

Odd how the human opioid *cup runneth over* and the veterinary opioid *river runneth dry*.

It sure is the topic of conversation as I tour the Cities doing surgery. To spin it positively, kudos to our profession for acknowledging pain physiology in our patients and proactively addressing it! On the obvious negative side, what the heck do we do now that supply has been curtailed?

The situation reminds me of a M*A*S*H* episode where they couldn't get any steroids for emergency treatment because of the lucrative black market in pharmaceuticals during the Korean war. Hawkeye and Trapper John got creative! Lots of favors and palm greasing! If you have an office manager good with that sort of thing, cut 'em loose. Other than that, what are our options?

Creativity does come into play. We need to optimize the concept of multimodal analgesia. It has been around for decades, but as they say, "necessity is the mother of invention." We can't knock pain with one *whack*, so we rely instead on several *thwaps* to get the job done. We just need to get below a threshold of unacceptable.

Pet owners are uber-clued into the pain concept too. Utilize that to improve and optimize the entire perioperative compliance. Link "pain" to pre- and post-operative recommendations. Picking up pre-visit medications is a hassle, but the patient is less painful. A dog that licks the incision is inoculating bugs, creating inflammation, stoking a painful result. A dog that runs around after a fracture repair is pouring lighter fluid on the inflammatory cascade; guaranteed hurt. Missed antibiotics or missed NSAIDs, and the result is pain. Sometimes the "why" behind the "do it" motivates folks better than "because".

Modulate the insult:

1) Surgical technique needs to be precise, exact.

- ✓ Don't touch unless you need to.
- ✓ Blot, don't wipe.
- ✓ Use moist gauze.
- ✓ Use sharp dissection when safe (scalpel > scissor > blunt dissect).
- ✓ Push tissue rather than pinch it.
- ✓ Lift tissue using suture needle as a tool to reposition things.

**Pick one surgery day to pay attention to each of these...don't focus on all of them and try to pay attention to the patient! Rather, "watch" yourself doing surgery with the "blot" concept preprogrammed into your brain for the day, etc. Do that for a few weeks, and you will find yourself changing.



- 2) Prevent inflammatory mediators from storming the zone.
 - ✓ Ice therapy (needs to be more than a rigid block perched on a leg; double-bag an alcohol:water combo for a perfectly flexible slush pack...throw in some food coloring and glitter just to make yourself smile!)
 - ✓ Compression (a good bandage, even for 12-24hrs, is our friend)
 - ✓ High tech stuff like cold laser, therapeutic ultrasound.
 - ✓ Cover your incisions (the outside world sends repeated texts through your incisions to the inflammatory cascade!) **more below

- 3) Blunt the “anxiety-pain” ramp up.
 - ✓ Low stress space (separate cats, separate trouble makers, lavender/pheromones, minimize *brutacaine* use)
 - ✓ Premedicate early with just anxiolytics (no need to waste hydromorphone for this application and no need to wait; admit→examine→stick ‘em) **more below
 - ✓ Pre-Pre-medicate for that pain-full visit with oral medications (trazadone and gabapentin)

Medicate the pain pathway:

- 1) NSAIDs (preemptive the day before; perioperative with young/healthy kidneys and GI; postoperative with most, adjusting dose down PRN)
- 2) Local anesthetics (used locally or with nerve blocks, we get 8-12hrs (or more) of numbness to bridge that acute period) **more below
- 3) CRI intra and postop (utilize the ketamine and lidocaine benefits administered systemically in tiny constant doses...morphine or fentanyl fit in here quite nicely too) **more below
- 4) Opioids (optimize their use to prolong the effect; administer intra and postop; premedicate with something else to facilitate catheter placement and induction) **more below

Getting used to using a drug or using a drug differently or using a different drug dose/route can be unnerving. (Hey, I used a little pain pathway pun there...) To provide a little long-distance handholding (seriously, not condescending here...anesthesia should scare everyone more than it does), I'll sketch some regimens that are easy to slide into without too much scary stuff happening. Obviously, do your due diligence and read up on the physiological effects as well.

Acepromazine: Much maligned by drug reps (no money to be made!), but I grew up with it, so still like it for what it is good at. I never use the horse strength (10mg/ml as sold) and shudder when folks use “just a hub” of that stuff for a little dog. Instead, *I premix a 10ml saline vial with 1ml of the strong stuff to yield 1mg/ml solution.* Then I label the heck out of the bottle and train staff with loud dramatic words and gestures! There is a glaring potential for medical errors here, so you have to be proactive in locking away the concentrated stuff and only keeping the dilute Ace (1mg/ml) around the clinic. It helps to speak in terms of mg's instead of cc's, but that change of habit might be asking too much all at once.

Dose for most (dog and cat); 0.01mg/kg SQ, IM or IV



- I'll bump up in increments for the crazy 2yr Golden or the wickedly mean 4yr cat.
- Don't think I have ever used more than 0.04mg/kg in my career.
- My goal is *chilled out, not flat out*. Blood pressure will hold at this dose.
- Not my choice for calm animals.
- *Not my choice* for any patient with blood pressure/kidney issues on their anesthesia planning sheet.

Midazolam: A very, very good safety profile. Higher doses can flip from anxiolytic to anxiety generating! Doesn't cut the mustard for the highly strung (a little mixing of metaphors there...) I like it for the timid middle aged/geriatrics and the cats who would prefer to be left alone but aren't interested in tasting your flesh. Intraop, it can do a lot for you IV.

