Received: 6 December 2021 | Revised: 26 May 2022 | Accepted: 27 May 2022

DOI: 10.1002/vrc2.430

Vet Record CaseReports

CASE REPORT

Companion or pet animals

Reversible tetraplegia in a dog caused by a transoral penetrating stick injury

Gesine Buhmann[1] | **Tanja Steinberg**[2] | **Andrea Fischer**[1] | **Jessica Schöbel**[1] | **Konrad Jurina**[2]

[1]Centre for Clinical Veterinary Medicine & Veterinary Mobility Centre, LMU Munich, Munich, Germany

[2]AniCura Tierklinik Haar, Haar, Germany

Correspondence
Gesine Buhmann, Centre for Clinical Veterinary Medicine & Veterinary Mobility Centre, LMU Munich, Munich, Germany.
Email: g.buhmann@medizinische-kleintierklinik.de

Abstract

A 3-year-old, male German shepherd dog was referred because of acute tetraplegia following endoscopic removal of stick fragments from the oral cavity. Magnetic resonance imaging revealed an extradural T2W- and T1W-hypointense linear structure within the vertebral canal at the level from the C1 to mid-C2 cervical vertebral body, causing pronounced dorsolateral spinal cord compression and spinal cord oedema extending to the caudal end of the C2 vertebra. A dorsal laminectomy was performed at the level of the C1–C2 vertebra. Three wooden fragments with lengths of up to 4 cm, which were located adjacent to the spinal cord, were removed from the vertebral canal. The dog was still tetraplegic after surgery. Postoperative care consisted of analgesics, antibiotics, bladder management, intensive neurorehabilitation and physical therapy. Recovery of ambulation was regained 3 weeks after surgery.

KEYWORDS

acute spinal cord injury, dogs, wooden foreign bodies

BACKGROUND

Transoral pharyngeal penetrating injuries due to sticks are a quite common phenomenon, especially in medium- to large-breed dogs, caused by their stick chasing and chewing activity.[1–4] However, acute myelopathy due to penetrating injuries caused by sticks[5–8] or other foreign bodies[9–13] is rarely reported in veterinary medicine. Affected dogs show pain, tetraparesis or tetraplegia, and systemic signs such as fever and leukocytosis in more chronic cases. Compressive spinal cord injury from foreign material should be suspected as a differential diagnosis for acute onset of spinal pain, neurological deficits and history of oropharyngeal trauma.[5–8,13] The following case report describes the clinical features, imaging findings, surgical procedure, postoperative therapy and outcome of a tetraplegic dog due to a transoral penetrating stick spinal cord injury.

CASE PRESENTATION

A 3-year-old, male German shepherd dog was referred for acute onset of tetraplegia after anaesthesia for oral examination and endoscopy. The day before presentation, the dog had fallen down a hill while he carried a stick in its mouth. Initially, it showed severe pain when opening the mouth and was severely depressed. No neurological signs were noted on initial examination. An endoscopic removal of penetrating sticks within the oral cavity was performed under general anaesthesia (inhalation anaesthesia with isoflurane gas). The duration of anaesthesia was 1.5 hours, and no complications occurred. The oxygen saturation was monitored all the time. After anaesthesia, the dog woke up uneventfully and showed normal mentation but was unable to stand or walk. As the non-ambulatory state did not change over the following 24 hours, the dog was referred for further diagnostics.

INVESTIGATIONS

At presentation, the physical examination was unremarkable. The neurological examination revealed a normal mental status, lateral recumbency, tetraplegia with intact deep pain perception, absent postural reactions in all four limbs, with a reduced withdrawal reflex in both thoracic limbs and normal spinal reflexes in both pelvic limbs, normal cranial nerves and a normal cutaneous trunci and perineal reflex. Due to the risk of neurological deterioration, the neck was not manipulated, but it was noted that the dog was able to lift the head. Neuroanatomic localisation was C1–T2 spinal cord segments. Based on the history of trauma, cervical vertebral subluxation or fracture, acute traumatic disc extrusion (ANNPE/AHNPE)

or acute myelopathy due to a penetrating foreign body were considered the main differential diagnoses. The latter was seen as the most likely diagnosis because of the anamnesis and the previously performed endoscopic investigation.

