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Medicating Horses with Colic
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Summary

Ever since dipyrone was taken off the market in 1977 in the USA, most horse farms have flunixin meglumine readily available and it is common for trainers to administer non-steroidal anti-inflammatory drugs (NSAIDs) for lameness or colic without consulting the veterinarian. Owners and veterinarians need to be aware that a full dose of flunixin meglumine (1.1mg/kg, IV) for treatment of colic is a potent analgesic and has duration of 8-12-hours. The manufacturers recommended dose of flunixin meglumine is every 12 hours. This time frequency should be very closely adhered to. Flunixin meglumine will not completely mask signs of colic, but it makes those signs more difficult to detect, especially for owners. This presentation will provide other approaches to pain control.

Availability of analgesics

Although there are a limited number of analgesics available, they can be divided into several categories based on mechanism of action:

<table>
<thead>
<tr>
<th>Analgesic</th>
<th>Mechanism</th>
<th>Potency</th>
<th>Length of action</th>
<th>Dose</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xylazine</td>
<td>α2-agonist</td>
<td>Moderate</td>
<td>Short</td>
<td>0.3 – 0.5mg/kg</td>
<td>prn</td>
</tr>
<tr>
<td>Detomidine</td>
<td>α2-agonist</td>
<td>High</td>
<td>Short</td>
<td>10 – 20µg/kg</td>
<td>prn</td>
</tr>
<tr>
<td>Butorphanol</td>
<td>opiate</td>
<td>Moderate</td>
<td>Medium</td>
<td>0.01 – 0.02mg/kg</td>
<td>prn</td>
</tr>
<tr>
<td>Flunixin</td>
<td>NSAID</td>
<td>Moderate</td>
<td>Long</td>
<td>0.25 – 1.1mg/kg</td>
<td>q8-q12h</td>
</tr>
<tr>
<td>Meloxicam</td>
<td>NSAID</td>
<td>Moderate</td>
<td>Long</td>
<td>0.6mg/kg</td>
<td>q24h</td>
</tr>
</tbody>
</table>

There are other agents in each of the above categories, but these drugs can be used as examples in order to develop a treatment plan.

Initial Approach to Control of Pain

For a horse that is actively showing signs of colic, an abbreviated physical examination (heart rate, mucous membrane color, and capillary refill time) should be performed before administering an analgesic. If the horse is extremely painful, an attempt at taking
the heart rate should be made, since the $\alpha_2$-agonists can dramatically alter this parameter. Furthermore, heart rate remains one of the most useful predictors of the need for surgery. The first analgesic I administer is xylazine (150-200mg for an adult horse) because it is a moderately potent but short-duration analgesic. This gives the veterinarian an opportunity to determine whether or not the colic is going to recur within the time it takes to complete the remainder of the examination. If a non-steroidal anti-inflammatory drug (NSAID) is used as the first line analgesic, it may not be possible to gauge whether or not colic will recur within the time of the initial visit because it is relatively long-acting. However, if the horse remains comfortable on the first dose of xylazine, and the remainder of the examination is normal or the veterinarian feels comfortable with the abnormal findings (such as a mild impaction) NSAIDs can be administered to control further mild or moderate pain. If the first dose of xylazine does not keep the horse comfortable, it can be repeated at the same dose. In addition, butorphanol can be combined to provide greater pain relief (typically 5-10mg for an adult horse). If xylazine and butorphanol have little or insufficient effect, the next drug I administer is detomidine (5-10mg for an adult horse). If the first dose of detomidine has little effect, I will repeat it. If detomidine fails to control pain, the horse should be referred as rapidly as possible. Addition of flunixin to the pain treatment plan is of little benefit in these types of cases because the majority of pain results from distension and tension on the mesenteric attachments rather than from inflammation. In addition, all of the drugs mentioned in the table can be repeated as needed except flunixin, which should only be given once every 12 hours.

One new drug in the $\alpha_2$-agonist class of drugs that has recently been approved for horses is romifidine. Like any analgesic, it will take some time to get used to using this pharmaceutical. In general, it is a more potent analgesic than xylazine, and less potent than detomidine. However, it has a relatively long half life (much longer than xylazine), and has good sedative properties. Therefore, at this time, I would consider use of romifidine for long term sedation, rather than an analgesic for colic.

