atrophic kidneys, and very limited renal blood flow.

### The second cat:

The ultrasonography examination was scheduled 3 months after the first visit (18/01/2016). The result showed chronic kidney disease due to hydronephrosis, slight enlargement of both kidneys at the ureter and renal pelvis, especially of the left kidney, bladder stone that may be sand stone or calculi. The ultrasonography examination had never been repeated.

## Treatment plan

### The first cat:

Treatment started on 15/07/2015 for chronic kidney disease and cystitis without bladder stone. Fluid therapy was administered intravenously for 1 week, and later subcutaneously every 1-2 days. Medication prescribed included Cystaid® cat (Acetyl D-Glucosamine: NAG125 mg)1 capsule bid, RenAvast™1 capsule bid for 1 month, and PCSO-524® (Vetz Petz Antinol®) 1 capsule sid continuously. The diet was changed to diet formulated for cats with renal failure (Hill's Prescription diet k/d).

### The second cat:

The cat had both chronic kidney disease and cystitis. The cystitis was likely to have bladder stone that may have caused pressure and dilatation of ureter and renal pelvis and consequently hydronephrosis. The hydronephrosis could be congenital but the onset had just started. The cat received fluid therapy intravenously. PCSO-524® (Vetz Petz Antinol®) 1 capsule sid was given continuously. The diet was changed to diet formulated for cats with renal failure (Hill's Prescription diet k/d).

## Follow-up and Outcome

### Early phase

After cystitis was treated and azotemia was controlled, the first cat showed less severity of urine retention, normal urination, and better urine color. The urine retention and hematuria disappeared within 1 week of treatment. Generally, the symptoms were improved and the cat had better appetite and better response. After azotemia was restored to normal condition in the second cat, no symptoms of cystitis were found and the cat had more appetite.

### Long-term phase

Fluid therapy was given to both cats every 1-3 days. PCSO-524® (Vetz Petz Antinol®) 1 capsule sid was continued. General health was improved as shiny hair and less hair loss, increased body weight, and less frequency of vomiting, urination, and drinking were observed.

Table showing follow-up timeline and clinical signs of the cats

Timeline	Date	Clinical signs	
		First cat	Second cat
First visit	15/7/2558 19/10/2558	Low output but frequent urination, hematuria, cachexia, coarse hair, hair loss, appetite loss, polydipsia, normal red and white blood cell count, thrombocytopenia, increased creatinine and BUN, low urine specific gravity, bacteriuria, atrophic kidneys, ultrasound images could not distinctively identified medulla and cortex.	Polyuria, polydipsia, weight loss, coarse hair, hair loss, appetite loss, normal red and white blood cell count, increased creatinine and BUN, ultrasound images showed hydronephrosis of both kidneys, bladder stone that may be sand stone or mass, low urine specific gravity, bacteriuria.
Second visit	18/7/2558 24/10/2558	Clear urine, significantly less frequent urination but still polyuria, increased appetite, polydipsia, lower creatinine and BUN.	Less urination output, polyuria, polydipsia, lower creatinine and BUN but still higher than normal.
Third visit	18/7/2558 6/1/2559	Normal red and white blood cell count, thrombocytopenia, lower creatinine and BUN, increased appetite.	Normal red and white blood cell count, thrombocytopenia, lower creatinine and BUN, less polydipsia and polyuria, normal appetite.
Fourth visit	2/8/2558 4/12/2559	Normal red and white blood cell count, thrombocytopenia, stable creatinine and BUN, increased appetite.	Normal red and white blood cell count, thrombocytopenia, lower creatinine and BUN, increased appetite, less hair loss, and smoother hair.
Fifth visit	21/3/2559	Normal red and white blood cell count, thrombocytopenia, stable creatinine, increased BUN, increased appetite, less hair loss and smoother hair, increased body weight.	NA
Sixth visit	4/12/2560	Normal red and white blood cell count, thrombocytopenia, stable creatinine, increased BUN, increased appetite, less hair loss and smoother hair.	NA

