Acute on Top of Chronic Pain in Geriatric Patients
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1. Introduction
   a. Many veterinarians fear the treatment of older dogs and cats with analgesics and anesthetics.
   b. Fear of use of these agents results in suffering and untreated conditions for which anesthesia is necessary.

2. Things to consider
   a. Being old doesn’t mean that anything is wrong
   b. Being old means that there are a number of patients with subclinical organ function
      i. Renal, hepatic, and cardiac are the most common
   c. Body composition itself can have a pharmacodynamics effect in geriatric patients
      i. Decreased lean body mass
      ii. Drug receptors
      iii. Neurotransmitters

3. Decreased Resilience
   a. It is not unusual for geriatric dogs and cats to have reduced recovery times from physiological disturbances such as those brought on by anesthesia or sedation.
   b. Geriatric animals may have heightened response to both pain and other stimuli that a younger animal would not have.

4. Concurrent Treatments
   a. Many Caregivers give OTC drugs or supplements
      i. They often don’t consider them important enough to tell you
      ii. St. John’s Wort is common

5. Behavioral Considerations
   a. Environmental changes
      i. Hospitalization can bring on signs of cognitive dysfunction
      ii. Can cause decreases in willingness to eat, drink or interact
      iii. Encourage caregivers to bring items from home
   b. Nursing Care
      i. Pay special attention to food and water intake
      ii. Padded bedding as most have OA
      iii. Socialization is important during time in clinic

6. Diagnostics
   a. Always check for concomitant disease.
      i. Lab work
      ii. Radiographs
      iii. Urinalysis

7. Treatment
   a. Treatment of long term pain can be challenging.
      i. Many causes are not curable; caretaker should understand that the goal is palliative not curative.
   b. Easy to give drugs, impossible to take them back
      i. Start with lower doses and monitor for effect of drug and adverse events
   c. Try to use reversible drugs

8. Cardiopulmonary Issues
   a. As many as 58% of geriatric dogs show evidence of valvular disease
   b. Both cats and dogs have decreased alveolar plasticity
   c. Both of these issues mean less oxygen availability to tissues

9. CNS
   a. Mean alveolar concentration requirements decrease with age by an unknown mechanism(s).
      i. Always use lower settings for older animals

10. Hepatic Issues
    a. Total hepatic mass decreases with age and subsequently the ability of the liver to metabolize drugs.

11. Metabolic Issues
a. As most animals age, their muscle mass decreases. At the same time body fat increases
   i. Affects both water soluble and fat soluble drugs
b. Many older animals are either hypothyroid (dogs) or hyperthyroid (cats)

12. Renal Issues
   a. Many geriatric animals have a decrease in renal function, which can impair their ability to excrete or clear certain drugs.
   b. This can be complicated by cardiac issues

13. Pain drugs for chronic use
   a. NSAIDs
      i. The side effects of NSAIDs in geriatric animals are similar to those of other age groups
      1. Monitoring for ulcer formation may be a challenge in older dogs that eat sporadically
      ii. Use of NSAIDs in cats with renal disease
         1. Over 90% of cats of any age have some DJD
         2. Renal disease in cats is inflammatory in part
            a. OK to give in cats with renal disease
            b. Follow other precautions
            c. Use is off label in the U.S.
   b. Amantadine
      i. Amantadine works on the NMDA pathway
      ii. Important to use in dogs that are refractory to NSAIDs alone
   c. Gabapentin
      i. Exact mechanism is unknown, no big studies in dogs or cats
      1. Encouraging reports on its effectiveness
      ii. Cleared by kidneys
         1. Decrease dose with possible renal impairment
         2. Start at half the recommended doses.
   d. Maropitant
      i. Confusing recommendations to use for pain
      ii. Use it for vomiting
      1. Given the day before, may relieve nausea as well
   e. Acetaminophen
      i. Bad in cats
      ii. OK for dogs
      1. Pharmacodynamics are uncertain, should never be sole source of pain relief
   f. Grapiprant
      i. New class of drugs, piprant class, approved for use in dogs
      ii. Blocks the prostaglandin E2 at the EP4 receptor
      iii. Has had pilot studies in cats

14. Other drugs
   a. No evidence to support:
      i. Oral tramadol
      ii. Oral hydrocodone
      iii. Oral Oxycodone
   b. All risk, no benefit

15. Physical Modalities
   a. Rehabilitation
   b. Acupuncture
   c. Massage
   d. Weight Loss
   e. Myofascial Pain Treatments
   f. Hot and cold therapy
1. NSAIDs are the most widely used analgesics in veterinary medicine
   a. Crucial in the treatment of acute pain
   b. Cornerstone of treatment in chronic painful conditions

