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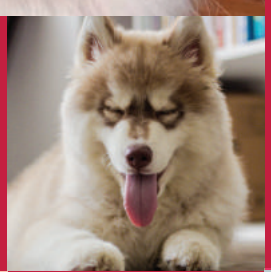

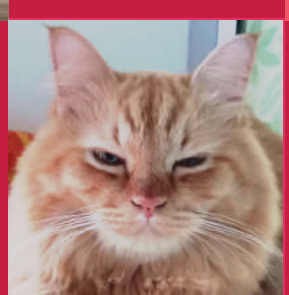

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Pharmalink International Ltd. and Vetz Petz® would like to thank everyone involved in this years Antinol® Case Study Contest competition.

As year one was such a huge success, we decided to carry on the tradition for a second year and we were not disappointed.

As we have said many times, we at Phramalink and Vetz Petz® have a passion for sciences and a love of our companion animal friends. The wonderful people that look after our furry, hairy, feathery and scaley friends that provide such an essential service and care, (our veterinarians) help us each year to scale new heights in our scientific endeavors. Each year we find a new way in which we are able to help heal our companion animals and each year the Vets provide us with the inspiration to dig deeper into our scientific budget to provide the essential tools that ultimately will assist the Vets, our companion animals and the pet parents to get the best out of each and every life.

This year was no exception with some remarkable findings!

It would be remiss of us if we did not pay homage to our Professors and Veterinarians who have assisted in the judging of the competition. This year was very special with the inclusion of Professor Duncan Lascelles and the wonderful innovation of the live poll that the audience took part in to choose the Vets choice, favorite presentation. It was outstanding to say the least. Dr.Achinee and DKSH also did a stellar job in arranging each part of the process from start to finish and so we say thank you to you all for your contribution. We could not have done it without you.

Lastly, to the many vets that entered the competition, we sincerely thank you. You can see from the quality of the presentations that Thailand is at the forefront of Veterinary care in Asia and most certainly up there with the best Veterinarians in the world. Professor Lascelles and Dr.Brian Beale both shared with us separately, that ThailandVets have a keenness to learn that the don't regularly see in their world of lecturing. They say that you can see it in the eyes, personally we feel it in the hearts of the many wonderful vets in Thailand.

Please enjoy this book and we will see you again next year with further innovations.

Kevin Cook
President of Vetz Petz® Group
John Waitzer
Pharmalink Director
Nathan Mclean
Pharmalink Director

Antinol® Case Study Contest 2017

1st Winning Awards

- Use of PCSO-524® (Antinol)® for treatment of Obsessive-Compulsive Disorders (OCD) in Domestic Short Hair Cat
  Kanok Bamrungsri, DVM Chaengwatthana Animal Hospital

- The Trial Treatment of Feline Osteoarthritis in an Eleven-Year-Old Cat
  Napaporn Senarat, DVM and IrinKwananocha, DVM VET KU Research Support Center Faculty of Veterinary Medicine, Kasetsart University

2nd Winning Awards

- Use of PCSO-524® for Treatment of Spine Fracture in Conjunction with Pedicle Screw-Rod Fixation (PSRF)
  Titiphan Trakanpol, DVM Small Animal Hospital, Chulalongkorn University

- Efficacy of PCSO-524® and prednisolone combination treatment for neck pain in Chihuahua dog with Chiari-like malformation and syringomyelia
  Pichanun Linharatanaruksa, DVM, PhDVET KU Research Support Center Faculty of Veterinary Medicine, Kasetsart University

- Use of PCSO-524® Combined with Surgical Treatment of Patellar luxation in Dogs
  Chalika Wangdee, DVM, PhD and Supaporn Komutee, DVM
  Faculty of Veterinary Science, Chulalongkorn University

3rd Winning Awards

- Effect of PCSO-524® Supplement on Inflammation and Pain Control and Its Safety for Orthopedic Surgery in Pregnant Cats
  Tirawat Sumalai, DVM Samut Songkhram Animal Hospital

- Effects of New Zealand Green-Lipped Mussel Extract (PCSO-524® (Antinol®) for Treatment of Exertional Rhabdomyolysis in Fighting Cocks
  Chaowaphan Yinharnmingmongkol, DVM Animal Space Veterinary Hospital Sala Thamasop, TaweeWatana, Bangkok

- Efficacy of oral PCSO-524® as an anti-inflammatory medicationin a Persian cat with pruritic skin disease.
  Lerpen Duangkaew Chaiyan Kasorndokbua Warunya Tessarak

- Treatment of Severe Hind Limb Paresis and Posterior Paresis Caused by Traumatic Myelopathy in Cats Using PSCO-524® (Antinol®) and Physical Therapy
  Anyamanee Chuybamrung, DVMVET KU Research Support Center Faculty of Veterinary Medicine, Kasetsart University

- Efficacy of PCSO-524® (VetzPetz Antinol®) for Inflammation Control in Cat with Chronic Juvenile Gingivitis Responsive to Full Mouth Extraction
  Dr. Ruangrat Buddhirongawatr Prasuarthon Animal Hospital,
  Faculty of Veterinary Science, Mahidol University

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Case Report : Use of PCSO-524® (Antinol)® for treatment of Obsessive-Compulsive Disorders (OCD) in Domestic Short Hair Cat

Kanok Bamrungsri, DVM
Chaengwatthana Animal Hospital

Abstract

A 3 years old domestic short hair cat had shown behavioral disorder after castration 4 months ago. Failure to control pain and inflammation after the operation could induce maladaptive pain and misbehavior. The cat had decreased water and diet consumption, failed to urinate in designated area, rubbed his face with surrounding objects, started destructive chewing, and showed sign of depression, anxiety, aggression, excessive grooming and scratching. Inflamed skin was observed at head, neck, back and legs with skin flaking especially at the medial right hind limb where a bruise was also found. The clinical signs were consistent with obsessive-compulsive disorders (OCD). Pathological examination found edema of epidermis andinfiltration of mature mast cells in hair follicle. Treatment with PCSO-524® (Antinol)® for 180 days had shown that the misbehavior was improved due to decreased pain and skin inflammation. Healthier coat and skin appearance was noticed after 30 consecutive days of PCSO-524® (Antinol)® intake. Pathological follow-up showed less inflammation of epidermis and decreased mast cells infiltration. It was shown that PCSO-524® (Antinol)® could reduce pain and inflammation that caused anxiety and consequently OCD in cats. Additional effects included antihistamine, antiallergy, and skin neurishing. The extract is appropriate for long-term use as it has been shown that 180 days intake was effective without causing abnormality of hematology and blood chemistry indicators such as ALT, creatinine, and BUN. In this case we found that OCD had re-emerged after termination of PCSO-524® (Antinol)® or replacing the supplement with other neutraceuticalsubstance such as Krill oil 425 mg.

Keywords: Cat, PCSO-524® (Antinol)®, obsessive-compulsive disorders (OCD)

Introduction

Obsessive-compulsive disorders (OCD) is a reaction to unknown stimulus that can change regular behavior of animals. The frequency of misbehaviors increased accordingly to duration of the exposure and eventually the misbehaviors can take place of regular behaviors. The misbehaviors as results of anxiety or excitement include loss of appetite, pica, change of grooming behavior and social interaction, failed house-training, and territorial marking. Behaviors that are apparently noticed are excessive grooming, barbering, feline hyperesthesia, self-mutilation, tail chasing, pica, wool and fabric chewing, and wool suckling. However, these behaviors may not be the direct symptoms of OCD (Frank, 2001). Since physical etiology of this disease is unknown, the diagnosis relies upon case history and ruling out other diseases that have similar symptoms. There is no laboratory technique that would contribute to the diagnosis neither.

Correction of the emerged misbehaviors is more effective if started as early as possible. The owners also are required to spend more time with their pets to adjust the unwanted behaviors. Failure to early treatment, behavior of the animals may be irreversibly changed. Use of anti-depressant for at least 12 weeks is recommended to control the misbehaviors (Frank, 2001)

Case history

The case was a neutered male domestic short hair cat aged 3 years old, 4.9 kg. The cat was a stray and adopted by the current owner when he was 2 weeks old. It has been living indoors with the family without children and was the only cat in the house. Commercial diet was fed. Vaccination included rabies, feline panleukopenia, and feline calicivirus was provided annually. The cat was brought to the veterinary hospital due to depression, decreased water and diet consumption, rubbing his face and body with surrounding objects, excessive grooming, scratching, hair loss, skin flaking, and inflamed skin particularly where severe licking and scratching occurred. Bruised cause by licking and scratching were found behind right ear and the medial aspect of right hind limb.

The cat was treated previously by another veterinary clinic for Aspergillus spp. infection. Itraconazole, amoxy-clavulanic acid, and hydroxyzine dihydrochloride were administered continuously for 4 months without any improvement. Misbehaviors of the cat included aggression, destructive chewing especially plastic bag, isolation and dissociative from the owner, hiding behind cabinet or under table. The owner informed that the misbehaviors were emerged after 10 days of admission at the veterinary clinic for neutering. The change was more frequent and getting worse, particularly the aggression, self-mutilation, eating plastic bag, and biting. The owner tried applying cat pheromone spray and prescribed medication from the veterinary clinic but only slight change of aggression and no improvement of other misbehaviors were observed.

Physical examination

Physical examination showed 101.2 oF body temperature, 3/5 body condition score, dilated pupil, 5% dehydration, decreased skin elasticity, hair loss, and inflammation at the back of right ear, right facial area, and medial aspect of right hind limb, where skin bruise was most apparent. The cat was anxious and did not cooperate with the palpationand restraint. The cat showed skin hyperesthesia of the back. Skin flaking was found behind the right ear.

Differential diagnosis

Tentative diagnosis included ectoparasite infestation, epilepsy, allergic skin disease, pain, hyperthyroidism, central nervous system (CNS) pathology, and obsessive-compulsive disorder.

Diagnostic plan and results

Skin examination

Physical appearance of the skin was examined at forehead, head, right area of the neck, and medial right hind limb. Hair loss, redness, abrasion, and skin thickening were found that the forehead, head, right area of the neck. Hair loss, edema, bruise, saliva stain and wet coatwere found at the medial right hind limb. (Figure 5)

Skin scraping did not find ectoparasites. Examination of skin cell using Scotch tape technique and dip quick staining found exfoliative dermatitis but found no yeast or bacteria (Figure 1). Dermatophyte test media culture was negative. Histopathological examination from skin biopsy of medial right hind limb showed mild epidermal hyperplasia and irregularly increased and cross-arrangement of collagen and reactive fibroblast. There was infiltration of mature mast cells in hair follicles. The cat was scheduled for follow-up every 3 days until improvement was noticed.

Hematological, clinical chemistry and urinary examination

Hematological test showed increased white blood cell count and hematocrit, and normal blood parameters (Table 1). Clinical chemistry test detected higher than normal level of creatinine and blood urea nitrogen (BUN), which indicated azotemia (Table 2). Leukemia virus test kit and feline immunodeficiency virus test showed negative result. Thyroid hormone was normal (1.45 mcg/dl). Treatment plan included correction of dehydration to eliminate azotemia and repeating blood test to confirm prerenal azotemia. Monitoring of PCSO-524® (Antinol)® adverse effect was performed by hematological and clinical chemistry test.

Urinary examination prior to the treatment showed normal results. Dark yellow urine, 1.053 specific gravity, 5 pH, 1+ protein, 1+ leukocytes, -glucose, -ketone, and 0.3 urine protein/creatinine ratio were detected. Urine collection was feasible only once and was prior to the treatment, so there was no repeated examination after PCSO-524® (Antinol)® administration.

Assessment of misbehaviors

The cat had anxiety, was growling and aggressive while being restrained, and failed to control urination while in pet carrier. Excessive licking at the right thigh and constantly rubbing head on the pet carrier were observed. Additional information was from the owner that had observed the cat's behavior at home since some misbehaviors were not expressed during the examination by veterinarian. Behaviors common for obsessive-compulsive disorders (OCD), i.e., aggression, self-mutilation, eating plastic bag, isolation, house training disorder, excessive grooming, head and back rubbing on surrounding objects were focused in order to plan the appropriate treatment.

Treatment outcome and follow up

PCSO-524® (Antinol)® was prescribed to reduce inflammation and pain and to strengthen the skin condition. Induction dosesimilar to dosage for a small dog weighted less than22 kg was applied so 1 capsule bid for 14 days was given then reduced down to maintenance dose, 1 capsule sid (Soontornvipart, 2012).

The treatment was divided into 3 phases, first 1-14 days, 15-30 days, and 31-180 days, respectively. The owner was asked to assist in the preliminary diagnosis (Table 1). Treatment outcome was monitored and assessed for improvement during each phase using behavior observation, skin test, hematological and clinical chemistry test.

Treatment plan for day 1-14

Dehydration was treated by infusion of 300 ml Acetaronce a day to adjust the pre-renal azotemia. PCSO-524® (Antinol)® was given at the induction dose, 1 capsule bid. Feline pheromone (Feliway®) was sprayed twice daily. Elizabethan collar was installed while the owner was not home and during the night. Wound dressing was scheduled daily for wounds at the head neck, right hind limb and biopsy spot. Amoxy-clavulanic acid 13.75 mg/kg bid was given until suture removal on day 10. The owner was requested to spend time with the cat at least 1-2 hours per day and kept body cleaning when arriving home,no matter with exposure to other animals outside.

Treatment outcome during day 1-14

Observation of behavior showed that the cat started to gain water and food appetite on day 3 after administration of PCSO-524® (Antinol)®. The misbehaviors had been improved. On day 10, the cat started to show less aggression and allowed the owner to pet or restrain but not the others especially during the examination. Using litter box, no face rubbing, less isolation but still hiding under the table or bed,less frequency of licking of medial right hind limb, normal body grooming, destructive chewingand eating plastic bag when the owner not presented were noticed (Table 2 and 4).

Skin examination on day 3 of the treatment found less inflammation and more dry crust at the forehead, head, and upper right neck. The examination also found less hair loss and less bruise at the medial right hind limb, but saliva stain and skin exudate still existed. The biopsy wound was clean and dry (Figure 6). On day 7, dryer lesion and crust detachment were noticed. Signs of skin inflammation were disappeared. Lesion at the medial right hind limb was dry without crust and the biopsy wound was clean and dry (Figure 7). On day 10, there was less crust on the forehead, head, and upper right neck but the lesion was dryer. Signs of skin inflammation disappeared. Lesion at the medial right hind limb was dry without crust. The biopsy wound was intact after the suture was removed (Figure 8 and Table 3).

On day 7, blood tests showed normal white blood cell count (Table 5), normal creatinine and BUN (Table 6). Dehydration disappeared so fluid therapy was terminated on day 7. Antibiotic administration was discontinued on day 10.

Treatment plan for day 15-90

Maintenance doseof PCSO-524® (Antinol)®, 1 capsule every 24 hour, was prescribed. Feline pheromone (Feliway®) was sprayed twice daily. Elizabethan collar was installed only when the owner observed excessive grooming. Monitoring of misbehaviors continued.

Treatment outcome during day 15-90

Water and diet intake was normal. The aggression was apparently less expressed after day 30. The cat started snuggling up with the owner and stopped hiding but showed aggressive resistance when being restrained. Other behaviors included using litter box, normal grooming, and chewing plastic bag (Table 2 and 4).

Skin examination found no lesion remained on forehead, head, upper right neck and medial right hind limb. Hair growth was noticed but new hair on the head and forehead was darker (Figure 9 and Table 3).

Histopathological test of skin biopsy specimen collected from medial right hind limb at day 30 showed thinner epidermis, moderate edema of dermis, and less infiltration of mature mast cell in mature follicles (Figure 3). ALT, creatinine, and BUN were normal (Table 5 and 6).

Treatment plan for day 91-180

Maintenance doseof PCSO-524® (Antinol)®, 1 capsule every 24 hour, was prescribed. Feline pheromone was discontinued. Elizabethan collar was installed only when the owner observed excessive grooming. Monitoring of misbehaviors continued.

Treatment outcome during day 91-180

Water and diet intake was normal. The aggression was apparently less expressed after day 30. Snuggling up with the owner, no hiding, no aggression even when being restrained, using litter box, normal grooming, chewing plastic bag and contamination of plastic in feces were observed (Table 2 and 4).

Skin examination found no lesion remained on forehead, head, upper right neck and medial right hind limb on day 180. New hair was shiny and soft throughout the body (Table 3).

Histopathological test of skin biopsy specimen collected from medial right hind limb at day 180 showed thinner epidermis, and less infiltration of mature mast cell (Figure 4). ALT, creatinine, and BUN were normal (Table 5 and 6).

Outcome of PCSO-524® (Antinol)® termination

Since the treatment outcome after 180 days was satisfied in behavior, skin, and blood chemistry aspects, the owner decided to discontinue the medication after day 210. The following misbehaviors had re-emerged within 7 days of termination; excessive grooming, face rubbing, destructive chewing and not using litter box for urination. Hiding was not noticed this time, but there were new misbehaviors such as running into objects and meowing at night. The misbehaviors had disappeared after PCSO-524® (Antinol)® was given again at the induction dosage for 10 days.

Fifteen days after PCSO-524® (Antinol)® was discontinued, skin examination showed inflammation of skin of the right ear lobe from face rubbingbut no otitis. Saliva stain was found at the medial side of both hind limbs with little inflammation and hair loss from hair chewing (Figure 11). The lesion, especially the inflammation, gradually disappeared after PCSO-524® (Antinol)®was given at the induction dosage for 5 days. Dosage of PCSO-524® (Antinol)® was then reduced after 14 days of the treatment.

Outcome of PCSO-524® (Antinol)® termination and administration of Krill oil 425 mg

When PCSO-524® (Antinol)® at the maintenance dose was discontinued by decision of the owner, Krill oil 425 mg was given by the owner even though the cat's condition was satisfied at that point. After 15 days of Krill oil supplementation, excessive grooming, face rubbing, not using litter box for urination, licking lateral side of right hind limb, and hiding were observed. Aggression and hissing and resistance to restraint were observed after Krill oil was given for 30 days. When the treatment was replaced with PCSO-524® (Antinol)® at the induction dose again, the misbehaviors were improved after 20 days.

Thirty days after PCSO-524® (Antinol)® was discontinued, skin examination showed scattered lesion all over the body including inflammation and saliva of ventral abdomen, paw inflammation, saliva stain on lateral side of right hind limb, broken nail of all paws and hair loss from hair chewing (Figure 12). The owner informed that all the lesions started to emerge about 1 week after the misbehaviors were noticed. The lesions had disappeared after PCSO-524® (Antinol)®was given at the induction dosage for 14 days. Dosage of PCSO-524® (Antinol)® was then reduced after 15 days of the treatment.

Discussion

Obsessive-compulsive disorders (OCD) is a reaction to unknown stimulus and can alter regular behavior of animals. The frequency of misbehaviors increased accordingly to duration of exposure and eventually the misbehaviors can take place of regular behaviors. The misbehaviors as results of anxiety or excitement include loss of appetite, pica, change of grooming behavior and social interaction, failed house-training, and territorial marking. Behaviors that are apparently noticed are excessive grooming, barbering, feline hyperesthesia, self-mutilation, tail chasing, pica, wool and fabric chewing, and wool suckling. However, these behaviors may not be the direct symptoms of OCD (Frank, 2001). Since physical etiology of this disease is unknown, the diagnosis relies upon case history and ruling out other diseases that have similar symptoms. There is no laboratory technique that would contribute to the diagnosis neither. Correction of the emerged misbehaviors is more effective if started as early as possible. The owners also are required to spend more time with their pets to adjust the unwanted behaviors. Failure to early treatment, behavior of the animals may be irreversibly changed. Use of anti-depressant for at least 12 weeks is recommended to control the misbehaviors (Frank, 2001)

Post-operative pain control, pain control after castration in this case, is very important since acute pain caused by the operation can induce adaptive pain as a mechanism of self-protection. The adaptive pain is, for example, nociceptive pain that is caused by stimulation of nociceptor or free nerve ending and inflammatory pain that is the result of stimulation of pain receptor by transmitters increased during the inflammation, such as prostaglandins (PGs) and bradykinin (BK). If adaptive pain continues, it will become chronic pain. Cats express chronic pain differently from dogs, particularly often show aggression and decreased response to pain killer. Response to chronic pain changes adaptive pain into maladaptive pain that continuously stimulate dorsal horn neuron. If pain is not eliminated within 3 months, pain at regular level can be at extreme level in affected animals. Misbehaviors such as aggression, isolation, being unfriendly to other cats in the house, loss of appetite usually emerged. The pain could be the cause of OCD in this cat since the maladaptive pain was not treated in the first place. The previous treatment for 4 months was focused on skin disease using antibiotic, antifungal and anti-itching.

OCD requires a long term treatment especially in animals with renal disorders or misdiagnosis. Some OCD medications can be at risk in animals with renal azotemia. Long term use of anti-inflammatory drugs, either steroids or NSAIDs, can be harmful to animals. A clinical study shows that when NSAIDs is used to prohibit the function of COX enzyme, it can damage kidney due to prostanoids from COX that have physiological effect on the kidney. (Suemanotham, 2014).

PCSO-524® (Antinol)® is extracted from New Zealand green-lipped mussel (Pernacaniculus). There is a report that it can prevent and reduce inflammation. Other effects include gastroprotective effect, antihistamine, antioxidant, anticytokines, and antiarthritis (Coulson et al., 2015). In this study we found that it could reduce inflammation, edema of epidermis, and infiltration of mast cells in hair follicles, which may be contributed by its antihistamine effect (Figure 2, 3 and 4).

OCD in cats has no specific cause although stress in one of the most well-known etiology of the disease (Frank, 2001). Inflammation and pain could stimulate stress in humans and animals. The response varies and, in cats, depending on breeds especially those that are independent and short hair breeds such as Burmese cat, Siamese cat and cats of the eastern world. Cats may show signs of wool-suckling and self-mutilation more than usual (Boven, J., 2005). Specific treatment of the condition is none since the cause is unknown. Most common treatments include medication and adjusting behavior. The best prevention scheme is not to cause stress in cats. Therefore PCSO-524® (Antinol)® is appropriate since it can reduce inflammation and pain that lead to stress in cats. It was confirmed in this case when PCSO-524® (Antinol)® was stopped and the cat started showing misbehaviors after 15 days.

Although PCSO-524® (Antinol)® was used for a long-term treatment in this case, hematological and clinical chemistry parameters were normal (Table 4 and 5). This strengthen the indication that PCSO-524® (Antinol)® is safe to use in cats. There is a study that used PCSO-524® (Antinol)® at double and triple dose of what recommended for 4 weeks to treat degenerative joint disease and found no adverse effects on ocular and neuromuscular system. Additionally, the cat in that study showed no change of behavior, and healthier skin and coat (Pusoonthornthum, 2017). This agrees with our study that the cat showed soft and shiny coat after being treated for 180 days. The cat in this study had responded clinically well to PCSO-524® (Antinol)® treatment. When the treatment was replaced with other neutraceutical, Krill oil 425 mg, that also had anti-inflammatory and skin nourishing effects, the response could not be compared with that of PCSO-524® (Antinol)®.

Conclusion and take-home message

PCSO-524® (Antinol)® is appropriate for treatment of OCD in cats. The anti-inflammatory, pain control and antihistamine effects can reduce stress caused by pain. The indirect effects include nourishing skin and coat. It is also safe for long-term use.

Since OCD has no exact cause and cannot be detected by laboratory examination, attentiveness and observation of behavior by the owner is most important other than the diagnosis. Treatment does not only requires medication, but cooperation from veterinarian, owner, and the animal as well. Treatment at the early stage of the disease gives better outcome compared to treatment given when the condition is chronic.

Prevention of OCD includes post-operative pain management. If the veterinarian does not aware of this, it could induce maladaptive behavior and eventually lead to OCD particularly in breeds that are at risk such as Burmese and Siamese cats.

Figures and Tables

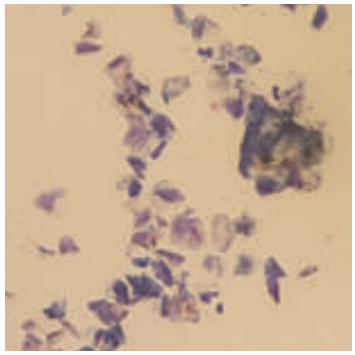

Figure 1. Skin specimen processed with dip-quick stain on the first day of examination showing exfoliation of skin cells but no yeast or bacteria was found.

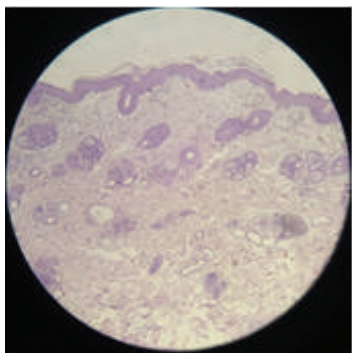

Figure 2. Histopathological examination of skin biopsy specimen collected from medial right hind limb before the treatment showed hyperplasia and increase of collagen and reactive fibroblast that were disorderly lined and crossed. Infiltration of mature mast cells in hair follicles was found.

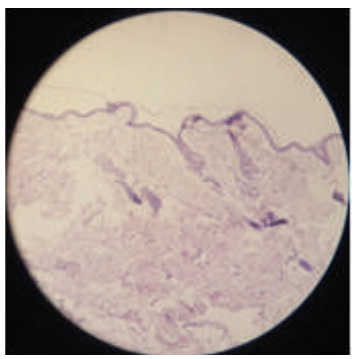

Figure 3. Histopathological examination of skin biopsy specimen collected from medial right hind limb after 1 month of the treatment showed thinner epidermis, moderate edema of dermis and little infiltration of mature mast cells.

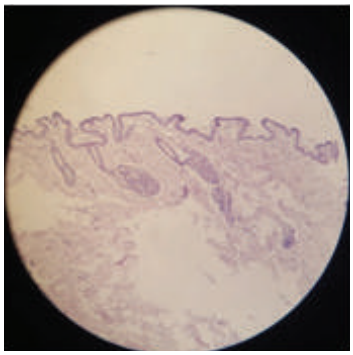

Figure 4. Histopathological examination of skin biopsy specimen collected from medial right hind limb after 6 months of the treatment showed thinner epidermis and little infiltration of mature mast cells.

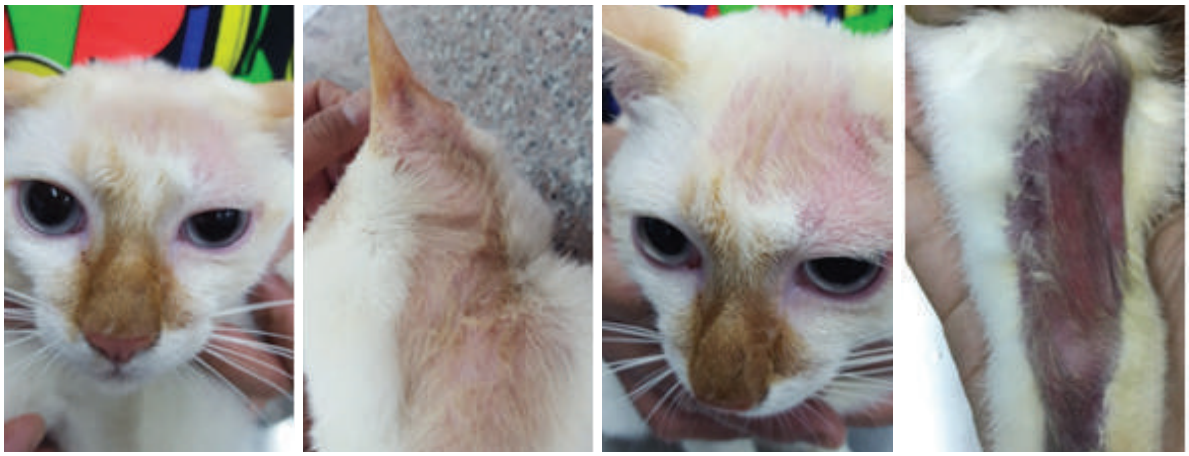

Figure 5. Images of forehead, head, upper right neck, and medial right hind limb before the treatment showed hair loss, inflammation, abrasion, and crust at the forehead, head, upper right neck. Hair loss, edema, bruise, saliva stain and exudate were found at the medial right hind limb.