## Discussion

Chronic renal failure is common in cats and accounts for 13% of mortality in cats over 5 years old. A study of cats mostly older than 10 years in Great Britain found that the disease prevalence was over 30-40% (Sparkes et al., 2016, Suemanotham, 2014). The treatment is aimed to maintain quality of life (QoL). Follow-up is needed every 3-6 months. Due to continuous development of the disease, diet adjustment and supportive treatment is necessary to restore normal body condition, such as management of dehydration, hypertension, anemia, protein loss, appetite loss, vomiting, and urinary tract infection. Urinalysis of both cats found rod and cocci bacteria in urine; however, bacterial culture and antimicrobial sensitivity test were not performed. According to suggestion from ISFM Consensus Guidelines on the Diagnosis and Management of Feline Chronic Kidney Disease (Sparkes et al, 2016), old female cats with chronic kidney disease had 10-30% chance of having bacterial infection of urinary bladder (Litster et al., 2009, 2010, Buffington, 2011). Over 70% of the infections are subclinical and 85% of the infection had change of urine sediment. Antimicrobial use to control the infection should be done with sensitivity test in order to select appropriate agents. Bacterial culture and sensitivity test were not performed for the 2 cats; therefore, antimicrobial treatment was omitted. The risk of having adverse effects, such as more damage to the kidney, caused by using antimicrobial drugs may worsen the chronic renal failure condition. Treatment of cystitis caused by bacteria is treated only when confirmed by bacterial culture or cats have other complications such as fever, abdominal pain, pyuria (>5 WBC/hpf), hematological test indicating bacterial infection (neutrophilia or left shift), or the renal condition is worse without known reasons. Assessment of risk and stage of the disease is essential. In case of subclinical cystitis, the risk of disease development and life threatening is null, so supportive therapy is recommended (Sparkes et al., 2016). There is limitation for selection of NSAIDs in treatment of cats with renal disease due to cyclooxygenase (COX) inhibition action of the drugs. COX and prostanooids from COX is responsible for electrolyte and acid-base balance and glomerular filtration rate of kidney. When COX is inhibited, kidney function could be disturbed. Long-term use of drugs in this group must be cautious and alternatives that have no effects on kidney should be considered (Suemanotham, 2014).



Effectiveness of glycosaminoglycan (GAG) in controlling cystitis in cats is due to the fact that internal surface tissue of lower urinary tract has GAG layer. GAG and GP-51, a specific GAG, are decreased in cystitic cats. Supplementation of GAG therefore restores the balance of tissues lining lower urinary tract (Buffington, 2011).

A study reported that diet formulated for kidney disease had high omega-3 and contributed to longer lifespan of cats. Diets that have high vitamin C and beta carotene are appropriate as well since cats with chronic renal failure have increased oxidative stress.

PCSO-524® (Vetz Petz Antinol®) is extracted from New Zealand Green-lipped mussel (*Perna canaliculus*). It is consisted of fatty acid, which is anti-inflammatory substance, and vitamin E, which is anti-oxidant. The anti-oxidant in vitamin E is 100-200 times more effective than that of EPA, evening primrose oil, and salmon oil. It has been proved that long-term use is safe without any adverse effect therefore appropriate for renal failure cats with oxidative stress and inflammation that regular anti-inflammatory drug is prohibited.

## Conclusion

PCSO-524® (Vetz Petz Antinol®) gives satisfactory treatment outcome when used for supportive treatment in cats with chronic renal failure and cystitis, of which the etiology is known or not. The anti-inflammatory and anti-oxidative effects are the key to the success.

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# Illustrations

Figure 1. Ultrasonography images of the first cat taken the first time on 20/07/2015 showed atrophic kidneys, indistinctive medulla and cortex, and thickening of urinary bladder wall.

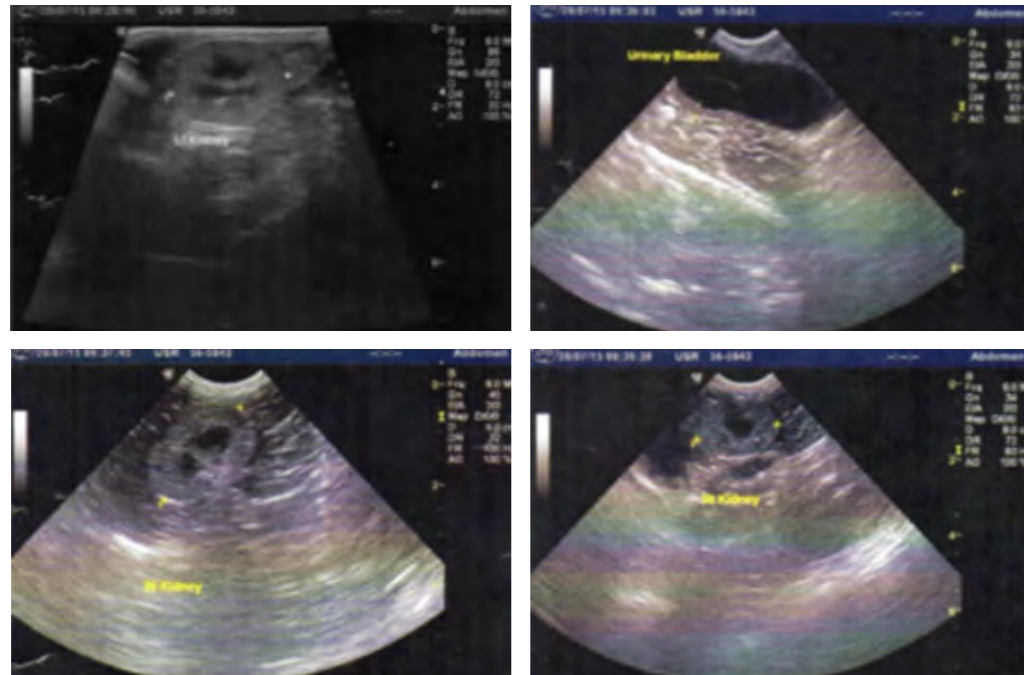


Figure 2. Ultrasonography images of the first cat taken the second time on 05/04/2016 showed atrophic kidneys, limited renal blood flow, and normal urinary bladder.