2. Review of COX pathway
   a. Cox-1 not used in veterinary medicine
      i. Considered constitutive or for physiologic function
   b. Cox-2 popular NSAIDs are Deramaxx, Metacam, Previcox and Rimadyl
      i. Work on pain and inflammation
   c. Work by stopping production of prostanoids from prostaglandins by inhibition of cyclooxygenase pathway
   d. Prostanoids cause pain and inflammation through stimulation of PGE receptors at both the nociceptor and dorsal horn of the spinal cord

3. Adverse effects of NSAIDs in Dogs
   b. Had sufficient data to compare carprofen, deracoxib, ketoprofen, meloxicam and rebenacoxib
      i. Most studies were not randomized, controlled and blinded
      ii. Most did not use a clinical population of dogs
   c. Most common Ae’s
      i. Vomiting and diarrhea
      ii. Melena and fecal blood
      iii. Colitis
      iv. Abdominal Pain
      v. Icterus
      vi. GI ulceration and perforation
   d. Results
      i. Difficult to discern if a significant difference exists between NSAIDs regarding safety
      ii. AE’s were similar to placebo when only the highest quality studies were included.

   a. Events per 1 million oral NSAIDs administered to DOGS
      i. Renal insufficiency 44
      ii. Emesis 170
      iii. Anorexia 74
      iv. Lethargy 83
      v. Death 113
   b. Events per 1 million oral NSAIDs administered to CATS
      i. Renal insufficiency 122
      ii. Emesis 254
      iii. Anorexia 180
      iv. Lethargy 172
      v. Death 164

