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Case Report

Multifidus cervicis plane block as part of a multimodal approach in a dog undergoing dorsal C3 laminectomy

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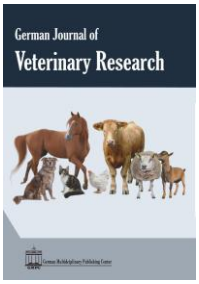

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Abstract

Effective perioperative analgesia is crucial in canine spinal surgery due to the moderate to severe pain associated. Locoregional anaesthesia is increasingly used within multimodal strategies to reduce opioid requirements, but reports on cervical applications remain limited. This case report describes the first use of a multifidus cervicis plane block in a Labrador Retriever undergoing dorsal laminectomy at C3 for removal of a dorsally compressive extradural mass. A multimodal anesthetic protocol included medetomidine, methadone, propofol, ketamine, and midazolam, with anaesthesia maintained using sevoflurane and a ketamine infusion. Bilateral ultrasound-guided multifidus cervicis plane blocks were performed, injecting bupivacaine (0.15 ml kg-1 per side) in the interfascial plane between the multifidus and semispinalis capititis muscles. Hemodynamic stability was maintained intraoperatively, with only a single fentanyl bolus required. Postoperative analgesia included ketamine and medetomidine infusions, paracetamol, gabapentin, methylprednisolone, and physiotherapy. Pain scores remained below intervention thresholds, and no additional opioid rescue was needed. The patient showed progressive neurological improvement and was discharged eight days postoperatively. Histopathology confirmed chronic pyogranulomatous pachymeningitis. This report demonstrates the feasibility and potential benefit of cervical multifidus plane block, supporting its inclusion in multimodal analgesia for cervical spine surgery. Further studies are warranted to define optimal dosing, efficacy, and safety.

Keywords: Cervical spine surgery, Locorregional anaesthesia, Cervical multifidus plane block, multimodal analgesic approach, laminectomy

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Introduction

Pain associated with spinal pathologies, such as disc extrusion, is reported in the veterinary literature as moderate to severe (Carroll and Martin, 2007; Mathews et al., 2014), demanding effective management. The implementation of multimodal analgesic protocols is a suitable approach to minimize drug dosages and associated adverse effects

(Deligne et al., 2024). Locoregional anaesthesia (LRA) plays a crucial role in these strategies to prevent acute and chronic postoperative pain (Kehlet et al., 2006). For instance, the erector spinae plane (ESP) block has been shown to reduce intra- and postoperative opioid consumption in canine thoracolumbar procedures (Portela et al., 2021). However, reports on LRA for canine cervical spinal surgery remain limited compared to other anatomical regions. While human medicine describes several techniques for cervical spine procedures, including the cervical interfascial plane and multifidus plane blocks (Ohgoshi and Kurahashi, 2017), veterinary literature is limited, currently identifying only the inter-transversospinalis plane block -ITPB- (Herrera-Linares et al., 2024) and the cervical plexus block -CPB- (Cañón Pérez et al., 2024; D'Urso et al., 2025), both in canine cadavers. Collectively, these techniques represent promising tools for clinical investigation, as evidenced by recent publications on CPB (Mangas-Ballester et al., 2025). The present report describes a multimodal analgesic approach including an ultrasound-guided multifidus cervicis plane block (US-MCPB) in a dog undergoing C3 dorsal laminectomy.

Case presentation

A 7-year-old, 30-kg spayed Labrador Retriever presented with ambulatory tetraparesis of 48–72 hours' duration. Medical history included treating leishmaniasis and previous elbow dysplasia surgery. Physical examination was unremarkable except for neurological deficits. The dog had a body condition score of 4/5. Neurological examination revealed ambulatory tetraparesis with greater thoracic limb involvement, absent postural reactions in forelimbs, and increased spinal reflexes in hind limbs. Blood analysis showed microcytosis, mild thrombocytopenia, hyperglobulinemia, and a low positive *Leishmania* titer. A Computed Tomography (CT) scan (Somatom Scope, Siemens, Erlangen, Germany) revealed a dorsally compressive extradural mass at C3, confirmed by CT myelography (Figure 1). CSF analysis showed mild neutrophilic pleocytosis. Based on these findings, decompressive surgery was recommended and scheduled for the following day.