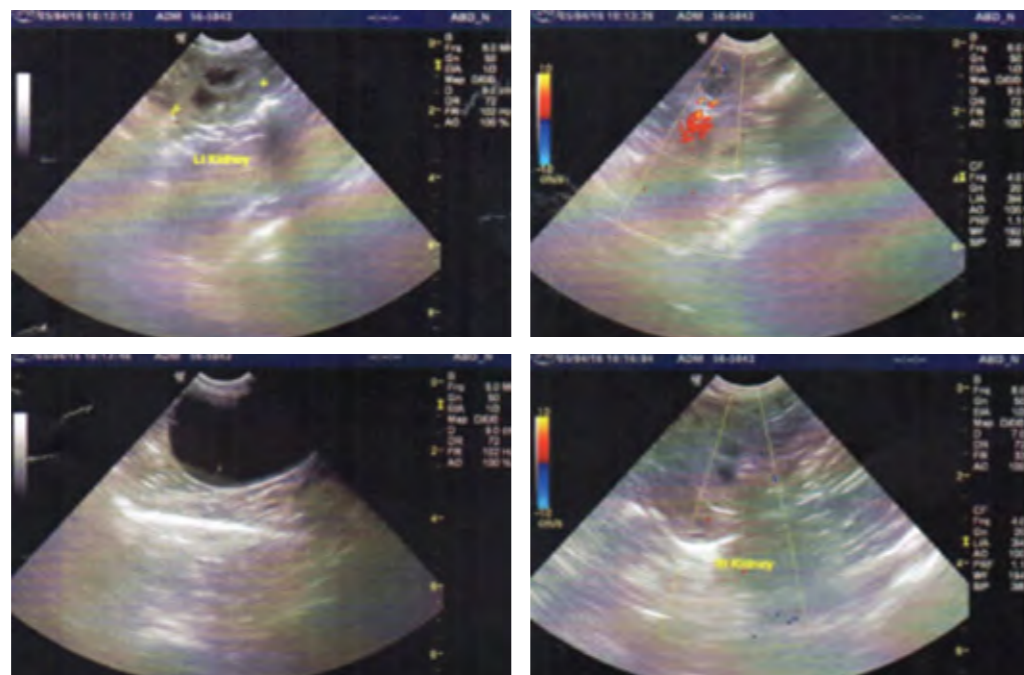


Figure 3. Images of retina of the first cat did not show hypertensive retinopathy due to hypertension caused by chronic renal failure. There was a band lesion previously identified when the cat was 15 years old. The band was likely caused by feline central retinal degeneration or taurine deficiency.

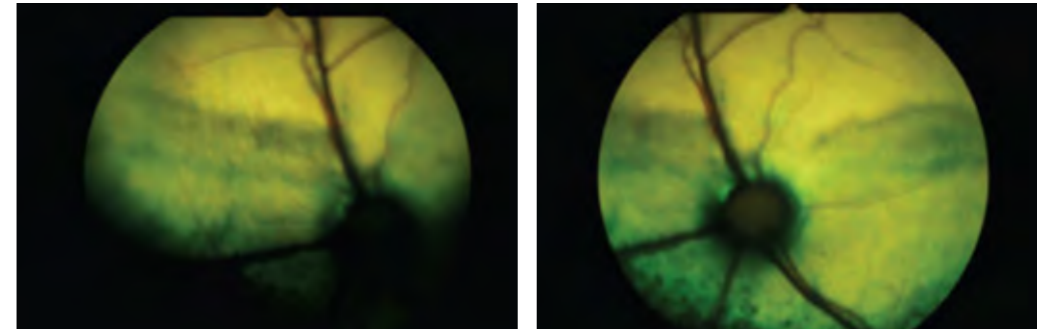


Figure 4. Ultrasonography images of the second cat taken on 18/01/2016 showed hydronephrosis and cystic calculi. The hydronephrosis may be congenital or caused by calculi or sand stone that dilated ureter and renal pelvis and consequently caused hydronephrosis.