The dog underwent a pre- and post-contrast CT scan of the head and cervical spine in sternal recumbency under general anaesthesia using a 16-slice CT scanner (GE Optima 520). Soft tissue and bone display settings were used. CT showed a poorly recognisable left-sided focal hypoattenuating lesion with a hyperattenuating margin extradural and dorsolateral to the spinal cord within the vertebral canal at the level from the C1 to mid-C2 vertebral body. Contrast-CT showed moderate rim enhancement surrounding the lesion (Figure 1). Within the soft tissue of the oropharynx, there were multiple hypoattenuating lesions, most likely gas accumulations, especially between the left mandibular gland and mandibular lymph node (Figure 2), as well as left side of the oesophagus at the level of C3. The bony structures were unremarkable. An entry side for foreign material into the vertebral canal was not traceable. To better evaluate spinal cord injury, MRI of the cervical and cranial thoracic regions was performed. MRI was carried out in the chest-prone position using a Vet-MR Grande Esaote 0.25 T unit. MRI was performed in sagittal, transverse and dorsal views in FSE T2W, FAST STIR, Myelo and SET1W sequences and following gadolinium (Dotarem) administration (0.2 mmol/kg intravenous [IV]).

The MRI displayed a well-demarcated extradural T2W- and T1W-hypointense linear structure in the vertebral canal in a dorsolateral, left-sided position at the level from the C1 to mid-C2 cervical vertebral body. On transverse and dorsal views in this location, the spinal cord deviated to the right, and the surrounding cerebrospinal fluid (CSF)-fat signal was not detectable (Figures 3b and 4). Furthermore, an intramedullary T2W-hyperintense signal was visible, which extended caudally to the compressive lesion up to the end of vertebral body C2 (Figure 3a). There was diffuse T2W-hyperintensity in the region of the left mandibular gland. Following gadolinium administration, mild contrast enhancement was detected surrounding the extradural intraspinal structure. In addition, mild to moderate contrast uptake in the left longus colli muscle at the level of the C1–C2 vertebra and diffuse contrast enhancement within the soft tissue in the region of the left mandibular gland were evident (Figure 5).

Based on imaging features and history, the most likely diagnosis was a transoral wooden foreign body into the vertebral canal at the level from the C1 to mid-C2 cervical vertebral body with spinal cord compression and spinal cord trauma.

DIFFERENTIAL DIAGNOSIS

Based on the case history, the previous endoscopic investigation and the imaging findings, a spinal cord injury due to a penetrating stick was diagnosed.

TREATMENT

Surgery and postoperative treatment

The dog was positioned in ventral recumbency, with the neck padded by towels and thoracic limbs tied caudally. An approach to the dorsal atlantoaxial junction was made. The dorsal lamina of C1 and one-third of the cranial part of the dorsal lamina of C2 were prepared. Dorsal laminectomy of C1 and C2 was performed, and the vertebral canal was opened. Stick fragments were detected in extradural and left-sided locations. They were directed diagonally from left ventrally to right dorsally within the vertebral canal. The spinal cord deviated to the right (Figure 6a). Macroscopically, the dura mater was uninjured. The foreign body was removed carefully; it was approximately 4 cm long and consisted of three parts (Figure 6b). A swab of the vertebral canal was submitted for bacteriological culture. Then, the wound cavity was flushed intensively with physiological saline. Before closure, a fat graft was positioned over the laminectomy site. Peri- and postoperative analgesia consisted of fentanyl-lidocaine-ketamine constant-rate infusion for the first 5 days, a non-steroidal anti-inflammatory drug (meloxicam 0.1 mg/kg orally [PO] every 24 hours) for 10 days and pregabaline (4 mg/kg PO every 12 hours) for 1 month after surgery. Additionally, antimicrobial treatment with amoxicillin/clavulanic acid (20 mg/kg IV every 12 hours) was administered for 2 weeks, although the bacteriological culture of the swab from the opened vertebral canal was negative. Additional medications were omeprazole (1 mg/kg PO every 12 hours) and propentofylline (3 mg/kg PO every 12 hours). A closed urine collection system was placed until the dog was able to stand with support. The patient underwent an intensive in-house rehabilitation programme for 2 weeks. The first days after surgery, rehabilitation comprised passive range of motion in all limbs in lateral recumbency and later on in a standing position. Flexion of all four limbs was stimulated by provoking the flexor reflex. Additionally, isometric training on a proprioceptive mat using a peanut ball positioned under its body to support standing was conducted to train proprioception and coordination. Moreover, laser therapy using a class IV laser was added to support regeneration (three points, bilateral paravertebral in the region of the surgical approach). When the dog had regained the ability to stand with mild assistance (on Day 13 after surgery), further gait training was pursued with an underwater treadmill with manual support (speed 1 km/h, starting with 5 minutes per session, water height at the level of the hip joint). On Day 16 after surgery, the dog performed a few steps with mild