5. New NSAIDs for Dogs
   a. Onsior injectable
      i. Injectable same for dogs and cats
      ii. Refrigeration required
      iii. Use within 12 weeks of broaching vial
      iv. 2 mg/sq
      v. Maximum use 3 days
   b. Onsior Tablets
      i. 2 mg/kg
      ii. Indicated for post-surgical pain
iii. Maximum 3 days
iv. Fast absorption
   1. Tablets 30-60 minutes
   2. SQ 1-2 hours
v. Rapid Clearance
   1. Tablets 1 hour
   2. Injection 1-4 hours
vi. Onsior persists longer at the site of inflammation than in the blood, so mechanism of action is 24 hours despite short clearance time
vii. Efficacy
   1. Injectable p=0.0055
   2. Tablets p=0.0188
   3. P value < 0.05 is good
viii. Adverse Reactions
   1. Similar to all NSAIDs, diarrhea, vomiting, decreased appetite
   c. Galliprant (Grapiprant)
      i. Classified as a “Non-COX inhibiting NSAID” by the FDA
         1. Actually belongs to its own class, the piprants
      ii. Inhibits the EP4 receptor which is responsible for pain
         1. NSAIS block the entire COX pathway
      iii. Tested in dogs, without significant pathology other than OA
   iv. AE’s
      1. Vomiting and diarrhea more common in grapiprant than in NSAIDs
         a. However most resolved within a few days and without intervention
         b. No further AE’s developed (i.e ulcer or gastric perf)
         c. Was given at 15 times the package dose daily for 9 months, no dogs developed an ulcer or gastric perforation
      2. Efficacy
         a. P=0.0315
6. Chronic Use of NSAIDS in Cats
   a. Not approved for long term use in cats in the U.S.
   b. Mode of Action in Cats
      i. Like dogs, inhibits COX
      ii. Metabolism of Meloxicam
         1. Oxidation, which is a good thing. More reliable in cats than glucuronidation
         2. Half-life about 24 hours but variable from cat to cat
      iii. Metabolism of Robenacoxib (Onsior)
         1. Degrades to form γ-lactam
         a. Extensively metabolized by liver
         2. Half-life is 1 ½ hours
            a. Persists in tissues longer
   c. Approved use
      i. Meloxicam single injection
      ii. Onsior 3 days
   d. Potential problems with long-term administration
      i. Dosing: Label dose of meloxicam is not appropriate for long-term administration
      ii. Half-life in meloxicam is near or exceeds 24 hours
         1. Can be cumulative at higher doses
7. Why chronic use in cats?
   a. Transitional Cell Carcinimal
   b. Degenerative Joint Disease
      i. High prevalence od DJD
         1. Lascelles study showed 92% rate of OA in cats from 6 months to 20 years
   c. No other drugs licensed in the US for the chronic treatment of OA in cats
8. Treatment of OA in cats
   a. Clinicians scared away
      i. Potential for toxicity
      ii. Off label Use
      iii. Black Box warning
   b. AAFP Guidelines
      i. Before starting any cat on a long term NSAID perform PE, Blood Pressure, CBC, Blood Chemistry, Urinalysis
      ii. Routinely monitor the patient every 3-6 months
      iii. Base dose on lean body mass
      iv. Give drug with or after food
      v. Feed moist food to insure good fluid intake
      vi. Educate owners on potential side effects
      vii. Stop drug if cat stops eating
      viii. Titrate to lowest effective dose
      ix. Reduce the dose if other drugs are being used
      x. Never give with corticosteroids
   c. Cats with renal disease
      i. Renal disease in cats has an inflammatory component
      ii. Most cats with renal disease will benefit from the administration of meloxicam, both pain and renal function
         1. 
Myofascial Pain Therapy and Massage for Successful Surgical and Pain Treatment Outcomes
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1) 3 Abbreviations and Definitions
a) MPS Myofascial Pain Syndrome
b) MTrP Myofascial Trigger Point
i) A contracted region of muscle
c) TB Taut Band
i) The band of muscle which is tight because of the MTrP
2) DN Dry Needling
a) The invasive method by which MTrP’s are treated, using an acupuncture needle
3) Twitch Response
a) An involuntary muscle reaction that occurs as a result of dry needling. Involves spinal pathways.
4) History of Muscle Pain
a) Janet Travell
i) Cardiologist in the 1940’s
ii) Took a strong interest in the amount of muscle pain seen in many of her cardiology patients
iii) Rediscovered myofascial pain
iv) Along with David Simons wrote the Trigger Point Manual
(1) Still used as text today
b) Interest has slowly but steadily grown in the human field
i) Barely known in the veterinary field
c) Past History
i) French physician Guillame de Baillou (1538-1616) published book on “muscular rheumatism”
ii) Thomas Sydenham (1624-1689) published book in 1676 that included description of MPS
iii) British Physician Balfour (1816) wrote: “Patients as having a large number of nodular tumours and thickenings which were painful to the touch and from which pain shot to neighbouring parts”
5) Has been called….
a) Fibrositis (Gowers, 1904)
b) Fibromyositis (Telling, 1911)
c) Myofascitis (Albee, 1927)
d) Myofibrosisits (Murray, 1929)
e) Perineuritis (Clayton & Livingstone, 1930)
f) Idiopathic myalgia (Gutstein-Good, 1940)
g) Rheumatic myalgia (Good, 1941)
h) Myofascial Pain Syndrome (Travell, 1948)
i) Myodysneuria (Gutstein, 1955)
j) Fibromyalgia (Yunus, 1977)
6) Trigger Point Development
a) Primary
i) Acute injury after trauma
ii) Chronic muscle overload
iii) Poor mechanics
iv) Repetitive movements
7) Secondary Causes: Most common
a) Underlying disease or inflammation from any chronic painful condition
b) Even when the primary cause is not muscular, central excitatory effects tend to expressed in the muscles, making this a frequent complication accompanying other sources of pain
c) Satellite MTrPs: Primary trigger points may cause or may induce and maintain referred pain in the form of satellite
i) MTrP’s elsewhere.
ii) Example of Satellite MTrP from Human literature
(1) Pain from MTrPs in the upper trapezius may induce and maintain MTrPs in the anteror temporalis or masseter muscle
(2) Dry needling of the trapezius can reduce the irritability of satellite MTrPs
d) Stress
i) It is known that stress can activate trigger points in humans.
ii) In animals??
8) Characteristics of Muscle Pain
a) Human description
i) Usually a cramp or an ache, sometimes hard to localize.

ii) Animals cannot tell us

b) Cortical structures unique to muscle pain are activated

i) Inhibited more strongly than other types of pain by descending pain modulating pathways

iii) Activation of muscle nociceptors are much more effective than other types of nociceptors at inducing changes in the spinal cord’s dorsal horn

9) 3 Types of electrical contractility
a) Normal
b) Abnormal
c) Pathological
i) More on this later

10) Acetylcholine (ACh) is necessary for all contractures, normal, abnormal or pathological
a) Increased ACh action can be present for a variety of reasons
   i) Lack of acetylcholinesterase
   ii) Sensitized receptors
   iii) Excess ACh
   iv) Low pH
b) Excess calcitonin gene related peptide

11) Action Potential
a) Release of acetylcholine causing an impulse via T tubule and release of Ca++ into the sarcoplasmic reticulum

12) Contraction
a) Ca++ binds to troponin and exposes active site of actin
   i) Allows bridge between myosin and actin to form
b) ADP released
c) ATP necessary to detach the myosin-actin bridge