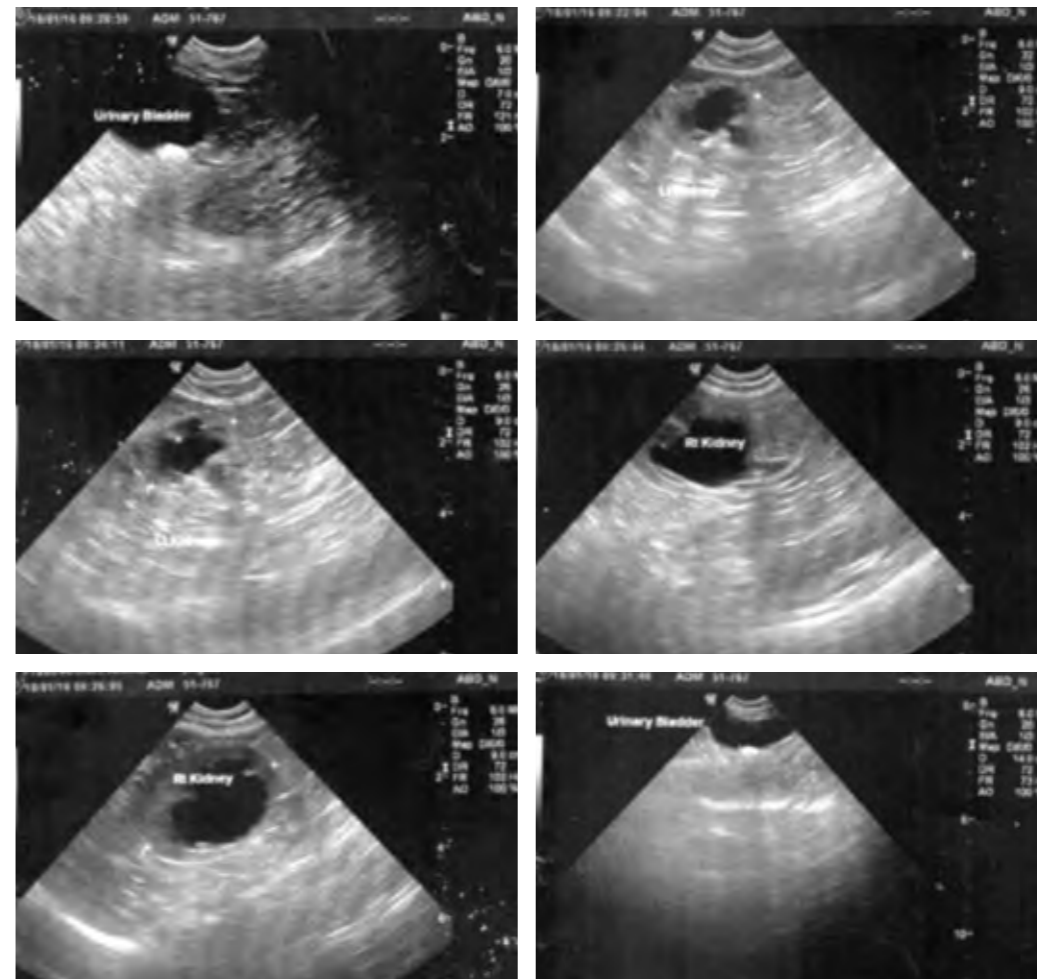


Figure 5. The second cat before onset of the incidence. Body weight was 6.3 kg before the onset and 4.4 kg after the onset. The coarse hair was apparent.





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

**Dendamrong Boonsonthi, DVM  
Sriwara animal hospital**

## 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).

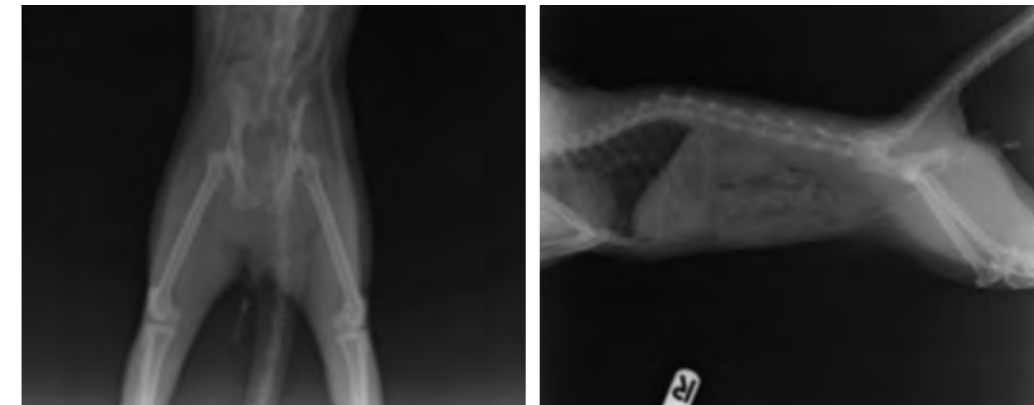


Figure 1. Left: Ventro-dorsal radiographic examination of the cat on plain film showed luxation of the pelvic joint and hip osteoarthritis on both sides. Right: The lateral position examination did not find damage of the lumbar vertebrae.

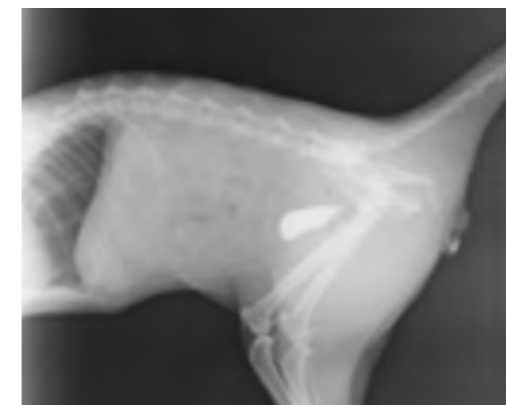


Figure 2. Radiographic findings from contrast cystography examination using iodinated contrast media.