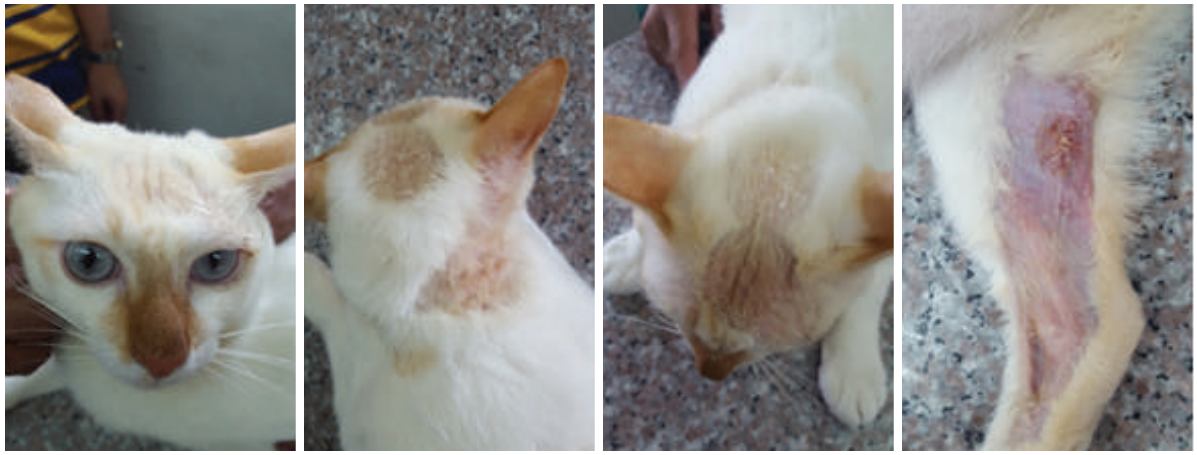

Figure 6. Images of forehead, head, upper right neck, and medial right hind limb after 3 days of treatment showed dryer and less inflamed lesion with plenty of dry crust at the forehead, head, upper right neck. Hair loss, less bruise, saliva stain and little exudate were found at the medial right hind limb.

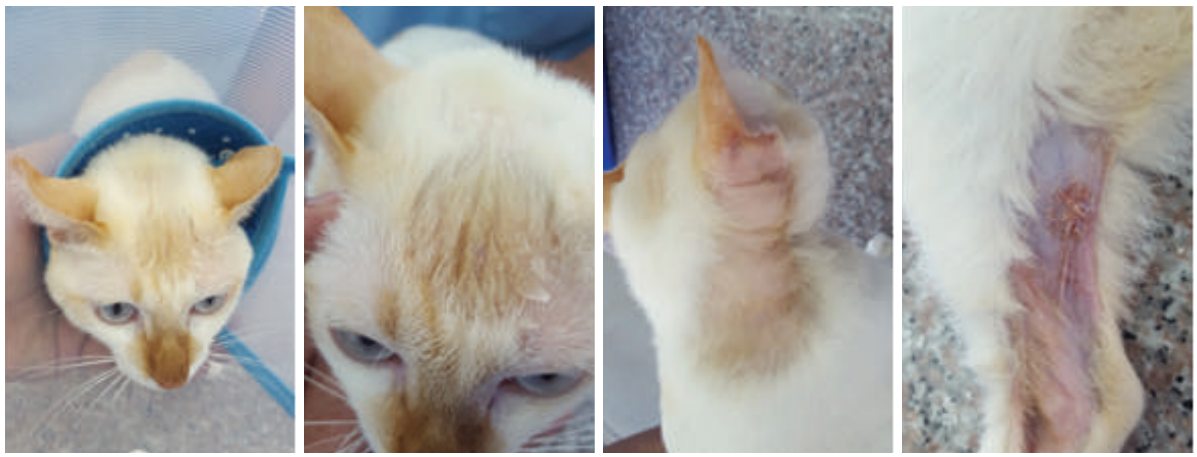

Figure 7. Images of forehead, head, upper right neck, and medial right hind limb after 7 days of treatment showed dryer lesion and crust detachment at the forehead, head, upper right neck. Signs of skin inflammation were disappeared. Lesion at the medial right hind limb was dry without crust and the biopsy wound was clean and dry

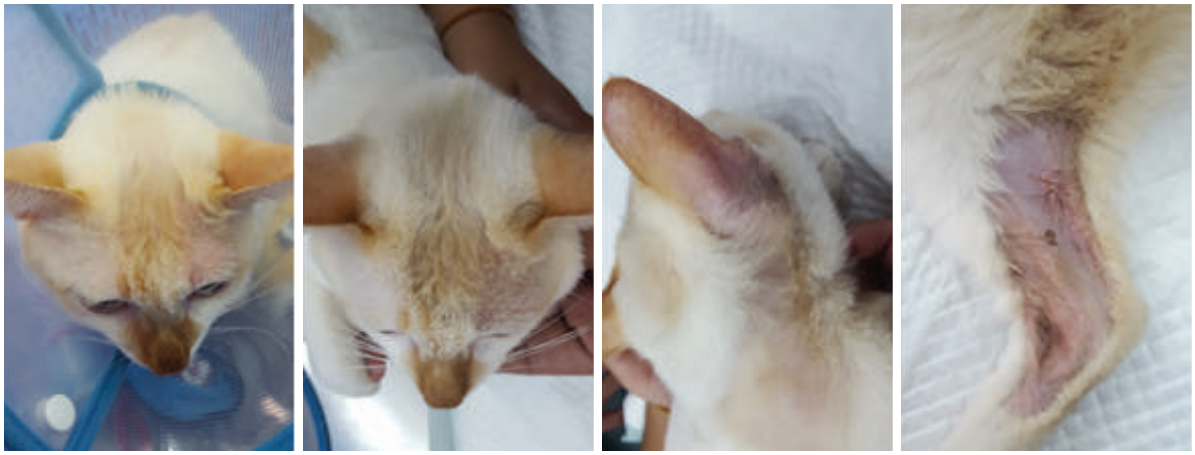

Figure 8. Images of forehead, head, upper right neck, and medial right hind limb after 10 days of treatment showed less crust on the forehead, head, and upper right neck but the lesion was dryer. Signs of skin inflammation were disappeared. Lesion at the medial right hind limb was dry without crust. The biopsy wound was intact after the suture was removed.

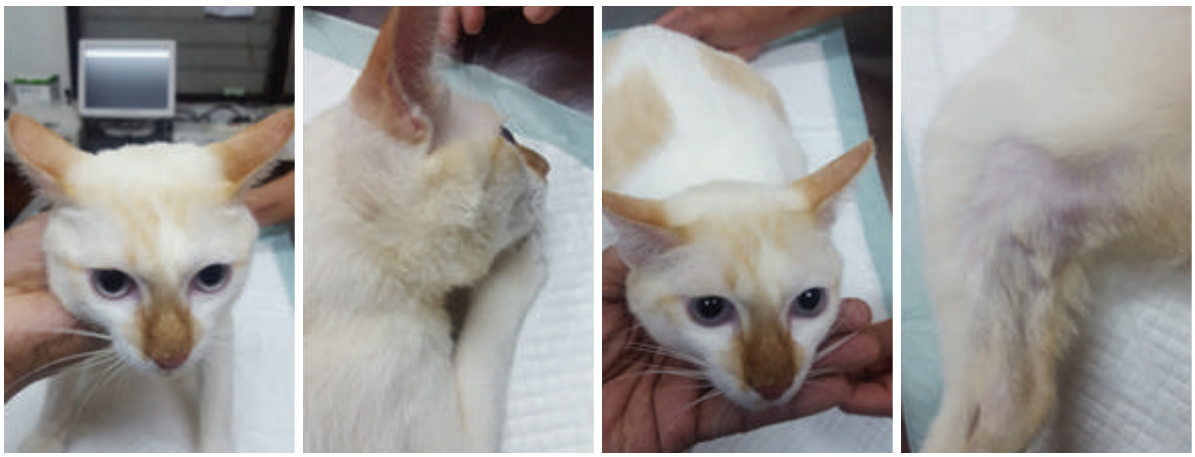

Figure 9. Images of forehead, head, upper right neck, and medial right hind limb after 30 days of treatment showed disappearance of all the lesions. Hair growth was observed. The new hair was darker at the head and forehead.

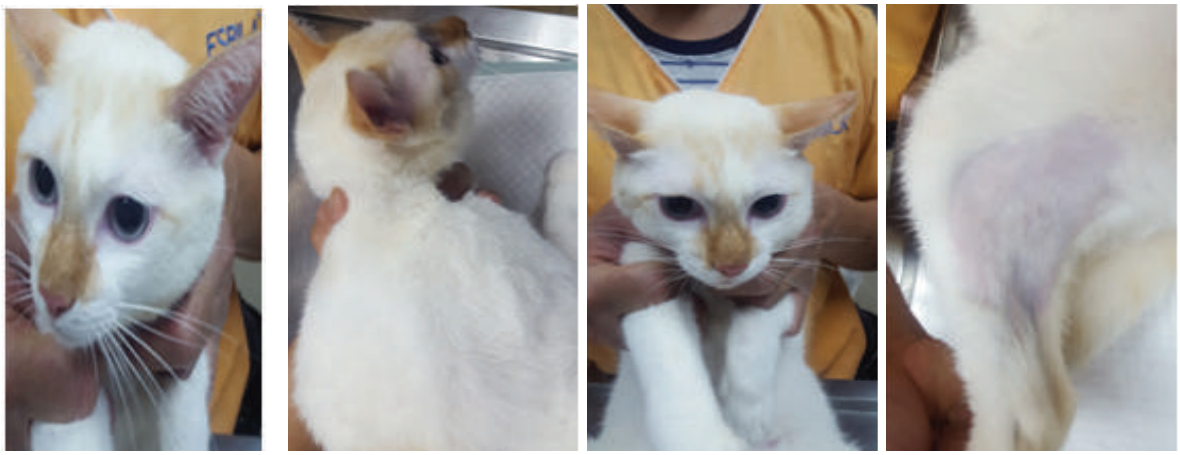

Figure 10. Images of forehead, head, upper right neck, and medial right hind limb after 180 days of treatment showed disappearance of all the lesions. Skin was soften and coat was shiny.

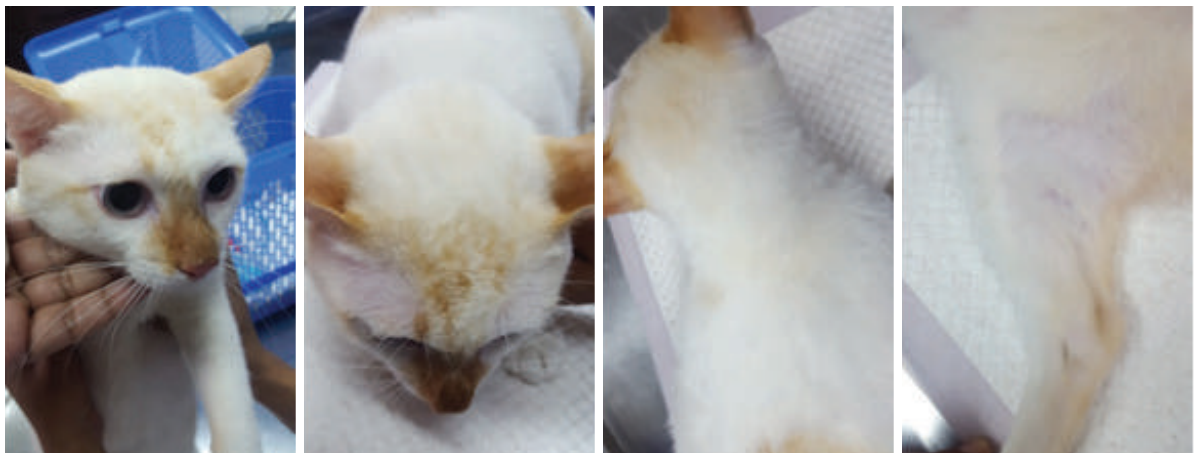

Figure 11. Images of forehead, head, upper right neck, and medial right hind limb after 210 days of treatment and the treatment was discontinued for 15 days showed inflammation of skin of the right ear lobe from face rubbingbut no otitis. Saliva stain was found at the medial side of both hind limbs with little inflammation and hair loss from hair chewing. The lesions, particularly the inflammation, disappeared 5 days after PCSO-524® (Antinol)®was given again.

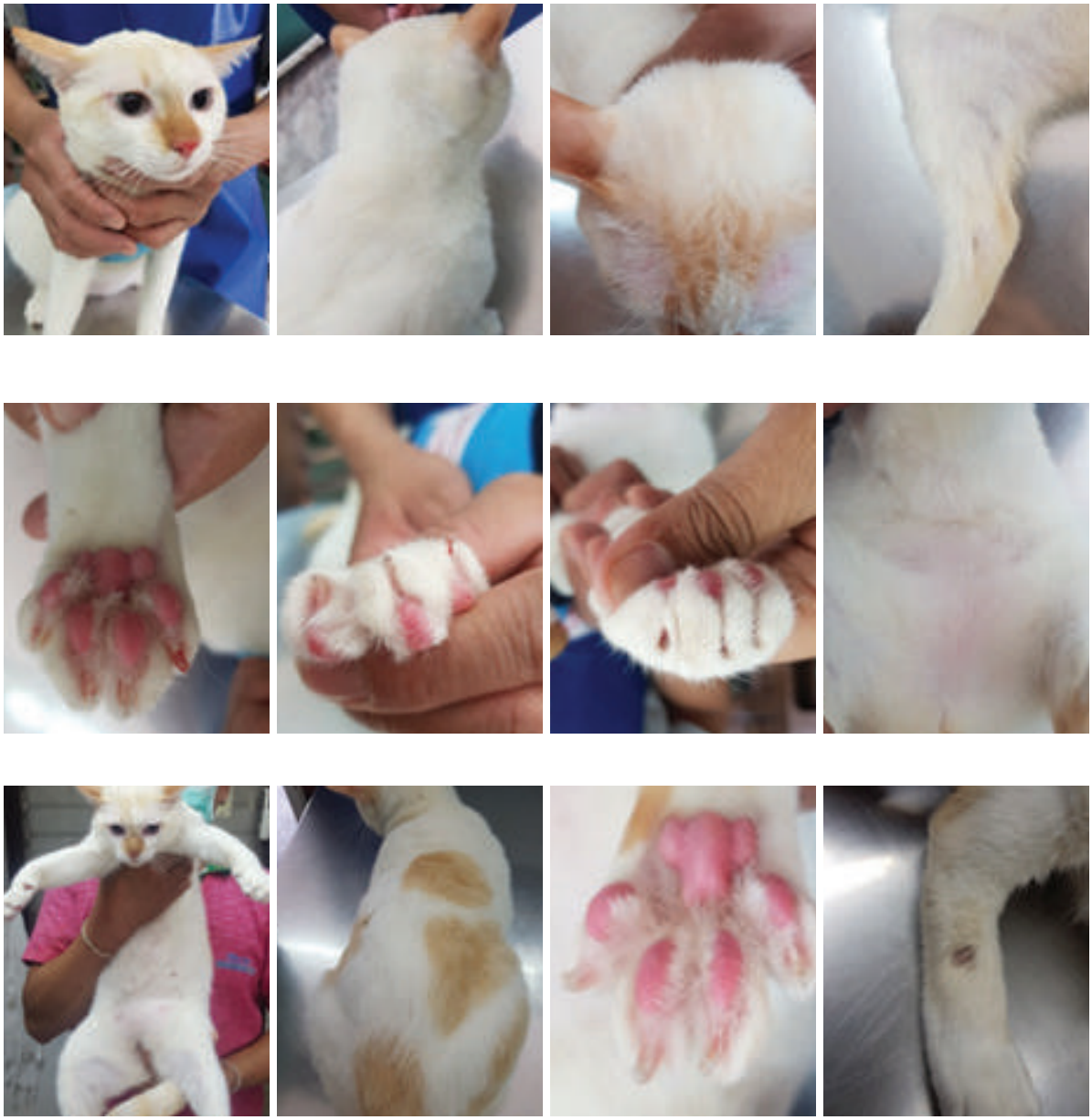

Figure 12. Skin lesion when Krill oil 425 mg was given for 30 days as a replacement of PCSO-524® (Antinol)® starting at day 270. There was inflammation on paws, abrasion on lateral hind limb surrounded by saliva stain, broken nail of all paws, and hair loss from hair chewing.

Table 1. Plan for treatment of Obsessive-Compulsive disorders (OCD) using PCSO-524® (Antinol®)

Treatment	Day 1-14	Day 15-90	Day 91-180
Fluid therapy	Yes	No	No
PCSO-524®(Antinol®) induction dose	Yes	No	No
PCSO-524®(Antinol®) maintenance dose	No	Yes	Yes
Feline pheromone spray	Yes	Yes	No
Elizabethan collar*	Yes	Yes*	Yes*
Spending time with owner	Yes	Yes	Yes
Pathological examination	Yes	Yes	Yes
Blood analysis	Yes	Yes	Yes
Behavior observation	Yes	Yes	Yes

* Only when excessive grooming was observed

Table 2. Symptoms and behaviors of the cat

Symptoms/Behavior	Treatment with PCSO-524®*				After termination of PCSO-524®**	Treatment with Krill oil***
	Day 0	Day 1-14	Day 15-90	Day 91-180		
Appetite	No	No / Yes	Yes	Yes	No / Yes	Yes
Aggression	Yes	No / Yes	No / Yes	No	No	No / Yes
Resistance to restraint	Yes	No / Yes	No / Yes	No	Yes	No / Yes
Anxiety/hissing	Yes	No / Yes	No	No	Yes	No / Yes
Pain on right hind limb when palpated	Yes	No	No	No	No	No
Hyperaesthesia	Yes	No / Yes	No	No	Yes	Yes
Excessive grooming	Yes	No / Yes	No	No	Yes	Yes
Body rubbing	Yes	No / Yes	No	No	Yes	No / Yes

*Induction dose, I capsule bid, on day 1-14, maintenance dose, 1 capsule sid after day 14

**15 days after PCSO-524®was discontinued on day 210

***1 month after PCSO-524®was discontinued and replaced by Krill oil 425 mg

Table 3. Skin lesion after PCSO-524®(Antinol®) treatment

Lesion	Treatment with PCSO-524®*				After termination of PCSO-524®**	Treatment with Krill oil***
	Day 0	Day 1-14	Day 15-90	Day 91-180		
Hair loss	Yes	Yes	No	No	Yes	No
Flaking	Yes	Yes	No	No	Yes	No
Severe inflammation	Yes	No / Yes	No	No	Yes	Yes
Severe bruise	Yes	No / Yes	No	No	Yes	Yes
Saliva stain	Yes	No / Yes	No	No	Yes	No / Yes
Itching	Yes	No / Yes	No	No	Yes	No / Yes
Soft skin/Shiny coat	No	No	Yes	Yes	Yes	Yes

*Induction dose, I capsule bid, on day 1-14, maintenance dose, 1 capsule sid after day 14
**15 days after PCSO-524® was discontinued on day 210
***1 month after PCSO-524® was discontinued and replaced by Krill oil 425 mg

Table 4. Symptoms of Obsessive-Compulsive disorders (OCD) after treated with PCSO-524® (Antinol®)

Symptoms	Treatment with PCSO-524®*				After termination of PCSO-524®**	Treatment with Krill oil***
	Day 0	Day 1-14	Day 15-90	Day 91-180		
Hypersensitivity	Yes	No / Yes	No	No	No / Yes	No / Yes
Excessive grooming	Yes	No / Yes	No	No	No / Yes	No / Yes
Self-mutilation	Yes	No / Yes	No	No	No /Yes	No / Yes
Wool suckling	No	No	No	No	No	No
Pica	Yes	Yes	Yes	Yes	Yes	Yes

*Induction dose, I capsule bid, on day 1-14, maintenance dose, 1 capsule sid after day 14
**15 days after PCSO-524® was discontinued on day 210
***1 month after PCSO-524® was discontinued and replaced by Krill oil 425 mg

Table 5. Hematological test results after 180 days of PCSO-524® (Antinol®) treatment

Parameter	Unit	Normal range	Before Tx	Day 7	Day 30	Day 60	Day180
RBC	x106/ul	5.5-10	8.1	8.5	6.7	8.4	6.2
Hemoglobin	g/dl	8-15	13.3	13.8	11.4	13.4	10.4
Haematocrit	%	24-45	48	40	33	40	32
Platelet	x103/ul	100-518	269000	212000	216000	232000	228000
WBC	x103/ul	5500-19000	21700	12300	9100	4800	10300
Neutrophils	%	33-75	82	78	75	86	75
Bands	%	0-3	0	0	0	0	0
Eosinophils	%	2-12	3	2	3	1	1
Lymphocytes	%	10-55	14	18	20	11	22
Monocytes	%	1-4	1	2	2	2	2

Table 6. Clinical chemistry test results after 180 days of PCSO-524® (Antinol®) treatment

Parameter	Unit	Normal range	Before Tx	Day 7	Day 30	Day 60	Day180
ALT(SGPT)	U/L	10-100	50	96	62	63	36
BUN	Mg/dL	5-30	31	16	23	19	20
Creatinine	Mg/dL	1.3-2.1	2.5	1.1	1.6	1.6	1.3

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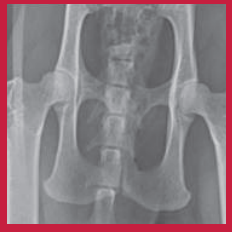
Case Report :
The Trial Treatment of Feline Osteoarthritis in an Eleven-Year-Old Cat



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Abstract

A domestic short hair cat aged 11 years was taken to the hospital due to shaking and weakened hind legs. The cat could not perform high jump for 1 month. Preliminary diagnosis included early stage of osteoarthritis of left hip and capsulitis. Pain killers, NSAIDs and gabapentin, were administered but the response was not satisfied. Therefore, multimodal treatment program was initiated. Physical therapy using electrical stimulation and laser beam class 4 in conjunction with PCSO-524® were used. Measurement of joint movement angle (active range of motion; active ROM) in 2 dimensions using Kinovea program was conducted for follow up. The study found increased active ROM and decreased lameness scoreafter the treatment. The owner described that the cat showed less isolation behavior and was able to perform vertical jump again. Overall quality of the cat's life was improved.

Keywords: Osteoarthritis of hip joint, cat, PCSO-524®, Kinovea, ROM

Introduction

Osteoarthritis is damaged joint that consists of degenerative cartilage within joint, osteophyte and capsulitis. Tissues surrounded the joint is thickened from fibrosis (1) and biochemistry of materials in the joint is altered. The causes of osteoarthritis are various, for example, age, body weight, accident, and genetics. Osteoarthritis can lower quality of life in affected animals, particularly in severe cases (2).

Diagnosis of osteoarthritis in cats is different from that performed in dogs. Osteoarthritic cats show signs of lameness that is less apparent when compared to dogs. Palpation may not be as effective as in dogs. Cats usually show changes of behavior such as less activity, easily irritated, poor ability to perform high jump (3). Radiographic examination is a standard method for diagnosis of the disease. However, inconsistence of clinical signs and images could occur (4). Therefore, measurement of active range of motion (Active ROM) is developed to improve accuracy of the diagnosis of osteoarthritis.

Treatment of osteoarthritis in cats commonly uses Non-Steroidal Anti-Inflammatory Drugs (NSAIDs). Osteoarthritis is considered chronic and can not be completely cured, so use of NSAIDs to reduce pain in osteoarthritic cats may not be appropriate since it affects function of kidney and gastrointestinal tract when used for a long-term (6). Additionally, senile cats with osteoarthritis usually have renal disorder and using NSAIDs is contradicted. Supplements containing essential fatty acid such as New Zealand Green Lipped mussel extract is a nutraceutical that is used for multimodal management in osteoarthritic animals. The extract is consisting of several fatty acids that can reduce inflammation of joint, especially in animals that NSAIDs are prohibited, and consequently reduce pain and improve life quality.

Case history

A domestic short hair cat aged 11 years was taken to Kasetsart University Veterinary Hospital due to shaking and weakened hind legs. The cat could not jump and conduct activities as usual. Preliminary treatment included NSAIDs (Tolfenamic acid 4 mg/kg sid) for 3 consecutive days. Follow up after 1 week showed no signs of improvement. Weakened hind limbs and lameness still existed. Further neurological examination could not detect any disorders. Pain killer, gabapentin 5 mg/kg bid and vitamin B1, 6,12 were prescribed for 14 days, but could not improve the hind leg weakness, lameness and jumping. The cat was then referred to rehabilitation unit for further physical therapy.

Physical and orthopedic examination

Physical examination found that the cat was lively, normal mucous membrane, no dehydration, normal lung and heart sound, chronic rhinitis that was under on-going treatment. Gait analysis showed lameness and weakness of both hind legs. The lameness score of the left leg was 3/4 (Table 1) and was higher that that of the right leg. The cat was not able to perform vertical jump, even for a short distance, and walking past obstruction. Palpation did not detect pain of the hind limbs and vertebral column but found atrophy of both hind leg muscle.

Table 1. Definition of lameness score (7)

Signs	Score
Normal walking and running. No lameness	0
Normal standing. Slightly lame while running	1
Normal standing. Slightly lame while walking	2
Normal standing and walking. Apparently lame while walking	3
Not normal posture while standing and especially while walking	4

Radiographic examination

Radiographic images of both hip joints showed mild sclerosis of caudal acetabular rim, particularly at the left hip joint. Osteoarthritis and capsulitis were diagnosed.

