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Bilateral Erector Spinae Plane Block Reduces Intraoperative Opioid Requirements Compared with Fentanyl CRI in Dogs Undergoing Hemilaminectomy: A Retrospective Study

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ABSTRACT

The erector spinae plane block (ESPB) is an ultrasound-assisted fascial block used to manage perioperative pain in dogs undergoing hemilaminectomy. This study set out to evaluate how a bilateral ESPB compares with a fentanyl constant rate infusion (CRI) for analgesia in this setting. This retrospective cohort review examined anaesthesia records from client-owned dogs that underwent hemilaminectomy between June 2019 and August 2020 and received a bilateral ESPB (group ESPB). Their outcomes were contrasted with those from 39 dogs operated between September 2014 and June 2017 who received fentanyl via CRI (2 µg/kg bolus, then 5 µg/kg/hour) as their main intraoperative analgesic (group CRI). The analysis focused on how many dogs needed rescue fentanyl doses during surgery, the cumulative amount administered, postoperative methadone usage, and adverse anaesthetic events within 24 hours. Univariate statistics were applied. Group ESPB included 93 dogs. The block was performed with a median (range) levobupivacaine volume of 1 (0.5–1.7) mL/kg per side at 0.125% (0.12–0.25). Rescue fentanyl was required in 54.8% of dogs in group ESPB and 56.4% in group CRI ($p > 0.99$). Dogs in the CRI cohort received a greater total number of rescue boluses ($p = 0.006$), particularly during lumbar procedures. From the moment of skin incision through vertebral lamina drilling, rescue boluses were administered more often in group CRI ($p = 0.001$), whereas from the end of drilling until surgery completion, the ESPB cohort received more additions ($p = 0.0002$). In the first 6 postoperative hours ($p = 0.0035$) and the 6–12 hour period ($p = 0.0005$), methadone use was more frequent in group CRI. Hypothermia occurred more often in the ESPB cohort ($p = 0.04$). One dog not included in the dataset experienced sinus arrest following a caudal thoracic ESPB. Within the limits of this dataset, bilateral ESPB corresponded with fewer fentanyl rescue boluses during hemilaminectomy, most notably from skin incision through lamina drilling. Although opioid requirements were reduced in the ESPB group during the first 12 postoperative hours, variations in postoperative care limited conclusions regarding longer-term analgesic effects.

Keywords: Dog, Erector spinae plane block, Hemilaminectomy, Regional anaesthesia, Analgesia

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Background

The erector spinae plane block involves deposition of local anaesthetic along the thoracolumbar fascial layer at the transverse processes under ultrasound guidance. Although its exact mechanism remains uncertain, it is thought to act on neural structures positioned beneath the erector spinae muscles and nearby compartments [1]. ESPB has been reported to aid analgesia for thoracic, abdominal, and spinal procedures in human patients [2].

Cadaveric work in dogs, horses, and pigs has documented thoracic and lumbar ESPB, with canine studies consistently showing staining of dorsal spinal nerve branches [3–8]. In dogs and cats undergoing hemilaminectomy, ESPB has been associated with improved analgesia [9–12] and reduced need for cardiovascular-related pharmacologic interventions [13].

This study retrospectively examined whether bilateral ESPB offers superior analgesic performance relative to fentanyl CRI in dogs undergoing hemilaminectomy. We proposed that the ESPB group would show fewer fentanyl rescue boluses intraoperatively (primary outcome) and fewer dogs requiring opioids during the first 6 postoperative hours (secondary outcome).

Methods

Because this was a retrospective observational project, no ethics submission was required. Owners had previously consented to allow use of clinical data for such studies. All procedures adhered to local standards.

