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Myelographic findings in dogs with vertebral column fractures: A study of 6 clinical cases

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Abstract

Myelography is an important adjunct to survey radiography for evaluating spinal cord lesions in dogs with vertebral trauma, particularly when soft tissue compression cannot be adequately assessed by plain radiographs. The present study was undertaken to evaluate the diagnostic utility of myelography in six dogs presented with clinical signs of spinal disorders. All dogs underwent detailed neurological examination and survey radiography, followed by cisternal myelography using Iohexol (0.3-0.5 mL/kg) under general anaesthesia. Myelographic findings were correlated with the clinical and radiographic observations. Extradural spinal cord compression associated with traumatic intervertebral disc protrusion was identified in one case. In two cases, attenuation or complete absence of the contrast columns suggested severe spinal cord swelling and compression, making interpretation difficult. In two additional cases, premature cessation of contrast flow occurred cranial to the radiographic lesion, indicating extensive cord oedema and severe compression. One dog showed passage of contrast medium through the lesion with diffuse attenuation of the dorsal and ventral contrast columns, consistent with narrowing of the subarachnoid space due to spinal cord oedema and haemorrhage. Incidental opacification of the central canal was observed in one case due to inadvertent intramedullary needle placement. The findings demonstrate that myelography provides valuable information regarding the location and severity of spinal cord compression and complements conventional radiography in dogs with spinal trauma. However, severe spinal cord oedema may obscure lesion boundaries and limit precise assessment of the extent of injury.

Keywords: Myelography, vertebral column, Iohexol, dogs

Introduction

Myelography is a specialized contrast radiographic technique used to evaluate the spinal cord by injecting a positive contrast medium into the subarachnoid space (Wheeler, 1989) ^[11]. In dogs with spinal trauma, prompt and accurate diagnosis is essential for appropriate therapeutic intervention. Although conventional radiography is useful for detecting vertebral fractures and luxations, it frequently fails to demonstrate spinal cord compression or associated soft tissue lesions. Consequently, myelography is routinely employed following survey radiography to accurately localize spinal cord lesions and to determine the severity and extent of injury.

Since its introduction in canine practice during the early 1950s (Hoerlein, 1953) ^[4], myelography has become one of the most commonly used contrast techniques in veterinary neuroradiology. The availability of safer, non-ionic contrast agents and the reduced cost of the procedure have made it a practical diagnostic tool in modern veterinary practice. Myelography is particularly indicated when survey radiographs do not permit precise localization or assessment of spinal cord abnormalities, or when neurological deficits are inconsistent with radiographic findings (Brawner Jr. and Hathcock, 2003) ^[2]. By outlining the subarachnoid space, the procedure provides indirect evidence of spinal cord compression through alterations in the normal flow of contrast medium and aids in identifying the site and nature of compressive lesions. Therefore, myelography remains an invaluable investigation for establishing a definitive diagnosis, planning surgical intervention, and formulating an accurate prognosis in dogs with spinal disorders.

Materials and Methods

A total of 6 dogs presenting with clinical signs of spinal disorders were included in the study. All cases were subjected to a comprehensive neurological examination and conventional survey radiography of the vertebral column. Further evaluation of spinal cord involvement and damage was carried out using myelography. All 6 dogs were premedicated with Atropine (0.045 mg/kg, S/C) and xylazine (0.5 mg/kg, I/V) 5 minutes before the induction of general anaesthesia. All the dogs were anaesthetized with Propofol (3 mg/kg, I/V) and maintained with Ketofol additional dose as and when required. Cisternal puncture was performed after surgical preparation of the area between the external occipital protuberance and the first cervical vertebra. The dog was positioned in lateral recumbency at the edge of the examination table, with the head maintained in dorsiflexion at approximately 90° to the neck by an assistant. The ear adjacent to the table was tucked beneath the head. Following standard aseptic procedures, anatomical landmarks were identified using the left hand: the external occipital protuberance with the middle finger, the wing of the atlas with the thumb, and the atlanto-occipital space with the index finger. The puncture site was located at the intersection of two imaginary lines: one extending along the midline from the external occipital protuberance to the dorsal spinous process of the axis, and the other drawn perpendicular to it across the cranial borders of the atlas wings. The spinal needle was inserted at the identified site through a slight depression and advanced perpendicularly through the skin and underlying musculature toward the atlanto-occipital space. Advancement continued until a distinct loss of resistance or “pop” was perceived, indicating penetration of the atlanto-occipital joint capsule and ligamentum flavum, and entry into the subarachnoid space. In lightly anesthetized dogs, puncture of the dura mater occasionally elicited a brief cutaneous reflex response. Successful entry into the subarachnoid space was confirmed by the appearance of cerebrospinal fluid (CSF) at the needle hub. Adequate placement of the needle bevel within the subarachnoid space was ensured by observing a steady flow of CSF. Iohexol was then administered at a dosage of 0.3-0.5 mL/kg. All dogs were evaluated by survey radiography and myelography.