LEARNING POINTS/TAKE HOME MESSAGES

- Transoral penetrating stick injury can involve the cervical spinal cord and result in severe neurological signs.
- Dogs with suspected spinal cord trauma must be handled carefully. Neurological deterioration after anaesthesia/manipulation is possible.
- Magnetic resonance imaging is a useful tool for lesion localisation and for assessing the severity of spinal cord trauma.
- Recovery is possible but can be time consuming and requires a dedicated dog owner.
- Daily intensive physical therapy and rehabilitation may aid recovery from severe cervical spinal cord injury.

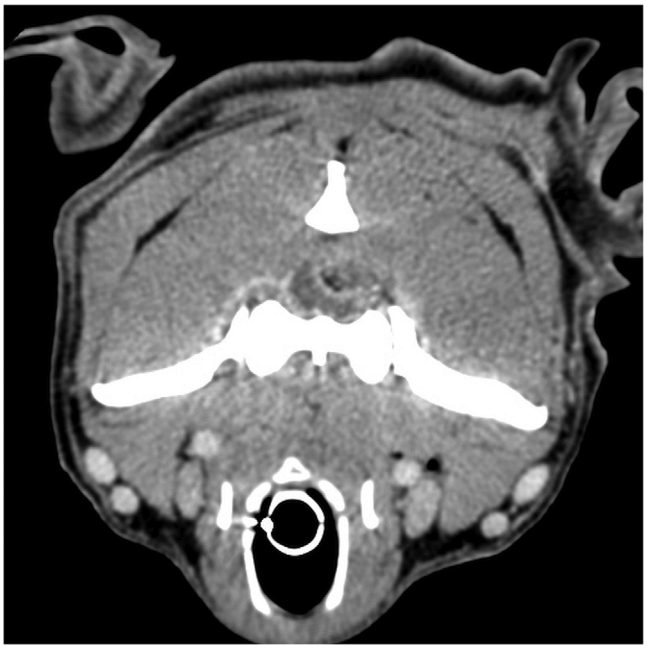

FIGURE 1 Transverse post-contrast CT image of the cervical spine at the level of the C1–C2 vertebra. A left-sided focal hypoattenuating lesion extradural and dorsolateral to the spinal cord and with moderate rim contrast enhancement surrounding the lesion

support. Following discharge, physiotherapy was continued with daily ambulatory appointments and home exercises for an additional 2 weeks.

OUTCOME AND FOLLOW-UP

The patient was hospitalised for 16 days. In the first days after surgery, the dog displayed severe cervical spinal pain when moving its neck despite high dosages of analgetic drugs and was in lateral recumbency. On Day 4 after surgery, it supported itself in sternal recumbency, was less painful and showed voluntary movements in the right thoracic and pelvic limb. Two days later, the dog recovered from the spinal shock phenomenon, so the normal strength of withdrawal reflexes in both thoracic limbs returned, and neuroanatomical localisation was C1–C5. However, voluntary movements of the left thoracic and pelvic limb were still absent, reflecting marked intramedullary oedema and spinal cord contusion. On Day 11, the dog had voluntary movements in all four limbs; on Day 13, it was able to stand with mild support, and on Day 16, it performed few steps with slight assistance. Three weeks after surgery, the dog was able to walk without support, but showed mild to moderate generalised ataxia. After discharge, weekly physiotherapy was pursued to train coordination and preserve muscle mass.

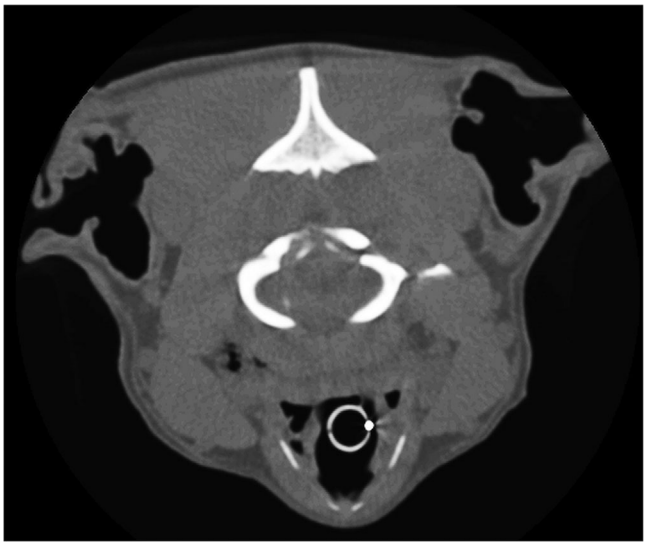

FIGURE 2 Transverse CT image of the head at the level of the craniocervical junction. Hypoattenuating lesions, most likely gas accumulations between the left mandibular gland and mandibular lymph node