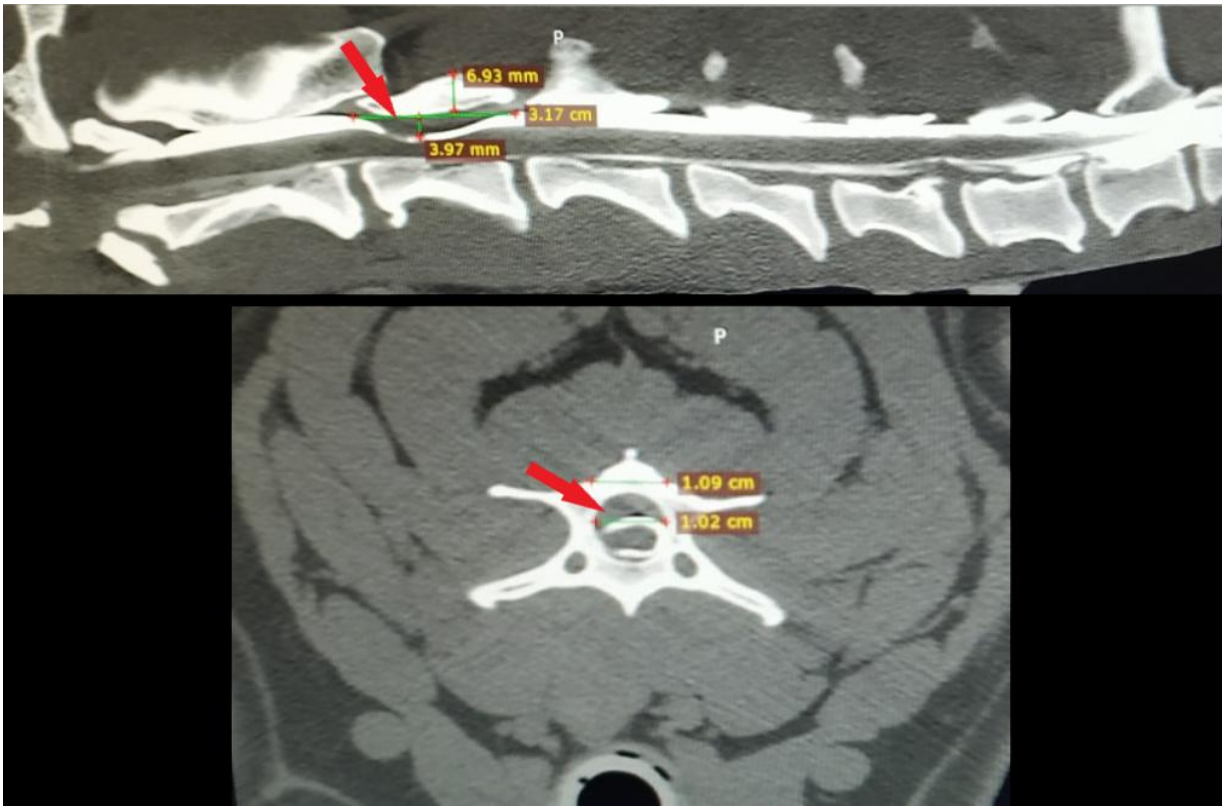

Figure 1: CT myelogram at the level of C3. Red arrows indicate the compressive extradural mass.