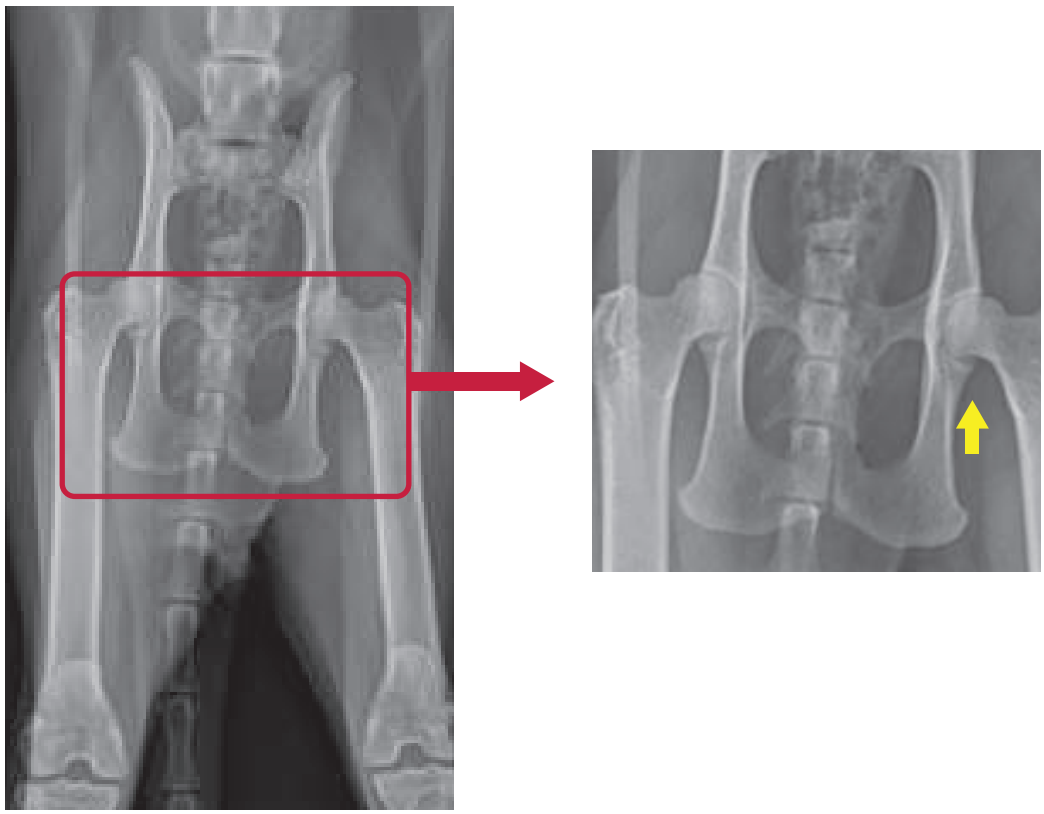

Figure 1. Radiographic images of left hip joint showed mild sclerosis of caudal acetabular rim (arrow)

Physical therapy

Treatment with laser beam class 4 was used to reduce pain of the left hip joint once a week for 4 consecutive weeks. Each session lasted 4 minutes and used energy level at 5 joules/cm2 in 30 cm2 of treated area. Electrical stimulation was applied at the quadricep and hamstring of both hind legs to enhance muscle restoration once a week for 4 consecutive weeks and 15 minutes for each leg.

Medication

New Zealand Green Lipped mussel extract, PCSO-524®, 1 capsule sid was administered for 30 days, starting 2 weeks after the beginning of physical therapy. Three weeks of follow-up was scheduled.

Treatment outcome and follow-up

After initiation of physical therapy and medication, the cat showed improvement of lameness score (1/4) of the left leg. Cat activities, walking past obstruction and high vertical jump were resumed. Palpation did not detect any joint pain. Further follow-up by measurement of joint movement angle (Active ROM) in 2 dimensions using Kinovea program was conducted before PCSO-524® administration (week 0) and 3 weeks after the start of PCSO-524® administration (week 3) (Figure 2 and 3).The joint movement angle increased 28 degrees which was consistent with signs of improved behaviors and orthopedic examination that showed reduced lameness score

Table 2. Joint movement angle (Active ROM) measured by Kinovea program

	Prior to treatment (week 0)	After treatment (week 3)
Active ROM at left hip	102˚	130˚

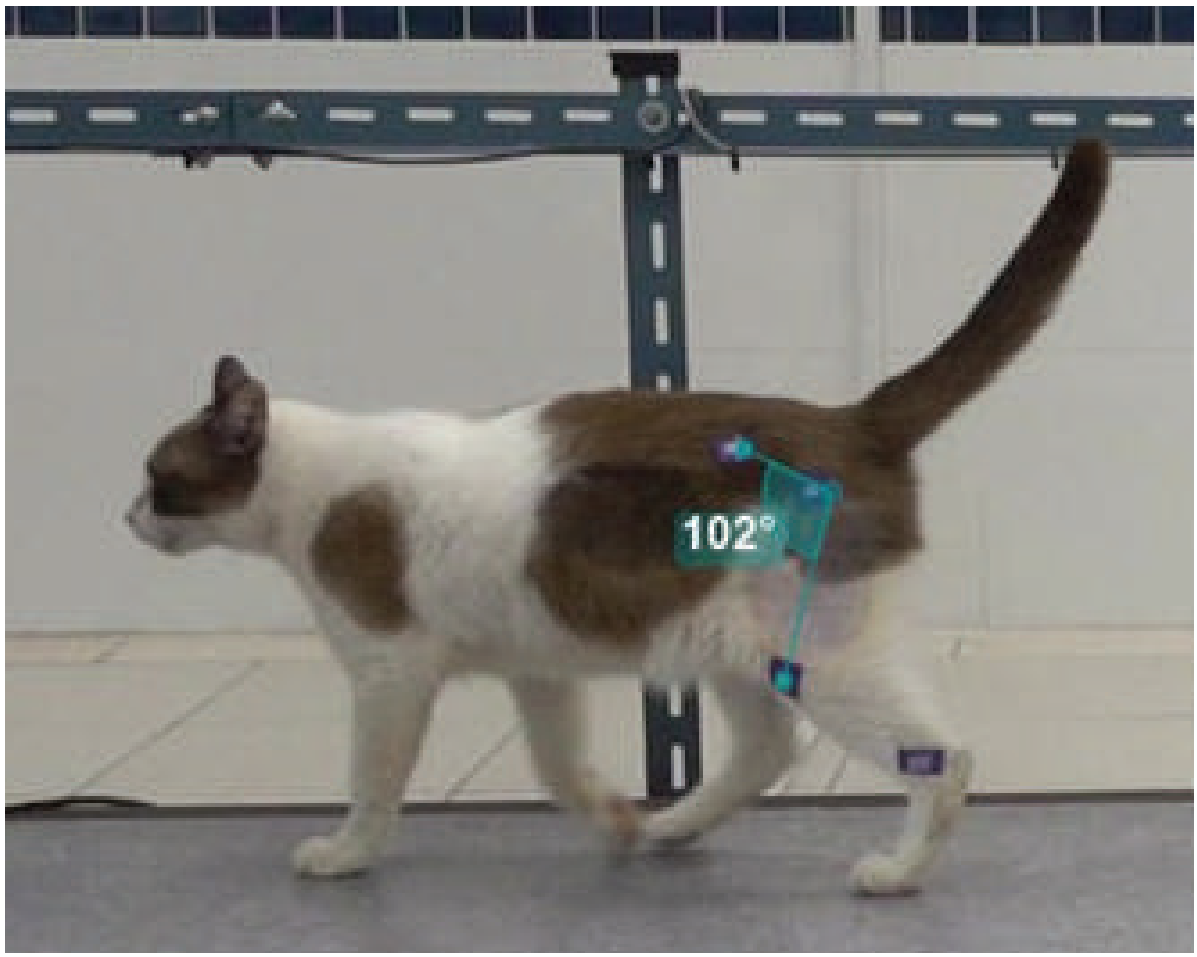

Figure 2. Measurement of joint movement angle (Active ROM) in 2 dimensions using Kinovea program prior to nutraceutical treatment

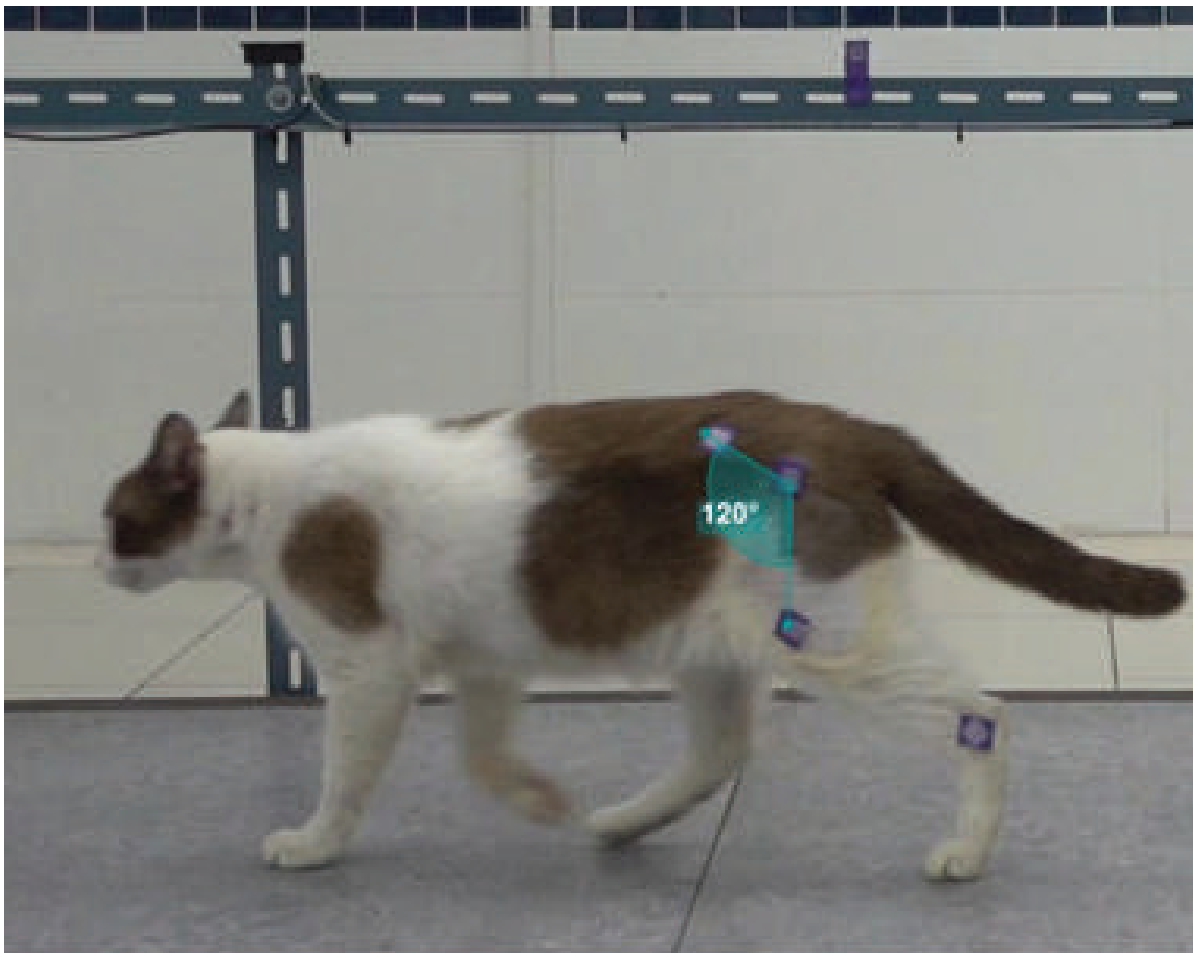

Figure 3. Measurement of joint movement angle (Active ROM) in 2 dimensions using Kinovea program 3 weeks after starting nutraceutical treatment

Conclusion and discussion

Osteoarthritis is a complicated disease to treat especially that of senile cats with renal disorder. Radiographic examination may find multiple joints that are affected with osteoarthritis in senile cats. Radiographic imaging is a basic tool that is important for diagnosis of osteoarthritis and commonly used along with physical examination. Images can identify alteration within joint (4). There are several studies reporting that osteoarthritis in cats often occurs at the limbs more than the core skeleton (3). Osteoarthritis can be treated using NSAIDs to reduce pain in conjunction with physical therapy. However, treatment with NSAIDs is contradicted in senile cats, among which renal disorder is common. Cats in this category usually suffer from chronic pain and degraded life quality.

Our case was a senile cat with osteoarthritis and capsulitis in the early stage and kidney function was normal. So NSAIDs and gabapentin were used for preliminary treatment, but the response was not satisfied. The treatment was then terminated and changed to multimodal program consisting of laser beam class 4, electrical stimulation to restore muscular system, and nutraceutical PCSO-524®administration continuously. The follow-up showed improvement of behaviors and increased activities and life quality without any adverse effects of PCSO-524®.

Standard method of osteoarthritis diagnosis is radiographic imaging together with palpation and measurement of joint angle. A study found that cats with osteoarthritis had decreased angle of joint movement (8). Conflict of the accuracy of diagnosis using joint angle occurred when another study found no difference of joint angle between healthy and sedated cats (9) and a study by Duncan et al found a slight difference. Various programs were developed to analyze body movement in 2 and 3 dimensions in humans and later were applied in animals. For instance, gait analysis and weight bearing force analysis in osteoarthritic dogs (10). This study used Kinovea program to compare the angle of joint movement before and after multimodal treatment. It was found that the angle increased after the treatment and was consistent with the improvement of ability to jump, walking past obstruction, and decreased frequency of isolation behavior.

Physical therapy in osteoarthritic animals is aimed to reduce pain and strengthen the muscle and tendon surrounding the joint to increase quality of life. Physical therapy used for treatment of osteoarthritis includes, for example, ultrasound, electrical stimulation, laser, and hydrotherapy. The cat in this study had atrophy and lameness of hind legs, so electrical stimulation and class 4 laser were used to strengthen the muscle and to reduce pain, respectively. There are reports describing that class 4 laser was effective for reducing pain (11, 12).

Nutraceutical for medication usually consists of essential fatty acid, particularly omega-3, which is an effective anti-inflammatory substance (13).Administration of PCSO-524, in which omega-3 is a principle component, was effective for restoring the body movement, vertical jump, and quality of life in our study. This is consistent with a study in osteoarthritic dogs that found that dogs fed high omega-3 diet had increased omega-3 and decreased omega-6 in blood circulation and better movement when compared to dogs fed regular diet (14).

There were missing data during week 6 of our studysince the cat's owner was out of the country. The follow-up could have been more completed if goniometer and pressure mapping platform had been used to measure the joint angle and weight bearing force.

Acknowledgement

The author would like to thank Asst.Prof.Dr.MonchanokVijarnsorn, DVM, for assistance in measurement of joint movement angle using Kinovea program, Asst.Prof.Dr. WarapornAumArm, DVM, for interpretation of radiographic images and Dr. BodinTirapat, DVM, for neurological examination in this study.

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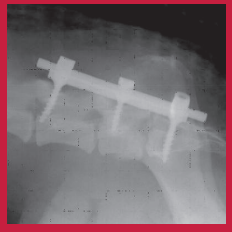
Case Report : Use of PCSO-524 for Treatment of Spine Fracture in Conjunction with Pedicle Screw-Rod Fixation (PSRF)



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Abstract

An intact male mixed breed dog aged 2 years engaged in a fight with several dogs resulting in disable of hind limbs and loss control of elimination. Physical and radiographic examination showed fracture and luxation of the 7th lumbar vertebrae. Spinal cord injury (SCI) was also found and the fracture was identified as the cause. The spinal cord trauma could occur since the incident and was left for more than 2 weeks. Pedicle screw-rod fixation (PSRF) was operated to fix the vertebral column. After the second operation, it was suspected that there was remain of inflammatory cytokines that probably increased after the operation. Anti-inflammatory medication for prohibition of inflammatory cytokines synthesis was essential but its adverse effect must be concerned. The study therefore used holistic treatment including PSRF, non-steroidal drug and PCSO-524® anti-inflammatory extract, in conjunction with physical therapy. Follow-up examination on neurological system, walking, and urinary system showed promising result. The neurological system was restored, and adverse effect of long-term use had not been found.

Keywords: PCSO-524®, lumbosacral fracture-luxation, pedicle screw-rod fixation (PSRF), spinal cord injury (SCI), postoperative care

Introduction

Injury or trauma of spinal cord is classified into primary and secondary incident. The primary trauma is caused by direct concussion of elements in neurological system resulting in malfunction or disruption of spinal cord (1). The secondary traumais divided into 3 stages, each of which starts at 0-48 hours, 48 hours-2 weeks, and 2 weeks after the primary trauma, respectively (1).

The first stage of secondary trauma is characterized by increased degree of the damage, for example, hemorrhage of spinal cord and change of polarization voltage. When neuron stimulation reaches a critical level (excitotoxicity), free radicals and inflammatory mediators are released (7, 8), particularly the secretion of phospholipase A2 and eicosanoid (2). The trauma in this stage consequently causes inflammation and degeneration of neuron tissue and prohibits the restoration of neuron function.

Some inflammatory mediators;interleukin-1β (IL-1β), interleukin-6 (IL-6) and tumor necrosis factor-α (TNF-α), causeinflammation of neurological system and damage its function (6, 7).

Loss of neurological function does not necessarily occur where the fracture is located. Edema or hemorrhage of spinal cord from the secondary trauma could cause the loss of neurological function in other areas (4).

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Loss of neurological function does not necessarily occur where the fracture is located. Edema or hemorrhage of spinal cord from the secondary trauma could cause the loss of neurological function in other areas (4).

Case history

An intact male mixed breed dog aged 2 years was engaged in a fight with several dogs on the 6th of October 2017 resulting in paresis of hind limbs and loss control of elimination. The dog was taken to the hospital on the 10thof October 2017. Radiographic examination found vertebral fracture and luxation of L7. Medication included gabapentin 10 mg/kg bid, multivitamin 1 tablet bid, and vitamin E 200 IU bid was provided. Surgical treatment was done on day 18 after the trauma. Post-operative care included additional medication as follows; firocoxib 5 mg/kg sid and PCSO-524®(Antinol®) 1 capsule bid. The dog showed effort to walk in a short distance on day 3 after the operation. However, on day 5 the dog was unable to walk again. Radiographic images showed that the planted instruments could not hold body weight of the animal. Therefore, the second operation was done 13 days after the first operation with similar technique but adding more screws and bandage throughout the body. Prescription for post-operative care included morphine injection for pain control, fentanyl pain relief plaster, firocoxib 5 mg/kg sid, PCSO-524® (Antinol®) 1 capsule bid, gabapentin 10 mg/kg bid and multivitamin B1 B6 B12 (neurobion®) 1 tablet sid.

A B C

Figure 1. Instruments used in surgical treatment: Pedicle screw-rod fixation
a) Pedicle screw b) Rod c) Inner screw (orthopeasia©)

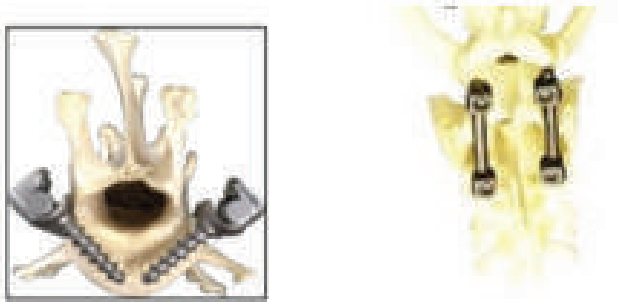

Figure 2. Method of instruments (orthopeasia©) insertion

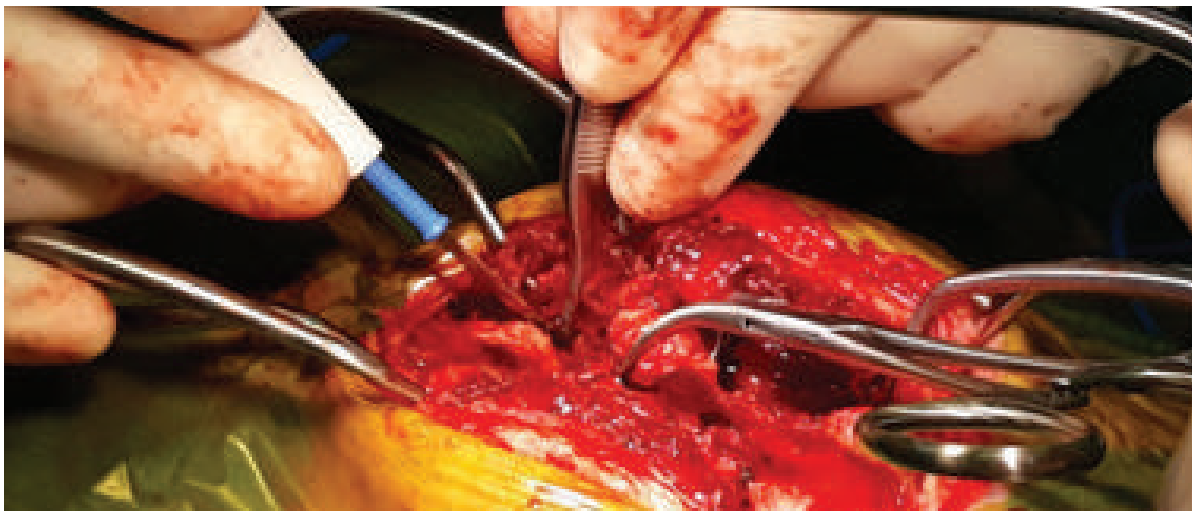

Figure 3. Insertion of the instruments

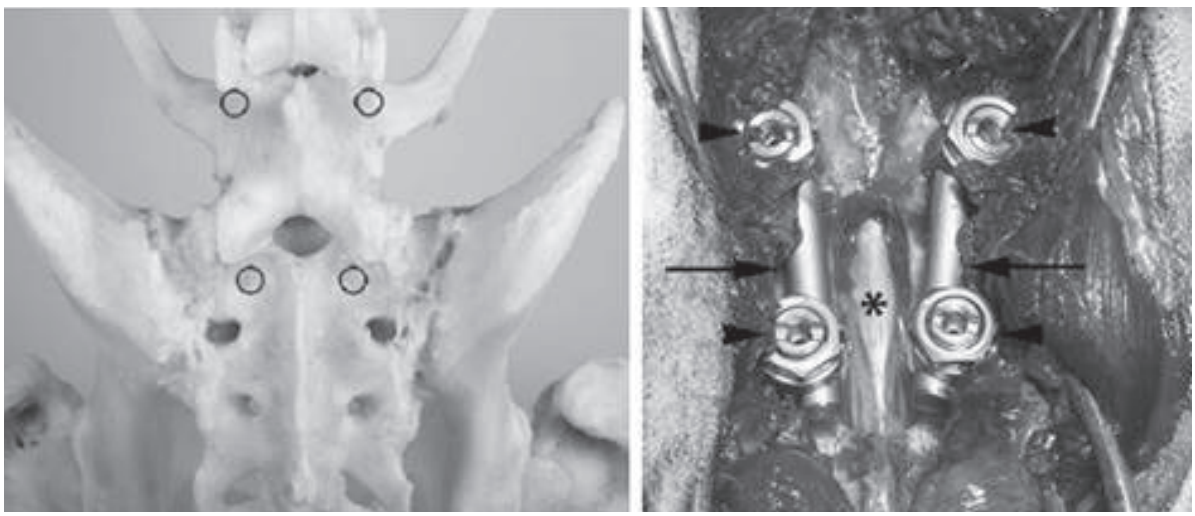

Figure 4. Position of instrument insertion on the vertebral column (Bjorn P. Meij, 2012)

Follow-up each week after the operation showed that the dog rapidly resumed body weight bearing but also developed cast dermatitis. Firocoxib was terminated on the 15th of November 2017, after 22 consecutive days of administration. The dog was transferred to rehabilitation unit for electrotherapy and hydrotherapy. At this point, the dog was not able to control elimination and prepuce retraction. On the 8thof December 2017, 1 month after the operation, radiographic image showed that the instruments were in place and there was healing of the vertebral fracture. On 28th December 2017, the follow-up found that body weight bearing while walking was satisfied, the elimination was not completely under control, and the prepuce retraction was resumed. At this point, the dog still received PCSO-524® (Antinol®) 1 capsule bid and multivitamin B1 B6 B12 (neurobion®) 1 tablet sid.

Treatment outcome

The leg function of the dog was fully recovered and there was a promising sign of neurological system restoration after the pain and anti-inflammatory medication and surgical treatment were given. Follow-up on walking, neurological function and elimination control showed satisfied treatment outcome (Table 1).

Table 1. Results of neurological examination

DD/MM/YY	Paretic grade	Voluntary /ambulatory	Deep pain	Superficial pain	Proprioceptive reflex	Patella reflex	Sciatic reflex	Perineal reflex
6/10/17	N/A	-	N/A	N/A	N/A	N/A	N/A	+
16/10/17	IV	-	+ (less lateral)	+	0	2+	0	-
17/10/17		-	+ (less lateral)	+	delayed	2+	0	-
24/10/17				First operation				
27/10/17	II	+	+	+	delayed	2+	1+	-
29/10/17	IV	-	+ (less lateral)	+	0	2+	0	-
6/11/17				Second operation				
15/11/17	II	+	+	+	delayed	2+	1+	-
8/12/17	II	+	+	+	delayed occasionally	2+	1+	-
28/12/17	II	+	+	+	+	2+	2+	-

Figure 5. The dog after 8 weeks of treatment

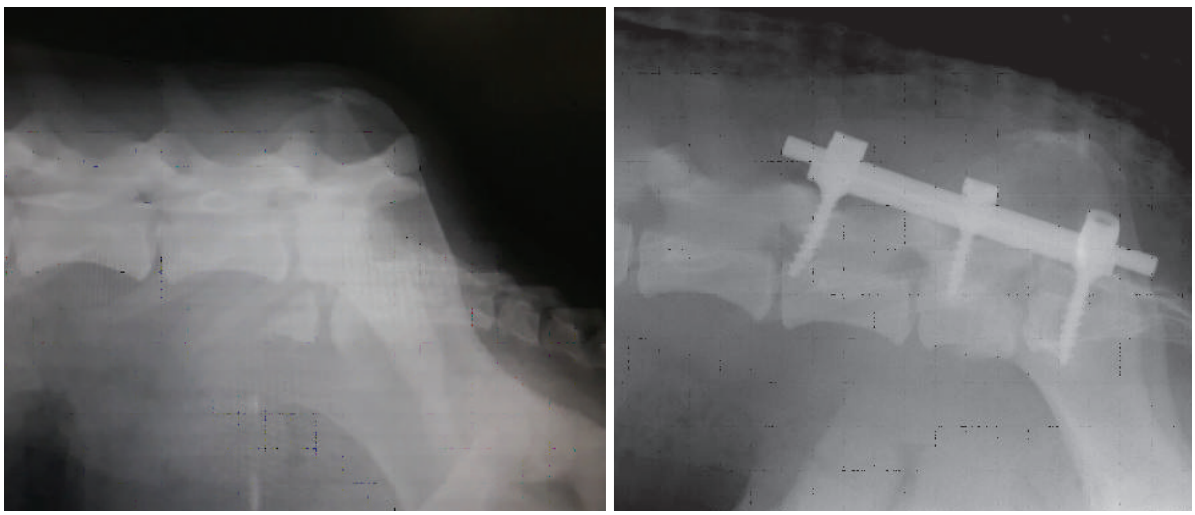

Figure 6. Radiographic images showing spinal column
before and after instrument installation

Discussion

Standing and supporting the body with hind legs requires cooperation of several nerves in area between L4 to S. Therefore, dogs have high ability to use hind legs. Dogs may show only slight symptoms when there is more than 50% luxation of 7th lumbar vertebrae since the area has sufficient space to compensate distorted route of nerves without severe compression (4). Dogs may not walk in the early stage of trauma because of pain and inflammation caused by the fracture (4).

Anal sphincter is controlled by motor neurons originated from S1-S3 (3). Therefore, the dog in this study could not control elimination since the trauma occurred in the area above the sacrum. Fracture of sacrum usually results in malfunction of elimination control (3).

