

Case Report #2

Pain Management following Tail Amputation in "Maxie"

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Introduction

"Maxie", a six year old spayed female Labrador Retriever was presented due to dehiscence of a wound following a mass removal. She was agitated and continued to traumatize the tail herself. Over the next two days, in spite of treatment, her pain level increased and the viability of the tail became questionable. A combination of constant rate infusion of fentanyl, lidocaine, and ketamine was used. Balanced multimodal anesthesia, including local blocks was utilized during amputation. Post-operatively, a combination of tramadol, gabapentin and amantadine was used to address her pain, including that associated with neuropathic pain and central sensitization. Maxie responded well and showed a dramatic difference in behaviour and pain scores following anesthesia and amputation. Pain control was assessed to be excellent throughout her recovery.

Clinical Report

"Maxie" was a six year old spayed female Labrador Retriever, presented to our practice one week following the removal of a mass on her tail. The owners were now at the cottage and did not wish to return to their regular veterinarian for care. Records from that clinic indicated that a 2 to 3 cm sebaceous cyst had been removed from the ventral aspect of the tail at mid-length.

Maxie was now reluctant to allow the tail to be examined, and was anorexic. She had received tramadol at 2.9 mg/kg q 8 hours PO for the first 4 days. She was on her seventh day of cephalexin. Maxie did have a history of atopic skin disease.

Self-trauma had occurred with only intermittent use of an Elizabethan collar, and the wound closure was beginning to dehisce. Surrounding skin was edematous, erythematous, with serous discharge. Purulent discharge and extensive bruising was present at the incision. She was not febrile. Her pain score was 4/10 on a composite pain scale. Clients declined CBC and biochemical profile at that time.

Discharge from the incision was sampled for culture and sensitivity. The wound was cleaned and rebandaged. The E collar was to remain in place at all times. Tramadol was restarted at 4.3 mg/kg q 8 hours and a subcutaneous dose of meloxicam given at 0.2 mg/kg. Pending return of culture results, cephalexin was replaced with amoxicillin/ clavulanic acid. Dermacool(TM) with lidocaine spray was to be applied to irritated skin surrounding, but not directly on the wound, up to three times per day. In case atopy was a contributing factor, antihistamines were prescribed. A recheck was scheduled in 48 hours.

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Please note: the treatment up to this point was provided by a colleague at the author's practice.

At the recheck, the author observed Maxie obsessively trying to chew at her tail. She had become irritable with the other family dogs and was restless and vocalizing at night. She was spending the majority of her time trying to gain access to her tail. The incision had dehisced completely. The hemopurulent discharge had increased and the distal tail, down to the tip, was extremely erythematous with serous discharge. The remainder of her physical exam was normal. Pain score at that time was 7/10.

Maxie was admitted for intravenous antibiotics, pain control and wound care. A constant rate infusion (CRI) of fentanyl at 0.24 mg/kg/hr, lidocaine at 0.3 mg/kg/hr, and ketamine at 0.12 mg/kg/hr was started with initial boluses of 0.003mg/kg fentanyl, 1mg/kg lidocaine, and 0.5mg/kg ketamine. As the preliminary culture results showed gram negative bacilli, intravenous enrofloxacin and ampicillin were started.

Four hours later, the patient was comfortable enough to allow thorough cleaning of the wound and application of a honey bandage. Pain score was 2. Much of the skin surrounding the original incision was now necrotic and the distal tail was cool to the touch. The doppler transducer from a blood pressure monitor was used to check perfusion. Pulses could not be reliably found. Amputation was recommended to the client. Gabapentin 11 mg/kg q 8 hours was added to the analgesic regime.

The following morning, the patient was agitated, tangled herself in her IV line, and repeatedly pulled bandages off of her tail, by bending her E collar against the wall. Her pain was scored at 6/10. There were no other changes in her physical examination. The owners

consented to tail amputation but due to financial concerns wanted to have Maxie home as soon as possible. As her FLK CRI had already become disconnected in her agitation, it was not resumed. The decision was made to begin oral medications in place of the FLK following surgery.

Acepromazine at 0.02 mg/kg and morphine at 0.5 mg/kg were given as a premedication. Induction was accomplished with propofol 2.4 mg/kg and midazolam 0.2 mg/kg. A ring block of lidocaine 1 mg/kg and bupivacaine 1 mg/kg was placed at the base of the tail. The tail was amputated between the third and fourth coccygeal vertebrae. Meloxicam 0.2 mg/kg was given intravenously at closure. Morphine at 0.5 mg/kg was given intravenously once the patient was sternal. Two hours post-operatively the patient was resting quietly and pain score was 1/10.

The following oral medications were used post-operatively: gabapentin 11 mg/kg, tramadol 4.2 mg/kg, amantidine 2.8 mg/kg, enrofloxacin 8.5 mg/kg. Ampicillin was discontinued, as the final sensitivity report indicated sensitivity to enrofloxacin, but not ampicillin.