## 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 <sup>1)</sup>
RBC (x10 <sup>6</sup> /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 <sup>3</sup> /μl)	209	435	421	-	65	40	71	150-900
WBC (x10 <sup>3</sup> /μl)	6.72	22.0	10.62	-	7.25	9.93	9.33	6-17
Neutrophils (x10 <sup>3</sup> /μl)	3.42	16.50	8.28	-	4.71	6.72	6.34	3-11.5
Band (x10 <sup>3</sup> /μl)	-	-	-	-	-	-	-	0-0.3
Eosinophils (x10 <sup>3</sup> /μl)	0.33	0.28	0.63	-	1.16	1.09	0.93	0.1-1.2
Lymphocytes (x10 <sup>3</sup> /μl)	2.95	2.6	1.69	-	1.16	1.89	1.96	1-4.8
Monocytes (x10 <sup>3</sup> /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	- <sup>2)</sup>	-	-	-	-	-	-

<sup>1)</sup>Benjamin, 1981    <sup>2)</sup> (-) = 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).

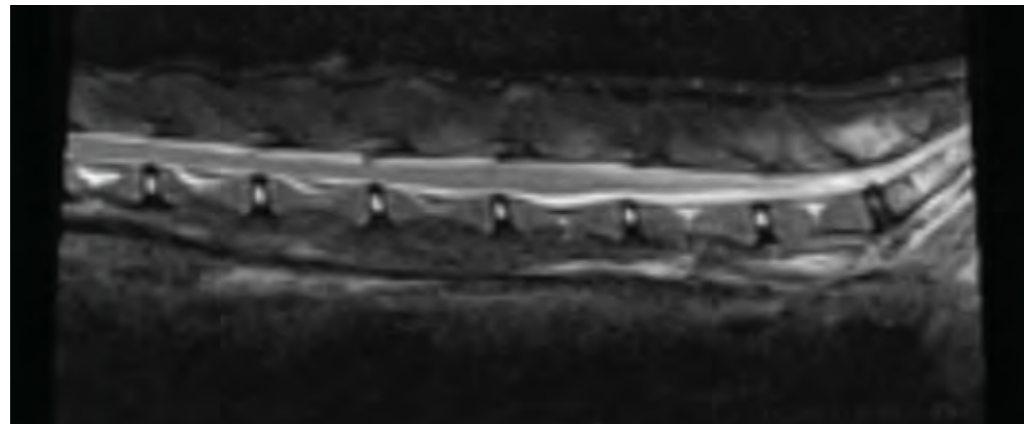


Figure 4. MRI image of lumbo-sacral vertebrae

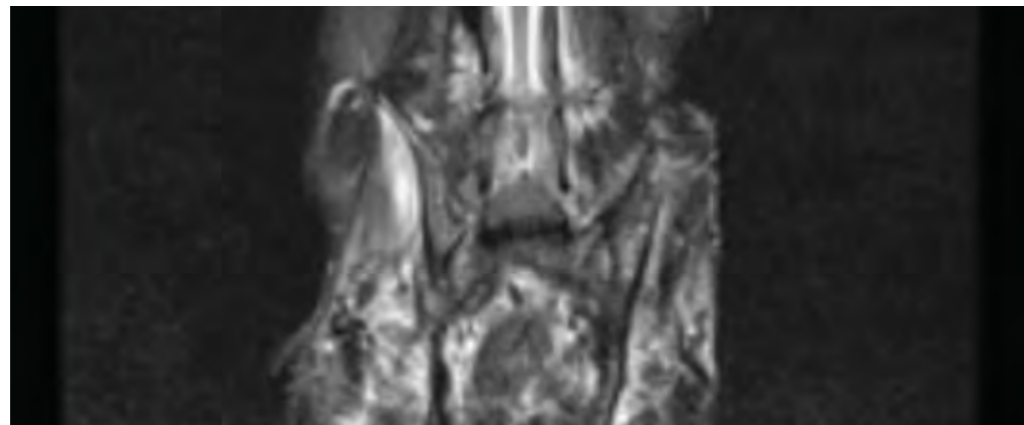


Figure 5. MRI image of sacro-iliac joint

### 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
<b>Right hind limb</b>				
Proprioception	-	-	+/-	+
Superficial pain	-	-	+	+
Deep pain	-	+	+	+
<b>Left hind limb</b>				
Proprioception	-	-	+/-	+
Superficial pain	-	-	+	+
Deep pain	-	+	+	+