At the 4-month follow-up, the gait was still characterised by mild generalised ataxia, most visible in the left thoracic and pelvic limb. The neurological examination showed only mild postural reaction deficits (hopping and proprioceptive positioning) in the left thoracic and pelvic limb. However, the dog had regained the ability to walk for 60–90 minutes.

DISCUSSION

Injuries caused by wooden foreign bodies are mainly described in medium- to large-breed dogs. The reason given is the joy of stick chewing and retrieving. The most frequent entry site for acute oropharyngeal foreign bodies is the sublingual region.[1] A distinction is made between acute (<7 days after accident) and chronic clinical presentations (>7 days) after injury. Therefore, chronic cases are more frequently reported, and clinical signs range from swelling, reduced general condition and fever to purulent discharge from the oral cavity or nose. However, the acute group displays, in particular, dysphagia or pain when opening the mouth.[1,4,7,13] Reports of spinal cord injuries in dogs and cats secondary to foreign bodies within the vertebral canal are a peculiarity. Most commonly, the cervical spine is affected; therefore, clinical signs are mainly cervical spinal pain, tetraparesis or plegia.[6,7,9–14]

In the case presented here, the dog showed pain immediately after the accident when opening the mouth, but no neurological abnormalities were detected. However, after endoscopy and the removal of the wood fragments from the oral cavity under general anaesthesia, the dog was non-ambulatory. A possible explanation for this could be a change in the position of the wooden foreign material into the vertebral canal due to manipulation of the fragments within the oral cavity or solely due to the movement of the head–neck region under anaesthesia. Another reason could be increased compression due to the manipulation and delayed onset of traumatic spinal cord oedema after the accident.

Interestingly, the neurological examination revealed markedly reduced flexor reflexes in both thoracic limbs, but the foreign body and spinal cord compression and secondary oedema were detected in a high cervical location at the level of the C1 and C2 vertebra. In the study by Forterre et al., approximately 34% of the dogs with a C1–C5 spinal cord lesion had a C6–T2 neuroanatomic lesion localisation.[15] Changes in the functional organisation of the spinal reflex arcs are discussed as a possible cause. Another explanation might be a sudden interruption of descending supraspinal input resulting in