Dogs that had thoracic or lumbar hemilaminectomy for disc extrusion or protrusion at Dick White Referrals (UK) between June 2019 and August 2020, and received a bilateral ESPB, were included in group ESPB. Records were excluded if the local anaesthetic dose per side was < 0.5 mL/kg; if fentanyl (Fentadon; Dechra Pharmaceuticals, UK) was not the only intraoperative rescue drug; if surgeries beyond hemilaminectomy were performed; if the modified Frankel score was 5 (paraplegia without deep pain) [14]; if any adverse drug reaction occurred; or if documentation was incomplete. The comparison cohort (group CRI) comprised 39 dogs treated between September 2014 and June 2017 using a fentanyl CRI protocol (2 µg/kg bolus, then 5 µg/kg/hour) [15].

The erector spinae plane block (ESPB) was applied using an approach previously outlined in the literature, and it was carried out by several anaesthetists who had differing levels of familiarity with ultrasound-guided fascial plane injections [3]. Dogs were placed in sternal recumbency for the block. Using a linear ultrasound probe (5–13 MHz; SonoScape S6V, SonoScape, UK) positioned parasagittally, the operator located the vertebral transverse process. A 20–22 gauge Tuohy needle (Perican®; Braun, Germany) of appropriate length was then advanced in-plane until it contacted the transverse process. Levobupivacaine (Chirocaine 0.5%; AbbVie Srl, Italy) was administered while observing the spread of the injectate within the correct fascial layer and the characteristic upward displacement of the epaxial musculature. The anaesthetist performing the case selected both the volume and strength of levobupivacaine.

All variables summarised in **Tables 1, 2, and 3** were entered into Microsoft Excel (Microsoft Corp, v 16.41, USA). The number of IV fentanyl rescue boluses given during surgery—specifically when the attending clinician observed abrupt changes in heart rate (HR) and/or mean arterial pressure (MAP) that suggested nociceptive stimulation, provided no prior drug had been administered, and no other explanation was likely, and provided that cardiovascular values normalised after fentanyl—was documented. To determine the total fentanyl rescue requirement (µg/kg/hour), the total fentanyl delivered (µg) was divided by each dog's body mass (kg) and total surgical time (hours). The first nociceptive event was assigned to either phase 1, defined from skin incision until the completion of drilling the vertebral lamina, or to phase 2, which began after drilling was completed and ended when surgery concluded. Procedures were labelled "thoracolumbar" when the affected disc lay caudal to T10 and cranial to L1, and "lumbar" when the herniated disc was located caudal to L1 but cranial to L6.

Table 1. Demographic, anaesthetic, and surgical information for 132 dogs undergoing thoracolumbar (cranial to the 1st lumbar vertebra) or lumbar (caudal to the 1st lumbar vertebra) hemilaminectomy using either bilateral ESPB (ESPB group) or continuous fentanyl infusion (CRI group). Values appear as mean ± SD or median (range). When applicable, odds ratios (OR) with 95% confidence intervals (CI) are included. * indicates reciprocal OR

Parameter	ESPB Group (n = 93)	CRI Group (n = 39)	ESPB vs CRI p-value	Odds Ratio (95% CI)
Age (months)	70 ± 34	71 ± 29	0.92	-
Sex distribution	10 intact females (10.7%) 33 spayed females (35.5%) 18 intact males (19.4%) 32 castrated males (34.4%)	2 intact females (5.1%) 11 spayed females (28.2%) 8 intact males (20.5%) 18 castrated males (46.2%)	0.18	-
Body weight (kg)	10 (3.1–38.3)	8.6 (3.9–41)	0.29	-