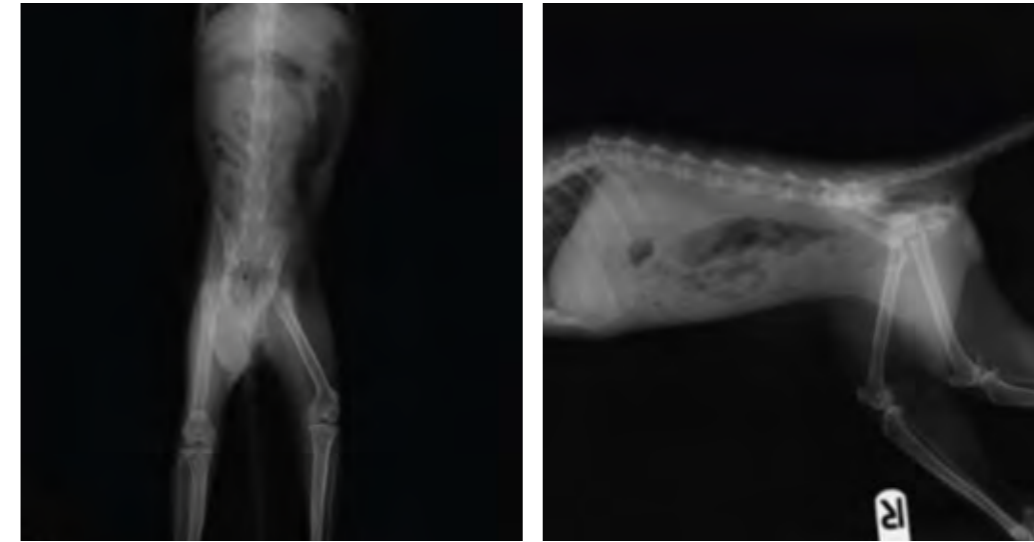


Figure 7. Radiographic image of week 32



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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## Illustrations



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**PCSO-524®  
as Supportive  
Therapy for  
Generalized Alopecia  
in Guinea Pigs**

**Chonkann Cheepborisutkul, DVM  
Animal Space Pet Hospital,  
Bangkok, Thailand**

## Abstract

Skin diseases are common in guinea pigs. Most frequently identified cause is improper management, for example, high humidity, unhygienic environment, nutrient deficiency, and high density, which may result in skin irritation leading to complications and alopecia. Hair growth mechanism in guinea pigs is affected by several factors such as photoperiod, environmental temperature, nutrition, physical health, stress, genetics, and some other internal factors. The aim of using PCSO-524® for supportive therapy of general alopecia is to reduce the skin irritation and to improve the skin and hair condition. Previous pilot studies showed that the treatment is effective for hair growth and improvement of hair condition in various exotic pets. Therefore the objective of this study is to study the efficacy of PCSO-524® for treatment of general alopecia and skin irritation due to scabies mite infestation and fungal infection in guinea pigs. The ultimate goal is to find alternative treatment to other anti-inflammatory medications and to reduce the quantity and frequency of medication use in guinea pigs, the species that is known to be difficult for medication administration.

### Keywords:

PCSO-524®, alopecia, exotic pet, guinea pigs, mite

## Case history

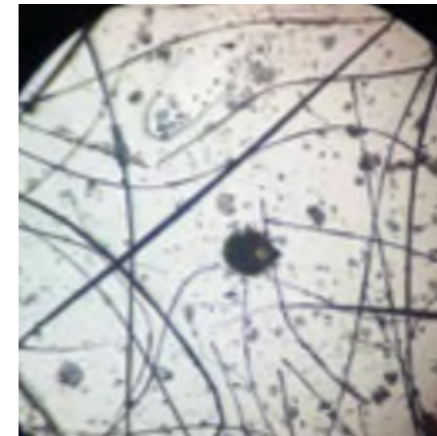
A white intact female Abyssinian guinea pig weighted 710 g, aged 18 months, raised alone in captivity and received daily vitamin C supplementation was presented to the hospital due to a month-long general alopecia. Pruritus was identified from regularly scratching. No history of any illness or seeking veterinary care.

## Physical examination

The animal was diagnosed to have mild depression. No nasal or ocular discharge were observed. Mucous membrane was normal with capillary refill time (CRT) less than 2 seconds. Heart, lung and gut sound appeared to be normal. Abdominal palpation did not show any unusual signs. Generalized crust, especially at the head, scale, skin erythema, lichenification, alopecia particularly at dorsal surface, and pruritus were detected. Other clinical signs were unremarkable.

## Diagnostic plan and results

Specimen collection was conducted by cellophane (Scotch tape) technique from the skin lesions. The specimens were then dyed with methylene blue for microscopic examination. Adult mites (*Trixacarus caviae*) were identified, along with budding yeast (*Malassezia* spp.), therefore, sarcoptic mange mite infestation with secondary *Malassezia* dermatitis was diagnosed.



*Trixacarus caviae* from microscopic examination

## Treatment and outcome

A single dose of 15 mg/kg Selamectin was applied topically every day for 3 consecutive days. After 2 weeks, the same routine was repeated in order to control sarcoptic mite infestation. Later, the treatment was repeated every 1-3 months for prohibition of recurrent infestation. Daily single dose of 10 mg/kg itraconazole was administered per oral for 1 month to control the secondary *Malassezia dermatitis*. A capsule of PCSO-524® was given per oral daily for 1 month for restoration of hair condition, enhancing hair growth and reduction of skin inflammation.