Result and Discussion

Myelographic evaluation of the six clinical cases demonstrated a range of alterations in the contrast columns corresponding to the severity and location of spinal cord injury. In Case No. 1, dorsal displacement of the ventral contrast column was observed at the L3-L4 intervertebral disc space, suggesting a traumatic intervertebral disc protrusion with associated extradural spinal cord compression (Plate 1). In Case No. 2, the ventral contrast column was absent between the T₃ and T₁₂ vertebral segments, which was likely attributable to spinal cord swelling and concussion. Additionally, opacification of the central canal was evident, probably due to inadvertent placement of the spinal needle within the central canal, a finding similar to that reported by Kirberger and Wrigley (1993)^[5] (Plate 2).

In Case No. 3, attenuation of both the dorsal and ventral contrast columns, together with complete absence of contrast medium over the T₁₁-T₁₃ vertebrae, was recorded (Plate 3). Comparable findings have been described by

Tartarelli *et al.* (2005)^[10] in dogs with thoracolumbar disc extrusion. According to Widmer and Thrall (2007)^[12], severe intramedullary swelling may completely obliterate the contrast column over affected spinal segments, thereby masking the extradural component of the lesion. Likewise, Sharp and Wheeler (2005a)^[9] reported poor filling of the subarachnoid space in animals with spinal cord swelling, while Olby *et al.* (1994)^[8] and Morgan and Bailey (2000)^[7] documented similar myelographic features in dogs with disc protrusion. Although these findings were suggestive of extradural compression, interpretation of the myelogram was difficult because the contrast medium was absent over several spinal segments. In addition, dorsal elevation of the ventral contrast column at the T₁₀-T₁₁ and T₁₃-L₁ intervertebral spaces indicated mild intervertebral disc protrusion at these levels.

In Cases No. 4 and 5, the progression of the contrast medium was interrupted before reaching the lesions identified on survey radiographs. In Case 4, the contrast column terminated at T₁₂, despite the lesion being localized at L1 (Plate 4), while in Case 5, contrast flow ceased at L2, although the radiographic abnormalities involved the L3 and L4 vertebrae (Plate 5). This premature cessation of contrast flow was most likely caused by spinal cord oedema, which obliterated the subarachnoid space and prevented normal distribution of the contrast agent, thereby obscuring the exact origin of the lesion. Similar observations were reported by Lamb (1994)^[6]. Hoerlein (1971)^[3] also noted that contrast medium frequently stops flowing approximately 1/2 to 1 vertebral segment cranial to the lesion due to spinal cord oedema. Comparable findings were documented by Lamb (1994)^[6], who observed that the contrast agent failed to progress to the site of injury, indicating severe spinal cord compression. Furthermore, the absence of contrast medium caudal to the lesion was probably due to marked cord swelling or compression preventing its caudal passage, in agreement with the findings of Adamo (2010)^[1]. Consequently, myelography in these cases allowed only approximate localization of the lesion, while accurate assessment of its full extent remained difficult.

In Case No. 6, the contrast medium traversed the compressive lesion and outlined the spinal cord up to the L2 vertebral level, with attenuation of both the dorsal and ventral contrast columns extending caudally towards the cauda equina (Plate 6). This appearance was most likely the result of diffuse narrowing of the subarachnoid space caused by spinal cord oedema and haemorrhage. Similar survey radiographic and myelographic findings have previously been reported by Lamb (1994)^[6].



Plate 1: Lateral myelogram showing dorsal elevation of ventral contrast column over L3-L4 intervertebral space



Plate 2: Lateral myelogram showing attenuation of the ventral contrast column from the T₃ vertebrae. flow of contrast stopped at T₁₂, then the absence of both contrast columns from L1 to L3