Modified Frankel Score (MFS) at presentation	35 dogs MFS 1 or 2 (37.6%) 53 dogs MFS 3 (57%) 5 dogs MFS 4 (5.4%)	31 dogs MFS 1 or 2 (79.5%) 8 dogs MFS 3 (20.5%) 0 dogs MFS 4 (0%)	< 0.0001	5.87 (2.39–13.70)*
Pre-anaesthetic premedication with methadone	93 dogs (100%)	39 dogs (100%)	1	-
Methadone dose (mg/kg)	0.2 (0.1–0.3)	0.25	-	-
Use of acepromazine as premedication	1 dog (1.1%)	0 dogs	1	-
Acepromazine dose (mg/kg)	0.01	-	-	-
Use of dexmedetomidine as premedication	89 dogs (95.7%)	0 dogs	< 0.0001	-
Dexmedetomidine dose (µg/kg)	1 (0.5–2)	-	-	-
Time from premedication to surgical incision (min)	85 (35–240)	90 (60–150)	0.18	-
Anaesthetic induction with propofol	85 dogs (91.4%)	39 dogs (100%)	0.10	-
Propofol dose (mg/kg)	2.4 (0.9–5.4)	4.2 (2.4–7.8)	< 0.0001	-
Anaesthetic induction with alfaxalone	8 dogs (8.6%)	0 dogs	0.10	-
Alfaxalone dose (mg/kg)	0.9 (0.7–1.8)	-	-	-
Inhalant agent for maintenance of anaesthesia	90 isoflurane (96.8%) 3 sevoflurane (3.2%)	39 isoflurane (100%) 0 sevoflurane (0%)	0.55	-
MAC multiple of inhalant anaesthetic agent	0.94 (0.86–1.1)	1.08 (0.91–1.19)	< 0.0001	-
Type of intervertebral disc herniation	91 extrusions (97.8%) 2 protrusions (2.2%)	39 extrusions (100%) 0 protrusions (0%)	1	-
Side of disc herniation	51 left (54.8%) 42 right (45.2%)	23 left (59%) 16 right (41%)	0.70	-
Number of affected disc spaces	80 single space (86%) 10 two spaces (10.8%) 3 three spaces (3.2%)	39 single space (100%) 0 two spaces (0%) 0 three spaces (0%)	0.01	-
Surgical site	62 thoracolumbar (66.7%) 31 lumbar (33.3%)	21 thoracolumbar (53.8%) 18 lumbar (46.1%)	0.17	-
Prophylactic disc fenestration performed	91 dogs (97.8%)	36 dogs (92.3%)	0.15	-
Total number of discs fenestrated	3 (1–5)	4 (1–6)	< 0.0001	-
Duration of surgery (min)	70 (30–150)	65 (40–110)	0.17	-
Total anaesthesia duration (min)	161 ± 43	140 ± 31	0.01	-

n = number; vs = versus; F = female; FS = female spayed; M = male; MN = male neutered; MFS = modified Frankel scale; MAC = minimum alveolar concentration; IAA = inhalational anaesthetic agent; min = minute.

Table 2. Intraoperative fentanyl rescue boluses and postoperative analgesia within the first 24 hours for 132 dogs undergoing thoracolumbar or lumbar surgery and managed with ESPB or CRI. Fentanyl usage, dosing, the time interval from the beginning of surgery to the first rescue bolus, and methadone dosage are listed as median (range). ORs with 95% CI are reported when relevant. * represents reciprocal OR.

Parameter	ESPB Group (n = 93)	CRI Group (n = 39)	ESPB vs CRI p-value	Odds Ratio (95% CI)
Dogs receiving intraoperative rescue fentanyl bolus	51 (54.8%)	22 (56.4%)	> 0.99	-
Rescue fentanyl bolus during thoracolumbar surgery	37 (39.8%)	7 (18%)	0.13	2.40 (0.85–6.93)
Rescue fentanyl bolus during lumbar surgery	14 (15%)	14 (36%)	0.037	4.25 (1.08–13.56)*
Total number of intraoperative rescue fentanyl boluses administered	1 (1–4)	2 (1–7)	0.006	-