**Cyclooxygenase (COX) Inhibitors**

An additional aspect of pain management is treatment of horses that have had colic surgery. These horses may have significant gastrointestinal mucosal injury, so it is advantageous to use low doses of flunixin because NSAIDs have deleterious effects on mucosa. This subject is becoming complicated as we learn about the physiology of NSAIDS. What is known is that NSAIDs inhibit the cyclooxygenase (COX) enzyme system, and that there are at least two isoforms of COX: COX-1 and COX-2. Cyclooxygenase-1 is generally responsible for elaborating prostaglandins that facilitate the physiologic function of organ systems such as the gastrointestinal tract, whereas COX-2 is typically involved in heightening pain and inflammation. One option, in countries where COX-2 preferential (meloxicam) or selective (firocoxib) inhibitors are available is to use this in place of non-selective COX inhibitors such as flunixin meglumine. Whether or not increased safety will be noticed, or a change in efficacy will be seen is unknown. One concern is that there is too much overlap between COX-1 and COX-2, so that non-selective inhibitors will continue to be required for optimum efficacy. In other words, if COX-1 does play a role in pain, no matter how small, then a reduction
in efficacy may be seen with COX-2 inhibitors. Nonetheless, it is exciting to have a new class of analgesics available to equine practitioners.

**Spasmolytic medications**

Another medication is hyoscine butylbromide (Buscopan®) (0.3mg/kg, slowly IV). This is an excellent anti-spasmodic agent, and therefore indicated in horses with spasmodic colic. In Europe, this drug can also be given as the Buscopan® compositum, which contains hyoscine and the NSAID dipyrone (metamizole). This provides analgesia as well as reduction in gut spasm, making it the favored first choice for initial treatment of colic in many EU countries. Buscopan® can also be given with NSAIDs such as flunixin meglumine (0.25-1.1mg/mg, IV). Concerns about transient elevations in heart rate with Buscopan® (approximately 20 minutes) become irrelevant if the veterinarian has already checked the heart rate prior to administration of an analgesic.

**Postoperative Pain Control**

Continuous infusion butorphanol (15µg/kg/hr) has recently been prospectively evaluated at Washington State University and North Carolina State University. This dosage can be approximated by adding 15mg butorphanol/5L bag of fluids at a rate of 2L/hr for the average 500kg horse. The prospective study revealed significantly improved postoperative comfort level of horses based on a behavioral scoring system. In addition, there was a significant reduction in cortisol levels and a significant reduction in weight loss compared to placebo-treated horses (all horses also received flunixin meglumine during the study). One important point that came out of the study is that horses can be painful without showing overt signs of colic. A typical painful postoperative case tends to stand in the back of the stall, with minimal response to environmental stimuli, as compared to more comfortable horses that tend to be at the front of the stall, responding to other horses and people in the environment. The one downside of butorphanol therapy was a significant delay in the initial passage of feces from a median of 5-hours in untreated horses to 14-hours in butorphanol-treated studies. However, this did not appear to alter the outcome of these cases. Horses treated with butorphanol were discharged from the hospital earlier and had a reduced bill, reflecting the positive aspects of optimal management of pain.

Lidocaine, which is typically used in an attempt to reduce postoperative ileus, also appears to provide substantial analgesia as well as an anti-inflammatory effect in horses with colic. The mechanism for the reduction in inflammation is not yet clear. We have used this drug as a constant rate infusion (0.05mg/kg/minute) for horses with continuous pain in which the owner is not willing to consider surgery (typically for financial reasons). We only do this if there is some reasonable chance of medical resolution. For any horse on lidocaine, because of its analgesic effects, the onset and progression of laminitis is more difficult to detect. Therefore, close attention to the feet, particularly in those horses with signs of endotoxemia, is indicated. Currently, all horses in the hospital judged to be at risk of laminitis have their feet iced using ice boots, ensuring cooling of the feet for an extended period of time.
References