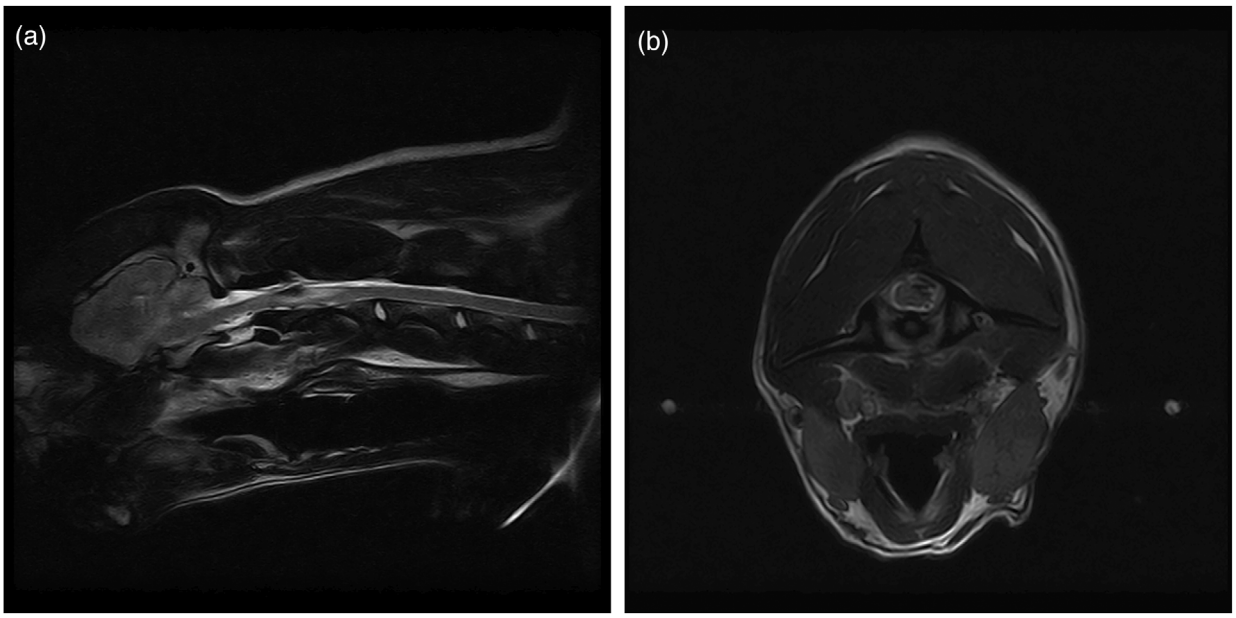

FIGURE 3 MRI of the cervical spine: T2W sagittal (a) and transverse (b) image. Dorsolateral, left-sided focal, well-demarcated extradural T2W hypointense linear structure within the vertebral canal at the level from C1 to mid-C2 cervical vertebral body. Deviation of the spinal cord to the right and loss of surrounding cerebrospinal fluid (CSF)-fat signal; spinal cord oedema with intramedullary T2W-hyperintensive signal caudally to the compressive lesion extending to the end of the vertebral body of C2

FIGURE 4 MRI of the cervical spine; fast spin-echo short inversion time inversion recovery (FAST STIR) sequence dorsal image. Left-sided focal, well-demarcated extradural STIR hypointense linear structure within the vertebral canal at the level from C1 to mid-C2 cervical vertebral body. Marked deviation of the spinal cord to the right

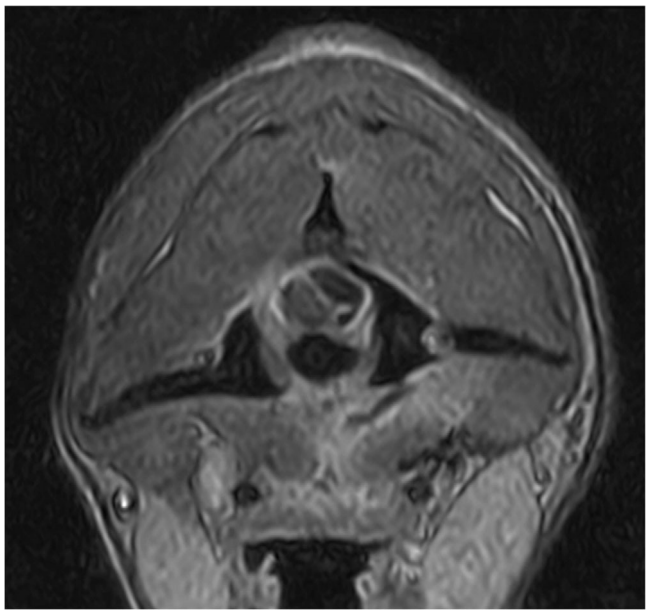

FIGURE 5 MRI of the cervical spine; post-contrast T1W transverse image. Mild contrast enhancement surrounding the extradural structures and mild to moderate contrast uptake in the left longus colli muscle at the level of the C1–C2 vertebra

areflexia, as described in spinal shock.[16] The spinal shock phenomenon is defined as reduced or areflexia caudally to the spinal cord lesion and is a common finding in human medicine but also exists in companion animals.[17] In dogs, it is more often reported in thoracolumbar myelopathies. In the present case, the recovery time for the withdrawal reflex in the thoracic limbs was approximately 6 days. This finding is consistent with other studies, where the recovery time was between 12 hours and 6.5 days.[16,18–20]

In the present case, the entry site of the foreign material into the oropharynx was demonstrated clearly with CT, whereas the entry site into the vertebral canal could not be visualised. Additionally, the lesion responsible for neurological impairment was poorly assessable by CT. The sensitivity and specificity for detecting wooden foreign bodies with CT in extraneural locations are 79% and 93%, respectively.[21] Wooden foreign bodies can have variable appearance on CT (−344 to +640 HU), as the material density depends on the plant composition and water content as well as the time spent within the tissue. Gas accumulations in soft tissues are typical findings in acute penetrating oropharyngeal injuries,[21] as