The following day, after cephalic vein catheterization, premedication consisted of intravenous (IV) medetomidine (2 µg kg^{-1}, Dechra, Barcelona, Spain) and methadone (0.2 mg kg^{-1}, Dechra, Barcelona, Spain). Anaesthesia was induced with propofol to effect (1.5 mg kg^{-1}, Propofol Lipuro 1%, B. Braun, Rubí, Spain), ketamine (1 mg kg^{-1}, Dechra, Barcelona, Spain), and midazolam (0.2 mg kg^{-1}, Normon, Tres Cantos, Spain). The trachea was intubated, and anaesthesia was maintained with sevoflurane (Zoetis, Madrid, Spain) in a 50:50 air-oxygen mixture under volume-controlled ventilation (Datex-Ohmeda 9100c, GE, Madison, USA). Multiparameter monitoring included ECG, SpO_2, capnography, spirometry, temperature, and non-invasive blood pressure (B40 monitor, GE, Milwaukee, USA). A continuous IV ketamine infusion (0.6 mg kg^{-1} h^{-1}) was initiated. Prophylactic IV cefazolin (22 mg kg-1, Normon, Tres Cantos, Spain) was administered every 90 minutes. Invasive blood pressure monitoring was established via the dorsal pedal artery catheterization.

Following induction, a bilateral US-MCPB was performed based on the authors' unpublished dissections, adapted from the human literature (Ohgoshi et al., 2017; Ohgoshi and Kurahashi, 2017). The patient was positioned in lateral recumbency with the side blocked facing upward, and a small pillow was placed under the cervical spine to optimize alignment. Using a 12 MHz linear transducer (Logiq P9, GE Healthcare, Milwaukee, USA), anatomical landmarks were identified: a longitudinal imaginary line connecting the C3 to C5 transverse processes and a transverse line at the caudal border of the atlas (C1). The probe was positioned longitudinally to the neck axis at the intersection of these lines at the level of C2, scanning dorsocaudally to identify the caudal articular process of C2. The target interfascial plane appeared as a fascial thickening immediately caudal to the articular process, bordered medially by the multifidus muscle and laterally by the complexus muscle (Figure 2). An in-plane approach was used with a 20G spinal needle (Spinocan, B. Braun, Rubí, Spain) in a craniocaudal direction (Figure 2), injecting bupivacaine (2.5 mg mL^{-1}, B. Braun, Rubí, Spain) at 0.15 mL kg^{-1}. The procedure was repeated on the contralateral side.

The patient was transferred to the operating room for C3 dorsal laminectomy. Intraoperative nociception was defined as an acute increase in heart rate (HR) or arterial blood pressure of >20% above pre-stimulation baseline values, consistent with cut-off values commonly reported in the literature (Bendinelli et al., 2024). Physiological parameters remained stable during the initial stages, allowing for a 50% reduction in the ketamine infusion rate (0.3 mg kg^{-1} h^{-1}) prior to laminectomy. However, during mass excision, a nociceptive response was identified, characterized by a transient increase in systolic arterial pressure (<20% from baseline). Although the strict threshold was not exceeded, intravenous fentanyl (1 µg kg^{-1}, Dechra, Barcelona, Spain) was administered. No further analgesic interventions were required, and the remainder of the procedure progressed uneventfully. Expired sevoflurane concentration (FeSev in %), heart rate, and invasive arterial pressure values obtained in the operating room are represented in Figure 3. The surgical time was 3 hours, and the total anaesthesia duration was 4 hours and 25 minutes.