Dose for most (dog and cat): 0.1mg/kg SQ, IM or IV

- I bump up in 0.05mg/kg increments for slightly challenging premed scenarios.
- Great to *smooth a slightly rocky early surgical period* (you can reach for this IV instead of the Hydromorphone I love so dearly for this application.)
- Use it in tandem with Propofol* to make that transition from injectable → inhalant → operating room transpire nicely. (Give midazolam IV, then ½ Propofol, test tubing, ¼ Propofol, test tubing...)
- Fine to mix and match as a premed, induction aid, intraop aid, recovery aid. Pay attention to total dose, so excitement effect is not misinterpreted as something else.

Local anesthetics: These cheap little fellers can be true work-horses!

BUPIVACAINE is the mainstay and inexpensive off the shelf. Lidocaine is so short lived, it is not worth the time as a solo local, but it IS in combo with bupivacaine to speed that slow-poke up if needed.

Dose for adult dog: 0.4ml/kg (not mg!) infiltrate as you close each layer

Dose for puppy <8mo: 0.2ml/kg

Dose for adult cat: 0.2ml/kg

Dose for kitten <8mo: 0.1ml/kg

****Morbidity/toxicity** is vomit/retch (even under anesthesia), respiratory arrest, cardiac arrest, in that order. Young animals are at most risk; adults, not so much as long as you calculate your doses instead of winging it. Trick if they arrest is to CPR until drug is gone (10-15min), then they pop right back up! (*And you have to go sit down in a dark room for a while!*)

No reason not to use this on every incision, in my opinion. Given its mild effect on neutrophil migration, you may notice your incisions are less inflamed. I have not experienced any healing delay in 20yrs of liberal use.

The new NOCITA deserves a mention here. I think the data is solid for it being a good "numbing agent" for incisions. Cost and logistics of use are the only things that hinder. If you were around back when Propofol originally came out, we were all in a blither about single-use, etc. That smoothed out over the years. I think the same will happen with Nocita. Until then, get creative



with using it for everything that could benefit from it during a day, and maybe it becomes cost effective?

Constant Rate Infusions (CRI): Probably the most complex-seeming item on the combo-platter. With some prepared calculations, they really can be slick though. Best use in my mind is intraop and transition to a gradual recovery. Wean down, and they wake up and go home. Peaceful recovery room.

Dogs: Morphine-Lidocaine-ketamine most well rounded

Cats: Morphine-Ketamine an option. Buprenorphine-Ketamine another.

<http://www.vasg.org/> Veterinary Anesthesia & Analgesia Support Group is a great resource for recipes and other things, if you don't already know of it.

Opioids: I once heard an anesthesiologist say, "the only way to kill a dog/cat with an opioid is by choking them with the bottle." Ok, extreme, but take away is "very safe". Seriously.

If you have read this far, thank you. A simple question and a long-winded answer, as my tech says!

We don't have access to hydromorphone (for a while?). It IS a well-rounded drug, isn't it?

MORPHINE

A direct switch to morphine is a simple answer. Dose is just 10x higher. Duration maybe slightly shorter (4-6hrs)

Dose for dogs: 0.5mg/kg for puny stuff, 1mg/kg a starting point for hurtful stuff.

- Use 0.25mg/kg increments PRN
- Awake environment, I use SQ or IM.
- Asleep environment, I use IM or slow IV (3-4min)
- Maybe more vomiting on premed?
- Maybe more narcotic dysphoria generally?

Dose for cats: usually stay lower end and use smaller increments moving up

- More narcotic dysphoria
- I avoid IV unless in a pickle, then small dose and very slow.

BUPRENORPHINE

Here we have a contender for a direct substitution too. Some folks have sworn by it since way before hydromorphone became popular. It's nice too, because of our familiarity with it and stocking of it for buccal administration in cats.

Dose for most: 0.01 - 0.04 mg/kg IM or IV



FENTANYL

Great pain reliever but really too short acting to use as a substitute directly for hydromorphone. Sticking it in a CRI works nicely, but it's one more narcotic to stock and that's a pain (! Ha, pun, get it? !)

BUTORPHANOL

Really not useful beyond an hour or so. It works as a nice "hold still" cocktail with Ace 0.02mg/kg IV for punch biopsy or something. More expensive than morphine and maybe buprenorphine, so seems like it is just an extra stock item.

Dose: 0.2-0.4mg/kg SQ, IM or IV

--Excitement as doses added.

Incision health is a whole other soapbox topic for me, but I have found Tegaderm to be a great incision bandaid to keep incisions healthy and pain-free; it is see-thru for accurate monitoring of incision health and sticks pretty well to dog/cat skin. I have only found it online, easily purchased thru Amazon. (Maybe with enough interest, VHA might get it in stock?) I use the 2" roll (11ft); you can cut-to-fit, and it will last a long time. Cost is around \$25. The only problem I have encountered (other than it not sticking to the occasional site) is that it sticks very well, and a few owners and vet professionals have become distressed trying to remove it (I was accused of cruelty to animals once.) My solution to that is to just not remove it. If the incision remains healthy on visual and tactile inspection, I wait until natural epidermal layer sloughing makes removal easy—up to a week or so.

For years I have used an **Excel auto-calculation spreadsheet** that I created for managing drug dosing. It includes orals, perioperative, CRI and CPR, both cat and dog in Lbs or Kgs. Several area clinics use it successfully. Each patient gets his/her sheets printed with body weight at admit; the attending DVM can highlight drug choices and routes of administration, kept on patient's travel clipboard, and can be a quick "what's that dose?" when needed ASAP intraop or postop. It is a go-to in the rare case of cardiac arrest. Happy to pass it on if you are interested.

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