Surgical treatment is recommended in case of impaired neurological function. Medication and extract supplementation are also necessary to reduce inflammation caused by the fracture and following operations (7).

Extract from New Zealand green-lipped mussel is consisting of 6 categories of lipid and other excellent anti-inflammatory substances. Lack of side effects even for a long-term use makes it appropriate for reducing inflammation caused by secondary trauma that can last longer than 2 weeks (1).

Conclusion

Fracture of vertebral column and spinal trauma cause inflammation and severe malfunction of neurological system. Integration of various medications and appropriate surgical treatment, in conjunction with anti-inflammatory extract PCSO-524® (Antinol®), gave satisfied treatment outcome without any complication.

Acknowledgement

The author would like to thank Assist.Prof.Dr. Kampanart Suntornvipart, DVM, Dr. Settapong Jarupatrakorn, DVM, and Dr. PiradaNilkuha, DVM, for assistance in treatment of this case and report writing. The author is also grateful to the veterinarians and staff of surgical unit, Small Animal hospital, Chulalongkorn University.

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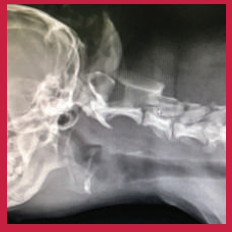
Case Report :
Efficacy of PCSO-524® and prednisolone combination treatment for neck pain in Chihuahua dog with Chiari-like malformation and syringomyelia



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Abstract

A 18-month-old male intact chihuahua presented with recurrent neck pain within 3 months after stop using prednisolone. Upon physical and neurological examination, dogdisplayed pain and neck stiffnesswithout neurological deficits. Radiographic findings of cervical spine was normal. The dog was treated with prednisolone to relieve pain and inflammation and showed improvement of clinical signs. However, the recurrence occurred in 7 months with more severity. Magnetic resonance imaging (MRI) demonstrated Chiari-like malformation and syringomyelia at C2-C4 and C7-T1 region. PCSO-524® (VetzPetzAntinol®) was administered in combination with prednisolone and gabapentin. The clinical signs improved in 2 weeks so prednisolone was gradually reduced until discontinued but dose of PCSO-524® remained constantly. The dog was able to recover from neck pain and continued life activities as normal. Long-term supplement ofPCSO-524® (VetzPetzAntinol®) was effective for reducing inflammation of spinal cord in dog suffered from neck pain caused by syringomyelia.

Introduction

Chiari-like malformation (CM) is defined as a decreased caudal fossa volume, due to congenital hypoplasia of supraoccipital bone which is a common cause of obstruction in foramen magnum that leads to syringomyelia (SM) in dogs. Syringomyelia is characterized by the accumulation of cerebrospinal fluid (CSF) within the parenchyma of the spinal cord. Chiari-like malformation and syringomyelia are most common in Cavalier King Charles Spaniel andGriffon Brussels Griffons dogs. It is estimated that 95% of Cavalier King Charles Spaniel dogs are affected with CM (1). The clinical signs in dogs with CM is usually neuropathic pain caused by syringomyelia. Treatment of the disease includes medication and operation. Determination of treatment choice depends on severity of the disease. Surgical treatment is recommended in case of no response to medication or in young dogs with severe pain. Long-term follow up shows that surgical treatment is effective and life quality of the dog is improved.

Case history

An 18-month-old male intact chihuahua and 2.18 kg body weight was presented with neck pain and cervical stiffness. Dog showed same clinical signs 3 months previously and was successfully treated. Physical and neurological examination showed pain and neck stiffness when raising or turning the neck left and right without neurological deficits. Radiography showed normal alignment of cervical spine. Prednisolone 0.5 mg/kg q12h was prescribed for 2 weeks and reduced to 0.5 mg/kg q24h for another 2 weeks and clinical signs rapidly improved after treatment. Seven months later, the dog was admitted again due to intermittent recurrence of neck pain.Clinical signs occurred every 2 months. When this happened, the owner gave prednisolone 0.5 mg/kg q12h orally to the dog and reduce the dose down until the symptom was improved. However, dog showed severe neck pain in the latest incident and thus was brought in for veterinary care. Palpation found neck pain, neck stiffness, anddiscomfort when the neck was turned right. Physical and neurological examination did not show any disorder.

Diagnosis and results

Hematological test showed slightly increased white blood cell with normal blood chemistry profile. Radiography did not show any abnormality of cervical vertebrae (Figure 1). However, Magnetic resonance imaging (MRI) demonstrated Chiari-like malformation andsyringomyelia at C2-C4 and C7-T1 vertebral column (Figure 2).

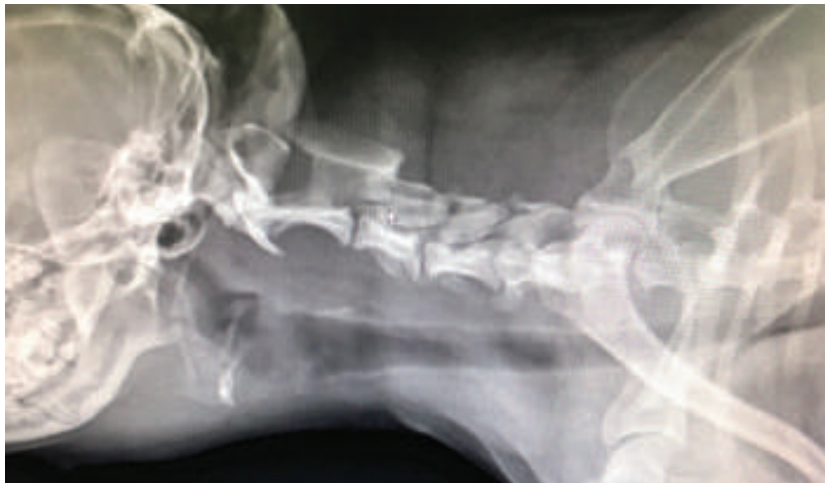
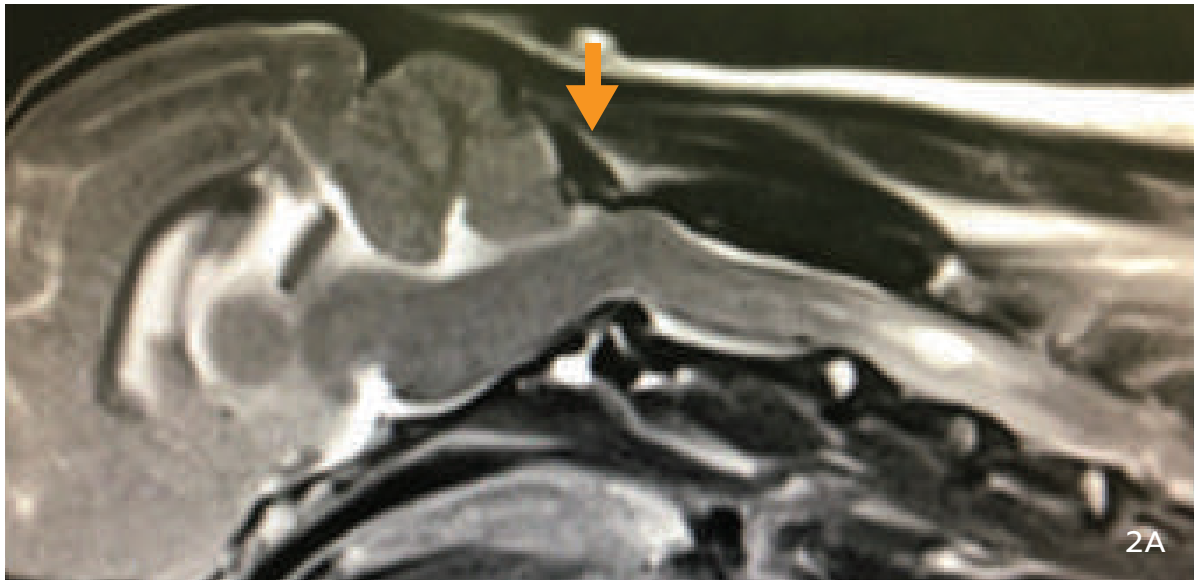


Figure 1. Radiographic image showed no abnormality of cervical vertebrae.



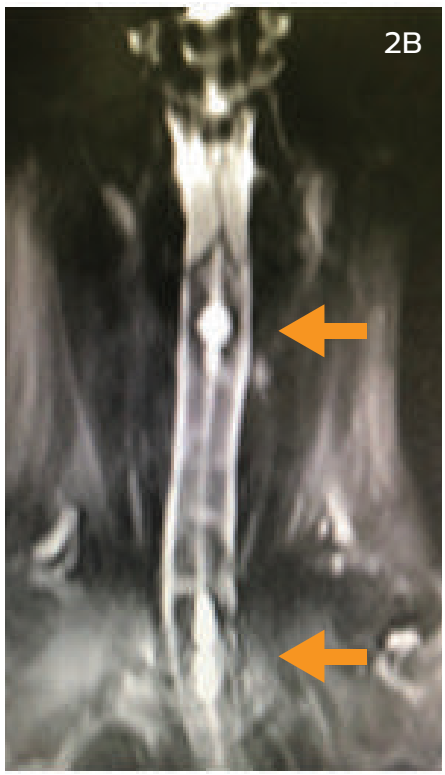


Figure 2. Sagittal T2-weighted MRI showed 2A: abnormal occipital bone (arrow) and 2B: accumulation of CSF at C2-C4 and C7-T1 (arrow head).

Treatment outcome and follow up

The examinations, particularly the MRI, identified that the cause of neck pain was syringomyelia at the spinal cord in cervical segment in combination with Chiari-like malformation. Prescribed medication included prednisolone 0.5 mg/kg (Prednisolone Olan®, Olan-Kemed Co., Ltd) q12h, Gabapentin 10 mg/kg (VULTIN 100® Unison, Laboratories Co., Ltd) q12h, pain killer q12h (only first day), ¼ tablet of Sucralfate 1 g (Ulsonic TM, Siam Bheasach Co., Ltd.)q12h, and tolperisone hydrochloride 2 mg/kg (Mydocalm®, Unison, Laboratories Co., Ltd) q12hfor muscle relaxation. Two weeks after the treatment, the dog showed less symptom of neck pain, and the owner decided to discontinue the medication.After 2 days of no medication, the dog started to show sign of head raising again so prednisolone q24hwas given to the dog again by the owner.The veterinarian also added PCSO-524® (VetzPetzAntinol®) q24h at this step. Two weeks later, the neck stiffness was drastically decreased so prednisolone dose was reduced to q24h and discontinued in 4 weeks together with tolperisone andgabapentin. Only PCSO-524 ® was continued with no sign of recurrent neck pain. The owner was called 4 months after the last examination and informed the veterinarian that there was occasional recurrence of neck pain that could be under control by only PCSO-524® 1 capsule q24h without prednisolone administration.

Discussion

Chiari-like malformation(CM) is the hypoplasia of supraoccipital bone that causes stenosis of caudal foramen and cerebellum herniation. The CM interferes with the circulation of CSF from craniocervical junction through the spinal canal. The accumulated CSF causes ventricle in the spinal cord or syringomyelia. Syringomyelia can also be found in case of injury, trauma, inflammation and spinal cord tumor. It is common in small breed dogs, particularly Cavalier King Charles Spaniels andGriffons (2, 3). The age at risk is usually between 6 months to 10 years. Symptoms of the disease may be acute or gradually developed. Common clinical signs include neuropathic pain with or without neurological deficits depending on the location and severity of spinal cord damage. It was reported that 35% of dogs suffered from syringomyelia andChiari-like malformation showed sign of neck pain (4). Neck stiffness, yelping in pain when neck or shoulder is touched, and scratching without contact of the foot and neck skin, phantom scratching, due to neuropathic pain.

Chiari-like malformation(CM) and syringomyelia (SM) can be accidental findings in some dogs without any clinical signs. Treatment is not necessary incase of subclinical or mild symptoms. Dogs that show pain or nervous disposers can be treated with medication or operation. Effective medication usually includes pain killer, gabapentin 10-20 mg/kg q8h for example, and those prohibit production of CSF, such as furosemide 1-2 mg/kg q12h and prednisolone 0.5-1 mg/kg q24h. Neuropathic pain should also be concerned and recommended treatment includes anticonvulsants, tricyclic antidepressants, cyclooxygenase (COX-2) inhibitors, amantadine, or acupuncture (5). It is estimated that 70% of treated dogs is recovered. In case of medication failure, operation to decompress foramen magnum is recommended in combination with medical treatment of neuropathic pain.

In this case study, prednisolone and gabapentin were core element of the treatment. Long-term effect of prednisolone was avoided by gradual decrease of the dose until it was completely stopped. However, the recurrence of neck pain after prednisolone termination made it necessary to keep prednisolone in the treatment program. Administration of PCSO-524® was considered for use in combination with prednisolone to treat spinal cord inflammation. PCSO-524® or Antinol® (VetzPetz, Antinol® DKSH, Thailand) is New Zealand green-lipped extract that has anti-inflammatory effect. Its main ingredient is Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA). The DHA is Omega-3 fatty acid that can alter 5'-lipoxygenase (5-LOX), 12'-lipoxygenase (12-LOX) and cyclooxygenase (COX) pathways resulting in decrease of inflammation (6). Substrate of inflammatory mediator, arachidonic acid, is also reduced by its effect. Administration of PCSO-524® potentially accounted for the relief of neck pain, partially if not totally. Omega-3 fatty acid, which is a component of PCSO-524® is a long-chain polyunsaturated fatty acid (LC PUFAs) that can increase blood lipid profiles, cardiovascular health, cell membrane fluidity andcell signaling cascades(7), and therefore enhance the neurological function.

Conclusion

Chiari-like malformation andsyringomyelia are common in Cavalier King Charles Spaniels andsmall breed dogs such as Chihuahua. Remarkable symptom of the disease is neck pain and cervical stiffness. Recommended medication includes prednisolone, gabapentin, and furosemide. In this case study, prednisolone was selected for the treatment of spinal cord inflammation. Termination of prednisolone was inevitable due to recurrence of the neck pain. Therefore PCSO-524® was considered for use in combination with prednisolone to control inflammation of spinal cord. It is concluded that PCSO-524® is suggested for long-term treatment ofspinal cord inflammation caused by syringomyelia and to replace long-term administration of prednisolone to avoid its adverse effects.

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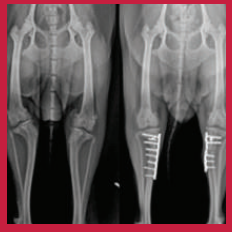
Case Report : Use of PCSO-524® Combined with Surgical Treatment of Patellar luxation in Dogs



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Abstract

Five dogs with bilateral patellar luxation were presented at the Small Animal Hospital of Faculty of Veterinary Medicine, Chulalongkorn University. Four dogs had grade 2, 3, and 4 medial patellar luxation in 3, 3, and 2 stifle joints, respectively. One dog had grade 3 bilateral lateral patellar luxation that had recurrent patellar luxation of left stifle joint for 6 months after previous surgery. All dogs werehad surgical treatment to re-align and stabilize extensor mechanism in the normal position. The dogs received anti-inflammatory drug and PCSO-524® in combination with rehabilitationto restore normal limb functionand muscle mass postoperatively. All dogs achieved good outcomes when compared with pre-operation. Range of motion was normal in all dogs and the patellae were in the normal position. However, one stifle with previous reluxation and severe osteoarthritis had slightly crepitation when flexed and extended the stifle joint. Patellar luxation causes abnormal wear of the patella and trochlear ridgesleading to lameness, muscle pain, and osteoarthritis. The treatment focuses on stabilization of the stifle joint and restore limb function. Surgical treatment is recommended in most cases. Rehabilitation provides strengthen muscle, improves normal joint function,enhanceslimb function, and prevents complications. Despite successful treatmentfor correcting patellar luxation, osteoarthritis remains occurrence in most cases. Therefore, use of anti-inflammatory supplement such as PCSO-524® is important for long-term managementwith less side effect and safetyfor long-term use when compared with non-steroidal anti-inflammatory drugs.

Keywords: Osteoarthritis, patellar luxation, PCSO-524®, surgical treatment, rehabilitation

Introduction

Patellar luxation causes malalignment of quadriceps muscle group resulting in abnormal extensor mechanism and muscle atrophy. Bowlegged and femoral or tibial torsioncan be found in severe cases. Patellar luxation results in abnormal grind between patella and femoral trochlear ridges leading to osteoarthritis. Surgical treatment is recommended to re-align extensor mechanism and prevent abnormal wear of patellaand trochlear ridges. In addition, rehabilitation is used to restore muscle and joint function and to control osteoarthritis. This case report presented the outcome of surgical treatment in combination with rehabilitation and nutraceutical use in vary degrees of patellar luxation in order to provide the guideline for treatment.

Case history

Five dogs consisting of 3 Pomeranians, 1 Chihuahua and 1 mixed breed dogs were diagnosed with patellar luxation and they did not have other concomitant stifle problems i.e. cranial cruciate ligament rupture (Table 1).

Table 1. Demographic information and history of illness

Dog	Breed	Age (Month)	Gender	Weight (kg)	BCS	Illness history
1	Pomeranian	48	Male, intact	3	2.5/5	Alopecia X Left hip luxation
2	Pomeranian	18	Male, neutered	4	4/5	Alopecia X
3	Chihuahua	52	Male, neutered	3	3/5	-
4	Pomeranian	10	Female, intact	2.6	3/5	-
5	Mixed breed	18	Female	13.4	3/5	-

BCS: Body condition score

Case 1: He could not weigh his left hind limb and he was diagnosed as left hip luxation, grade 3 left medial patellar luxation (MPL), and grade 2 right MPL. The dog was treated hip luxation by using closed reduction and Ehmer sling for 10 days, in combination with PCSO-524® 1 sid for 2 months before stifle surgery.

Case 2: The dog had bilateral grade 3 MPL with both hind limbs lameness (score 2). He did not receive any treatment before surgery.

Case 3: The dog had bilateral grade 2 MPL with left hind limb lameness (score 2). He was treated with non-steroidal anti-inflammatory drug (NSAID) for 8 days and PCSO-524® 1 bid for 1 month.

Case 4: She had left hind limb lameness (score 3) and limited stifle in extension. The symptoms emerged since the dog was 3 months old withoutany treatment. She had bilateral grade 4 MPL.

Case 5:The dog had bilateral grade 3 LPL and she received previous surgical correctionon left stifle 5 months ago but she had recurrent left LPL with lameness (score 3). The dog continuously received PCSO-524® 1 bid since the previous operation.

Physical examination

All dogs received orthopedic examination and assessment of lameness score of each leg as shown in table 2 and 3.

Table 2. The severity of patellar luxation and surgical techniques used in each stifle joint

No	Patellar status	1	2	3	4	5	6	7
1	Right MPL 2	✓		✓	✓	✓	✓	
	Left MPL 3	✓				✓		
2	Right MPL 3	✓	✓	✓	✓			
	Left MPL 3	✓		✓	✓			
3	Right MPL 2	✓		✓		✓		
	Left MPL 2	✓		✓		✓		
4	Right MPL 4	✓	✓	✓	✓			✓
	Left MPL 4	✓	✓	✓	✓			✓
5	Right LPL 3	✓	✓	✓		✓	✓	
	Recurrence of left LPL 3	✓*	✓	✓		✓	✓	

1: Trochlear block recession, 2: Desmotomy, 3: Imbrication, 4: Tibial tuberosity transposition, 5: Patelloplasty, 6: Patellar antirotational suture, 7: Proximal tibial osteotomy
*Adjust the recessed groove

Diagnostic plan and results

All dogs received radiographic examination of the pelvic limbs in order to ruleoutother problems including hip disease and osteoarthritis. The dog numbers 1, 2, 4, and 5 were further examined for pelvic limb deformity by using computer tomography. Tibial torsion was found in the 4th dog. Hematology was also used to screen for health status before surgery. All dogs had normal values of hematological parameters throughout the study.

Treatment

All stifle joints were operated in order to provide stability. The operation was performed on each joint 1-3 months apart in each dog. Synovitis and cartilage erosion of femoral groove and patella were recorded (Figure 1). Surgical procedures for each stifle joint was shown in table 2.

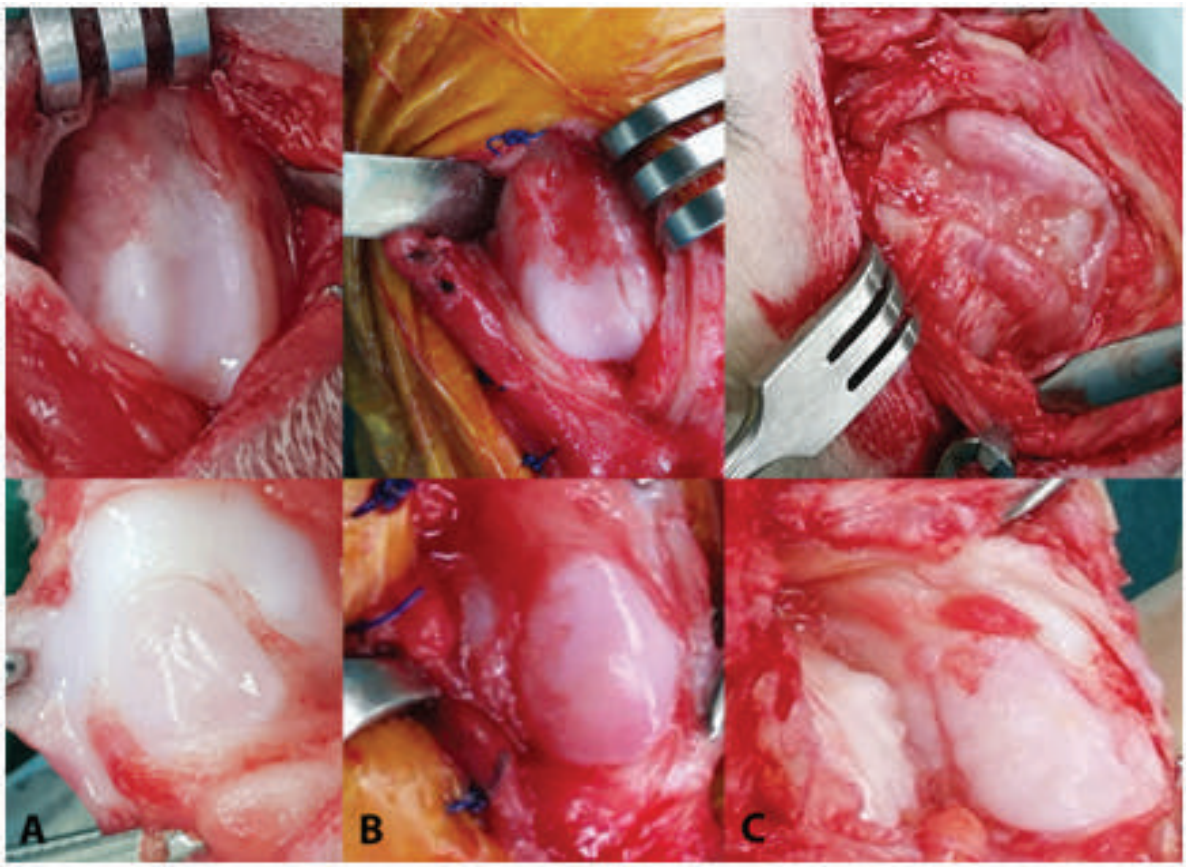

Figure 1. Femoral groove and patellar lesion of the dog numbers 2, 4, and 5

Treatment outcome and follow up

All dogs received cefazolin (25 mg/kg) for 7 days and carprofen 2.2 mg/kg bid for at least 2 weeks in combination with PCSO-524® 1 bid for 2 weeks then the dosage was reduced individually after surgery. The dogs were restricted to short leash-walks for 6 weeks and they were evaluated for pain and limb use at 2, 4, 6, 8, 10, and 12 weeks after surgery. Rehabilitation were assigned in all dogs until they had normal limb function and muscle mass. Lameness score and surgical procedures were shown in table 3.

Case 1: The operation was performed on each stifle joint at 11 weeks apart. The dog was able to bear his weight at 2 weeks after surgery.Ultrasound therapy of stifle joint and quadriceps muscle was used for rehabilitation together with treadmill walking once a week. The dog was able to use his legs normally within 4 weeks after surgery. Both patellae were in the normal position without crepitation when flexed and extended and range of motion became normal. However, muscle atrophy of both limbs remained until the 10th week after surgery andthe muscle tight became normal at 12 weeksafter rehabilitation. Radiographic images were taken approximately 1 year after surgery to follow up any bone change (Figure 2).

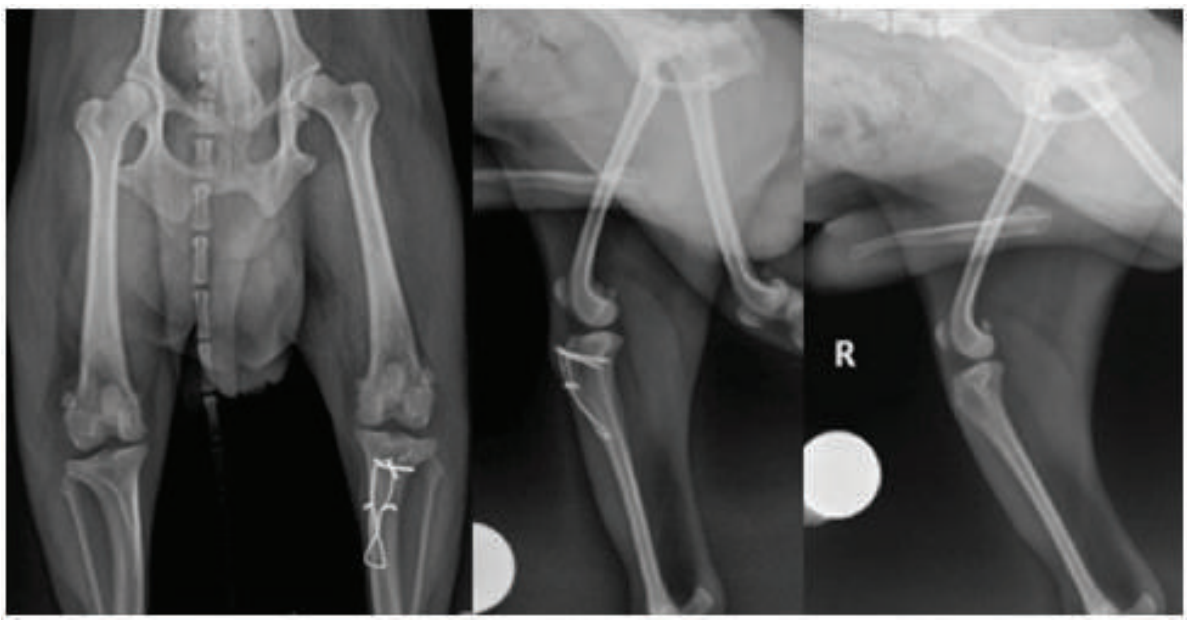

Figure 2. Radiographic images of the 1st dog after after surgery on the 2nd limb for 1 years.