Prior to extubation, medetomidine (1 µg kg^{-1}) was administered IV followed by a continuous infusion at 0.75 µg kg^{-1} h^{-1} to ensure smooth recovery. Upon transfer to hospitalization, a single IV dose of methadone (0.1 mg kg^{-1}) was administered (5.5 hours after the initial dose). The medetomidine infusion was tapered and discontinued after 18 hours. Ketamine infusion was continued for 48 hours. The postoperative analgesic protocol included IV paracetamol (10 mg kg^{-1} TID, B. Braun, Rubí, Spain), and oral gabapentin (10 mg kg^{-1} TID, Kern Pharma, Terrassa, Spain), complemented by progressive physiotherapy (cryotherapy, passive mobilization) and postural management. Methylprednisolone was administered per the surgical team´s indication. Serial pain assessments were performed using the Glasgow CMPS-SF. Thresholds were exceeded only at 11 and 15 hours post-surgery (score 7/20). Both episodes resolved following non-pharmacological measures (repositioning, cold packs, spontaneous urination), dropping scores below the threshold without additional pharmacological analgesia. Median pain score was 2.3 (range: 2-7). Ambulation resumed on day 8 with difficulty, followed by steady motor improvement until discharge 12 days postoperatively. Histopathological findings were consistent with chronic pyogranulomatous pachymeningitis (Figure 4).

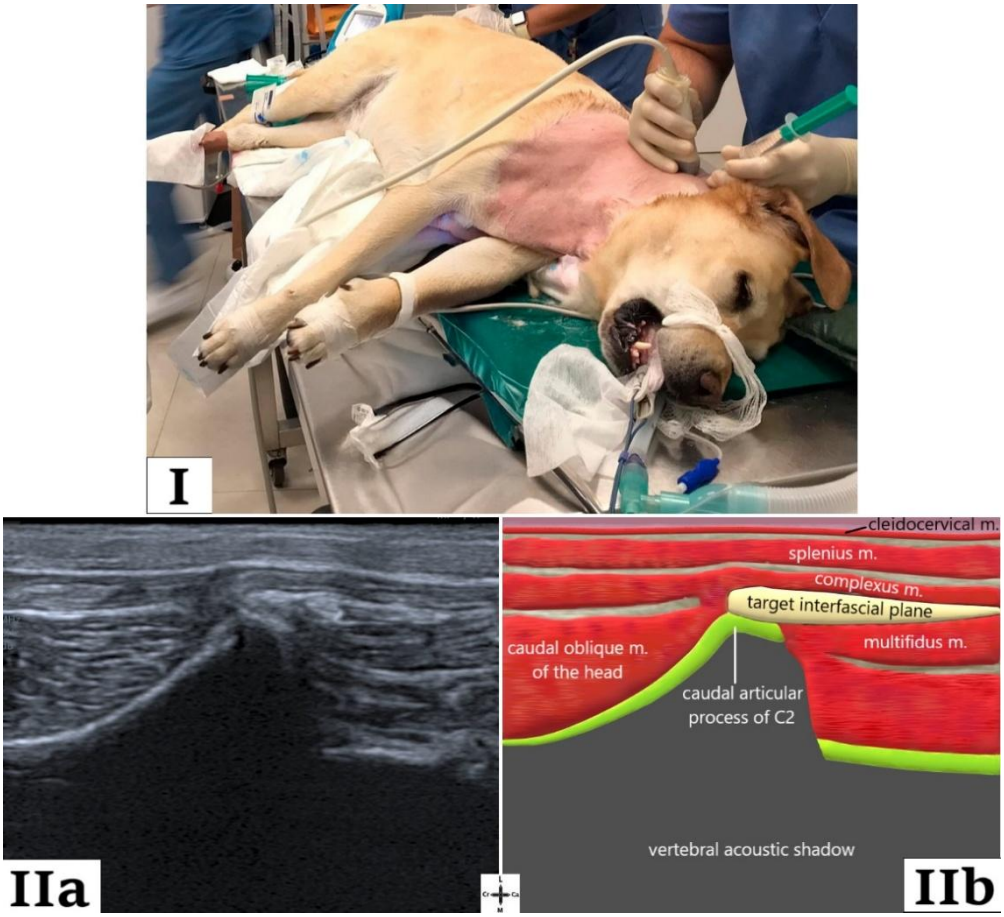

Figure 2: I: Probe position and in-plane approach. IIa and IIb: Acoustic window of the desired injection site.

