Analgesia Tea Time Teaser

Ana Del Alamo Foster

MS DipACVAA MRCVS

American Specialist in Veterinary Anaesthesia and Analgesia

Ana graduated in 2008 from the Veterinary College of the Complutense University of Madrid after a rotating Equine Internship she undertook a residency in veterinary anaesthesia and analgesia at Oregon State University in the USA. She gained a Masters Degree in Veterinary Science in 2013 and a diploma from the American College of Veterinary Anesthesia and Analgesia in 2015. After working in the USA and Ireland she moved to the UK to work at Pride Veterinary Centre.

Ana's areas of interest are all aspects of anaesthesia and critical care after anaesthesia.

Ray is a 4-year-old French Bulldog that presented to Pride Veterinary Centre with a one month history of mild ambulatory paraparesis, neck pain and brachycephalic obstructive airway syndrome (BOAS).

On presentation Ray had low head carriage and was extremely reluctant to manipulation of the neck. He appeared to be very painful. He had marked upper respiratory noise with stridor, was struggling to breathe and this was causing him a high level of stress. He had also regurgitated a few times in the past days. His conditions were being managed with gabapentin, paracetamol, cerenia (maropitant), and omeprazole.

It was decided to perform an MRI of the neck and to thoroughly examine the airway under general anaesthesia.

MRI revealed a disk at the level of C3/C4 requiring surgical decompression.

Airway examinations revealed a thickened soft palate that became entrapped in the larynx during inspiration, grade II collapse of the larynx, a nasopharyngeal cyst, reduced opening of the choanae and inflammation of the nasal mucosa and turbinates leading to nasal obstruction.

A tracheostomy tube had to be placed on recovery from anaesthesia due to upper airway obstruction. Ray recovered in a smooth and quiet manner, happy to be able to breathe again.

Surgeries (ventral slot and upper airways surgery) were scheduled for the following day.

He spent the night in ICU, ambulatory with mild paraparesis, eating and drinking and showing no discomfort moving his neck.

Test yourself with these Tea Time Teaser questions

Q1. Is it easy to make an accurate pain assessment on a patient that is in severe respiratory distress?

Q2. Is this acute or chronic pain? What kind of pain is it (inflammatory, neuropathic, somatic, cancer, etc.)?

Q3. What concerns and considerations would you have regarding pain management in this case?

Q4. What could you use overnight to keep this dog comfortable overnight until surgery?

Q5. Which side effects of opioid administration would be concerning in this case?

Q6. Could NSAIDs (non-steroidal anti-inflammatory drugs) be used in this patient?

Q7. How would you assess pain overnight in this dog?

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Q1. Is it easy to make an accurate pain assessment on a patient that is in severe respiratory distress?

Answer: When a patient is exhibiting signs of respiratory distress like orthopnea (extension of head and neck), tachypnea or dyspnea (increased inspiratory or expiratory effort or abdominal breathing), they have a tendency to become rigid, reluctant to walk and mentally dull. These symptoms can overlap with those of a painful dog which can make the clinical picture unclear. This patient was in pain, as exhibited by his complete reluctance to move his neck, but it was difficult to discern if this pain was severe because it wasn't just his neck that he didn't want to move. He was resistant to any kind of examination due to his struggle to breathe.

Q2. Is this acute or chronic pain? What kind of pain is it (inflammatory, neuropathic, somatic, cancer, etc.)?

Answer: According to the definition chronic pain in people, Ray's pain would be classified as acute as it has been ongoing for less than 3 months.

Duration of pain, however, especially in veterinary medicine, should not be used alone to classify pain. Chronic pain can be otherwise referred to as pathological pain in most cases, which means that the pain is not present in response to an injury or healing process but instead becomes out of control. Chronic pain is a disease in itself and should be treated immediately.

We sometimes say pain of a few weeks of duration means that the patient has been in chronic pain. In many of these cases we are misquoting out of habit. The pain is ongoing or persistent but as long as it is in response to an injury or lesion it is still classified as acute or physiological pain. Ray's pain can be described in this way.

His pain has two origins: neuropathic and inflammatory. It is neuropathic because the cause of the pain is the direct compression of the spinal cord by the intervertebral disk. It is inflammatory because the compression itself causes the release of inflammatory mediators which are, amongst other things, designed to amplify nociception for protective purposes.

Knowing all of this information is important when selecting appropriate treatment.

Q3. What concerns and considerations would you have regarding pain management in this case?

Answer: There are three interrelated concerns: respiratory depression, panting and stress.

In non-brachycephalic dogs, the degree of respiratory depression caused by analgesic drugs is usually clinically non-relevant. In brachycephalics with severe BOAS there is a need to tailor analgesic plans to interfere with breathing as little as possible.

Obstruction of the upper airway in BOAS dogs is worse when they are under stress or trying to pant, as the changes in airway pressure required to allow rapid air flow during the breathing cycle will cause partial or complete collapse of the already weak upper airway structures (nasal passages, larynx and trachea). Also, pain and a warm, humid environment can increase respiratory rate, leading to further upper airway obstruction in these dogs.