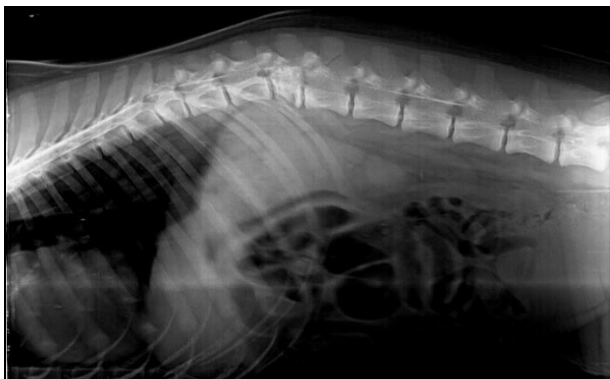


Plate 3: Lateral myelogram showing dorsal elevation of ventral contrast column at T₁₁ and attenuation of both the contrast column with absence of contrast agent in the central canal



Plate 4: Lateral myelogram showing flow of contrast stopped at T₁₂

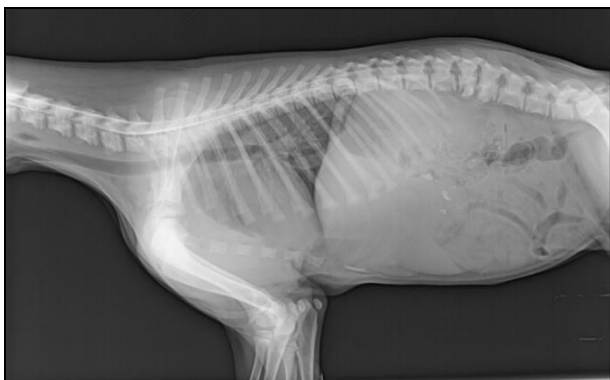


Plate 5: Lateral myelogram showing attenuation of both contrast columns from T 10 and flow of contrast stopped at L 2



Plate 6: Lateral myelogram showing attenuation of the dorsal and ventral columns from L2 to cauda equina

Conclusion

Myelography proved to be a valuable adjunct to survey radiography for the evaluation of spinal cord injuries in dogs. It facilitated the localization of compressive lesions and the assessment of the severity of spinal cord involvement, particularly in cases where conventional radiography was inconclusive. However, severe spinal cord oedema and swelling occasionally obscured the exact extent of the lesion by interfering with the normal flow of contrast medium. Overall, myelography remains a useful diagnostic tool for the assessment and prognostication of canine spinal trauma.

References

1. Adamo PF. Cerebrospinal fluid collection, myelography, epidurography and discography. In: Ettinger SJ, Feldman EC, editors. Textbook of Veterinary Internal Medicine. 7th ed. Philadelphia: Saunders; 2010. p. 447-451.
2. Brawner WR Jr, Hathcock JT. Neuroradiology. In: Slatter D, editor. Textbook of Small Animal Surgery. 3rd ed. Philadelphia: Saunders; 2003. p. 1118-1131.
3. Hoerlein BF. Intervertebral discs. In: Hoerlein BF, editor. Canine Neurology: Diagnosis and Treatment. 2nd ed. Philadelphia: W.B. Saunders; 1971. p. 307-382.
4. Hoerlein BF. Intervertebral disc protrusion in the dog. III. Radiological diagnosis. Am J Vet Res. 1953;14:275-283.
5. Kirberger RM, Wrigley RH. Myelography in the dog: A review of patients with contrast medium in the central canal. Vet Radiol. 1993;34:253-257.
6. Lamb CR. Common difficulties with myelographic diagnosis of acute intervertebral disc prolapse in the dog. J Small Anim Pract. 1994;35:549-558.
7. Morgan JP, Bailey CS. Exercises in Veterinary Radiology: Spinal Disease. 1st ed. California: Venture Press; 2000. p. 53-53.
8. Olby NJ, Dyce J, Houlton JEF. Correlation of plain radiographic and lumbar myelographic findings with surgical findings in thoracolumbar disc disease. J Small Anim Pract. 1994;35:345-350.
9. Sharp NJH, Wheeler SJ, editors. Diagnostic aids. In: Small Animal Spinal Disorders: Diagnosis and Surgery. 2nd ed. St. Louis: Elsevier Mosby; 2005. p. 43-72.
10. Tartarelli CL, Baroni M, Borghi M. Thoracolumbar disc extrusion associated with extensive epidural haemorrhage: A retrospective study of 23 dogs. J Small Anim Pract. 2005;46:485-490.

11. Wheeler SJ. Diagnosis of spinal disease in dogs. J Small Anim Pract. 1989;30:81-91.
12. Widmer WR, Thrall DE. Canine and feline intervertebral disc disease, myelography and spinal cord disease. In: Thrall DE, editor. Textbook of Veterinary Diagnostic Radiology. 5th ed. Missouri: Saunders Elsevier; 2007. p. 194-219.