

Case Report

Use of PCSO-524® (Antinol®) and Casting for Treatment of Tetraparesis and Neck Pain Due to Atlantoaxial Instability and Subluxation of the 1st-2nd Cervical Vertebrae

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Abstract

A 7 months old male Pomeranian dog was admitted to Thong Lor animal hospital for signs of intermittent leg paresis and hyperesthesia during the past 2 weeks.

Physical examination found grade II tetraparesis, neck hyperflexion, spasm of cervical muscle, and cervical hyperesthesia.

X-ray examination showed atlantoaxial instability and dorsal subluxation of the first and second cervical vertebrae. **The disease is congenital and commonly found in toy breed dogs** (Itoh H. et al, 2017).

A cast was used to stabilize the joints for 12 weeks in conjunction with medicinal treatment including pain killer medicine, gabapentin, and 1 capsule of PSCO-524® (Antinol®) sid.

After one week of the treatment, the dog showed no sign of pain when touched but the signs of hind limb paresis still remained. The treatment was continued until the 10th week that **gabapentin was terminated** and no recurrence of pain was detected since then.

After 12 weeks of the treatment, the cast was removed and PSCO-524® (Antinol®) 1 capsule sid was continued and the dog did not show any progressive development of clinical signs.

Keywords: Atlantoaxial instability, dog, small breed, PSCO-524®, Antinol®, tetraparesis, hyperesthesia, congenital, dorsal subluxation

Introduction

Atlantoaxial subluxation of the first two cervical vertebrae, atlas and axis, is the joint instability caused by developmental disorder of the second vertebra (dens).

The developmental disorder can be of various types such as hypoplasia, aplasia, non-union of the dens with the axis, incomplete ossification of the atlas (Thomas et al, 1991), and tissue trauma of the cervical spine. **It is mostly found in small breed dogs**, especially the young ones, and was first report in 1967 by Gary et al.

The most common form of the disease is dorsal luxation. X-ray imaging of cervical vertebrae is commonly used for diagnosis of the disease and computer x-ray and magnetic resonance imaging (MRI) can be used for further examination of the tissues in the area. Neurological symptoms usually found include neck pain, cervical hyperesthesia, neck hyperflexion, and paresis. The symptoms are the results of spinal cord injury due to dislocation of the dens that causes compression on the spinal cord. The instability of the cervical spine results in excessive movement that causes even more damage to the spine.

The treatment can be categorized as **conservative management and surgical treatment**. Surgery is the treatment of choice, especially in dogs that do not respond to conservative treatment and dogs that show severe neurological disorder. The treatments are aimed to increase stabilization of the first and second cervical vertebrae to delay the progress of spinal injury, and in some cases, able to restore normal function of the spinal vertebrae.

Case history

A 7 years old male Pomeranian dog weighed 1.2 kilograms had a history of patella luxation of both knees and history of pain killer administration. The dog was admitted to Thong Lor animal hospital for intermittent signs of lethargy, leg paresis particularly the hind limbs and cry out in pain when touched during the past 2 weeks. The dog was vaccinated accordingly to veterinary pregram, raised in a closed system and had no history of any illness or accident.

Physical examination

The dog was alert, responsive to environmental stimuli, had normal lung and heart sound, normal vital signs, and no injury had been found. The dog showed no signs of leg injury but grade II medial patellar luxation was found.

Laboratory results showed normal complete blood count and blood chemistry parameters. Neurological examination found that the dog had ambulatory walking paresis of all 4 legs with negative proprioception of the hind legs, normal patellar reflex and flexor reflex, positive deep pain perception of all 4 legs, neck heperflexion, spasm of cervical muscle, neck hyperesthesia, and normal cranial nerve function.

The dog was then diagnosed with grade II tetraparesis of which the lesion was located at C1-C5.

Diagnosis

The dog was further examined using radiographic imaging of C1-C7 and the results showed spinal disorders including dorsal subluxation of the second cervical vertebra and excessive gap between spinous process of the atlas and axis that is commonly found in atlantoaxial instability (Figure 1). Dens aplasia of the second vertebra was also suspected.