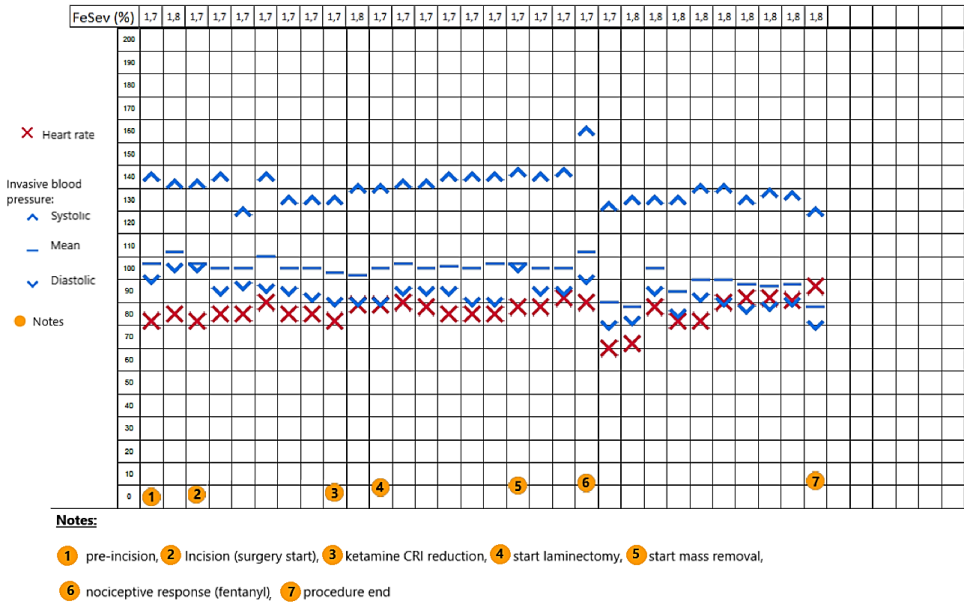

Figure 3: Graphical representation of the anaesthetic record showing: FeSev (%), heart rate, and invasive arterial pressure values obtained during the procedure in the operating room.