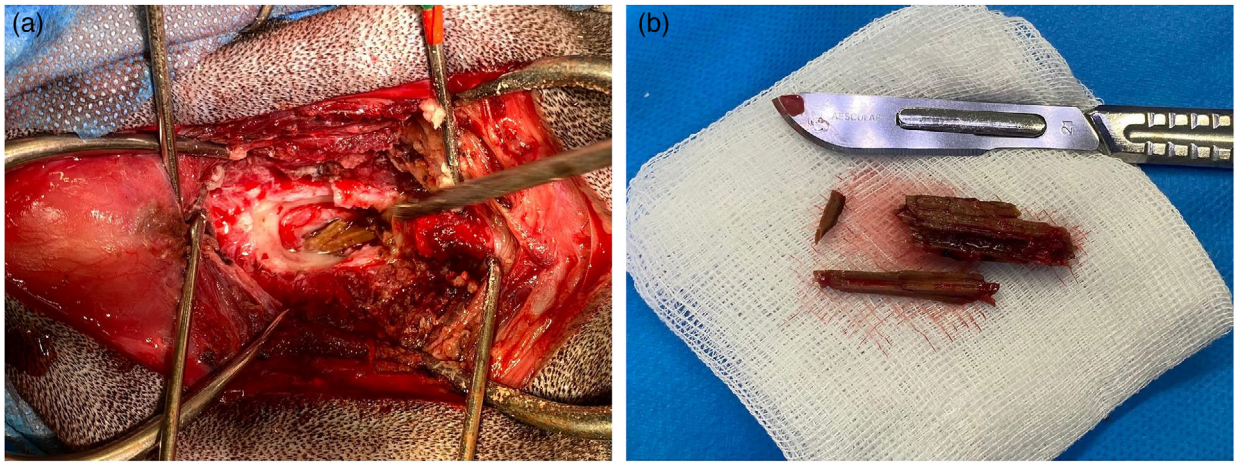

FIGURE 6 Dorsal laminectomy of the C1 and C2 vertebra (a): wooden foreign bodies within the opened vertebral canal left-sided adjacent to the spinal cord. Removed foreign bodies (b)

was seen in our case. A recent case report illustrated the benefit of contrast CT for detecting a foreign body within the vertebral canal.[5] As reported in a previous case, myelography might be another possibility to detect wooden foreign bodies within the vertebral canal.[7] This method is currently rarely used, and cerebellomedullary cistern puncture may even be deleterious, especially in this specific case with a high cervical localisation of the stick. In our dog, MRI was found to be a superior diagnostic tool for detecting wooden foreign bodies, and MRI studies allowed a much better evaluation and helped to evaluate the severity of spinal cord damage in comparison to CT. Other studies support this perception by demonstrating MRI as an excellent imaging modality for detecting the inflammatory tissue reactions associated with foreign bodies. Additionally, MRI facilitates surgical planning.[8,22]

The presented dog received an intensive rehabilitation programme, which was started a few days after surgery. Physiotherapy is an important tool in patients for functional recovery after spinal cord injuries.[23,24] In veterinary medicine, neurorehabilitation has been shown to be important for recovery of motor function and ambulation as well.[25–27] Laser therapy for spinal cord diseases in dogs has limited evidence, as it is uncertain if enough light reaches and is absorbed by neural cells of the spinal cord. In comparison, cadaver studies in mice and rats verified an effect.[28–30] Supplementary to regular physical rehabilitation, perseverance and support of the pet owner are essential parts of the management, as returning to normal neurological function can take a long time. This dog was ambulatory 3 weeks after surgery. In people, after 1 year, recovery of ambulation after spinal cord injury with loss of motor function and preservation of sensory function is considered to be approximately 33%.[31] The recovery rate for dogs with paraplegia without sensory loss after acute thoracolumbar disk extrusion is specified as >90%, and the mean time to recovery with surgery is 15 days.[32]

In addition to physical therapy and supportive care, this dog received antimicrobials to treat infection and propentofylline, as experimental studies have shown its possible neuroprotective effects on damaged nerve tissue and that it may promote metabolic and functional convalescence.[33,34] However, there are no evidence-based data on the treatment of spinal cord injury with propentofylline in dogs or humans.

In conclusion, this case report presents a tetraplegic dog with a transoral stick injury within the vertebral canal and severe spinal cord compression at the C1–C2 vertebra that showed recovery to independent ambulation 3 weeks after surgery.

ACKNOWLEDGEMENTS

Open Access funding enabled and organized by Projekt DEAL.

CONFLICTS OF INTEREST

The authors declare they have no conflicts of interest.

