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CASE REPORT

Continuous extradural analgesia in a cow with complex regional pain syndrome

Alessandra Bergadano DVM, Dr Med. Vet., Diplomate ECVA, **Yves Moens*** DVM, PhD, Diplomate ECVA & **Urs Schatzmann** Dr Med. Vet., FHV, Diplomate ECVA

Anaesthesiology Section, Department of Clinical Veterinary Medicine, Vetsuisse Faculty, University of Berne, Berne, Switzerland

Correspondence: Alessandra Bergadano, Anaesthesiology Section, Department of Clinical Veterinary Medicine, Vetsuisse Faculty, University of Berne, Länggassstrasse 124, PB 8466 CH-3001, Berne, Switzerland. E-mail: alessandra.bergadano@knp.unibe.ch

Abstract

A chronic pain syndrome, similar to the complex regional pain syndrome (CRPS) described in human beings, was diagnosed in a cow with persisting severe pelvic limb lameness. Diagnosis was based on the disproportionate relationship between the severity and duration of pain and the lesion, the failure of conventional analgesic and surgical therapy and the presence of characteristic clinical features. Multimodal therapy, i.e. a mixture of methadone, ketamine and bupivacaine was administered continuously for 17 days via an extradural catheter to counteract nociceptive hypersensitization. Doses were adjusted daily after assessing the effect, using a composite pain score. Physiotherapy was also performed. The diagnosis of CRPS in cattle is unusual. In this case, treatment was successful and the cow was discharged mildly lame and in improving physical condition. Long-term extradural analgesia proved to be safe and effective in the treatment of this syndrome, which was nonresponsive to conventional therapy.

Keywords bovine, chronic pain, extradural catheter, multimodal therapy.

History

A 7-year-old Brown Swiss cow weighing 640 kg was presented with an injury to the lateral digit of the right pelvic limb. Three operations involving joint lavage were performed over the following 18 days. Despite this, the lameness worsened and the lateral digit was eventually amputated. All surgeries were performed under intravenous regional anaesthesia using 20 mL of lidocaine 2% (Xylocain; AstraZeneca PLC, London, UK). Postoperatively, systemic antibiotics and a combination of phenylbutazone and ramifenazon were given for analgesia (Tomanol ad us.vet.; Schering-Plough Santé Animale, Segré, France). The latter was substituted successively with combinations of phenylbutazone, acetylsalicylic acid and paracetamol (Sepvadol ad us.vet.; Sogeval SA, Laval, France) but without success. Thirty-nine days after admission the cow was referred to the anaesthesiology division with a tentative diagnosis of pathological pain.

Observations and interventions

On physical examination the cow was depressed and reluctant to stand or walk, with a nonweight-bearing pelvic limb lameness. There was muscle atrophy of the right pelvic limb, oedema of the fetlock and evidence of delayed surgical wound healing. A light touch to the fetlock provoked immediate withdrawal, while responses to palpation above the tarsus were normal. Flexion, extension and rotation tests of the fetlock joint did not appear to cause pain. Neither radiographic examination nor analysis of synovial fluid supported a diagnosis of joint infection. Values of haematological examination and serum biochemistry and the rectal temperature

*Present address: Yves Moens, Department of Small Animals and Horses, Clinic of Anaesthesiology and Perioperative Intensive Care, Veterinärplatz 1, A-1210 Wien, Austria