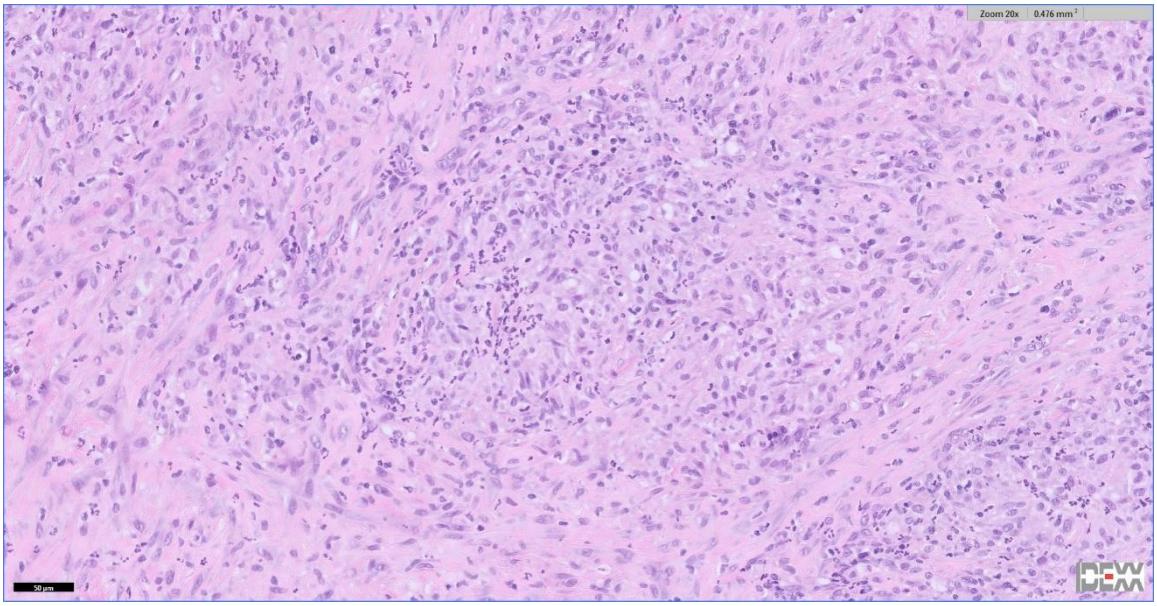

Figure 4: Histopathological section of the compressive meningeal mass from a 7-year-old dog. The image demonstrates chronic pyogranulomatous pachymeningitis, characterized by a dense fibrovascular stroma heavily infiltrated by neutrophils and macrophages. (H&E stain, 20×).

Discussion

In the present case, a multimodal analgesic approach incorporating a US-MCPB was successfully employed to provide perioperative analgesia for a dog undergoing C3 dorsal laminectomy. This protocol provided effective perioperative antinociception, as evidenced by intraoperative hemodynamic stability and minimal requirements for rescue analgesia, followed by a comfortable postoperative recovery maintained until hospital discharge.

From an anatomical perspective, the injection target described in this case, the interfascial plane between the multifidus and semispinalis capitis muscles, is fundamentally equivalent to the ITPB recently detailed in cadavers by Herrera-Linares et al. (2024). Therefore, the terminological distinction (ITP vs. MCPB) reflects nomenclature preferences rather than a distinct anatomical site. However, a distinct technical approach was employed in the present case: while Herrera-Linares et al. (2024) described a transverse approach at the mid-cervical level (C5), a longitudinal approach targeting the caudal articular process of C2 was performed in this case. This cranial shift aimed to desensitize the cranial cervical segments (C2–C4).

The multimodal analgesic strategy employed provided comprehensive coverage of nociception, leveraging the synergistic effects of systemic agents and locoregional anaesthesia. The intraoperative hemodynamic stability, maintained despite a 50% reduction in the ketamine infusion rate, suggests an effective blockade of nociceptive transmission, particularly considering the severe-to-excruciating input described for this surgery (Mathews et al., 2014). This aligns with the potential of locoregional anaesthesia to reduce perioperative anaesthetic requirements (Grubb and Lobprise, 2020) and opioid consumption (Pérez et al., 2024; Portela et al., 2021). The isolated, mild hemodynamic event was temporally associated with nerve root traction, as noted by the surgeons. This proximal traction represents a stimulus that may anatomically bypass the target of the block.

Postoperatively, the efficacy of the protocol was underscored by the sustained low pain scores and the absence of opioid rescue requirements after the immediate recovery phase. The use of bupivacaine, with an expected duration of 4-12 hours (Grubb and Lobprise, 2020), likely facilitated a smooth transition to the maintenance regimen of ketamine, paracetamol, and gabapentin. Crucially, resolving transient score elevations solely through non-pharmacological interventions (cryotherapy, repositioning, bladder emptying) underscores the importance of integrating these therapies into the multimodal approach (Gruen et al., 2022), thereby avoiding unnecessary pharmacological administration. Finally, the absence of complications such as hypotension, respiratory

depression, or ataxia suggests that the technique provided effective regional analgesia without inadvertent epidural spread.

Conclusion

This report demonstrates the clinical feasibility of a novel US-MCPB as part of a multimodal analgesic protocol for C3 dorsal laminectomy, contributing to hemodynamic stability and effective perioperative analgesia. Although the inherent limitations of a single-case report necessitate further clinical studies to define safety and dosing, the favorable outcome observed here highlights the technique's potential as a valuable component of multimodal analgesic strategies in veterinary neurosurgery.

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Authors' contribution: All authors contributed to this case report. A.C.P performed material preparation, data collection, and analysis. The first draft of the manuscript was written by A.C.P., J.V.M., C.B.R., and R.F.P., and all authors commented on previous versions of the manuscript. All authors read and approved the final version of the manuscript.

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