Case 2: The operation was achieved on eachstifle joints at 11 weeks apart (right and left). Two weeks after the operation on each leg, the dog was able to bear his weight and rehabilitation was started with ultrasound therapy in combination with balancing exercise and treadmill walking once a week. The dog was able to use the right and left legs normally without pain at 3 and 4 weeks after surgery on each leg, respectively. Rehabilitation was continued for 12 weeks after the operation of the 2nd leg (left). The dog was assigned to treadmill walking at home every day. Left patella was in the femoral trochlear groove without crepitation when flexed and extended. Both stifle joints had normal range of motion, but muscle atrophy of right limb remained until the 6th week after surgery. There was slight crepitation of the right stifle joint when stifle in extension with some degree of patellar subluxation to medial direction. The dog received alternate administration of glucosamine/chondroitin sulfate (Synoquin®) 1 sid and PCSO-524® 1 sid daily for 3 months. Right patella became stable without crepitation at 47 weeks after surgery.

Case 3: The operation was performed on each of stifle joints at 12 weeks apart (right and left). Two weeks after the operation on each leg, rehabilitation was started withlaser to reduce pain in combination with balancing exercise and weight training once a week. The dog was able to bear his weight without lameness at 4 weeks after surgery on each leg. The patella was in the normal position without crepitation when flexed and extended. Range of motion was normal without pain when palpation. The quadriceps muscle of right leg was slightly tight,so ultrasound therapy was particularly applied on this area for 2 more weeks until normal. The rehabilitation was continued for 8 weeks after surgery of the 2nd leg; however, left tight muscle showed slightly less circumference (14.5 cm) when compared to that of the right limb (15 cm).

Case 4: The dog suffered from grade 4 MPL with distal tibial torsion. The surgery was started on the right stifle joint and bandage was applied for 3 days. Rehabilitation consisting of ultrasound therapy and balancing exercise was started at 2 weeks after surgery and scheduled every 2 weeks. The dog was unable to fully bear weight norextend the stiflejoint and the muscle remained atrophy since prior to the operation. Four weeks after surgery, the weight bearing and range of motionwerebetter, but Achilles tendon had slightly lost flexibility. Internal rotation of the foot was found. The patella was in the femoral groove without crepitation when flexion or extension the stifle joint. The muscle circumference had increased by the 4th week after surgery. The weight bearing of the right leg was improved at 8 weeks after surgery, but left leg became worse. Therefore, surgery was appointed on left stifle joint.She could bear weight on left leg at the first week after surgery with good improvement and the rehabilitation was started. The limb function was improved but external rotation still slightly remained and stretching of both hock joint while walking was observed occasionally at 4 weeks after surgery.At this point, the dog was able to partially stretch the left stifle joint and left quadriceps muscle was tight. Radiographic images of the operated joint were taken before and 1 month after the left leg operation (Figure 3). At 10 weeks after surgery of the 2nd leg, the right leg had normal alignment, joint angle, and limb function with improvement of muscle mass. However, muscle atrophy and external rotation of the left leg slightly remained. Hydrotherapy was started at this point.

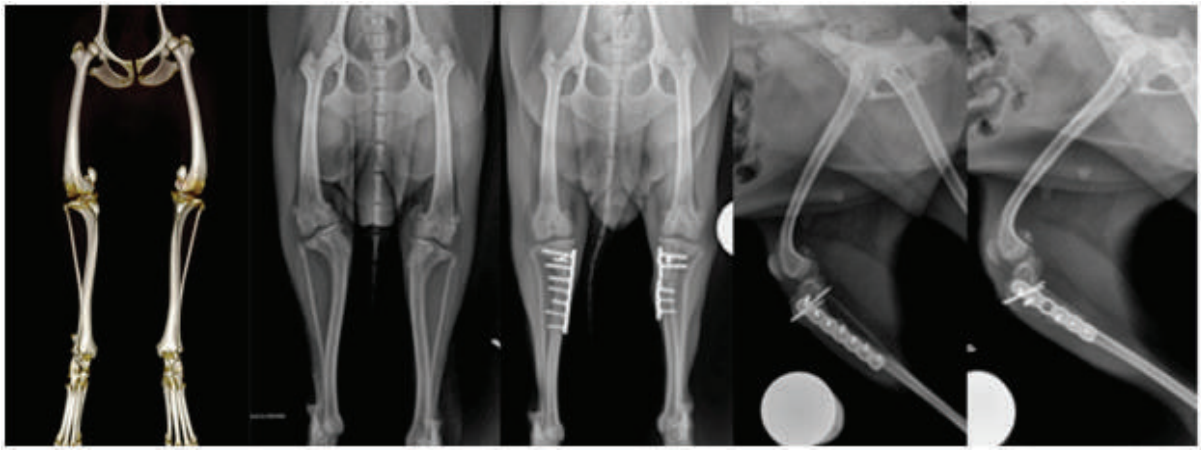

Figure 3. 3D and radiographic images of the 4th dog before and 1 month after surgery on the 2nd limb for 1 months

Case 5: The dog could bear weight at1 week after surgeryof left stifle joint. Rehabilitation also started at that timewith alternate use of laser and ultrasound therapy and electrical stimulation was applied 1-2 times per week. The patella was in the normal position with slightly crepitus found when flexed and extended stifle joint at 2 weeks after surgery. Limited stiflein flexion and pain when stretching was indicated. She could not bear weight on the right hind limb so surgery was planed to prevent excess weight bearing on the left stifle joint. Weight bearing obviously improved at 1 week after surgery. Both patellae were in the normal position with slightly crepitus found on left stifle in flexion and extension at 2 weeks after surgery on the right stifle joint and range of motion became normal at 3 weeks after surgery.The left patella showed slightly medial patellar subluxation while stretching which resumed normal at4 weeks after surgery. The dog had normal limb function and range of motion at 6 weeks after surgery. The patellae were in the normal position butslightly crepitus found when flexed and extended left stifle joint. At 17 weeks after surgery of the 2nd leg, the dog had normal limb function with mild lameness of the left leg at trot, crepitation still found when flexed or extendedleft stifle joint, muscle mass and range of motion fully recovered. The dog received 1 sid of PCSO-524® every day.

Table 3. Preoperative and postoperative lameness scores and PCSO-524® use in each dog

Dog No	Patellar status	Lameness score* (Week)							PCSO-524® Treatment
		0	2	4	6	8	10	12	
1	Left MPL 3	3	2	0	0	0	0	0	Continued until present
	Right MPL 2	2	1	0	0	0	0	0	
2	Right MPL 3	2	2	1	0	0	0	0	1 sid for 3 months
	Left MPL 3	2	2	0	0	0	0	0	
3	Right MPL 2	2	2	1	0	0	0	0	Throughout 7 months
	Left MPL 2	1	1	0	0	0	0	0	of treatment
4	Right MPL 4	3	2	2	1	1	1	0	1 bid for 6 weeks then
	Left MPL 4	3	2	2	1	1	0	0	1 bid for 3 months
5	Recurrence of left	3	3	2	2	1	1	1	1 bid until present
	LPL 3 Right LPL 3	3	2	1	0	0	0	0	

*Lameness score 0: No lameness; 1: Mild lameness, normal at walk with mild lameness at trot; 2: Moderate lameness, lameness at walk and increased lameness at trot; 3: Severe lameness; 4: Non-weight bearing lameness (Hazewinkel et al., 2008)

Discussion

Patellar luxation is a common problem especially in small breeddogs (2). It causes impaired limb function, abnormal walking, lameness, and muscle atrophy. Patellar luxation results in synovitis andpatellar mal-tracking leading to cartilage erosion, osteoarthritis, and severe chronic pain (3). A previous study reported that cartilage lesions were found on both patella and femoral trochlear ridge in dogs with patellar luxation (4). Treatment is aimed to re-establish patella on the femoral trochlear sulcus and to provide joint stability. Rehabilitation is provided to restore muscle and joint function while PCSO-524® is used to reduce joint inflammation. Three dogs in this study received PCSO-524® in combination with NSAIDs prior to the operation because of pain, which was decreased after the administration. The outcome of the surgical treatment was favorable in all dogs. Patellae were in the normal position, the limb function was improved compared to that before the operation and range of motion was normal. The surgical treatment contributed to the decreased chance of osteoarthritis developed from abnormal grinding of the patella. Onestifle joint had slightlycrepitus at flexion and extension because ofprevious recurrent patellar luxation and severe osteoarthritis. All stifle joints in this study had cartilage abrasion caused by the abnormalwearof patella and femoral trochlear grooveindicating chronic osteoarthritis. Roy et al found that osteoarthritis could occur even the surgical treatment was performedin dogs with patellar luxation(5). Inflammation of joint disease and osteoarthritic pain should be concerned. Therefore, the dogs in this study received PCSO-524® in combination with NSAID, but NSAID was only used for a short period of time. NSAIDs are contradicted for long-term use due to their side effects. PCSO-524® is therefore an appropriate alternative option in osteoarthritic animals. It can be used for long period without adverse effects. It is consisted of eicosapentaenoic acid (EPA) anddocosahexaenoic acid (DHA), which are omega-3 fatty acids that can prohibit the inflammatory mediators (6-7). Another component of PCSO-524® is eicosatetraenoic acid (ETA), which attaches to active binding site of the enzymes that use arachidonic acid as substrate resulting in anti-inflammatory property of PCSO-524® (6, 8).

Conclusion

Treatment of patellar luxation is aimed to stabilize the extensor mechanism of the stifle joint, to re-establish normal limb function, and to prevent the development of osteoarthritis from abnormal wear of patella and femoral trochlear ridge. Rehabilitation is provided to restore muscle and joint function as well as neutraceutical i.e. PCSO-524® is used to decrease joint inflammation and to manage osteoarthritis caused by patellar luxation.

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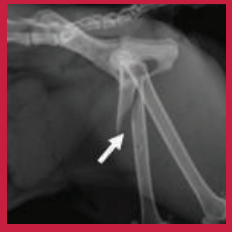
Case Report : Effect of PCSO-524® Supplement on Inflammation and Pain Control and Its Safety for Orthopedic Surgery in Pregnant Cats



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Abstract

Bone fracture is common in stray cats. It can cause severe pain and requires surgical treatment. Use of non-steroidal anti-inflammatory drugs (NSAIDs) or opioid drugs is common for control of pain from bone fracture. However, adverse effects are frequently reported for NSAIDs and opioid use. Objective of this study is to evaluate anti-inflammatory and pain-relieving effects and safety of PCSO-524® (Antinol®)for bone surgery in pregnant cats. Radiographic examination identified spiral fracture of femur of a cat. Orthopedic surgery, external skeleton fixation (ESF), was performed. Intramuscular injection of Tramadol2 mg/kg was given before the operation. Post-operative medication included amoxicillin/clavulanicacid (Synulox®, Zoetis) 8.75 mg/kgfor 4 consecutive days to prevent infection and oral administration of PCSO-524® 50 mg (Antino®, DKSH (Thailand)) 1 capsule sid throughout the treatment. Follow-up at 14 days after the operation found that the cat was able to bear weight, had increased appetite and gained body weight. Gestation was diagnosed on day 30 of the treatment and cesarean operation was performed on day 56. It took 67 days after external skeleton fixationoperation that the fracture was completely healed. The cat was able to normally bear weight on hind limbs and nurturing kittens after the removal of ESF and the cesarean delivery, respectively. It was concluded that PCSO-524® (Antinol®) was effective for controlling of inflammation and pain of tissue surrounding the fracture followingexternal skeleton fixationoperation in cats without causing fetal malformation or irregular blood clotting during the operation.

Keywords: PCSO-524®, gestation, spiral fracture, external skeleton fixation

Introduction

Cats often hide their pain and do not show clear symptoms of pain. Severe pain caused by bone fracture is usually found in stray cats hit in a car accident. This type of fracture must be treated immediately to restore normal function of the body.

Fifty percent of bone fracture occur at long bones, especially the leg bones (8). Surgical treatment for repairing bone fracture depends on type of fracture and severity of the fracture. Complications following bone surgery using plate or pin occur at 5.2% in cats (8). External skeleton fixation is a surgical technique that does not cause much damage to blood vessels and muscle surrounding the bone fracture. Cats underwent this surgical technique can bear weight rapidly (10) and there has never been a report of nonunion in cats.

Use of Non-steroidal anti-inflammatory drugs (NSAIDs) to reduce pain and inflammation in cats usually causes side effects including stomach ulcer, increased kidney function as indicated by blood parameters, and physiological change of maternal-placental unit in pregnant animals. Pregnant animals have less motility of gastrointestinal tract, and increase of total lipid, blood albumin, hepatic enzymes, and glomerular filtration. These physiological changes alter pharmacokinetics of drugs and their absorption. Therefore, NSAIDs are contradicted in pregnant animals due to transfer of the drugs to fetus that may cause fetal malformation. Another important side effect of NSAIDs is impaired platelet function causing prolonged or delayed blood coagulation during or after the delivery (2).

Nutraceutical PCSO-524® (Antinol®) is an alternative to NSAIDs, of which the use is limited, for controlling inflammation. PCSO-524® (Antinol®) is New Zealand green-lipped mussel extract consisting of eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), and over 90 essential fatty acids that are effective against the release of inflammatory mediators (5). Its safety for veterinary use has been reported. Objective of this study is to evaluate anti-inflammatory and pain-relieving effects and safety of PCSO-524® (Antinol®) use for bone surgery in pregnant cats.

Case history

A female intact, stray, domestic short hair cat was hit by a car approximately 1 week ago. The cat refused assistance after the accident by showing aggression and hiding so transferring to veterinary hospital was not possible until it was too weak to resist the capture.

Physical examination

On the first day of admission (28th of July 2017), the cat showed sign of depression and aggression. Physical examination found 10% dehydration, CRT higher than normal (>2 sec), normal body temperature (100.5 °F), normal heart sound, normal heart rate (120 bpm) and respiratory rate (26 bpm), fine crepitation lung sound, normal body condition score (BCS 3), and none of abdominal or urinary bladder distention. The cat's left hind leg was not able to bear weight at walk. Palpation at the leg found a closed fracture and swelling of tissuesurrounding the fracture but deep pain was normal. Further examination using radiographic imaging and hematological test were performed. The cat was then admitted for surgical treatment.

Radiographic and laboratory examination prior to the operation

Radiographic images (Figure 1A and 1B) indicated a spiral fracture of the proximal femur that needed surgical treatment. Hematological examination found high white blood cell count from inflammation and infection and mild anemia. Blood chemistry test showed that ALT was slightly higher than normal.

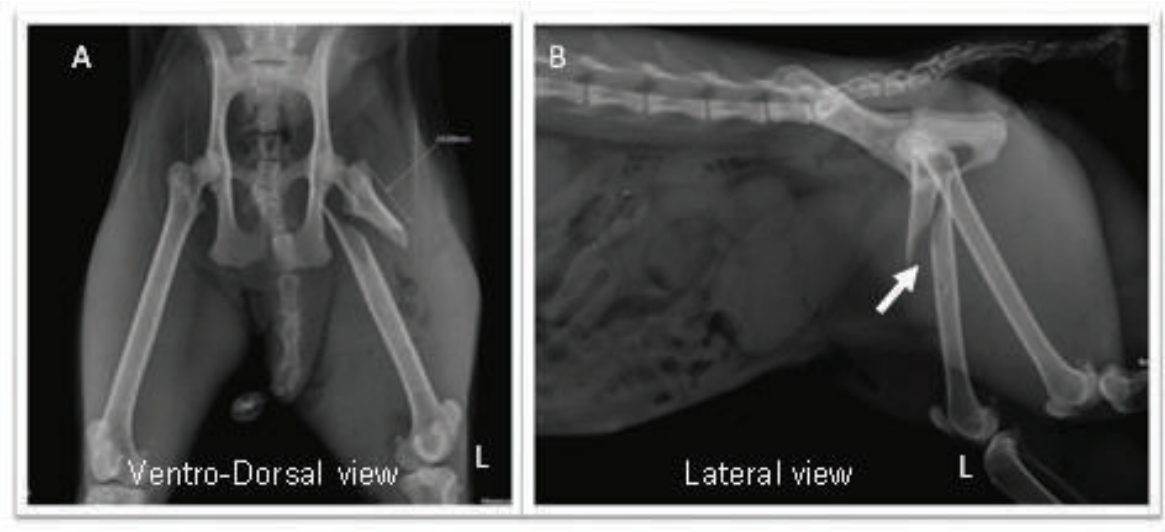

Figure 1. Radiographic images on day 0 (28th of July 2017) showing left spiral fracture at proximal femur (B) and the distance of 24 mm between Greater Trochanter and the fracture (A)

Table 1. Hematological and blood chemistry examination on day 0 (28th of July 2017)

Test (unit)	Normal range	Day 0
CBC		
RBC (x10^6 per ul)	5.0-10.0	5.21
Hb (g/dl)	9.8-15.4	8.4
Hct (%)	26-47	27.5
Platelet (10^3 per ul)	300-800	325
WBC (10^3 per ul)	5.5-19.5	28.9
Neutrophils (%)	45-64	90.3
Eosinophils (%)	0-4	1.7
Lymphocyte (%)	1.5-7.0	7.3
Monocyte (%)	0-5	2.4
Serum chemistry test		
BUN (mg%)	19-34	24
Creatinine (mg%)	0.9-2.2	0.8
ALT (u/l)	25-97	490
ALK (u/l)	0-45	23

Treatment and treatment outcome

Medication provided to restore body condition prior to surgical treatment consisted of amoxicillin/clavulanicacid (Synulox®, Zoetis) 8.75 mg/kg, PCSO-524® (50 mg, DKSH (Thailand)) 1 capsule sid and Samarin(Samarin 70®, Berlin Pharmaceutical Industry) ½ tablet bid.

The cat body condition was ready for the orthopedic surgery on day2 (30th of July 2017) of the treatment. The distance between the fracture at the proximal femur and the greater trochanter was 24 mm, which was not sufficient for installing 3 plates and screws. Additionally, the cat was diagnosed as mild anemia, which was a concern for surgical treatment. Non-invasive technique, external skeleton fixation, therefore was selected for the operation. Pre-medication for the operation included intramuscular injection of atropine-xylazine, amoxicillin/clavulanicacid (Synulox®, Zoetis) 8.75 mg/kg and Tramadol2 mg/kg for pain control. Anesthesia induction, Zoletil®, was used before inhalation of anesthetic drug, isoflurane. The operation took approximately 45 minutes. Recovery after the operation was normal and the cat was admitted at the veterinary hospital until cesarean delivery and removal of the fixation.

Post-operation medication consisted of amoxicillin/clavulanicacid (Synulox®) and oral administration of 1 capsule of PCSO-524® (Antinol®) sid. Cold compression was applied for 3 days consecutively after the operation. Wound dressing was scheduled daily to minimize the chance of getting infection around the external pin.

Nine days after the operation, the cat showed less panic attack, starting self-grooming, less isolation, increased water and diet appetite and body weight gain.

Thirty days after the operation (27th of August 2017), weight bearing of hind limbs was improved, and the cat's body weight was drastically increased. Physical examination found abdominal enlargement and fixation instruments remained steady in place. There was no loosen pins and no signs of infection around the pins. X-ray examination found that the bone healing was promising and no signs of infection (Figure 3). The x-ray images also showed skeletal structure of 4 kittens, of which heart beat was confirmed later by ultrasound examination (Table 3). Gestation was diagnosed and PCSO-524® (Antinol®) 1 capsule sid was continued for inflammation and pain control during the gestation period.

Fifty-six days after the operation (23rd of July 2017), the cat was restless, lost appetite, and was showing sign of pushing for delivery. The veterinarian decided to perform cesarean section to avoid chance of dystocia due to malfunctioned hind limbs of the cat. Spaying was performed in the same operation. Premedication included intramuscular injection of amoxicillin/clavulanicacid (Synulox®) and Tramadol. Anesthesia induction medication was Zoletil®, and the inhalation anesthetic drug was isoflurane. The operation used midline incision technique and gave satisfied outcomewhich 3 out of 4 kittens survived. Hematological and blood chemistry test showed normal values (Table 2).There was no excessive hemorrhage or delayed blood coagulation during and after the operation. Administration of nutraceutical supplement, PCSO-524® (Antinol®),1 capsule sidwas continued after the operation.

Sixty-seven days after the operation (4th of October 2017), weight bearing of the hind limbs was improved. X-ray examination showed sufficient bone healing (Figure 5). An operation for removal of fixators was done using Zoletil® as anesthetic drug. After the operation, weight bearing was normal.

Radiographic and laboratory examination after surgical treatment

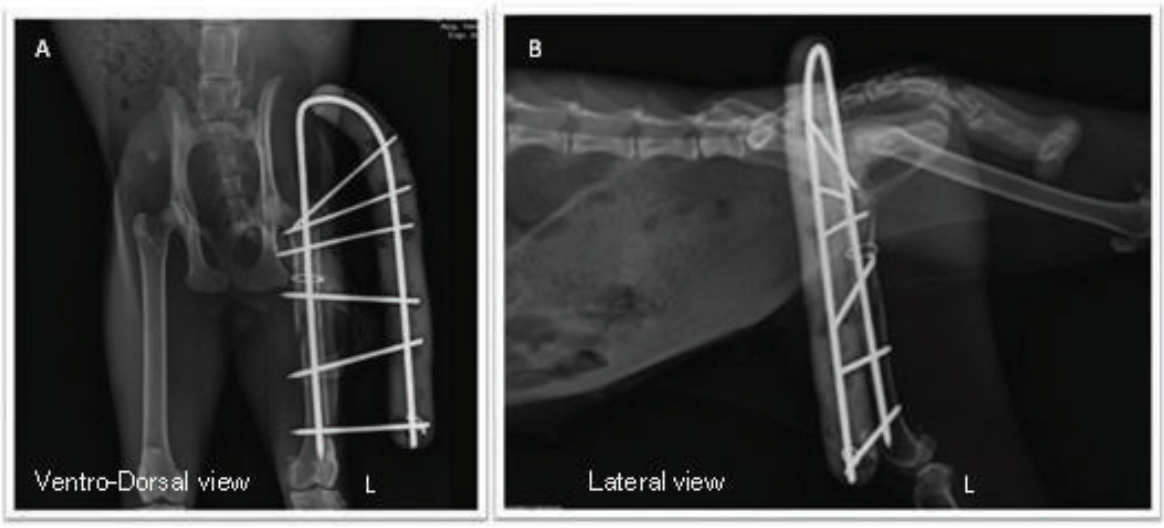

Figure 2. Radiographic images 2 days after operation (30th of July 2017)

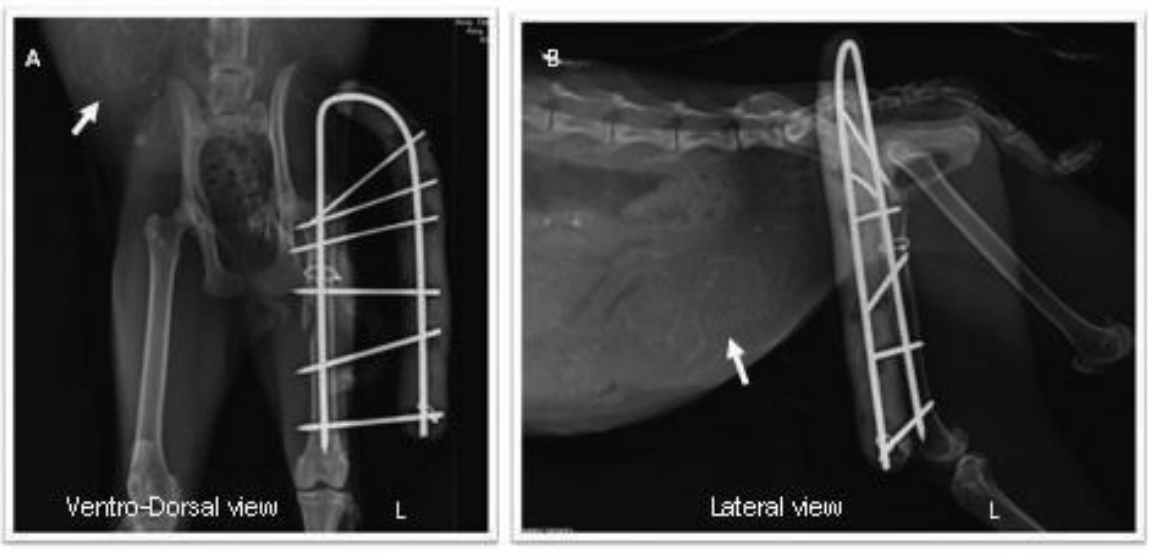

Figure 3. Radiographic images 30 days after operation (27th of August 2017) showing bone healing at the fracture and skeleton of fetuses (arrow)

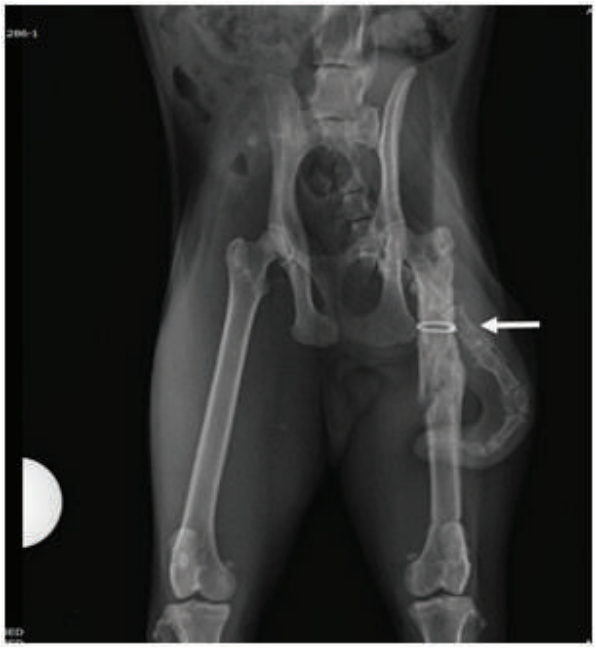

Figure 4. Radiographic image 67 days after operation (4th of October 2017) showing secondary bone healing at the fracture line

Table 2. Hematological test results

CBC (unit)	Normal range	Day 0 (28/7/17)	Day 35 (1/9/17)	Day 56 (23/9/17)
RBC (x10^6 per ul)	5.0-10.0	5.21	5.22	6.70
Hb (g/dl)	9.8-15.4	8.4	7.9	10.1
Hct (%)	26-47	27.5	26.1	32.4
Platelet (10^3 per ul)	300-800	325	634	551
WBC (10^3 per ul)	5.5-19.5	28.9	15.1	17.3
Neutrophils (%)	45-64	90.3	77.9	60.6
Eosinophils (%)	0-4	1.7	9.1	4.3
Lymphocyte (%)	1.5-7.0	7.3	8.3	5.2
Monocyte (%)	0-5	2.4	3.8	4.4

Table 3. X-ray and ultrasound examination results

Diagnostic method	Day 0 (28/7/17)	Day 30 (27/8/17)	Day 56 (23/9/17)
X-ray	Left Spiral fracture at proximal femur	Secondary bone healing at fracture line	Bone union
Ultrasound		Found fetus	

Discussion

External fixation was appropriate for nearly all types of bone fracture. A study of Worth (2007) showed that the average time for bone healing that fixator could be removed was 7 weeks (5-12 weeks) in cats depending on type of fracture, damage of blood vesselsand complications. In this case study, we were able to remove the fixator 9 weeks after the operation, which was within normal time range reported by the paper.