Total intraoperative rescue fentanyl dose	1.7 (0.4–6) µg/kg/hour	1.6 (0.75–5.1) µg/kg/hour	0.59	-
Time from surgical incision to first rescue fentanyl bolus (min)	25 (5–105)	10 (5–50)	< 0.0001	-
Postoperative oral analgesic regimen				
• Gabapentin + NSAID	71 (76.3%)	39 (100%)	0.0008	-
• Gabapentin + NSAID + amantadine	1 (1.1%)	0 (0%)	1	-
• Gabapentin + NSAID + paracetamol	1 (1.1%)	0 (0%)	1	-
• Gabapentin only	13 (13.9%)	0 (0%)	0.01	-
• Gabapentin + paracetamol	2 (2.2%)	0 (0%)	1	-
• Gabapentin + steroid	2 (2.2%)	0 (0%)	1	-
• Gabapentin + steroid + paracetamol	3 (3.2%)	0 (0%)	0.55	-
Postoperative methadone requirement – first 6 hours				
Dogs receiving at least one dose	15 / 86 (17.4%)	17 (43.6%)	0.003	3.66 (1.60–8.71)*
Dose administered (mg/kg)	0.2 (0.2–0.5)	0.2 (0.2–0.4)	0.18	-
Postoperative methadone requirement – 6–12 hours				
Dogs receiving at least one dose	9 / 86 (10.5%)	15 (38.5%)	0.0005	5.35 (2.14–12.98)*
Dose administered (mg/kg)	0.2 (0.2–0.4)	0.2 (0.2–0.4)	0.24	-
Postoperative methadone requirement – 12–24 hours				
Dogs receiving at least one dose	6 / 86 (7%)	6 (15.4%)	0.19	-
Dose administered (mg/kg)	0.3 (0.2–0.4)	0.2 (0.2–0.4)	> 0.99	-

n = number; min = minute; NSAID = non-steroidal anti-inflammatory drug.

Table 3. Intra- and postoperative complications in the same 132-dog cohort, comparing ESPB to CRI. Odds ratios (95% CI) provided where appropriate

Parameter	ESPB Group (n = 93)	CRI Group (n = 39)	ESPB vs CRI p-value	Odds Ratio (95% CI)
Intraoperative complications				
Hypotension	34 (36.6%)	16 (41%)	0.69	-
Hypothermia	74 (79.6%)	24 (61.5%)	0.04	2.57 (1.13–5.74)
Other intraoperative complications				
• Regurgitation	4 (4.3%)	0 (0%)	0.34	-
• Second-degree atrioventricular block	3 (3.2%)	2 (5.1%)	-	-
• Vagal reflex	1 (1.1%)	0 (0%)	-	-
• Intraoperative haemorrhage < 5% of blood volume	1 (1.1%)	0 (0%)	-	-
• Bradycardia	1 (1.1%)	0 (0%)	-	-
Postoperative complications				
Multidrug-resistant (MDR) bacterial infection	1 (1.1%)	0 (0%)	1	-

n = number of dogs; AV = atrio-ventricular; MDR = multi-drug resistant.

To determine the multiple of MAC for inhalational anaesthesia, the mean of the end-expiratory percentage of isoflurane (IsoFlo; Zoetis UK Ltd., UK) or sevoflurane (SevoTek; Animalcare, UK) recorded every 5 minutes (Mindray BeneView T5; Mindray, UK) was calculated. That value was divided by the canine MAC values—1.28 % for isoflurane and 2.36 % for sevoflurane [16, 17].

Intraoperative hypotension was defined as MAP < 60 mmHg for two consecutive oscillometric readings taken 5 minutes apart [18]. Bradycardia referred to HR < 50 beats per minute accompanied by hypotension requiring an antimuscarinic agent. Hypothermia was defined as an oesophageal temperature below 36.5 °C for at least 10 minutes [19]. Any additional anaesthetic or surgical complication was also noted. The anaesthetist knew whether an ESPB had been placed, and several neurosurgeons performed the hemilaminectomies.

Postoperative pain was scored every 2 hours using the short form of the Glasgow Composite Measure Pain Scale (CMPS-SF). Methadone (0.2 mg/kg IV; Comfortan; Dechra Pharmaceuticals, UK) was administered whenever the CMPS-SF result was ≥5 / 20 [20]. Assessments were conducted by trained neurology nurses familiar with the scale, who were also aware of whether ESPB had been used. Methadone requirements across the 0–6, 6–12, and

12–24 hour periods were compared between groups. Postoperative complications and any other analgesic drugs provided were also recorded.