The struggle to breathe will lead to more stress and the mechanical inability to pant to allow for proper thermoregulation can exacerbate the BOAS signs. It's a vicious, self-perpetuating cycle. Thus, maintaining a cool environment and combining tranquilizers or sedatives with analgesic drugs at doses that are low enough to avoid excessive muscle relaxation and central respiratory depression (but not too low to allow the animal to be in pain) is essential to provide analgesia in patients like Ray.

Q4. What could you use overnight to keep this dog comfortable until surgery?

Answer: There is not a single answer to this question as many different combinations of drugs and care tactics can be used. The analgesic overnight plan made for Ray was as follows:

Methadone
0.2 mg/Kg IV q4 h

Paracetamol
10 mg/Kg IV q8 h

Dexmedetomidine CRI
0.5 mcg/Kg/h after a loading dose of 0.5 mcg/Kg IV

Opioids are the strongest class of analgesic drugs and they are especially effective when treating acute pain. There are several different types of opioids. The full mu receptor agonists, such as methadone, have the strongest analgesic effects, followed by the partial mu receptor agonists (i.e. buprenorphine). Agonist/antagonists such as butorphanol have very weak analgesic effects and should not be used as part of an analgesic plan in most cases.

Paracetamol is a non-traditional NSAID. Although it has been suggested that it is an inhibitor of the COX3 enzyme, its full mechanism of action is still unclear. It has antipyretic and mild to moderate analgesic effects in dogs and it does not disrupt the protective mechanism of the GI tract, which is why it is commonly used in patients that cannot tolerate traditional NSAIDs, like meloxicam or the coxibs, for the treatment of pain. Paracetamol has no anti-inflammatory properties.

While there is the need to do more studies in veterinary medicine, it is empirically thought that when paracetamol is administered intravenously the analgesic effect is superior than the oral route, which is why this route was chosen.

Dexmedetomidine, like all apha-2 receptor agonists, has multiple actions amongst which sedation and analgesia are the most important in this case.

Q5. Which side effects of opioid administration would be concerning in this case?

Answer: Respiratory depression is a well-recognized side effect of opioids, especially in people. This is related to the degree of sedation and to the activation of opioid mu receptors in brainstem neurons that control breathing in response to carbon dioxide in the body (causing bradypnoea). A dose of 0.2 mg/Kg of methadone IV q4 h is likely to cause mild respiratory depression however this would not be concerning in most dogs with BOAS.

Panting is often seen in dogs after opioid administration. It is of short duration and more pronounced in dogs that are not in pain. As mentioned before, tachypnoea and panting can lead to upper airway obstruction in BOAS patients. It can also cause discomfort in dogs with severe neck lesions.

This is not to say opioids should be avoided in BOAS dogs but more to emphasise that they should be closely monitored at all times. In Ray's case, breathing through a tracheostomy tube, respiratory depression and panting would not be considered a concern.

Sedation from opioid administration, along with that provided by the dexmedetomidine CRI, would be acceptable in this case. Nausea and vomiting could potentially be an issue since there was a history of regurgitation/vomiting and the risk of aspiration pneumonia is high. Also, during the actual ejection of stomach contents sudden neck movements would be painful and could potentially aggravate the lesion.

How can you decide which is worse, regurgitation/vomiting or pain? The answer to this question depends a lot on the case and the scenario but it is important to remember that pain itself can cause nausea and ileus. Leaving pain untreated should never be an option.

Opioids have a myriad of other side effects, most of which are clinically irrelevant in most acute pain cases (decrease in forward peristalsis, mild immunosuppression etc.). Usually, the side effects of opioids are more pronounced in non-painful animals.

Q6. Could NSAIDs (non-steroidal anti-inflammatory drugs) be used in this patient?

Answer: Ray had a history of occasional regurgitation when he presented to Pride Vet Centre. Due to their COX1 inhibitory effects, NSAIDs have the potential to cause gastritis and ulceration of the stomach. Pain and stress can exacerbate this effect.

Even if Ray had not had these signs he was scheduled to undergo disk decompression surgery through ventral slot approach the following day and occasionally corticosteroids are necessary to treat life-threatening spinal cord compression, so it would have been necessary to withhold NSAIDs before surgery.

Q7. How would you assess pain overnight in this dog?

Answer: Using a validated acute pain scale for dogs, such as the short form of the Glasgow composite pain scale (SF-GCPS). This scale is validated only for dogs with pain of orthopedic origin. However, as there are no scales validated for intervertebral disk disease in dogs, the SF-GCPS can be used keeping this in mind.

Pain should be assessed frequently at first to ensure adequate pain management; every 2 hours for the first 6 hours. Then, if stable, the frequency can be reduced to every 4 hours. The results should be recorded on hospitalization sheets so changes in pain levels can be traced. Since Ray was ambulatory, a cutoff value of 6 or higher was used as an indicator of pain and this was treated with an additional dose of methadone at 0.1 mg/Kg IV if > 6/24.

Dogs that are ill need to rest so if a dog is sound asleep he should not be woken up to pain score as it is safe to assume that pain levels are low during that period of time.