FUNDING INFORMATION

The authors received no specific funding for this work.

ETHICS STATEMENT

The presented case report fulfils the high ethical standards concerning animal welfare. Client consent was received for the involved client-owned animal. All investigations and treatments were performed with the client's consent.

AUTHOR CONTRIBUTIONS

Gesine Buhmann wrote the manuscript. Konrad Jurina and Tanja Steinberg approved and edited the imaging and surgical part. Andrea Fischer and Jessica Schöbel approved and edited the rehabilitation and outcome part. All authors read and approved the final version of the manuscript.

ORCID

Gesine Buhmann https://orcid.org/0000-0002-7698-3651

REFERENCES

1. Griffiths LG, Tiruneh R, Sullivan M, Reid SW. Oropharyngeal penetrating injuries in 50 Dogs: a retrospective study. Vet Surg. 2000;29(5):383–8.
2. Nicholson I, Halfacree Z, Whatmough C, Mantis P, Baines S. Computed tomography as an aid to management of chronic oropharyngeal stick injury in the dog. J Small Anim Pract. 2008;49(9):451–7.
3. Doran IP, Wright CA, Moore AH. Acute oropharyngeal and esophageal stick injury in forty-one dogs. Vet Surg. 2008;37(8):781–5.
4. Shales C. Acute oropharyngeal stick injuries in canine patients. Vet Times. 2017;47(10):1–12.
5. Bosma F, Gerritsen R, Visser J, Passon-Vastenburg M. Contrast-enhanced CT findings in a dog with a wood foreign body in the vertebral