Statistical analysis

Because group F contained 39 dogs, the power calculation indicated that 79 animals were required in the ESPB cohort to evaluate the primary hypothesis (effect size 0.5, $\alpha = 0.05$, $\beta = 0.08$) with a 0.5 allocation ratio (G*Power 3.1; MAC module).

Normality of variables was examined with the D'Agostino–Pearson test (GraphPad Prism 8, Mac OS). Continuous outcomes were processed using either a Student t-test or Mann–Whitney U test, based on distribution, with results expressed as mean ± SD or median (range).

Categorical variables were contrasted with Fisher's exact test. When relevant, odds ratios (OR) or their reciprocals and 95% confidence intervals (CI) were provided. A p-value < 0.05 marked statistical significance.

Results

Across June 2019–August 2020, 112 hemilaminectomies that included an ESPB were identified; after excluding 19, a total of 93 ESPB cases were compared with the 39 dogs in the CRI group **(Figure 1)**. All key variables were fully recorded. In the ESPB cohort, 10 dogs (7.6%) were omitted from postoperative evaluation because behavioural issues prevented pain scoring, requiring methadone every 4 h. One additional dog was removed after a sinus arrest occurring 10 min after a T13 ESPB using 1 mL/kg of 0.125% levobupivacaine bilaterally (total 2.4 mg/kg). Multiple doses of atropine (0.02 mg/kg IV) produced no improvement, but intralipid 20% (1.5 mL/kg bolus, then 0.25 mL/kg/min) restored sinus rhythm [21].

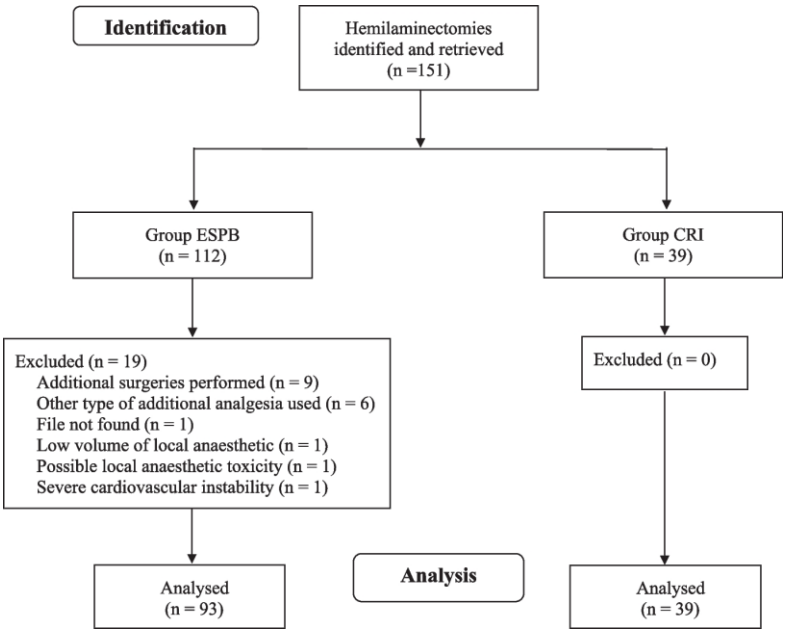

Figure 1. CONSORT diagram (n = number)

Demographics were comparable between groups; however, ESPB dogs were 5.87 times more likely to present with non-ambulatory paraparesis (MFS = 3; **Table 1**). Pre-anaesthetic and anaesthetic choices appear in **Table 1**. Dexmedetomidine was given to 95.7% of ESPB dogs and to 0% of CRI dogs ($p < 0.0001$). The inhalant MAC multiple was significantly reduced in ESPB animals ($p < 0.0001$).

MRI was completed preoperatively in 87.9% of the sample; the remaining 12.1% (all ESPB) underwent MRI the day prior to surgery. Disc extrusion occurred in 98.5% of cases, with no lateralisation differences **(Table 1)**. A single disc was affected in 90.1% of ESPB dogs and 100% of CRI dogs ($p = 0.01$). Surgical region comparisons showed no group differences, though more fenestrations were done in the CRI cohort ($p < 0.0001$). One neurosurgeon carried out 70.4% of procedures (all CRI; 58% ESPB). Anaesthetic duration was longer in the ESPB group ($p < 0.01$), while surgical time showed no variation **(Table 1)**.