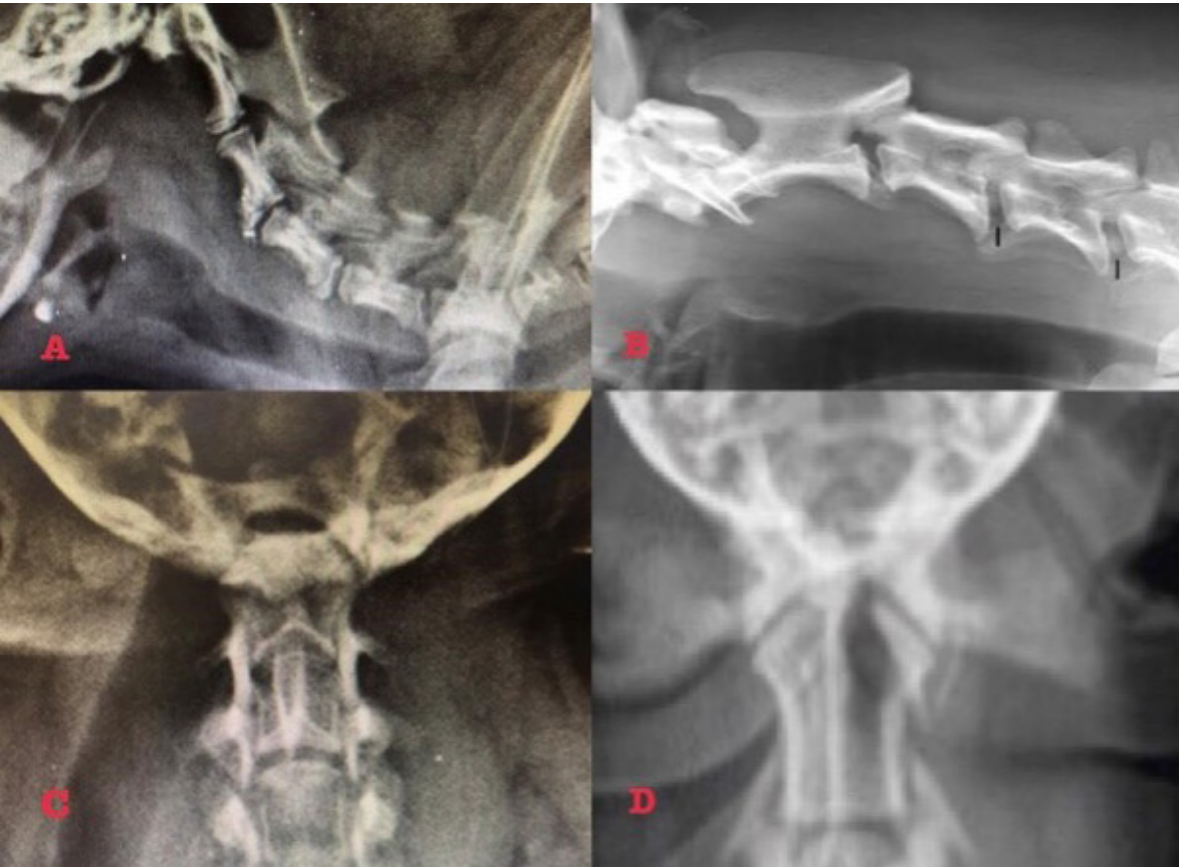


Figure 1. Radiographic images of cervical spine (C1-C7): A: dorsal subluxation of the axis and excessive gap between spinous process of the atlas and axis, B: normal cervical vertebrae, C: no dens were found in the image, D: normal cervical vertebrae

Treatment

There are 2 steps designed for the treatment as follows;

1. Stabilization:

Cast of the neck was used to restore normal position of the cervical vertebrae and to minimize the movement of the neck for 12 weeks. The cast was changed every 1-2 weeks.

2. Medical treatment:

The dog was given a prescription including gabapentin 10 mg/kg bid to control neuropathic pain and PSCO-524® (Antinol®) 1 capsule per day to reduce the inflammation.

Treatment outcome and Follow up

Week 1: Decreased severity of neck pain was observed but the dog still occasionally showed signs of hyperesthesia. Degree of the neck hyperflexion was decreased but the signs of grade II tetraparesis remained the same. PSCO-524® (Antinol®) and gabapentin were continued in order to reduce inflammation from the secondary injury. The follow up and changing of the cast was scheduled every 1-2 weeks.

Week 3: The dog showed improvement and no signs of hyperesthesia was observed. The neck hyperflexion was nearly disappeared and the dog showed ambulatory walking paresis without knuckling when walked. The neck cast remained installed and the medication was continued with PSCO-524® (Antinol®) and gabapentin.

Week 5-8: The clinical signs were stable with no signs of hyperesthesia. The neck hyperflexion was nearly disappeared and the dog showed ambulatory walking paresis without knuckling when walked. The neck cast remained installed and the medication was continued with PSCO-524® (Antinol®) and gabapentin.