Throughout the evening, Maxie appeared to sleep well. Her pain score remained at 1/10. By the early morning, she was excited to see people, responsive and active, but not agitated. She paid little attention to her tail even without an Elizabethan collar. She no longer tried to remove her bandages. Again, her pain was scored at a 1/10.

Maxie was discharged to her owners that afternoon. Tramadol was to be continued for 5 days, amantadine for 7 days, and gabapentin for 10 days, at the above dosages. She returned to her regular veterinarian for suture removal, following her owners' vacation. Followup calls to the client indicated that Maxie remained comfortable and did not traumatize the incision. As

each medication was discontinued in turn, they did not appreciate any return of pain-related behaviours.

Clinical Outcome

Following the tail amputation, Maxie made a full recovery, with her pain scores returning to 1/10 by the time of discharge. Owner reports were our only source on follow-up, but these suggested that her scores did not increase again. Please note that in our hospital protocols, a patient with a recent wound or incision will receive a pain score of 1/10 at minimum. A score of 0/10 is reserved for patients with no clinical signs of pain, and no apparent source of potential pain.

Discussion

The pain scoring tool used at our hospital is a composite pain scale, based on the Colorado State University scale *1*, but expanded from 0-10, rather than 0-4. A constant rate infusion was chosen as the first component of the pain management plan because it can provide a steady level of the medications used, eliminating any trough effect between doses.² Fentanyl was used to provide analgesia via opiate receptors at the level of the brain, spinal cord, and peripheral receptors.³ Lidocaine was used to provide analgesia at the spinal and supraspinal level, and to lower the level of isoflurane required during surgery.⁴ Ketamine was used to provide NMDA receptor antagonism, potentially reducing the development of central sensitization and preventing both acute and chronic pain.⁵ Dosages were taken from Dr. Robin

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Downing's handouts posted on the IVAPM website.⁶ Response to the CRI was favourable, with pain scores diminishing quickly.

Gabapentin was added to the treatment plan to inhibit hyperalgesia related to peripheral nerve injury at the time of amputation, and as an adjunctive analgesic.⁷ The response to this medication is impossible to quantify in this case. We can say that we anticipated neuropathic pain following amputation, and with the use of gabapentin, we did not detect neuropathic pain. Beyond that, it is speculative.

Multimodal anesthesia⁸ was used for the amputation. Acepromazine was used as a premedication for its sedative effects.⁹ Morphine was used as a premedication to utilize a potent pure mu agonist with longer duration than fentanyl.¹⁰ Propofol and midazolam were used together to provide a smooth induction, with reduced cost vs. propofol alone.¹¹

Local anesthesia was used in an attempt to block additional nociceptive input from the surgical site.¹²

Peri-operative meloxicam was administered because it provided an additional form of analgesia and the pre-existing inflammation distal to the surgical site was significant. ¹³

As ketamine was no longer given via CRI at the time of surgery, amantadine was prescribed for post-operative use. It was chosen for its similar actions as an NMDA antagonist useful in treating windup.¹⁴ Tramadol was used post-operatively in place of the pure mu agonists, fentanyl and morphine, as it binds to mu receptors ¹⁵, and may be useful in cases of allodynia.¹⁶

Continuation of the constant rate infusion from admission through the post-operative period would have been the author's preference. Unfortunately, an intensive care unit staffed 24 hours per day was not available, and the patient did manage to disconnect her infusion. The bag had emptied, and the line was contaminated. Their replacement was an expense that the client was not willing to incur.

Epidural anesthesia, either opioid alone¹⁷, or opioid/local anesthetic combination¹⁸, could have provided longer analgesia compared to a ring block technique. Unfortunately, in this case, the cellulitis surrounding the wound, created an increased risk of infection¹⁹, making the use of epidural anesthesia less attractive.

There has been some debate regarding the use of combinations of local anesthetic agents²⁰. The decision to combine was based on the goal of minimizing time to onset of activity and maximizing duration of effect.²¹ It is possible that the combination of agents may provide no advantage²².

Non-steroidal anti-inflammatory medications received limited use in this case. They could have been utilized beyond the immediate post-operative dose²³. This addition would have been made, had the patient shown inadequate response to the treatment prescribed. The author was concerned that adding a fifth medication to go home, would have decreased client compliance with treatment²⁴; therefore, did not prescribe it as part of the initial plan.

At the conclusion of its use, tapering of the gabapentin dose is recommended by some references²⁵. Given the short duration of use in this case, a tapering dose was not used²⁶.

Therapeutic laser treatment was available at the author's facility but it was not utilized in this case. This was an oversight. Its use had been planned immediately following surgery 27, but the tail stump had been bandaged before we realized the omission. The following day, the bandage was undisturbed, with no evidence of bleeding. It was decided not to remove the bandage to accommodate the use of laser.

Overall, the author felt that subjective observation, and pain score results, indicated a successful patient outcome.

Summary

Maxie's case demonstrates that through the use of multi-modal analgesia, including agents to address central sensitization, the cycle of self-trauma could be broken. Once the initial source of pain was eliminated via amputation, the previously escalating pain scores were halted, and began to return to normal. There were no clinically detectable long-term effects from this painful episode.

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