ESPBs were carried out by multiple anaesthetists using 0.125% levobupivacaine (range 0.12–0.25%). Per-side volume was 1 (0.5–1.7) mL/kg, with a total dose of 2.3 (1.2–2.5) mg/kg. Overall, the proportion of dogs needing at least one intraoperative fentanyl rescue did not differ; however, CRI dogs were 4.25 times more likely to require a rescue dose during lumbar hemilaminectomy. The number of boluses ($p = 0.006$) but not the total µg/kg/hour ($p = 0.59$) was higher in CRI **(Table 2)**. Time to the first rescue bolus was shorter in CRI ($p < 0.0001$).

Phase-specific rescue rates:

- Phase 1: ESPB 23.7% (22/93) vs CRI 53.9% (21/39)

[$p = 0.001$; reciprocal OR = 3.77 (1.69–8.02)]

- Phase 2: ESPB 31.2% (29/93) vs CRI 2.6% (1/38)

[$p = 0.0002$; OR = 17.22 (2.93–181.3)]

Within the ESPB cohort, neither the volume [1.9 (1–2.4) vs 1.9 (1–2.1) mL/kg; $p = 0.85$] nor concentration [0.125% (0.12–0.25) for both; $p = 0.31$] of levobupivacaine differed between dogs that did or did not need rescue dosing. Comparing ESPB dogs by surgical region, rescue fentanyl was used in 59.7% (37/62) of thoracolumbar cases and 45.2% (14/31) of lumbar cases [$p = 0.19$; reciprocal OR = 1.80 (0.75–4.06)].

Before closure, extralural morphine (0.1 mg/kg) or buprenorphine (0.01 mg/kg), alone or with methylprednisolone (0.4 mg/kg), was applied in 91.2% (83 dogs) of ESPB procedures and in 0% of CRI surgeries.

Postoperative NSAIDs + gabapentin (10 mg/kg TID) were used in 100% of CRI dogs and 76.3% of ESPB dogs ($p = 0.0008$; **Table 2**). The remaining ESPB animals received alternative oral analgesic combinations **(Table 2)**. In ESPB dogs, dexmedetomidine infusions were used in 4 cases and lidocaine infusions in 2. In the CRI cohort, 20/39 dogs had two 1.5-cm-wide 5% lidocaine patches cut to incision length and placed alongside the wound [15].

Methadone dosing was guided by CMPS-SF in 92.4% (122/132) of dogs. 73.1% of ESPB dogs required no postoperative methadone. During 0–6 h and 6–12 h, methadone use was higher in CRI ($p = 0.0035$ and $p = 0.0005$). From 12–24 h, no difference was detected **(Table 2)**.

Perioperative complication rates are summarised in **Table 3**. ESPB dogs demonstrated a 2.57-fold higher likelihood of hypothermia ($p = 0.04$).

Discussion

This retrospective analysis examined pain control in dogs receiving either a bilateral ESPB or a fentanyl CRI during hemilaminectomy. Although both cohorts showed a comparable proportion of animals needing at least one intraoperative fentanyl rescue, the CRI group required a greater number of rescue doses overall, most notably during lumbar procedures. Rescue dosing in phase 1 occurred more frequently in the CRI cohort, while in phase 2 the opposite pattern emerged, with the ESPB group demonstrating a higher likelihood of requiring intervention. After surgery, dogs treated with the ESPB exhibited a marked reduction in methadone use during the initial 12 hours. These observations align with our initial expectations and are consistent with previous findings demonstrating opioid-sparing properties of a unilateral ESPB in similar surgical contexts [13].