Week 10: The clinical signs were stable with no signs of hyperesthesia. The neck hyperflexion was nearly disappeared and the dog showed ambulatory walking paresis without knuckling when walked. The neck cast was continued with PSCO-524® (Antinol®) 1 capsule per day but gabapentin was terminated due to lack of pain for more than 6 weeks.

Week 12: All the signs were stable after gabapentin was stopped. Ambulatory walking paresis still remained. The cast was removed when PSCO-524® (Antinol®) 1 capsule per day was continued and limited activity was introduced this week.

Week 14: All the neurological signs were stable with remaining ambulatory walking paresis. No sign of excessive pain was observed. PSCO-524® (Antinol®) 1 capsule per day and limited activity were continued.

Presence: The dog was under monitoring after the cast and pain killer medication were removed from the treatment scheme. Since the dog was young and had little body weight, only medical treatment was considered at this period. Surgical treatment was recommended when the dog was full grown.

Discussion

Atlantoaxial subluxation of the first two cervical vertebrae is a neurological disorder that is commonly found in small breed dogs. It is caused by **instability of the cervical spines** that may be the result of congenital disorder or severe trauma of the cervical tissues. The disease mostly occurs in young animals, except for that caused by trauma or injury.

Clinical signs are various including neck pain, hyperesthesia and hyperflexion of the neck, limb paresis and grade III tetraparesis or above. Severity of the disease depends on body weight, angle of the bone movement, and severity of the spinal trauma.

Treatment of atlantoaxial subluxation consists of **conservative management and surgical treatment**. Approximately 50% of diseased dogs respond well to the use of neck cast and medical prescription, although orthopedic surgery for spinal realignment and stabilization is preferred since it directly eliminates the actual cause of the disease.

However, the surgical treatment is not always recommended due to the fact that affected animals mostly are young small breed dogs and sometimes have low body weight, which does not allow surgical process and the stabilization tools to be fully functional.

Conservative management is therefore an alternative to delay progression of neurological disorder while the dog health is recovering and getting ready for the surgery.

This study case started to show clinical symptoms when he was 7-months old and weighed only 1.2 kilograms. The small size of spine and the growth plate that was not fully developed prohibited possibility of surgical treatment.

Due to **limitation of using stabilization tools and low bone density**, a cast and PSCO-524® (Antinol®) were selected for treatment in this case. Several study reports show that PSCO-524® (Antinol®), which is consisted of omega-3 polyunsaturated fatty acids (omega-3 PUFAs), has **anti-inflammatory and pain control effects**.

The fatty acids, especially eicosapentaenoic acid (EPA) and eicosatetraenoic acid (ETA), are effective for **prohibition of the synthesis of leukotrienes and prostaglandins**, which are products of inflammatory mechanism in COX pathway (Whitehouse et al., 1997; Dugas, 2000; Murphy et al., 2002).

The use of PSCO-524® (Antinol®) in this case was aimed for reduction of inflammation and control the development of spinal lesion while the spinal cord was spontaneously recovering from the injury.

Table 1. Treatment scheme and the results of 14-weeks follow up

Week	Neck cast	Gabapentin	PSCO-524® (Antinol®)	Clinical signs
0	-	✓	-	Hyperesthesia, tetrapar-esis grade II
1	✓	✓	✓	Mild hyperesthesia, tetraparesis grade II
3	✓	✓	✓	Hind limbs weakness
5-8	✓	✓	✓	Hind limbs weakness
10	✓	✓	✓	Hind limbs weakness
12	✓	-	✓	Hind limbs weakness
Presence (14 +)	-	-	✓	Hind limbs weakness

Conclusion

The dog had atlantoaxial subluxation of the first two cervical vertebrae that caused neurological disorders including grade II paresis, neck hyperflexion, stiff neck, and hyperesthesia of the neck.

Surgical treatment using stabilization tools was not recommended in this case due to small body size of the dog and high risk of complications.

Conservative management using a neck cast and PSCO-524® (Antinol®) was designed for treatment in this case. The use of PSCO-524® (Antinol®) was for **controlling pain and inflammation of the spinal tissue**. The dog showed improvement since the first week of the treatment and was able to stop the pain medication in week 10.

The study showed that PSCO-524® (Antinol®) is an effective treatment for atlantoaxial instability and luxation when used with a neck cast in dogs that are not ready for surgical treatment.

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