A long-term follow-up found that after 2 weeks of the treatment, hair growth at the dorsal surface was observed. Generalized crust was reduced to only the head area between ears. Skin inflammation and pruritus were apparently reduced. General health was improved and no sign of depression detected. One month after the treatment, the ectoparasites and yeast were no longer found. Skin condition returned to normal stage. Scale, pruritus and inflammation were not identified. New hair had been extended to full length all over the body, and was in healthy condition (Table 1).

Table 1. Skin and hair condition prior to and after the therapy

Date of examination	Skin and hair condition
November 1, 2016 First visit at the hospital 0.71 kg. body weight	
November 11, 2016 0.78 kg. body weight	
November 25, 2016 0.85 kg. body weight	

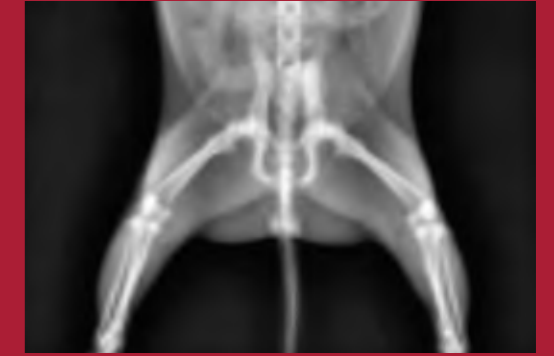
วันที่ทำการตรวจ	รูปภาพ
<p data-bbox="477 653 774 730">December 2, 2016 0.89 kg. body weight</p>	
<p data-bbox="477 1440 774 1518">January 13, 2017 0.95 kg. body weight</p>	

## Discussion

The study has shown that combination of conventional medications and PCSO-524® can restore skin condition and hair growth to satisfactory level within 1 moth after the treatment. The animal then gained back healthy life, as shown in enthusiastic activities, and increased appetite and weight gain to normal level. PCSO-524® is proved to be safe for guinea pigs when administered per oral at 1 capsule per day for an animal weighted 700-1000 g. Although this experimental dose is similar to the dose used in dogs weighted 10 kg., no adverse effects were found during or after the treatment. The mechanism of PCSO-524® is to prohibit COX and LOX enzymes from producing substances that stimulate the inflammation, consequently, reduce or eliminate the inflammatory symptoms and pruritus. The mechanism of PCSO-524® involving hair growth promotion is not thoroughly known but the stimulating effect of PCSO-524® during the Anagen phase of the hair growth cycle is expected.

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**Use of Acupuncture  
in Combination  
with PCSO-524®  
(Antinol®) for  
Treatment of  
Hindlimb Paresis in  
Prairie Dogs**

**Varinda Somrit, DVM  
Animal Space Pet Hospital,  
Bangkok, Thailand**

## Abstract

A prairie dog was admitted to the hospital due to falling from a height accident. During 2 weeks of admission, the animal was treated with steroid and vitamin B, however, no response was observed. Alternative medicine; acupuncture, was then applied in combination with PCSO-524® (Antinol®) to enhance the effects of acupuncture on pain relief and repairing the damaged neurons. Excellent recovery was observed after 1 month of the treatment. The animal could stand in normal position, express other normal gestures, and the reflex was nearly fully recovered.

### Keywords:

Prairie dogs, Antinol®, PCSO-524®

## Case history

Male prairie dog aged 7 months, weighted 820 g. raised strictly indoor had fallen from a height approximately 3 meters. The animal was presented with hind limb weakness. X-ray examination did not any disorders of vertebral column or hind limbs (Figure 1-2). Steroid and vitamin B were prescribed. No response was observed during 2 weeks of the treatment. Then the animal was referred for alternative medicine.

## Physical examination

The animal was enthusiastic, with normal appetite, normal heart and lung sound, and no signs of dehydration. The paresis of hind limbs and atrophy of hind limb muscle was apparent and adduction position or standing on hind limbs was not feasible. Defecation was normal but sporadically urinary incontinence was observed. No signs of pain along the vertebral column. Tail movement was normal but hind feet were colder and paler than usual. Negative response was observed for proprioceptive, withdrawal, and anal reflex. Rapidly loss of body weight from 830 g. to 650 g. was noticed within 2 weeks. The body condition score was 2.5/5 at the first examination.

## Treatment plan

Dry needle acupuncture and electro acupuncture were exercised with supplementation of 1 tablet of PCSO-524® (Antinol®) daily. Positions for the acupuncture included BL-21, BL-23, BL-25, BL-26, BL-40, BL-62, BL-65 and Bai-Hui. The acupuncture positions were changed each week, most of which were along thoracolumbar vertebrae where the damage was likely. Pain relieving effect and stimulation of neurons were expected from the acupuncture. Each acupuncture session took only 5-10 minutes maximum since the animal did not cooperate with the treatment.