were within normal limits. Given the history and the absence of pathology, a tentative diagnosis of hyperalgesia and complex regional pain syndrome (CRPS) was made. In view of the failure of conventional analgesic and anti-inflammatory therapy, a constant rate infusion (CRI) of extradural analgesics was planned. The skin over the first coccygeal interspace was clipped, scrubbed and desensitized with transdermal lidocaine (2%). A 18 SWG × 3.5 inch (8.89 cm) Tuhoy needle was aseptically inserted into the extradural space with the bevel directed cranially. Accurate positioning was confirmed by a positive 'hanging drop' sign, minimal resistance to the injection of 3 mL of 2% lidocaine, and by the subsequent development of tail paralysis. An extradural catheter (EC) (Perifix 420; B Braun, Melsungen, Gremany) was advanced cranially for 15 cm without resistance and a bacterial filter was fitted at its proximal end. The catheter insertion site was protected with antiseptic ointment, gauze and a sterile adhesive wound dressing. The catheter was connected to a mechanical spring-loaded syringe pump (Flowline, Springfusor syringe pump; Mila International Inc., Erlanger, KY, USA) which was sutured to the animal's back. The pump featured a 10 mL syringe with flow control tubing designed to allow the delivery of 10 mL in 4 hours (Flow control tubing, Mila International Inc.). The actual delivery rate (10 mL in 6 hours) was probably caused by the narrower diameter (approximately 1.2 mm) of the extradural catheter.

The effectiveness of analgesia was assessed using a four-point pain score (PS) applied to four tests: (i) degree of lameness (0: no lameness; 1: uses foot to walk, mild gait irregularity; 2: uses foot at rest, severe gait irregularity; 3: nonweight bearing at rest, severe head movement whilst moving), (ii) reaction to fetlock palpation (0: no withdrawal after four palpations; 1: withdrawal after three palpations; 2: withdrawal after two palpations; 3: withdrawal after a single palpation), (iii) amount of time spent in recumbency (0: lying down once during the four daily assessments; 1: lying down twice; 2: lying down three times; 3: lying at all four daily assessments) and (iv) percentage of heart rate variation from baseline (0: < 10% variation from baseline; 1: 11–30% variation from baseline; 2: 31–50% variation from baseline; 3: more than 50% variation from baseline). Scores from each test were added to obtain a total (PS).

Five hours after the extradural injection of preservative-free morphine (0.1 mg kg^{-1}) (Dr E. Graeub AG, Berne, Switzerland) diluted in 20 mL saline, the cow developed pruritus (restlessness and flank scratching). Thereafter, a mixture of methadone (10 mg mL^{-1}; Dr E. Graeub AG) detomidine (Domosedan 10 mg mL^{-1}; Orion Corporation, Turku, Finland) ketamine (Narketan 100 mg mL^{-1}; Vétoquinol, Lure, France) and bupivacaine (Carbostesin 7.5 mg mL^{-1}; AstraZeneca PLC) was given as an extradural CRI. Doses were based initially on the calculated 24-hour requirement for each drug injected intermittently. These were then altered daily according to the clinical effect, PS and incidence of side effects. The drugs were mixed and diluted in saline to a volume of 10 mL. The total daily volume (40 mL) was infused constantly over 24 hours. The daily dose of each drug used, and the PS are shown in Table 1. Detomidine was discontinued on day 4 because of excessive sedation. The infusion rate of ketamine was reduced from 1.3 to 0.6 mg kg^{-1} 24 $hour^{-1}$ on day 10 because food intake was reduced and irregular ruminal contractions were encountered.

After 6 days a new extradural catheter was inserted at the lumbo-sacral space and advanced 10 cm cranially, to allow more accurate drug deposition in proximity to the fifth and sixth lumbar, and the first sacral vertebra. The same introduction technique was used: an attempt at CSF aspiration was unsuccessful. Four days later (day 10) the PS achieved a minimum value (of 2). On day 13, the infusion rate slowed and became irregular, and although the remaining drug was rapidly injected and the syringe changed on schedule, resistance to injection persisted. Reduced drug delivery probably accounted for the subsequent rise in PS (to 5). The catheter was removed on day 17 and because of consistent clinical improvement – the cow was now less lame and continuously bore weight at rest – was not replaced. Meloxicam 0.25 mg kg^{-1} IV (Metacam 20; Boehringer Ingelheim GmbH, Ingelheim am Rhein, Germany) was given for 5 days after catheter removal. Physiotherapy, involving walks twice daily, massage and hydrotherapy, were performed throughout the treatment period. The cow was discharged in good clinical condition and slightly lame 19 days after catheter removal.

Discussion

Complex regional pain syndromes are uncommon, usually affect the distal extremities and are associated with typical clinical phenomena. At least four