Several limitations must be addressed when interpreting these data. The retrospective design, combined with the fact that the comparison group originated from an earlier prospective investigation at the same institution, likely introduced inconsistencies in anaesthetic and analgesic protocols. Although the neurosurgeons used comparable operative techniques, differences in procedural finesse related to evolving experience may have influenced tissue trauma, nociceptive stimulation, and postoperative pain levels. In addition, numerous anaesthetists—each with varying proficiency in ultrasound-guided regional techniques—performed the ESPBs, and both the dose and concentration of local anaesthetic were adjusted at their discretion. Despite senior supervision, this variability could have influenced block success.

Rescue fentanyl was administered based on the real-time judgement of the attending anaesthetist. Although the rationale for each administration was recorded, it remains impossible to rule out missed nociceptive events or inconsistent interpretation, especially given differing skill levels. Pre-existing pain disparities may also affect outcomes [22], though this seems improbable here, considering that ESPB dogs had higher MFS scores, consistent with more pronounced spinal cord compression. Postoperative pain scoring involved multiple anaesthetists and ward nurses, all aware of whether an ESPB had been performed, and the absence of uniform postoperative protocols may have contributed to bias. Nevertheless, the CMPS-SF, which was applied uniformly throughout the study period, was validated across three institutions as a tool that indicates the need for additional analgesia rather

than quantifies exact pain intensity [20]. Despite these constraints, the results likely retain clinical importance, as they reflect conditions typical of a busy referral centre.

Dogs receiving the ESPB were less likely to require fentanyl rescue during phase 1. This finding aligns with cadaveric work showing that injectate placed within the thoracic or lumbar ESPB fascial plane can colour the dorsal rami of spinal nerves [3,5,7,8], which supply structures such as the vertebral laminae, zygapophysial joints, epaxial musculature, and dorsal midline skin [23,24]. During phase 2, which involves manipulation of the spinal cord, disc excision, and possible fenestration of adjacent discs, fewer CRI dogs needed rescue analgesia. The contents of the vertebral canal are supplied by the meningeal branches of spinal nerves in humans, and although dogs lack a distinct thoracolumbar meningeal ramus, innervation is present [23,25]. Achieving an effect on these nerves would require paralateral or extradural spread of the injectate; human cadaveric work supports this possibility, but canine studies using a parasagittal technique have not demonstrated such staining [1,3,5,7,8]. Prior research noted increased analgesic requirements when the dorsal root ganglion area was manipulated [13], which may explain why the CRI appeared more effective during this stage. Even so, 64 of 93 ESPB dogs (68.8%) did not demand intraoperative fentanyl during disc removal or fenestration, despite a greater proportion presenting with multiple disc extrusions. This suggests that the ESPB's clinical mechanism may be more complex than anatomical dye studies imply [3,5,8].

In contrast to Portela *et al.* (2021), our protocol used bilateral rather than unilateral blocks, based on evidence that cutaneous and vertebral canal innervation can cross the midline [13,23,26]. Local anaesthetic characteristics also differed. Interfascial blocks theoretically benefit from increased volume and concentration [2,27], yet human clinical studies have not shown a consistent dose–response relationship [27,28]. Our approach used high volume / low concentration (1 mL/kg of 0.125% per side), whereas the previous report applied low volume / high concentration [median 0.46 mL/kg (0.2–0.6) of 0.5% bupivacaine] [13]. The decision to adopt a more dilute, larger volume strategy was influenced by knowledge that the anulus fibrosus can receive segmental sensory input extending two vertebrae cranially and caudally [23], as well as the generally longer skin incisions and higher number of fenestrated discs at our centre compared with that earlier study. Despite these technical contrasts, the overall proportion of dogs needing rescue analgesia was very similar between studies (54.8% versus 59.5%). Future prospective, randomised trials comparing unilateral vs bilateral approaches and varying volumes or concentrations of local anaesthetic are needed to elucidate the true intraoperative potential of the ESPB in canine hemilaminectomy.

The MAC multiple of the inhalational anaesthetic agent administered was lower in group ESPB.