## Treatment outcome

After the second treatment (day 14), the owner started to observe the improvement of hind limb muscle control. The animal was able to stand on hind legs. The reflex examination showed better response compared to the previous examination. After the third treatment (day 21), footstep was nearly normal with slightly shuffle and reflex examination showed normal result except for anal reflex. Urinary incontinence had disappeared. Sitting on the hind limb position was feasible with little help and the muscle tone was improved when compared to the previous week (Table 1).



Table 1. Treatment outcome by timeline

Examination	Day 0	Day 7	Day 14	Day 21	Day 28
Body weight (g)	650	710	760	830	840
Shuffle*	9/10	9/10	7/10	3/10	3/10
Proprioceptive reflex	-	-	+/-	+	+
Withdrawal reflex	-	-	+/-	+	+
Superficial pain	+	+	+	+	+
Muscle atrophy	7/10	7/10	5/10	3/10	2/10
Urinary incontinence**	+	+	+	-	-
Standing on hind limbs	-	-	-	+	+
Rear body lift while walking	-	-	-	-	-
Hind limb step	-	-	-	+/-	+/-

\*Hind limb extended with the toes pointing toward the back

\*\*Reported by the owner

## Discussion

Particular cause of the hind limb weakness was not identified since the x-ray examination showed no abnormal remarks and the owner declined further examination. Damage of the vertebral column was expected from clinical signs of the animals. Nervous disorders usually cause pain and incomplete nerve impulse. The main effect of the acupuncture is pain relief and stimulating the secretion of neurotransmitters namely enkephalin, beta-endorphin and endomorphin, which is a natural pain killer. The other action of acupuncture is to restore the complete transmission of nerve impulse. The exact mechanism of nervous system stimulation by acupuncture is not known. The action of acupuncture presumably includes decreasing resistance, restoring electrical activity of damaged tissue, promoting axonal regrowth and tissue healing, enhancing secretion of opioid peptide, serotonin, and gamma-aminobutyric acid neurotransmitters, and stimulation of vasodilation.

Prairie dogs usually do not cooperate with long-time restraint so the acupuncture session could continue for only 5-10 minutes long and the result is not as effective as seen in dogs and cats. Therefore PCSO-524® (Antinol®) was chosen to boost the pain relief and nervous system restoration effects of the acupuncture. Omega-3, the main ingredient of PCSO-524® (Antinol®), are known for pain killing, neuroprotective and pro-regenerative effects for peripheral nerve injury with no adverse effect on other functions of the body. This is the advantage to the pain killers in steroid group since they may prohibit the action of acupuncture in stimulating secretion of endogenous opioid peptide.

## Conclusion

Acupuncture in combination with daily dose of PCSO-524® (Antinol®) provided satisfactory treatment results for hind limb paresis in prairie dogs. Nearly fully recovery was observed within 1 month after the treatment. Muscle tone and body weight were restored back to normal level presumably due to the better movement control of the limbs.

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# Illustrations



Figure 1. Standing on hind limbs; normal gesture of prairie dogs.

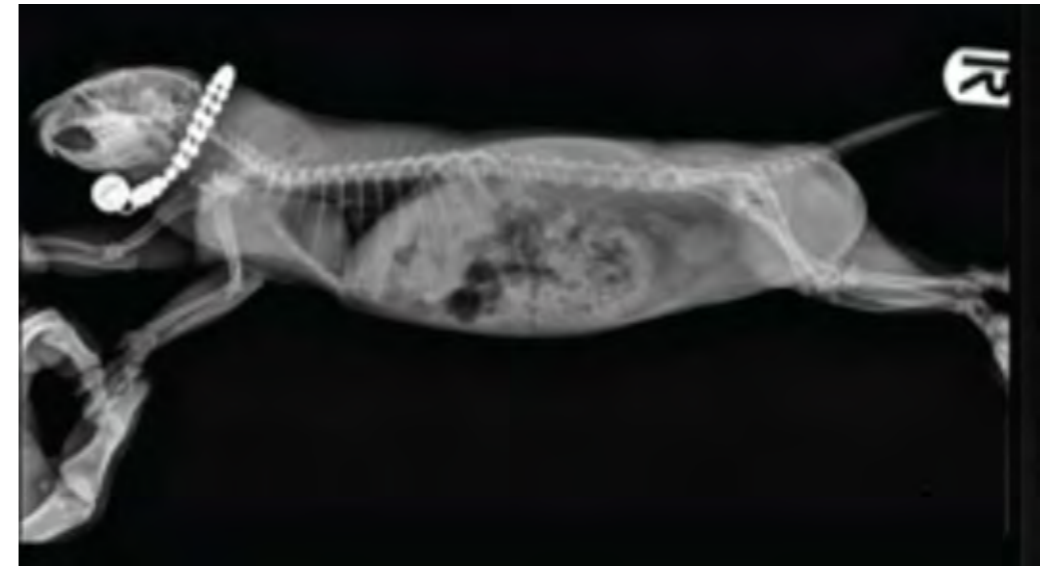


Figure 2. Left: Ventro-dorsal radiographic image. Right: Lateral radiographic image

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