Non-steroidal anti-inflammatory drugs (NSAIDs) and drugs in opioid group are effective for pain control before and after operation. Tramadol, an opioid drug, is effective pain control in cats and not costly. Adverse effects of Tramadol are reported in cats, for example, dilated pupil, vomiting, and excessive saliva. Use of Tramadol during early gestation can increase the risk of having cardiovascular disorders by 1.56 times (2). However, there is no report on adverse effects of Tramadol in animals. Since the gestation was diagnosed during the hospital admission, NSAIDs use for pain and inflammatory control was limited. Diet supplement containing omega 3 was an appropriate alternative for controlling inflammation. Omega 3 is safe for use in pregnant animals andcontains fatty acid essential for cats during gestation and lactation by enhancing neurological system and visibility of the fetus (6). Oil extract from New Zealand Green-lipped mussel (Perna canaliculus); PCSO-524® (Antinol®), was used throughout the treatment to control inflammation and support the pregnancy. A study of PCSO-524® (Antinol®) safety in cats used the supplement at double and triple size of what recommended for 28 days and found that hematological and blood chemistry values and physiological functions were normal (7).

A comparison study of fish oilandPCSO-524® for treatment of osteoarthritis in 66 dogs that received the supplement for 24 weeks found that serum WF6, biological marker for osteoarthritis, was significantly decreased in dogs received PCSO-524® when compared to dogs received fish oil since the second week of the treatment (9). The dog that received PCSO-524® also showed better weight bearing while there were no changes observed after 12 weeks of treatment in dogs received fish oil (9). In this study, the cat was able to bear weight since the second week of the operation.

Self-healing of the bone occurs after bone trauma by a mechanism similar to embryogenesis of infants. At the early stage after bone fracture, there is an inflammatory mechanism called cyclooxygenase activity that can be affected by use of NSAIDs resulting in delayed fracture healing process (1). Mechanism of bone healing is complicated and consists of a process that needs lipid mediators to regulate bone homeostasis and regeneration. A lipid mediatorderived from omega 3 is Resolvin E1 (RvE1), which has anti-inflammatory effect and inhibits osteolysis during the inflammation (1, 8). Our study showed that PCSO-524® (Antinol®) is effective for bone healing and safe for use in pregnant cats without causing any malformation of fetus or other adverse effects after the operation.

Conclusion

Diet supplementation with PCSO-524® (Antinol®) is effective against inflammation of the tissues surrounding bone fracture after the external fixation operation in cats. It is safe for use in pregnant cats without causing any malformation of fetus or blood clotting disorder.

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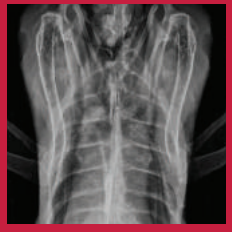
Case Report : Effects of New Zealand Green-Lipped Mussel Extract (PCSO-524® (Antinol®) for Treatment of Exertional Rhabdomyolysis in Fighting Cocks



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Abstract

A fighting cock aged 2 years suffered from excessive exercise. The clinical symptoms were flaccid paralysis, inability to stand, and head dropping. Hematological test showed that Creatinine kinase (CK) and Aspartate transaminase (AST) was 50 and 10 times higher than normal, respectively. Exertional rhabdomyolysis was diagnosed. Treatment plan included intensive care in conjunction with extract from New Zealand green-lipped mussel (PCSO-524®). The treatment outcome was satisfied, and the cock was able to restore normal condition and daily activities within 9 days.

Keywords: Capture myopathy, exertional rhabdomyolysis, fighting cocks, PCSO-524®

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Introduction

Exertional rhabdomyolysis (ER) or captive myopathy (CM) is common in wild animals in captivity that are not properly cared, pets, sport animals, and humans (Bartsch, 1977). The disease can be referred to differently by animal species but the symptoms are common in all species. In humans, it is frequently found in sport players who practice heavy workout routine such as marathon runners. Dehydration and heat stress can worsen the symptoms, and in severe case, chronic kidney failure may occur (Clarkson, 2007). The disease also found in wild animals kept in inappropriate facilities or without proper familiarization to the facilities, and sport animals such as racing greyhounds (McNicholl, 2016) and fighting cocks. A report in humans describing efficacy omega-3 fatty acid for relief of muscle inflammation after exercise (Kim, 2014) initiated the application of PCSO-524® (Antinol®) in animals. The main ingredient of PCSO-524® (Antinol®) was antioxidants that are effective against ER in fighting cocks, for example, eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), vitamin E and fatty acids.

Case history

A fighting breeder cock aged 2 years and 2.5 kg body weight was trained for competition out of town during September-October. After being transported for training, the cock showed signs of depression, flaccid, and inability to stand. After 3 days of expressing the clinical signs, the cock was brought to the veterinary hospital.

Physical examination

Physical examination on the first day at the hospital found 200 (220-360) bpm heart rate, 54 (12-37) bpm respiratory rate, 41.5 (41.2) °C body temperature, 5% dehydration, pale mucous membrane, pale comb, CRT>3 sec, and 2/5 body condition score. The only lesion found was mouth sore that covered with yellow crust similar to pustule with a circumference of 1 cm. Palpation found no food left in the crop. Other symptoms included inability to stand, dropping head, and muscle pain when being restrained.

Diagnostic plan

Since the cock was transported from out of town and the care taker had no history of the animal, it was speculated that intensive training and excessive muscle use caused stress in the animal. Differential diagnosis included exertional rhabdomyolysis, musculoskeletal disease, and other metabolic diseases. Further examination using hematological test, radiographic image, physical examination and investigation of case history were performed to rule out following diseases or disorders; exertional rhabdomyolysis, heat stroke, metabolic diseases, fracture, blood parasites and infection.

Table 1. Hematological test results

Complete blood count (unit)	Day1	Reference*
WBC (10^3cell/mm^3)	5.2	1.2-3.0
Heterophils (%)	69	15-40
Lymphocyte (%)	24	45-70
Monocyte (%)	7	5-10
Eosinophils (%)	0	1.5-6
Basophils (%)	0	Rare
RBC (10^6 cell/mm^3)	1.94	2.5-3.5
Hemoglobin (g/dl)	8.4	7.0-13.0
Hematocrit (%)	27	22-35
Indices MCV (fl)	139.1	90-140
MCH (pg)	43.3	33.0-47.0
MCHC %	31.1	26.0-35.0
Blood parasite	Not found	

*Reference from Simaraks, 2004

Table 2. Blood chemistry test results

Blood chemistry	Day1	Day3	Day7	Reference **
CK	23235	19898	6842	235-402
AST	3556	2920	1083	255-499
Uric acid	13.9	13.4	6.7	2.5-8.1

** Reference from Miller, 2014

Muscle enzymes, AST and CK, were 10 and 50 times elevated, respectively, and uric acid was 1.5 times higher than normal

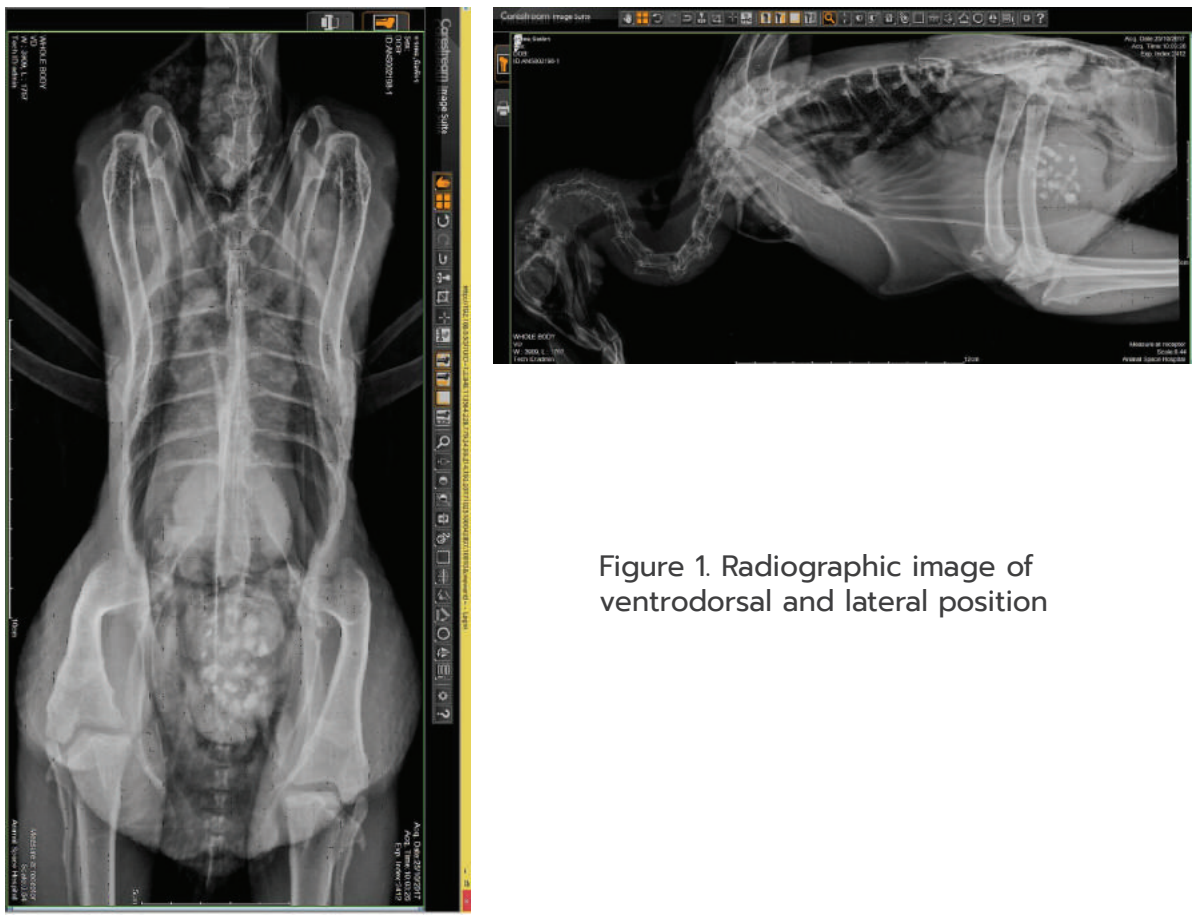

Figure 1. Radiographic image of ventrodorsal and lateral position

Fresh smear technique was used for examination of oral cavity and no parasites were found. Identification of fecal bacteria using gram stain found that the ratio of gram-positive and gram-negative was 70:30, which was normal for poultry. Fresh fecal smear did not find parasites or any parasitic eggs. Radiographic examination identified airsaculitis at caudal abdominal air sac. The image showed a pebble in ventriculus which was interpreted as normal. The final diagnosis was exertional rhabdomyolysis (capture myopathy).

Treatment and treatment outcome

On day1, the cock suffered from muscle flaccid that it could not stand, and the head was dropping all the time. Primary diagnosis was ER (CM) and airsaculitis. The treatment consisted of green-lipped extract (PCSO-524®) 1 capsule sid pc in combination with S-Adenosyl methionine (SAMe) 90 mg 1 tablet sid ac and marbofloxacin 5 mg/kg sid pc (Hawkins, 2014). Fluid therapy using 100 ml of Lactated Ringer's solution was given subcutaneously, and divided in half at each inner thigh. Liquid diet supplement, recovery formula Harison's bird food® 75 ml was given tid.

The cock showed worse symptoms of panting and open-mouth breathing on the second day. The fluid therapy was adjusted by replacing the previous program with intravascular administration of D5 ½ S 6 ml/hr, which made a total of 144 ml per day, and adding oxygen therapy using an incubator and temperature was regulated at 32 C (Lichtenberger, 2004). The nebulization used F10 solution at 1:250 concentration (Scott, 2011) twice a day.

The cock showed signs of improvement on the third day. Eating food (Chao Payu®) was observed for the first time since the admission. PCSO-524®, SAMe, and intravascular administration of fluid were continued. Iron, vitamin B12, subcutaneous injection of nicotinamide (Fercobsang) 0.5 ml were added to the treatment program. Physical rehabilitation was performed 15 min each session and 4 sessions per day to stabilize the standing and movement (McEntire, 2017). Blood chemistry values were lower than those of day1 and showed a decreasing trend.

Improvement of weight bearing was observed from day4 to day6, and the cock was able to stand briefly. PCSO-524®, SAMe, marbofloxacin, fluid therapy, and physical rehabilitation were continued. The cock was removed from oxygen cage on day6.

On day7, the cock walked more often, but postural instability occurred if standing for too long. The appetite was increased, and the cock started to crow. Similar treatment continued except for termination of fluid therapy because water and diet intake were sufficiently increased. Blood chemistry test showed decrease of uric acid from 13.9 to 6.7.

On day8 of the treatment, the cock could stand and run without showing muscle weakness. Normal water and diet intake were resumed.

The cock fully recovered on day9 of the treatment and then was discharged. Crowing was more frequent. Postural balance was normal without sign of weakness. Fluid and oxygen therapy were terminated. Oral medication was prescribed for the owner to administer at home.

Table 3. Medication and treatment program

Day	PCSO-524®	SAMe	Marbofloxacin	Oxygen	Fluid	Nebulization	Fercobsang®	Ferrus fumalate
Day1	✓	✓	✓		✓			
Day2	✓	✓	✓	✓	✓	✓		
Day3	✓	✓	✓	✓	✓	✓	✓	
Day4	✓	✓	✓	✓	✓	✓		
Day5	✓	✓	✓	✓	✓	✓		
Day6	✓	✓	✓	✓	✓	✓		
Day7	✓	✓	✓		✓			
Day8	✓	✓	✓					
Day 9 (discharged)	✓	✓	✓					
Day10-14	✓		✓					✓
Day15-23	✓							✓

Discussion

ER or CM is a common disease found in wild animals, pets, and humans (Bartsch, 1977). Sport animal such as racing horses are also affected (McGowan, 2002). There are reports of the disease in some avian species, for example, Greater Sandhill Cranes (Businga, 2007), Rhea (Smith, 2005), Emu (Menon et al.,2014), and racing pigeons (Scope et al., 2002).

Symptom of the disease is categorized into 4 stages by duration of the disease and its pathogenesis. A common lesion that is found in every stage of the disease is degeneration of muscle cells resulting in muscle infarction. Pathogenesis of the disease in mammals and poultry are similar except that the stages of the disease in poultry are not distinctively defined. When muscle infarction occurs, large amount of myoglobin and potassium are released from muscle cells into blood circulation causing renal tubular necrosis and heart failure (McEntire, 2017). In addition, excessive use of muscle causes accumulation of lactic acid. All these physiological changes could cause mortality in ER animals (Paterson, 2007). Risk factors of the disease are various and include stress, improper restraint, excessive exercise, increased body and environmental temperature, and vitamin E and selenium deficiency. Fighting cocks that are excessively trained or exercise during raining season that temperature and humidity is high are therefore at risk of exertional rhabdomyolysis.

Typical symptoms of the disease are muscle flaccid, ataxia, muscle fibrillation, and inability to move, eat or drink. Blood chemistry test usually shows significantly increase of CK and AST, and possibly increased lactic acid. Diagnosis of exertional rhabdomyolysis is based on blood chemistry test and muscle biopsy results.

Hematological test in this study found increase of white blood cell and heterophil and decreased lymphocyte, which indicated stress in the cock. Increased ratio of heterophil to lymphocyte (H/L ratio) was previously reported in chickens with stress (Singh et al., 2009). The average H/L ratio of Thai native chicken is 0.43±0.12 (Simaraks, 2004). The value of CK and AST found in this study were at least 10 times higher than normal values which indicated severe muscle degeneration. This study did not measure level of lactate and muscle biopsy was not performed due to concern that it may cause mortality during restraint or anesthesia. In addition, muscle biopsy is not recommended for final diagnosis in lived animals. The increase of uric acid during the early treatment of this case could be due to dehydration or renal tubular necrosis. Urinalysis in avian species is not practical and not performed in this study since feces, urine and urate are eliminated altogether. The final diagnosis of this case, exertional rhabdomyolysis, was based on history, physical examination and blood chemistry test results.

Principle of exertional rhabdomyolysis treatment is similar in all animal species. The treatment focuses on controlling of muscle degeneration by supplement of energy, electrolytes, and antioxidant, and stress management by providing enriched environment for the animals (Smith, 2005).

This case study used extract from New Zealand green-lipped mussel (PCSO-524® or Antinol®) that contains omega 3, which is consisted of eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), over 90 fatty acids, and vitamin E, all of which have anti-inflammatory effects (Kim, 2014). There is a report in humans showing that PCSO-524® is effective again muscle fatigue by delaying onset of muscle soreness (DOMS) after exercise (Baum, 2013, Mickleborough et al., 2015). Nonsteroidal anti-inflammatory drugs (NSAIDs) was avoided in this study due to concern of renal tubular necrosis in ER animals. Elevated uric acid in this case indicated malfunction of kidney and NSAIDs is prohibited. Alternative medication using PCSO-524® is therefore appropriate for controlling inflammation and providing antioxidant effect. From experience of the author, there has never been any adverse effects of PCSO-524® observed in exotic animals. There was a study using PCSO-524® at high dose, 300 mg/kg, in rats that did not find adverse effects on gastric mucosa and platelet coagulation.

The cock was able to resume normal activity within 9 days of intensive treatment including fluid therapy, force feeding, physical rehabilitation, diet adjustment, and PCSO-524® supplementation.


Figure 2


Figure 3

Figure 2. The cock was unable to stand on the third day of treatment
Figure 3. The cock was standing, and the comb showed brighter color

Conclusion

This case report is the first report of efficacy of the extract from New Zealand green-lipped mussel (PCSO-524® or Antinol®) for treatment of exertional rhabdomyolysis in fighting cocks. The cock was able to recover and resumed normal activities. The treatment program can be applied to animals of other species that suffer from exertional rhabdomyolysis.

Footage 1. The cock was unable to stand but able to drink water on day 3 of the treatment
https://drive.google.com/file/d/1CA0Bi3gxOOTbXHjrTkHxDNyslEX-9W3G4/view?usp=sharing

Footage 2. Normal gesture and behavior,walking, running, and spreading wings were recovered on the 8th day of the treatment
https://drive.google.com/file/d/1BCKzO1lKd6lFKNrRZBEnkPpG-jV0XWiiY/view?usp=sharing

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Antinol®
Case Study
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2017

Case Report :
Efficacy of oral PCSO-524® as an anti-inflammatory medicationin a Persian cat with pruritic skin disease.

Lerpen Duangkaew
Chaiyan Kasorndokbua
Warunya Tessarak

Abstract

This is a case report of a Persian cat with severe pruritus, which was not improved by topical external parasitic treatment, food trial and 2 months treatment with oral cyclosporine at the dose 5mg/kg. The cat developed corneal ulcer after the long-term treatment with oral cyclosporine. PCSO-524® (Antinol® Vetz Petz, New Zealand) was replaced cyclosporine as an anti-inflammation treatment and also was considered as a skin barrier support. The cause of pruritic in this case report was still inconclusive, but the skin lesions of this cat resolved after 2 months supplement with oral PCSO-524®and external parasitic treatment with oral f vluralaner (Bravecto®, MSD).

In conclusion, oral PCSO-524® (Antinol®, Vetz Petz), could be considered as an anti-inflammation and skin barrier support when the cats could not be treated with potent anti-inflammatory medications such as corticosteroid or cyclosporine. The underlying causes of pruritic skin lesions should be corrected in order to manage feline pruritic skin diseases.

Introduction

Feline pruritic skin diseases or feline hypersensitivity associated dermatoses can be manifested at least one of the following patterns: head and neck excoriations, symmetrical alopecia, eosinophilic granuloma complex, military dermatitis and scaling.[1-2] Some cats will manifest more than one clinical patterns. The underlying causes of feline pruritic skin diseases, which could be due to external parasites infestation, infections such as dermatophytes, and secondary bacterial and Malassezia infection, food allergy or atopic dermatitis (environmental allergy). The diagnosis should be made step by step by ruling out external parasites infestation first, follow by ruling out infections. If there is no improvement, the owner will be discussed about performing dietary trial with hydrolyzed protein or novel protein diets for 2-3 months. The diagnosis of feline atopic dermatitis is made by exclusion of other causes of pruritic skin diseases.[1-3]

Treatment of feline pruritic skin diseases consists of correcting the underlying causes, control 2nd infection, and use anti-inflammatory medications. The purpose of anti-inflammatory medications is to stop pruritus, which could be mild anti-inflammatory medication such as antihistamines and essential fatty acids. These two medications have synergistic effect to decrease mild to moderate pruritus.[1,2,4] Anti-inflammatory medications such as corticosteroids and cyclosporine are potent and are use for moderate to severe pruritus.[1,4] Side effects from long-term treatment with corticosteroid in cats are diabetic mellitus, cutaneous atrophy, congestive heart failure, and urinary tract infection[1,4]. Side effect from long-term use of oral cyclosporine are increased risk for viral and toxoplasmosis infection.[1,4] The benefit of skin barrier support of essential fatty acids also has been discussed as cats with defective skin barrier can predisposed to have atopic dermatitis.[1]

Antinol® (Vetz Petz, New Zealand) is a dietary fatty acid supplement made from New Zealand green-lipped mussel (Perna Canaliculus) which contains PCSO-524®. The main active ingredients are omega 3 fatty acids include eicosatetraenoic acid (ETA), eicosapentaenoic acid (EPA) and docosahexaenoic (DHA). It has anti-inflammatory effect due to these omega3 fatty acids can compete with arachidonic acid through lipooxygenase (LOX) and cyclooxygenase (COX) pathways resulting in decreasing inflammatory mediators: leukotrieneB4 and prostaglandin E2 and increasing less potent inflammatory mediator leukotrieneB5 and prostaglandin E3.[4,5] This medication is regularly used as an adjunct anti-inflammatory medication with non-steroid anti-inflammatory medications for arthritis.[5,6] This medication also has linoleic acid (omega6 fatty acid), which is the main ingredient of skin barrier.[4]

Case report
History:

An eight years old, male intact, Persian cat weight 4kg, presented for dermatology clinic for consultation. The cat was treated with the problem of pruritic skin disease with crusting lesions at face, both back legs, and lateral aspect of hips and entire tail for the past 3months. The referring vet found intracellular cocci bacteria and inflammatory cells with degenerated neutrophils and eosinophils from skin cytology. Trichogram was negative for demodectic mange. Dermatophyte culture was negative. The cat was tested for feline immunodeficiency and leukemia virus and was negative. His blood work was with in normal limits.The referring vet started treatments with topical external parasitic control with 10% imidacloprid and 1% moxidectin(Advocate®, Bayer) every 2weeks for 4 doses. The cat was given cefovecin (Convenia®, Zoetis) injection at the dose 8mg/kg every 2 weeks for 2 injections, then the systemic antibiotic was changed to oral doxycycline 5mg/kg daily for 6 weeks in order to control secondary bacterial infection. The last dose of oral doxycycline was finished 1 month before referral. The cat was fed hydrolyzed protein (Z/D®, Hill's prescription diet) for 3months with no improvement. Due to severe pruritic, after one month of food trial, the cat was given oral cyclosporine (Atopica®, Elanco) at the dose 5mg/kg daily for 2 month, with oral prednisolone at the dose .5mg/kg SID for the first 2 weeks when starting oral cyclosporine. Referring vet noticed that the skin lesions and pruritus of this cat were not improved during the period of 3 months with restricted dietary trial and the treatment with daily oral cyclosporine at the dose of 5mg/kg. The cat was suspected to have atopic dermatitis, and was referred to get intradermal or serology test in order to start allergen specific immunotherapy.

Physical examination:

On the first day at dermatology clinic, the cat had crusting lesions at forehead, back legs and tail and brown debris in both ears.

Diagnostic tests:
Skin biopsies:

were performed at face lesions and back legs in order to rule out another causes of crusting and pruritic skin diseases.

Skin cytology:

revealed degenerated neutrophils with nuclear streaming. There was no intracellular bacteria.

Ear cytology:

was positive for Malassezia organism.

Trichogram:

was negative for demodectic mange.

Ear cytology:

was negative for dermatophyte.

Treatment plan:

The owner was discussed about the differential diagnosis for feline pruritic skin diseases, which could be due to allergies (flea, food, environmental) or external parasites infestation. The cat was on dietary trial for 3moths with no improvement and was on topical 10% imidacloprid and 1% moxidectin (Advocate®, Bayer) every 2weeks for 4 doses. The owner agreed to get skin biopsied in order to rule out other causes of crusting skin lesions. During the pending period for histopathological result, the owner was recommended about the treatment with oral fluralaner (Bravecto®, MSD) 112.5mg at the dose of 28mg/kgin order to rule out Demodex gatoi. The owner was discussed about extra-label treatment for this medication.

In order to control secondary bacterial and Malassezia infection,the owner was instructed to use topical 3%chlohexidine, climbazole and phytosphygosine wipe (Douxo PS® wipe, Dechra) to clean crusty areas daily.

For the anti-inflammation, the cat was continued with oral cyclosporine at the dose 25mg (5mg/kg) daily.

One week later, the owner brought the cat to the ophthalmology clinic for severe inflammation of the left eye. The conjunctiva tissue was inflamed (chemosis) and there was a small corneal ulcer at right upper corner of the left eye. The cat was tested for herpes virus by conjunctiva swab, and was treated with systemic doxycycline 5mg/kg orally twice a day for 4 weeks with topical Terramycin eye ointment. Famciclovir was started with dose 125mg orally twice a day until getting the result of conjunctiva swab. Oral cyclosporine was discontinued for possible viral infection, and oral PCSO-524® (Antinol®, Vetz Petz) was added as anti-inflammatory medication and skin barrier support. The dose is one capsule per day. The cat was continued with daily topical cleaning with Douxo PS® wipe. The owner also discontinue feeding hydrolyzed protein® (Z/D diet,Hill's prescription diet) and the diet was changed to Hair and skin care diet®by Royal canin.

Skin biopsy result:

Chronic hyperplastic and perivascular dermatitis with suppurative epidermitis. Special stain for deep mycotic infection (PAS stain) was negative.

PCR test:

for herpes viral infection was negative.

One month recheck after discontinue oral cyclosporine and daily supplement with oral PCSO-524® (Antinol®, Vetz Petz), and 4 weeks of oral doxycycline 5mg/kg twice a day, the skin lesions was 50% improved with mild crusting lesion at forehead. Both ear canals had mild debris. The owner noticed 50% less of pruritus. The owner continued with oral daily supplement with PCSO-524® (Antinol®, Vetz Petz) and daily topical cleaning with Douxo PS® wipe.

Skin cytology:

found only small amount of degenerated neutrophils with no bacterial and ear smear did not find any organism.

Two month recheck after discontinue oral cyclosporine and daily supplement with oral PCSO-524® (Antinol®, Vetz Petz), the skin lesions of this cat was completely resolved with no pruritus. The cat did not come back for recheck at the dermatology clinic, and the owner brought the cat for recheck at the referring vet. After two month of daily dose, the owner decreased the dose of oral PCSO-524® (Antinol®, Vetz Petz) to one capsule every other day due to the difficulty of giving oral medication to this cat.

Discussion:

This case report demonstrated the efficacy of oral PCSO-524® (Antinol®, VetzPetz) as an anti-inflammatory medicationand skin barrier support in the cat with pruritic skin disease.