canal. Vet Radiol Ultrasound. 2022;E6–10. https://doi.org/10.1111/vru.13015
6. Kihoon K. Surgical removal of an intramedullary chopstick fragment penetrating the spinal cord in a cat. J Vet Med Sci. 2021;83(11):1670–3.
7. Rayward RM. Acute onset quadriparesis as a sequela to an oropharyngeal stick injury. J Small Anim Pract. 2002;43(7):295–8.
8. Young B, Klopp L, Albrecht M, Kraft S. Imaging diagnosis: Magnetic resonance imaging of a cervical wooden foreign body in a dog. Vet Radiol Ultrasound. 2004;45(6):538–41.
9. Brocal J, Guevar J, Stalin C, Durand A, Gutierrez-Quintana R. Intraparenchymal brainstem haemorrhage secondary to iatrogenic needle injury after a parenteral injection in a cat. JFMS Open Rep. 2016;2(1):2055116916631562.
10. Lafuente P, Driver CJ. Migrating sewing needle in the cervical vertebral canal in a dog. Vet Rec Case Rep. 2014;2(1):2–6.
11. Smith TJ, Fitzpatrick N. Surgical removal of a microchip from a puppy's spinal canal. Vet Comp Orthop Traumatol. 2009;22(1):63–5.
12. Joslyn SK, Witte PG, Scott HW. Delayed spinal cord injury following microchip placement in a dog. Vet Comp Orthop Traumatol. 2010;23(3):214–7.
13. Ostrager A, Levitin B. What is your neurologic diagnosis? J Am Vet Med Assoc. 2017;251(2):153–6.
14. Platt S, Wieczorek L, Dennis R, De Stefani A. Spinal cord injury resulting from incorrect microchip placement in a cat. J Feline Med Surg. 2007;9(2):157–60.
15. Forterre F, Konar M, Tomek A, Doherr M, Howard J, Spreng D, et al. Accuracy of the withdrawal reflex for localization of the site of cervical disk herniation in dogs: 35 cases (2004–2007). J Am Vet Med Assoc. 2008;232(4):559–63.
16. Smith P, Jeffery N. Spinal shock - comparative aspects and clinical relevance. J Vet Intern Med. 2005;19:788–93.
17. Negrin A, Negrin L, Cherubini GB. Spinal shock in dogs and humans: clinical and comparative findings. Companion Anim. 2018;23:523–6.
18. Granger N, Carwardine D. Acute spinal cord injury. Tetraplegia and paraplegia in small animals. Vet Clin North Am Small Anim Pract. 2014;44(6):1131–56.
19. Park EH, White GA, Tieber LM. Mechanisms of injury and emergency care of acute spinal cord injury in dogs and cats. J Vet Emerg Crit Care. 2012;22(2):160–78.
20. Hodshon AW, Thomas WB. Transient depression of pelvic limb reflexes in dogs with acute focal thoracolumbar myelopathy. J Am Vet Med Assoc. 2018;253(8):1022–31.
21. Lamb CR, Pope EHW, Lee KCL. Results of computed tomography in dogs with suspected wooden foreign bodies. Vet Radiol Ultrasound. 2017;58(2):144–50.
22. Dobromylskyj MJ, Dennis R, Ladlow JF, Adams VJ. The use of magnetic resonance imaging in the management of pharyngeal penetration injuries in dogs. J Small Anim Pract. 2008;49(2):74–9.
23. Harvey LA, Glinsky JV, Bowden JL. The effectiveness of 22 commonly administered physiotherapy interventions for people with spinal cord injury: a systematic review. Spinal Cord. 2016;54(11):914–23.
24. Harvey LA. Physiotherapy rehabilitation for people with spinal cord injuries. J Physiother. 2016;62(1):4–11.
25. Sims C, Waldron R, Marcellin-Little DJ. Rehabilitation and physical therapy for the neurologic veterinary patient. Vet Clin North Am Small Anim Pract. 2014;45(1):123–43.
26. Zidan N, Sims C, Fenn J, Williams K, Griffith E, Early PJ, et al. A randomized, blinded, prospective clinical trial of postoperative rehabilitation in dogs after surgical decompression of acute thoracolumbar intervertebral disc herniation. J Vet Intern Med. 2018;32(3):1133–44.
27. Martins Â, Gouveia D, Cardoso A, Gamboa Ó, Millis D, Ferreira A. Nervous system modulation through electrical stimulation in companion animals. Acta Vet Scand. 2021;63(22):1–12. https://doi.org/10.1186/s13028-020-00566-8
28. Miller LA, Torraca D, De Taboada L. Retrospective observational study and analysis of two different photobiomodulation therapy protocols combined with rehabilitation therapy as therapeutic interventions for canine degenerative myelopathy. Photobiomodul Photomed Laser Surg. 2020;38(4):195–205.
29. Piao D, Sypniewski LA, Dugat D, Bailey C, Burba DJ, DeTaboada L. Transcutaneous transmission of photobiomodulation light to the spinal canal of dog as measured from cadaver dogs using a multi-channel intra-spinal probe. Lasers Med Sci. 2019;34(8):1645–54.
30. Piao D, Sypniewski LA, Bartels KE. Challenges of transcutaneous laser application for the potential of photobiomodulation of the spinal cord at the scale of a large companion animal. Paper presented at: SPIE BiOS on Photobiomodulation of Spinal Cord. 2017;10048.
31. Scivoletto G, Tamburella F, Laurenza L, Torre M, Molinari M. Who is going to walk? A review of the factors influencing walking recovery after spinal cord injury. Front Hum Neurosci. 2014;8:1–11. https://doi.org/10.3389/fnhum.2014.00001
32. Moore SA, Tipold A, Olby NJ, Stein V, Granger N, Canine Spinal Cord Injury Consortium (CANSORT SCI). Current approaches to the management of acute thoracolumbar disc extrusion in dogs. Front Vet Sci. 2020;7:610.
33. Danielisová V, Chavko M, Schubert PH. Effect of propentofylline (HWA 285) on metabolic and functional recovery in the spinal cord after ischemia. Neuropharmacology. 1994;33(2):199–204.
34. De Haan P, Kalkman CJ, Jacobs MJHM. Pharmacologic neuroprotection in experimental spinal cord ischemia: a systematic review. J Neurosurg Anesthesiol. 2001;13(1):3–12.

How to cite this article: Buhmann G, Steinberg T, Fischer A, Schöbel J, Jurina K. Reversible tetraplegia in a dog caused by a transoral penetrating stick injury. Vet Rec Case Rep. 2022;10:e430. https://doi.org/10.1002/vrc2.430

IMAGE QUIZ

It is an MRI in a T2W sagittal view of the cervical spine of a dog with acute onset of tetraplegia (Figure 3a).

MULTIPLE-CHOICE QUESTION

What's the likely diagnosis?

POSSIBLE ANSWERS TO MULTIPLE-CHOICE QUESTION

A) Atlantoaxial instability
B) Subarachnoid diverticulum
C) Extradural foreign body within the vertebral canal
D) Acute spinal cord haematoma

CORRECT ANSWER

C) Extradural foreign body within the vertebral canal.

The extradural T2W hypointense structure was wooden foreign bodies. Stick fragments penetrated the dog's oral cavity after the dog fell down a hill while carrying a stick in its mouth.