Group ESPB showed a reduced MAC multiple for volatile anaesthesia. The practical relevance of this finding is uncertain because FE′Iso was kept unchanged in the CRI cohort, and the attending clinician likely knew that an ESPB had been performed, introducing potential bias. Additionally, 95.7% of ESPB dogs received dexmedetomidine as part of premedication. Earlier work showed that when 5 μg/kg IV medetomidine was given to dogs under isoflurane, MAC values returned to baseline by 60 minutes after dosing [29]. Moreover, Muir *et al.* reported no analgesic benefit after intramuscular medetomidine at 2–5 μg/kg in dogs [30], whereas intravenous dexmedetomidine produced analgesia only when exceeding 2 μg/kg [31]. In the present study, the median dexmedetomidine dose was 1 μg/kg, and the median interval between premedication and surgery onset was 85 minutes; thus, it is improbable that dexmedetomidine meaningfully contributed to lowering MAC values or reducing the frequency of rescue fentanyl in the ESPB group.

Overall, the postoperative methadone requirement was reduced in group ESPB, consistent with observations in both human and veterinary settings [13, 32, 33]. The reduction occurred during the first 12 hours, whereas the 12–24-hour window showed no difference, suggesting an effect aligned with the pharmacologic duration of levobupivacaine [34]. Nevertheless, postoperative analgesia was not standardised, making interpretation difficult. Notably, 91.2% of ESPB dogs received an extradural application of an opioid, sometimes combined with a steroid, prior to closure. This could influence methadone use because extradural opioid splash has been shown to enhance post-hemilaminectomy analgesia in dogs [35], and extradural steroids may mitigate spinal cord inflammation associated with disc herniation [36]. Meanwhile, all CRI dogs received an NSAID, compared with 78.5% in the ESPB group. Half of the CRI dogs (51%) had a lidocaine patch applied, although this approach has not demonstrated postoperative analgesic value after hemilaminectomy [15].

Contrary to our findings, a previous investigation reported that a unilateral ESP block conferred analgesic benefits for up to 48 hours after hemilaminectomy [13]. Their stronger outcomes may relate to administering a higher concentration of local anaesthetic, as human data indicate that more concentrated solutions produce greater

reductions in rescue analgesia [28]. However, their study relied on a non-validated pain scoring system [13], whereas ours used a validated canine acute-pain scale [20]. Furthermore, dexmedetomidine was included as an additive in 21% of their blocks [13], a practice known to extend ESPB duration [37], and 23.8% of their dogs received intraoperative lidocaine and/or ketamine infusions—factors that may have influenced their outcomes.
General anaesthesia lasted longer—but surgery duration did not—in dogs receiving ESPB. The block performance time was not recorded, but likely contributed to a lengthened anaesthetic period. A higher rate of hypothermia was also observed in the ESPB cohort. Although prolonged anaesthesia could contribute, previous work found no significant association between anaesthetic length and hypothermia in hemilaminectomy procedures [38]. Another possibility is that bilateral ESPB induced notable peripheral vasodilation, increasing heat loss [39].
One dog developed sinus arrest 10 minutes after a T13 ESPB, showed no response to antimuscarinic treatment, and subsequently received intralipid because LAST was suspected [21]. Nevertheless, a causal link cannot be definitively established. In human patients, the incidence of LAST associated with ESPB is around 1.6%, generally presenting with CNS-related signs [27, 40]. LAST may occur if the injectate spreads into paravertebral or intercostal regions, allowing rapid systemic uptake from these vascular compartments [27]. Although no relationship between LAST and injectate volume has been documented, toxicity appears more often with low-concentration local anaesthetics [27], which aligns with the concentrations used here. Earlier canine work using higher concentrations detected no cases of LAST [13].

Conclusions

Within the parameters of this study, and relative to fentanyl CRI, a preoperative bilateral ultrasound-guided ESPB seems effective in reducing the proportion of dogs requiring rescue fentanyl boluses, particularly from the initial incision through the completion of vertebral lamina drilling. Postoperatively, the block may lower opioid use during the first 12 hours. However, variability in postoperative analgesic management prevents firm conclusions about its later effects. Additional prospective investigations are necessary to confirm these findings.

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