According to the referring vet, the crusting skin lesions and pruritus of this cat, which had clinical signs of face and neck excoriation and eosinophilic granuloma, were not improved with dietary trial, topical external parasitic treatment and daily oral cyclosporine at the dose 5mg/kg. Due to the development of corneal ulcer, the cat had to discontinue oral cyclosporine and oral PCSO-524® (Antinol®, Vetz Petz) was selected as an anti-inflammation and skin barrier support. The causes of corneal ulcer, which were possibly caused by face scratching from pruritus or long-term treatment with oral cyclosporine (2 months) and subsequently decreased immune system leading to herpes viral infection. But in this case, PCR test for herpes virus was negative.

The causes of pruritus in this reported case was still inconclusive. In order to completely rule out external parasite infestation, especially Demodex gatoi,the treatment for external parasite with oral fluralaner was recommended. There were two case reports of successful treatment for feline demodicosis with oral fluralaner.[7,8]

At 2 months recheck post oral fluralaner treatment, and supplement with daily oral PCSO-524® (Antinol®, Vetz Petz) together with topical Douxo PS® wipe, the skin lesions were significantly improved. The explanation for the improvement for this cat's skin lesions could be from the treatment of oral fluralaner in order to rule out Demodex gatoi, which could be the cause of pruritic skin disease in this cat.[7,9] According to the publication, there were 13 cats infected with Demodex gatoi, whichwere successful treated with topical 10% imidacloprid and 1% moxidectin (Advocate®, Bayer) weekly for 8-10 doses.9 For this case report, the cat was applied topical 10% imidacloprid and 1% moxidectin (Advocate®, Bayer) every 2 weeks for total of 4 doses, which was not be able to control the infestation of Demodex gatoi. However, the skin biopsy result of this case did not reveal Demodex gatoi, therefore the definitive diagnosis of Demodex gatoiinfection could not be confirmed in this case. The other possibility of the improvement of the skin could be from the supplement of oral PCSO-524® (Antinol®, Vetz Petz). The picture of two months post treatment showed that the skin lesions improved significantly. The clinical improvement from oral PCSO-524® (Antinol®, Vetz Petz) could be due to its anti-inflammatory effects, combination with the skin barrier support.

In conclusion, oral PCSO-524® (Antinol®, Vetz Petz), could be considered as an anti-inflammation and skin barrier support when the cats could not be treated with anti-inflammatory medications such as corticosteroid or cyclosporine. The underlying causes of pruritic skin lesions and 2nd bacterial infection should be controlled in order to manage the pruritus in cats.

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Table1: Chemistry profile during 3months treatment with oral cyclosporine

	Results			Units	Reference
	8/21/2017	9/11/2017	10/16/2017		
BUN	13	17	26	mg/dL	16 – 36
CREA	1.0	0.9	1.1	mg/dL	0.8 – 2.4
BUN/CREA	12	18	25		
ALT	36	45	57	U/L	12 – 130
AST	26	42	36	U/L	0 – 48
ALKP	27	25	32	U/L	14 - 111

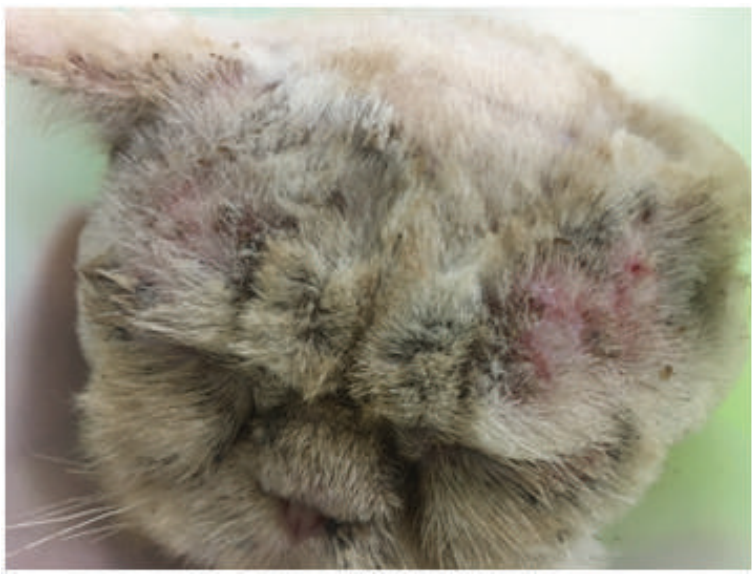
Table 2: Complete blood count during 3months treatment with oral cyclosporine

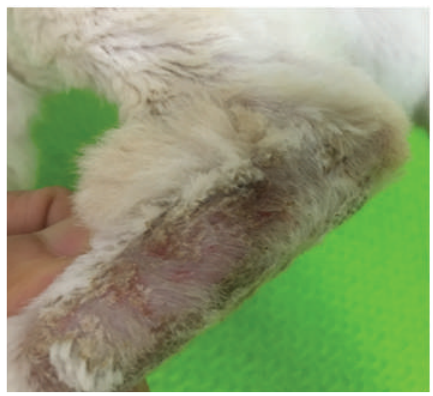
Lab Tests	Results				Units	Reference
	8/21/60	8/27/60	9/11/60	11/13/60		
Hematology						
WBC	22.0 H	16.0	14.2	17.0	x 10^3cell/mm^3	5.5 – 19.5
Neutrophil%	61.0	64.0	52.0	63.0	%	35 – 75
Band neutrophil%	2.0	0.0	0.0	0.0	%	0 – 2
Lymphocyte%	22.0	12.0 L	40.0	20.0	%	20 – 55
Monocyte%	1.0	1.0	5.0 H	1.0	%	1 – 4
Eosinophil%	14.0 H	23.0 H	3.0	16.0 H	%	2 – 12
RBC	6.89	7.28	6.38	7.11	10^6/uL	5.0 – 10.0
Hb	11.0	9.8	9.0	9.6	g/dL	8.0 – 15.0
Hct	32.9	30.0	28.1 L	29.9 L	%	30 – 45
MCV	47.1	41.2	44.0	42.0	fL	39 – 55
MCH	15.7	13.5	14.1	13.5	pg	13 – 17
MCHC	33.6	32.7	32.0	32.1	g/dL	30 – 36
RDW	16.6	17.1	17.9	17.9	%	14 – 18
PLT	256 L	350	268 L	400	x 10^3cell/mm^3	300 - 800

Morphology	Results				Units	Reference
	8/21/60	8/27/60	9/11/60	11/13/60		
Anisocytosis	Few	Few	Few	Few		
Macrocytic	Few	Few	Few	Few		
Microcytic	Few	Few	Few	Few		
Poikilocytosis	-	Few	-	-		
Schistocyte	-	Few	-	-		

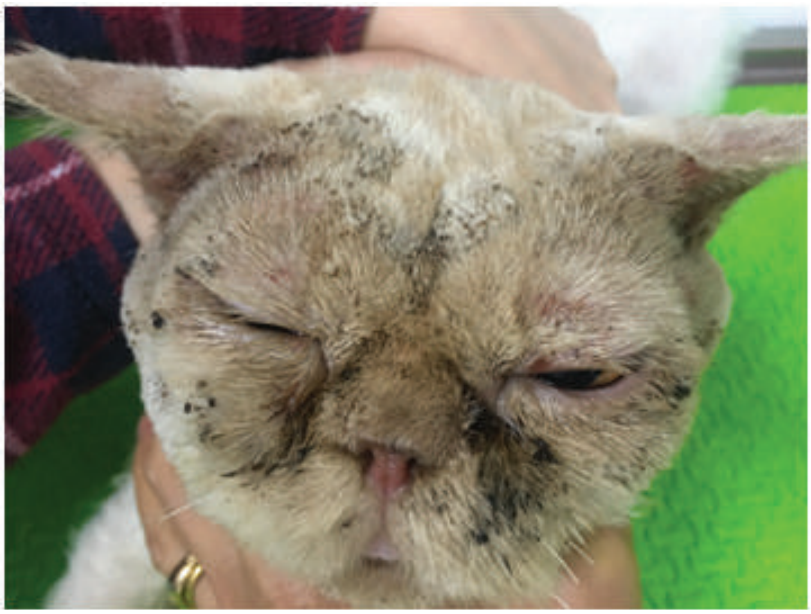
Blood parasite	Results				Units	Reference
	8/21/60	8/27/60	9/11/60	11/13/60		
Blood parasite	Not found	Not found	Not found	Not found		

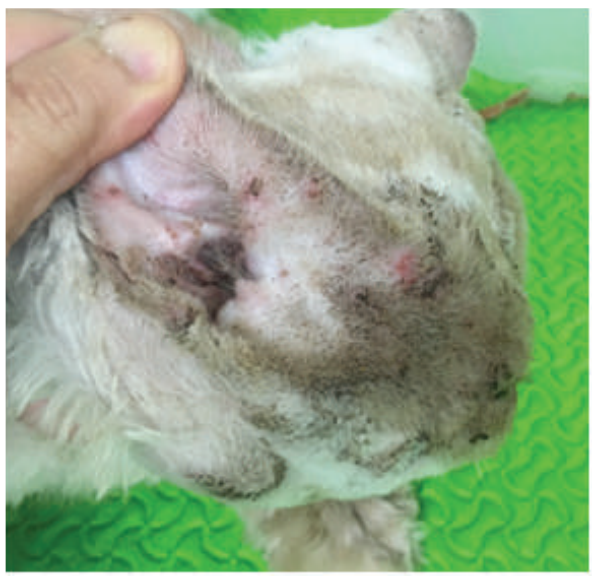
Pre treatment



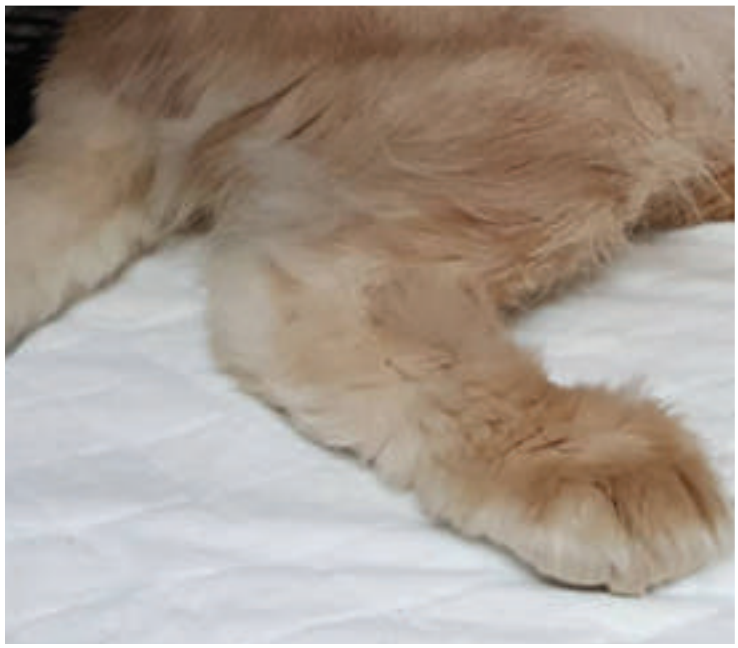


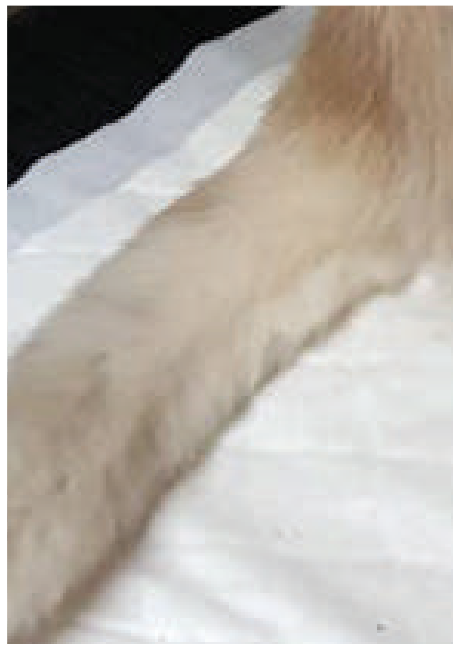
Post treatment: 1 month

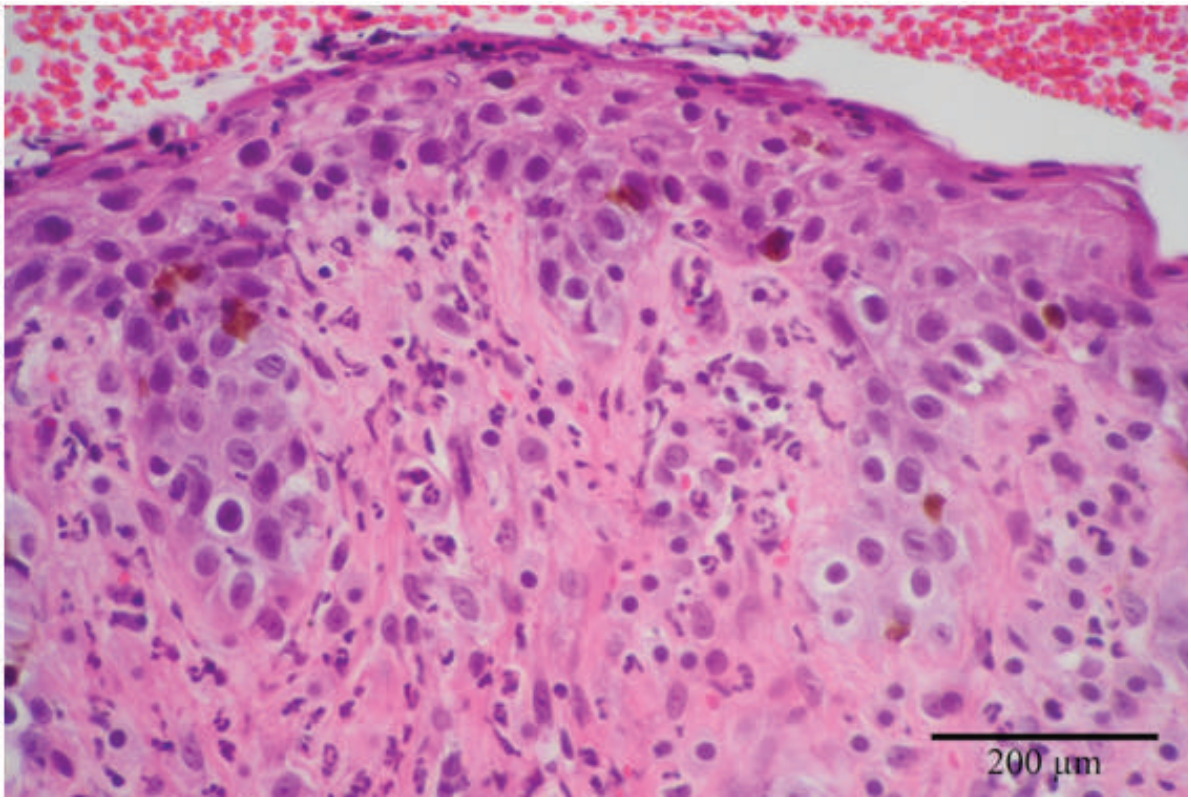




Post treatment: 2 months







Biopsy results: The epidermis was multi-focally ulcerated with excessive hemorrhage. Adjacent epidermis was acanthotic. Superficial dermis was diffusely infiltrated with neutrophils. Epidermal basal cells were vacuolar. Dermal blood vessels were congested with red blood cells and neutrophils. Lymphocytes were occasionally present surrounding the engorged dermal blood vessels. PAS stain did not reveal pathogenic fungi in hair follicles or in the suppurative dermal lesions.

Histipathological diagnosis: chronic hyperplastic and perivascular dermatitis with chronic suppurative and ulcerative epidermitis.

Microphotograph: Epidermis was slightly acanthotic with hemorrhage. Epidermal basal cells were vacuolated. Superficial dermis was infiltrated with neutrophils. Lymphocytes surrounded dermal blood vessels. H & E.

Chaiyan Kasorndorkbua, DVM, PhD, Diplomate Thai Board of Veterinary Pathology

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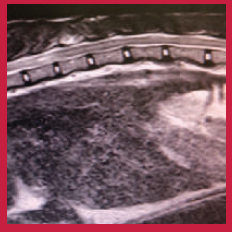
2017

Case Report : Treatment of Severe Hind Limb Paresis and Posterior Paresis Caused by Traumatic Myelopathy in Cats Using PSCO-524® (Antinol®) and Physical Therapy



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Abstract

A 2 years old domestic short hair cat weighted 3.55 kilograms was referred to Kasetsart University Veterinary Hospital for severe hind limb paresiswith loss of sensory function. The onset of symptoms was observed a week ago after the cat returned from missing. Radiographic examination did not show any vertebral disorders. Magnetic Resonance Imaging (MRI) examination found accumulation of fluid in spinal cord at T_{10}-T_{12} level, which indicated spinal cord injury. Traumatic myelopathy was diagnosed. The paresiswas grade 5 so PSCO-524® (Antinol®) 1 capsule per day was prescribed. After a week of the treatment, the cat was able to control urination and voluntary motor function of the hind limbs. However, the sensory system malfunction remained. Spinal walk, walking with the hind limbs when sensation loss was observed after physical therapy was concurrently provided for 3 weeks.

Keywords: Posterior paresis, traumatic myelopathy, cat, PSCO-524®, Antinol®, Magnetic Resonance Imaging, MRI, spinal walk

Introduction

Traumatic myelopathy is common in pets, especially those that are kept outdoors since they are at high risk of injury from beating, falling, fighting, and car accidents. Spinal cord trauma caused by the injury includes contusion, laceration, ischemia, and compression, for example. Paresis may occur as a result at different level of severity depending on location of the lesion, degree of the trauma, and duration. Diagnosis can be performed by radiographic imaging, computed tomography and magnetic resonance imaging to identify location, type of injury and to assess the severity of spinal trauma.

Treatment of traumatic myelopathy is mainly concentrated on prevention of secondary injury which is a consequence of inflammation after primary injury. Purpose of the treatment is to inhibit the ascending and/or descending damage of spinal cord. The treatment should be as early as possibleeven though there is no current medication proved to be effective for secondary injury. Drugs of choice are those with neuroprotective effect, for example, methylprednisolone sodium succinate (MPSS) and polyethylene glycol. There is not a report confirming efficacy of spinal trauma medication for veterinary use.

Symptomatic treatment is also recommended, such as pain control, urination and compression management. Physical therapy is considered individually for each case depending on severity of paresis and restoration of voluntary motor function.

Case history

A 2 years old domestic short hair cat weighted 3.55 kilograms was suffering fromparesis of both hind limbs. Observation of clinical signs showed deterioration from paresis grade 3 to grade 5 within 1 week. The cat was previously missing for 3 days and returned home paralyzed without external injury. Prednisolone 0.4 mg/kg bid was prescribed for 1 week. No signs of improvement after the treatment was completed,so the cat was referred to Neurology Center at Kasetsart University Veterinary Teaching Hospital.

Physical Examination

Vital signs of the cat were normal. The cat was alert and responded to environmental stimulation. Lung and heart sounds were normal. Pulse was detected from both hind limbs palpation. External injury and wound were not found.

Neurological examination found that the cat was always in dog sitting posture. Proprioceptive reflex and deep pain perception were negative while patellar and flexor reflex were normal. Cutaneous trunci reflex was observed at T_7 and above. Urinary incontinence was present. The diagnosis was paresis of both hind limbs at grade 5 with the lesion between T_3 and L_3 (thoracolumbar segment).

Diagnosis

The case history and neurological examination leaded to radiographic imaging of thoracolumbar segment (T3-L3). Vertebral disorders were not identified. Therefore, further examination was focused on spinal cord which is soft tissue inside the vertebral canal and unable to be shown in radiographic image. MRI was selected for the diagnosis.

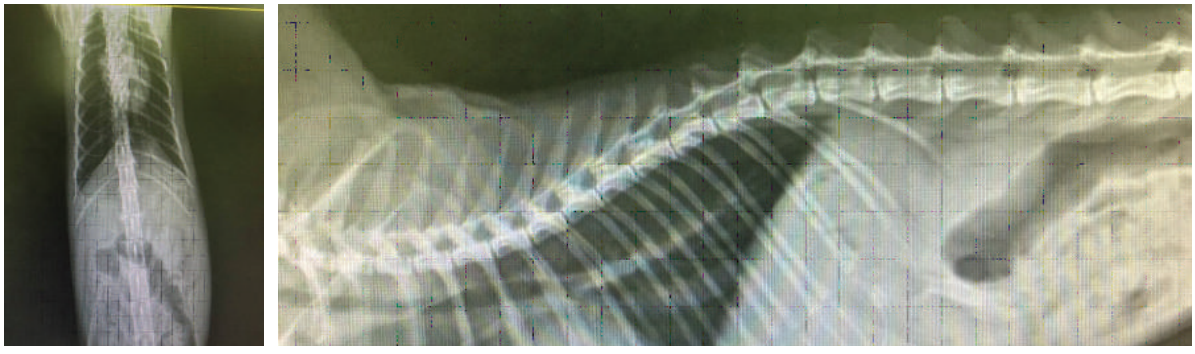

Figure 1 and 2. Radiographic images of T3-L3 showing normal vertebrae

The MRI examination found hyperintensity signal at intramedullary of T_{10}-T_{12} level on T2W, indicated fluid accumulation, syringomyelia, without any compressive lesion which can be commonly found in case of direct traumatic myelopathy.

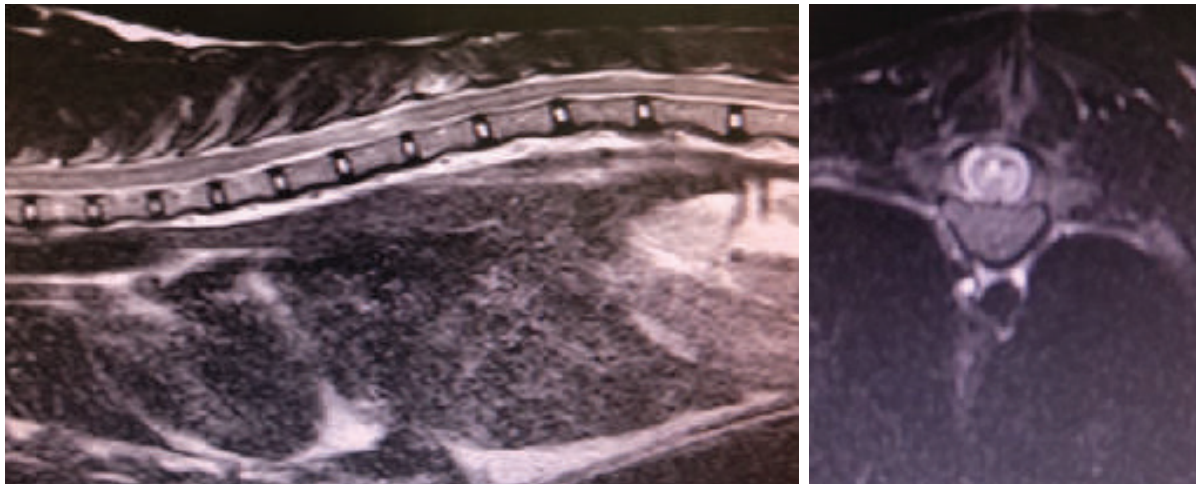

Figure 3 and 4. MRI images showed fluid accumulation (syringomyelia) on thoracic segment

From case history and lesions identified by MRI images, injury of the thoracic spinal cord was diagnosed. The cause was likely to be severe concussion of spinal cord that resulted in hind limb paresis.

Treatment

Since there was no response to 0.4 mg/kg bidprednisolone, a steroid drug, it was discontinued after 1 week. PSCO-524® (Antinol®) 1 tablet per day was then prescribed for anti-inflammatory effect. Other medications included gabapentin 10 mg/kg bid for neuropathic pain control, amoxy-clavulanic acid 25 mg/kg bid for prevention of urinary tract infection due to UB catheterization, and methylocobalamin (B12) 500 mg/day for neurological function restoration.

Outcome and follow up

After 1 week of treatment, the cat started to show motoric function of right hind limb. However, paresis of both hind limbs was remained at grade 5. Administration of PSCO-524® (Antinol®) was continued to reduce inflammation from secondary injury that was usually a consequence of primary injury. Gabapentin, amoxy-clavulanic acid and methylocobalamin were continued as well. Physical therapy using passive range of motion (PROM) was added to the treatment program. The owner was asked to provide the physical treatment at home. The cat was scheduled for electrical stimulation in the following 2 weeks.

In the third week of the treatment, the cat was able to control urination so UB catheterization and antibiotic was stopped. Neurological examination found voluntary motor function of both hind limbs. The cat showed walking posture and started to use hind limbs for weight bearing while standing. However, sensory function of the hind limbs was still deficit. There was a tendency that the cat could eventually use hind limbs to walk as spinal walk. PSCO-524® (Antinol®) and methylcobalamin was continued as well as electrical stimulation of the hind limb muscle twice a week. Follow up showed that hind limb muscle was strengthened, and function of the limbs was improved.

Five weeks later the cat started to use hind limbs for walking. Administration of PSCO-524® (Antinol®), methylcobalamin and physical therapy were continued until 12th week.

Table 1. Neurological response by week of treatment

Response	Week 0	Week 1	Week 3	Week5
Proprioception reflex	0	0	0	0
Spinal reflex HL	2	2	2	2
Deep pain	0	0	0	0
Urinary incontinence	Yes	Yes	No	No
HL motor function	0	Rt HL	Both HL	Both HL
Weight bearing HL	0	0	1	1-2
Walking	0	0	1	1-2

0: No response, 1: Slight response but not normal, 2: Normal response

Discussion

Treatment of traumatic myelopathy is focused on prevention of secondary injury that is a consequence of primary injury. Purpose of the treatment is to inhibit the increase of damage to spinal cord. There is no current medication proved to be effective for secondary injury. There are various medications available for treatment, however prognosis of the disorders and treatment success depends on severity of the paresis. Posterior paresis with loss of sensory function is the most severe paresis (grade 5). The chance that animals can restore function of the legs is less than 5%, however, the chance of spinal walking is unknown.

Use of PSCO-524® (Antinol®) in this case was aimed reduce inflammation caused by secondary injury and to prevent more damage of the spinal cord while in healing process. PSCO-524® (Antinol®) is consisting of omega-3, DHA, and EPA which is effective against inflammation, and consisting of more than 90 other essential fatty acid. PSCO-524® (Antinol®) can be used in a long term without any adverse effects, particularly in cats. Metabolization of drugs by the liver in cats is not as effective as in dogs, so limitation of drug use in cats is common especially drugs that affect liver function such as steroid.

Conclusion

This cat was suffering from traumatic myelopathy at T_{10}-T_{12} that caused posterior paresis grade 5. The prognosis was poor and the likelihood that hind limbs function and urination control could be restored was less than 5%. After treatment with PSCO-524® (Antinol®), anti-inflammatory supplement, the cat could control urination and the neurological function was restored. The cat could perform spinal walking within 5 weeks after the treatment. It is concluded that PSCO-524® (Antinol®) is an effective alternative of choice for traumatic myelopathy in cats.

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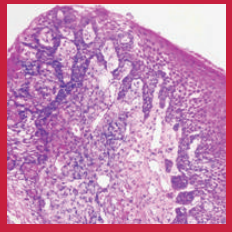
Case Report : Efficacy of PCSO-524® (VetzPetz Antinol®) for Inflammation Control in Cat with Chronic Juvenile Gingivitis Responsive to Full Mouth Extraction



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Abstract

A male, neutered, domestic short hair cat aged 3 years and 10 months, 4.8 kg body weight was kept indoors, annually vaccinated for feline panleukopenia, cat flu, and rabies for the first 2 years of life, and given regular backdrop for prevention of ectoparasites and endoparasites. The test for FeLV/FIV was negative. The cat was having signs of juvenile gingivitis and retained deciduous dentition. Extraction of deciduous teeth were performed when the cat was 11 months old. However, gingivitis was persistent and causing severe halitosis, saliva stain on hair around the lips, drooling, and gingival overgrowth. The cat was treated with New Zealand green-lipped mussel oil extract PCSO-524® (VetzPetzAntinol®, DKSH, Thailand) 1 capsule daily for 2 months after the extraction of deciduous teeth. The treatment was able to reduce degree of drooling and gingivitis but could not completely eliminate the disease. Full mouth extraction was then performed. Post-operative care included anti-inflammatory drug, Tolfenamic acid (Tolfedine®, Vétoquinol, Best Agro; Thailand) 4 mg/kg for 3 consecutive days, Amoxicillin-Clavulanic acid (Clavamox®, Zoetis, Thailand12.5 mg/kg for 1 week, and New Zealand green-lipped mussel oil extract PCSO-524® (VetzPetzAntinol®, DKSH, Thailand) 1 capsule per day continuously. The severity of gingivitis was rapidly decreased after the operation and within 2 weeks after the operation, the gingivitis was completely subsided. The oil extract was administered continuously for 31 months without showing any clinical signs or impaired hematological indicators.

Introduction

Periodontal disease is the most common disease found in small animals. Incidence of the disease in cats and dogs over 2 years old is 70% and 80%, respectively (Niemiec, 2018). Primary clinical sign of the disease is gingivitis. The inflammation causes bacterial plaque buildup which can be combined with calcium from saliva and become tartar. The plaque and tartar can lead to periodontitis and permanent gingival damage (Niemiec, 2018). Lymphocytic-plasmacytic gingivitis/stomatitis is one of the diseases infeline chronic gingivostomatitis group. It is an autoimmune disease caused by genetic disorder, stress, physiological factors, nutrition, or viral infection such as FIV and feline calicivirus. There is a report of significant association between felinecalicivirus infection and feline chronic gingivostomatitis. The disease can occur in kittens and cats and requires a life-long treatment. Its clinical signs include inflammation, exfoliation, or excessive growth of tissue in oral cavity that causes pain, dysphagia, weight lost, complications from other diseases, and poor quality of life (Hung et al., 2014, Gorrel, 2008, Thoma et al., 2017, Diehl and Rosychuck, 1993). Cats with gingivostomatitis therefore need scholarly diagnosis and appropriate treatment plan.

Case history

A male, neutered, domestic short hair cat aged 3 years and 10 months, 4.8 kg body weight was diagnosed with juvenile gingivitis and retained deciduous dentition. Extraction of deciduous teeth were performed when the cat was 11 months old. However, gingivitis was persistent and causing severe halitosis, red and swollen gum, saliva stain on hair around the lips, and drooling. The cat was able to eat pellet food normally. Oral cavity care included rinsing with 0.12% chlorhexidine (C-20: OsothInterlab, Thailand) when necessary. New Zealand green-lipped mussel oil extract PCSO-524® (VetzPetzAntinol®, DKSH, Thailand) 1 capsule daily was prescribed. About 1 week after the treatment, the degree of drooling, halitosis, red and swollen gum were decreased significantly. The medication was continued due to persistent symptoms. Six months later, the cat was surgically treated bycleaning teeth, and extraction of half amount of all teeth. Biopsy specimen of the overgrowth gum was collected. Full mouth extraction was performed 6 months later.

Diagnostic and treatment plan

Diagnosis consisted of physical examination, radiographic examination of oral cavity, hematological test and blood chemistry test was performed. Surgical treatment including teeth cleaning and full mouth extraction was planned. Specimen from biopsy of the overgrowth gum was submitted for laboratory examination.

Results of oral cavity examination

There were no remained deciduous teeth since they were totally extracted when the cat was 11 months old. Other findings included loose incisor 104, loose premolar 106 and molar 107 with tartar buildup, gingival recession of incisor 204, halitosis and gingival hyperplasia. There was no sign of faucitis.

Results of complete blood count test

Table 1. Complete blood count test results prior to and after administration of New Zealand green-lipped mussel oil extract PCSO-524 (Vetz Petz Antinol®)

Parameter	Ref. range	Unit	1st and before oil extract treatment (2/7/2013)	2nd and before oil extract treatment (23/4/2013)	3rd and before 1st operation	4th and before 2nd operation	5th and 1 year after operation
RBC	4.60-10.20	10^6/µL	7.6	7.8	6.7	7.4	9.24
Hb	8.5-15.3	g/dL	11.7	11.2	10.4	12.6	14.1
Hct	26-47	%	38.7	35	30	36	43.9
MCV	38-54	FL	51	56.5	52	57	47.5
MCH	11.8-18.0	Pg	16.7	17.2	17.7	17.7	15.3
MCHC	29.0-36.0	g/dL	32.9	30.5	34.0	30.9	32.4
Platelet	100-518	10^3/µL	242	245	286	202	277
WBC	5.5-19.5	10^3/µL	6.7	10.3	9.1	10.3	12.8
Seg	3.12-12.58	10^3/µL	66	69	73	77	65
Lymphocyte	0.73-7.86	10^3/µL	33	29	25	19	32
Monocyte	0.07-1.36	10^3/µL	0	1	1	2	1
Eosinophil	0.06-1.93	10^3/µL	1	1	1	2	2
Basophil	0.00-0.12	10^3/µL	0	0	0	0	0
SGPT	10-60	U/L	58	43	56	53	50
Creatinine	0.8-2.1	Mg/dL	1.6	1.4	1.3	1.6	1.53
BUN	5-30	Mg/dL	21	18	40	17	NA

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 alanine transaminase, MCV-mean corpuscular volume, MCH-mean corpuscular hemoglobin, MCHC-mean corpuscular hemoglobin concentration, Fl- femtoliter, pg-picogram, NA-not applicable

Treatment and treatment outcome

The first operation was performed to extract half amount of the teeth and clean the other half of the teeth. Specimen was collected from gum hyperplasia for laboratory examination. The operation took a prolonged time and only half of the teeth could be extracted. The owner was required to provide oral cavity care at home and observe the response after surgery. In case there was persistent gingivitis of the remained teeth, they would be extracted later. After the operation, anti-inflammatory drug, Tolfenamic acid (Tolfedine®, Vétoquinol, Best Agro; Thailand) 4 mg/kg was given for 3 consecutive days and antibiotic, Amoxicillin-Clavulanic acid (Clavamox®, Zoetis, Thailand) 12.5 mg/kg was given for 1 week. The oil extract from New Zealand green-lipped mussel, PCSO-524® (VetzPetz Antinol®, DKSH, Thailand), was continued at 1 capsule sid. Oral cavity was rinsed 1-2 times daily with Chlorhexidine 0.12% (C-20® OsothInterlab, Thailand). The cat was fed with recovery formula diet (a/d Hill's prescription diet, Vet Recommend) for 2 days after the operation and then continued with the regular diet (Optimum care Hill's Science diet, Vet Recommend). There was no inflammation of gum where the teeth were extracted. Halitosis and drooling were significantly decreased. However, gingivitis was found at the remaining teeth.

The second operation was performed to extract the rest of the teeth. Post-operative care was similar to that of the previous operation. The recovery and response after treatment was satisfied. Examination did not find gingivitis or inflammation in the oral cavity. Halitosis, drooling, and dysphagia were disappeared.

Laboratory results

The examination of biopsy specimen identified mild lymphocytic-plasmacytic gingivitis that may be the result of autoimmune reaction to protein at the dental neck. Other potential etiology included viral or bacterial infection, nutrition, dental diseases, deformed structure of oral cavity, genetic disorder, allergy, systemic immunodeficiency, and immunodeficiency of the oral cavity.

Discussion

Periodontal disease is the most common disease found in small animals. Incidence of the disease in cats and dogs over 2 years old is 70% and 80%, respectively (Niemiec, 2018). Primary clinical sign of the disease is gingivitis. The inflammation causes bacterial plaque buildup which can be combined with calcium from saliva and become tartar. The plaque and tartar can lead to periodontitis and permanent damage (Niemiec, 2018).Lymphocytic-plasmacytic gingivitis/stomatitis is one of the diseases infeline chronic gingivostomatitis group. It is common in cats but not frequently found in dogs. It is abnormal reaction of the immune system that is caused by genetics, stress, physiological factors, nutrition, or viral infection such as FIV and calicivirus. There is a report of significant association between felinecalicivirus infection and feline chronic gingivostomatitis. The disease can occur in kittens and cats and requires a life-long treatment. Its clinical signs include inflammation, exfoliation, or excessive growth of tissue in oral cavity that causes pain, dysphagia, weight lost, complications from other diseases, and poor quality of life (Hung et al., 2014, Gorrel, 2008, Thoma et al., 2017, Diehl and Rosychuck, 1993). Cats with gingivostomatitis therefore need scholarly diagnosis and appropriate treatment plan.

In this case, the overall condition of the cat was healthy. No systemic diseases were identified. The test for FeLV/FIV was negative. There was gingivitis, gingival recession, loose teeth, and tartar buildup at the cheek teeth. Chronic inflammation caused by retained deciduous dentition was found. There was no caudal faucitis. The lesion at the teeth and gum was in the 2nd stage of periodontitis and 1st grade of lymphocytic-plasmacytic gingivitis/stomatitis. Stages of periodontitis and lymphocytic-plasmacytic gingivitis/stomatitis are classified as follows;

Stages of Periodontitis (Gorrel, 2008)

Grade 0: Normal gum and periodontium. No gingivitis. Gingival groove is normal (0.5-1 mm)

Grade 1: Mild inflammation that is confined only at the gum. Can be restored if treated. No damage of periodontal ligament. Slightly red gum. Blunt marginal gingiva. Normal alveolar bone.

Grade 2: Mild periodontitis. Normal condition cannot be restored after treatment. There is loss of bone mass. Red and swollen gum. There is hemorrhage when dental probe is used for examination. Exposed dental root. Approximately 25% of the tissue are damaged.

Grade 3: Moderate periodontitis. Normal condition cannot be restored after treatment. Bleeding gum, gingival recession, and exposed dental root are found. Approximately 25-50% of the tissue are damaged.

Grade 4: Severe periodontitis. Deep gingival groove and gingivitis are found. Severe periodontitis. Tooth loss. Exposed dental root. Approximately 50% of the tissue are damaged.

Stages of lymphocytic-plasmacytic gingivitis/stomatitis (Hung et al., 2014)

Grade 0:There is no inflammation of gum and buccal mucosa at the lateralpalatoglossal arch

Grade 1:Mild inflammation. Tissue hyperplasia of the caudal oral mucosa. Gingivitis is found on both upper and lower aspect but not at palatoglossal fold

Grade 2:Moderate inflammation. There is inflammation of buccal mucosa on both sides, upper and lower gum, caudal oral mucosaor tongue, and partial area of caudal oral cavity.

Grade 3:Severe inflammation. There is ulcer or fistula of mandible and caudal oral mucosa. Exfoliation of tongue surface or gum is found. There is nodular proliferation at the caudal oral mucosa, buccal mucosa, gum or tongue. Size of caudal oral cavityis decreased.

Conventional treatment of lymphocytic-plasmacytic gingivitis/stomatitis consists of teeth cleaning and brushing daily to eliminate bacterial plaque and tartar. Rinsing oral cavity with diluted chlorhexidine 3 weeks after teeth cleaning and continuously brushing is effective against plaque buildup. If the gingivitis developed, adding chlorhexidine rinse to the program is recommended (Gorrel, 2008). Use of anti-inflammatory drugs, either corticosteroid, NSAIDs, or immunosuppressant, in combination with antibiotics is recommended for controlling infection. There is a report of effective use of piroxicam and thalidomide to reduce inflammation in combination with spraying bovine lactoferrin. Lactoferrin is effective against controlling the disease without adverse effect on kidney after 12 weeks of consecutive use. Additionally, when piroxicam was terminated and only lactoferrin spray was applied, the symptom was suppressed and satisfied (Hung et al.,2014, Addie et al., 2003). The treatment success was due to antimicrobial, immunomodulation, antiinflammation andanticarcinogenic effects of lactoferrin. The other alternative treatment of the disease is premolar and molar extraction which is found to be 80% effective. The other 20% that do not respond to the surgical treatment, conventional treatment is recommended.

Long-term use of non-steroidal anti-inflammatory drugs (NSAIDs) or steroidal drugs to treat inflammation due to feline chronic gingivostomatitis is limited. Action of these drugs is to prohibit function of COX-1 enzyme, which contributes to electrolyte balance, proliferation of mucosa of gastrointestinal tract, secretion of hydrochloric acid, glomerular filtration rate, and kidney blood supply. Long-term prohibition of COX-enzyme function could therefore disturb kidney function. Alternative medication that is not harmful to kidney is necessary (Kampanart, 2012 and Suemanotham, 2014).

PCSO-524® or Antinol® (VetzPetz® Antinol® DKSH, Thailand) is extracted from New Zealand green-lipped mussel(Perna canaliculus) using liquefied carbon dioxide technique. There is a report of anti-inflammatory effect of the extract for treatment and prevention of inflammation (McPhee et al., 2007; Coulson et al., 2013; Coulson et al., 2015). The extract from green-lippedmussel (Perna canaliculus) contains non-saturated fatty acids that consists of eicosatetraenoic acid (ETA), omega-3 PUFAs and docasahexaenoicacid (DHA). ETA is effective against control of inflammatory mediators including prostaglandins and leukotrienes without causing any side effects (Kampanart, 2013). Other properties of the extract include gastroprotective effect, antihistaminic effect, antioxidant, anticytokines, and antiarthritis. The extract from green-lippedmussel also contains other ingredients from the mussel's tissue, such as protein and peptide, that are the main ingredient of the extract and effective for use as anti-microbial agent, antioxidant, binding agent, and antihypertensive agent (Coulson et al., 2015). The lack of adverse effects makes it an alternative for long-term anti-inflammatory treatment.

Conclusion

Lymphocytic-plasmacytic gingivitis in cats is Type II hypersensitivity reaction. The disease can occur in kittens and cats and requires a life-long treatment. Its clinical signs include inflammation, exfoliation, or excessive growth of tissue in oral cavity that causes pain, dysphagia, weight lost, complications from other diseases, and poor quality of life. The disease can be treated with full mouth extraction. In case that full mouth extraction is not feasible or prior to the surgery, anti-inflammatory agent can be used in conjunction with oral cavity care and use of antibiotics. New Zealand green-lipped mussel extract (PCSO-524® or Antinol®) is effective against inflammation caused by the disease and can be used for long-term treatment. Treatment program consisting of administration of the extract, anti-inflammatory agent, and antibiotic can be used for controlling of inflammation or used as pre-operative medication or post-operative care in cats. Its advantage to using steroidal and NSAIDs is the lack of adverse effects for long-term use, especially in cats that surgical treatment is not feasible.

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Illustrations

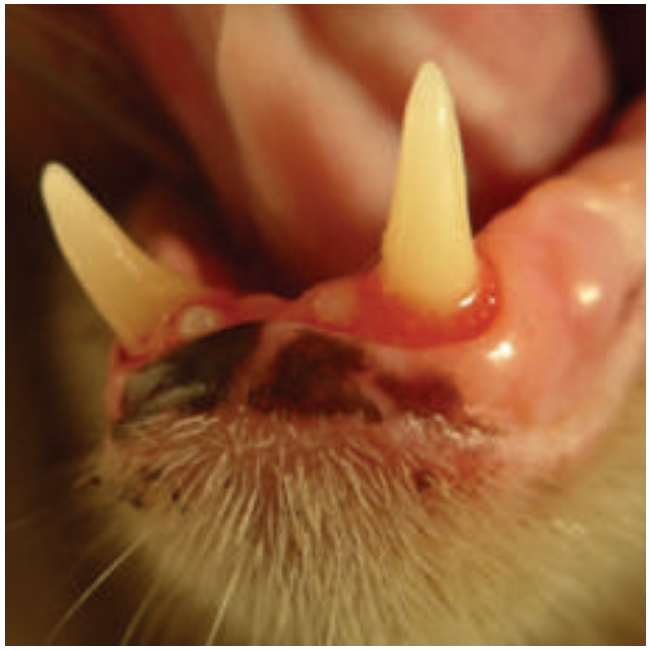

Figure 1. Image showing gingival recession and gingival hyperplasia at tooth 204. Teeth 101, 102, 201, and 202 were extracted when the cat was 11 months old.

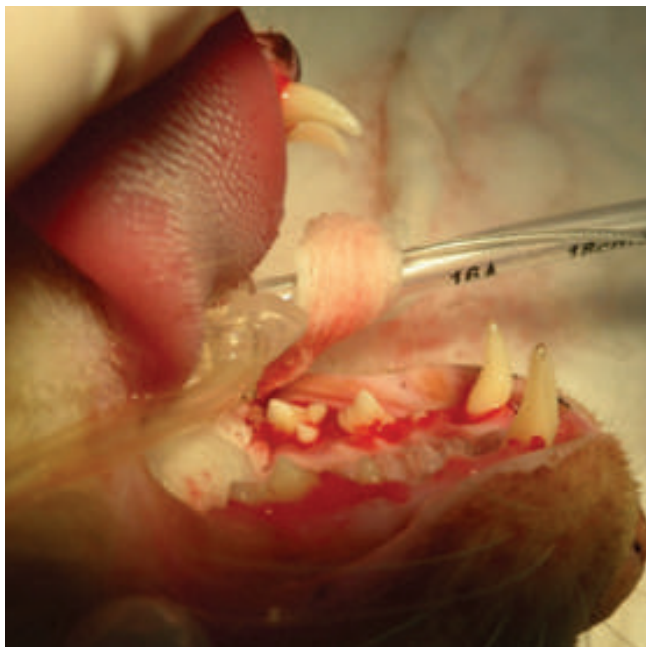

Figure 2. Image showing chronic gingivitis or grade 2 mild periodontitis with red and swollen gums that bleed when examined with dental probe, root furcation, and gingival recession

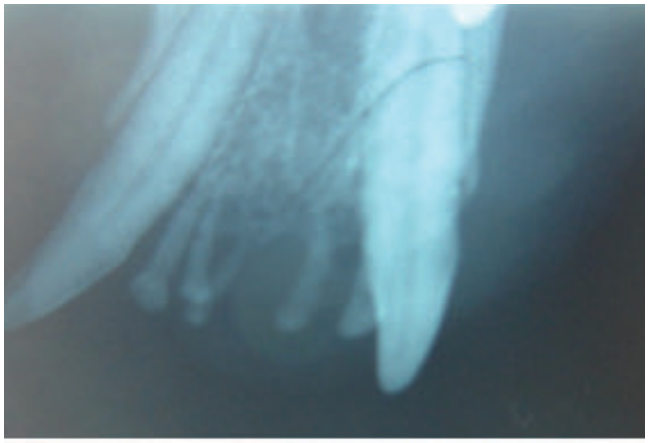

Figure 3. Radiographic image showing the cat's teeth at age 11 months. There were no deciduous teeth at the anterior mandible and no signs of periodontal disease.

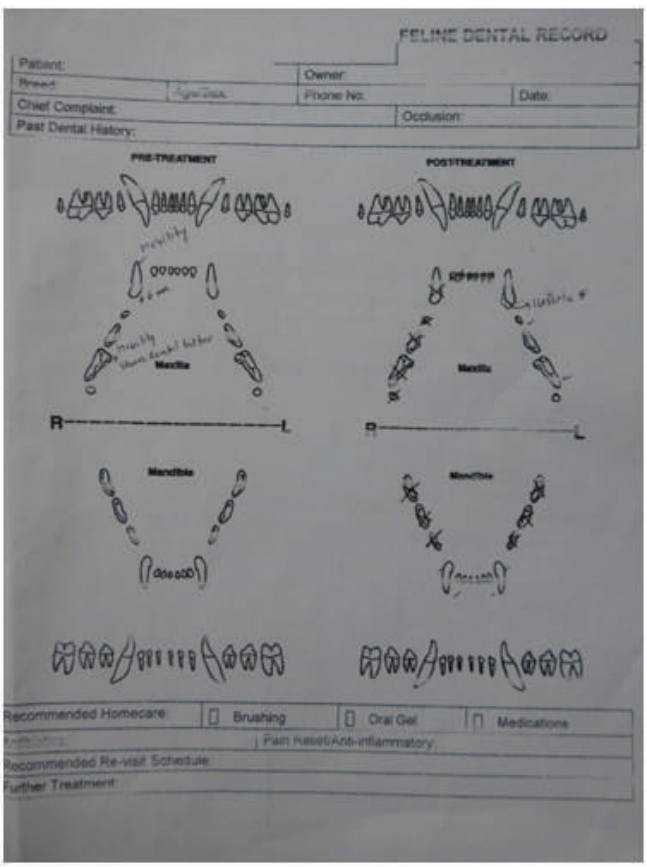

Figure 4. Diagram of gum and teeth before and after the first surgical treatment. The extracted teeth included teeth 101-108, 305-307, and 405-407. The remaining teeth were cleaned in the same operation.

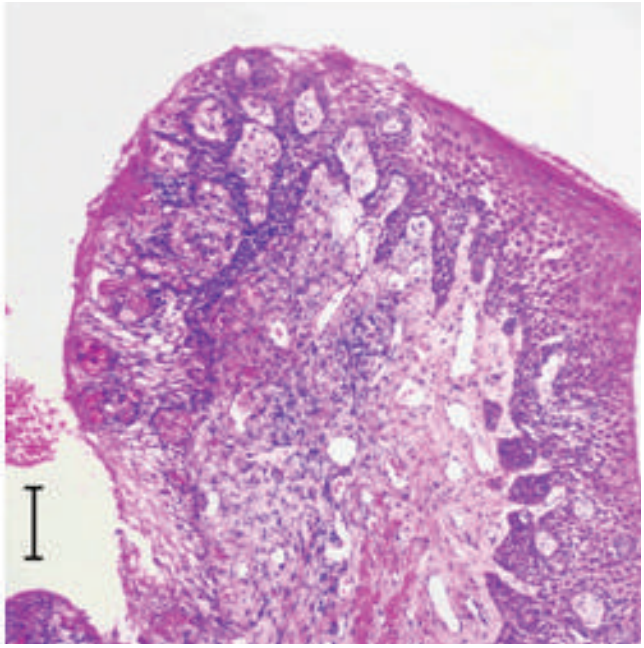

Figure 5. Histopathological section of gingival hyperplasia stained with H&E dye at 10X

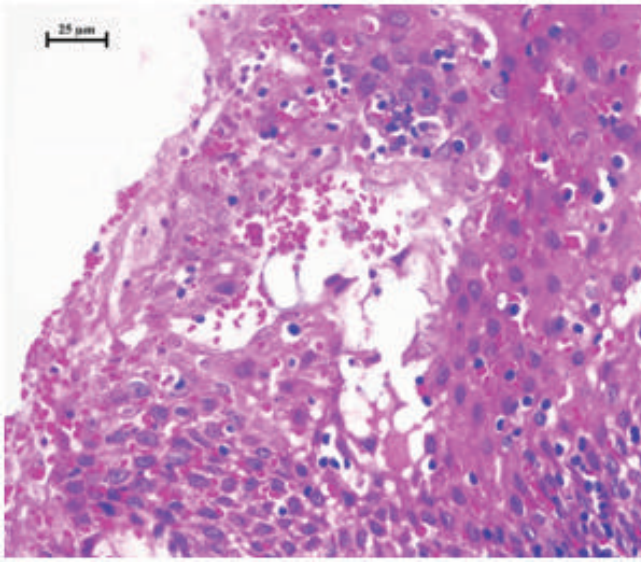

Figure 6. Histopathological section of gingival hyperplasia stained with H&E dye at 40X. The diagnosis was mild lymphocytic-plasmacytic gingivitis. There was a focally mild intraepidermal blister. The remaining epithelium was mildly hyperplastic with prominent intracellular bridging (spongiosis). Focally, there is a submucosal edema with low numbers of lymphocytes, plasma cells, degenerate neutrophils, and fewer macrophages. There was multifocal congestion of small vessels.Etiology was concluded as autoimmune reaction which is type II hypersensitivity to the protein in intercellular junction at the epithelium (e.g., the epidermal cadherin desmoglein) of the gum.

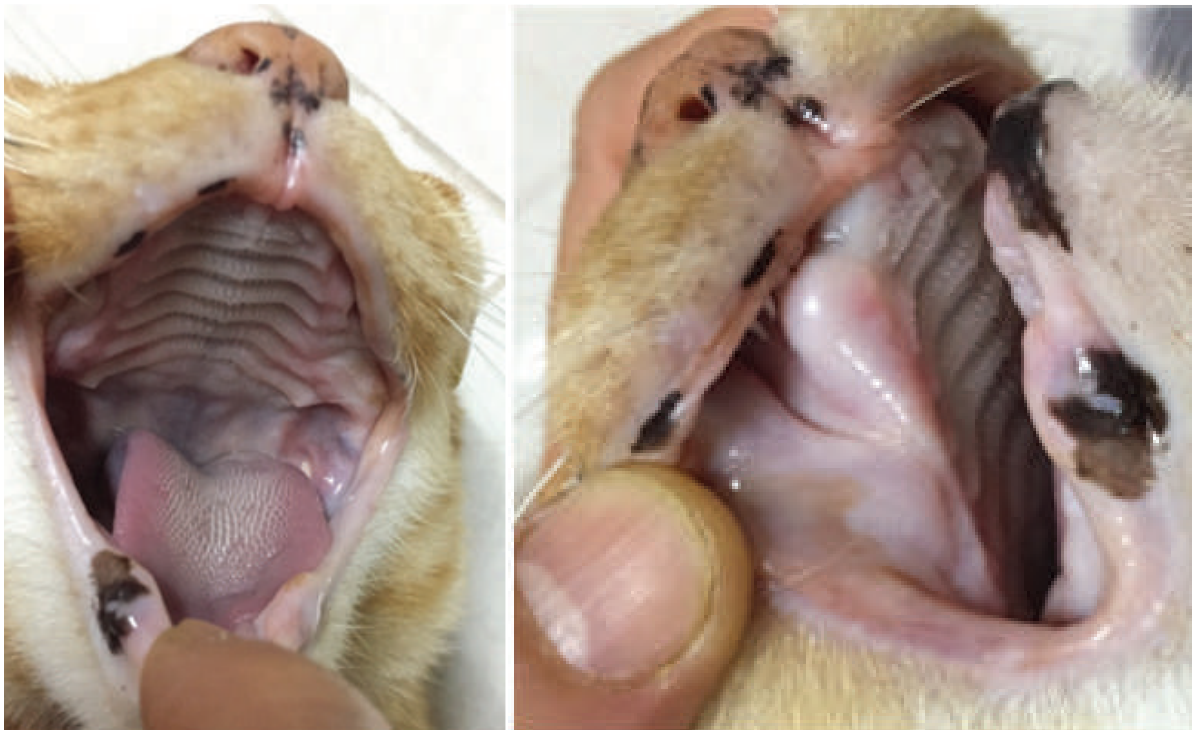

Figure 7 and 8. Images showing disappearance of inflammation since the second week after full mouth extraction

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