13) Pathophysiology
a) There are several components that make up the pathophysiology of the trigger point. They are:
   i) The Motor Endplate Component
      (1) The motor endplate is the place where alpha motor neurons synapse with target muscle fibers
      (2) These neurons cause the release of acetylcholine (ACH) which through a cascade of reactions causes myosin and actin to bind causing sarcomere contraction
      (3) A decrease in acetylcholinesterase results in the inability of the contraction to “release.”
   ii) The Motor Component
      (1) Muscle contraction compresses local sensory nerves, which reduces the axoplasmic transport of molecules that normally inhibit ACH release
      (2) Muscle contraction also compresses local blood vessels resulting in a decrease in oxygen at a time when the muscle contraction requires an increase in the amount of oxygen
      (3) This results in a rapid depletion of ATP resulting in an energy crisis ATP is needed to turn off ACH release. This results in a vicious cycle of continued muscle contraction and ATP depletion
   iii) Sensory Component
      (1) Micro-sampling from within the MTrP revealed elevated concentrations of inflammatory substances:
         (2) protons, bradykinin, serotonin, substance P, norepinephrine, tumor necrosis factor and interleukin-1b
            (a) Persistent barrage of nociceptive signals from MTrPs may eventually cause central sensitization leading to allodynia or hyperalgesia
            (b) These changes can become permanent
   iv) Autonomic Component
      (1) Autonomic phenomena associated with MTrPs may include vasoconstriction/vasodilation and pilomotor activity.
      (2) The autonomic nervous system may indirectly exacerbate MTrP formation via viscerosomatic reflexes.
      (a) Again, another reflex arc where MTrPs stimulate the ANS which causes disturbances in the viscera which then can increase the central sensitization

14) Theory to Therapy
a) Deep digital pressure? Only increases compression and worsens the condition
b) Affected muscles that cross an articular surface can reduce the functionality of that joint via decreased muscle length
c) Constant pressure on the joint increases sensitization which then sends constant nociceptive signals to the CNS which responds with further activation of the MTrPs
d) Needling with botulinum toxin type A prevents release of ACh
e) Dry needling in animals is very effective

15) Why that muscle?
   a) The Cinderella Hypothesis
      i) Works on the idea that within any muscle, certain fibers are always the first recruited during contraction and the last released during relaxation
      ii) This is very significant during activities that do not require full muscle contraction, but only subtle contraction
iii) e.g. Chronic cruciate rupture or hip dysplasia results in very slight and subtle contraction to take just a little weight off the affected leg.

16) What is a trigger point?
   a) Not all trigger points are active.
      i) We have latent trigger points, either through lack of a triggering event or because it has been treated
   b) A trigger point is an area of disturbed motor function
      i) As described in the previous slides, there are areas of unrelenting myosin and actin binding
      ii) This results in the “taut band” an area of muscle fibers that are abnormally shortened and which mechanically impair the action of the muscle AND reduces joint space in the joint the muscle crosses resulting in restricted range of motion

17) Biochemical changes in trigger points
   a) Shah J, Phillips T M, et al. analyzed substances within a trigger point
   b) Use of a microdialysis needle capable of continuously collecting extremely small samples of physiological saline after exposure to the trigger point
   c) Findings
      i) Protons
      ii) Bradykinin
      iii) Calcitonin gene-related peptide
      iv) Substance P
      v) Tumor necrosis factor - Alpha
      vi) Interleukin -1 beta
      vii) serotonin
      viii) norepinephrine

18) Muscle weakness
   a) Results because of the disturbed motor function
   b) Vasoconstriction often results secondary to the muscle compression of the taut band but can be an autonomic response
      i) This happens at a time when the muscle needs MORE oxygen to generate ATP molecules

19) Pain
   a) The affected muscle is painful
   b) Referred pain may be present
   c) Muscle Cramps can be induced by irritation of the latent MTrPs
      i) Glutamate injected into both latent trigger points and into normal muscle
         (1) Normal muscle had zero muscle cramps
         (2) Trigger point injections resulted in 93% of the muscles having cramps
         (3) Pain propagation of MTrP after glutamate
      ii) Mechanical stimulation of latent MTrP
      iii) Pain propagation to latent MTrP

20) What causes Trigger Points in the clinical setting?
   a) Mechanical Stresses
      i) Most common perpetuating factor in dogs
   b) Chronic Muscle Overload
      i) Contributes to the muscle mechanisms that develop taut bands by different causes all which can result in:
         ii) Low level sustained muscle contractions
         iii) Direct trauma
         iv) Eccentric muscle contractions
         v) Submaximal concentric muscle contractions
         vi) Maximal concentric contractions
   c) Orthopedic Injury
   d) Post Operative surgical trauma and pain
   e) Neuropathy
   f) Joint dysfunction
   g) Acute Trauma
      i) Acute trauma may activate MTrPs but does not perpetuate them. Sudden activation of muscles resulting in
         (1) Muscle strain
         (2) Joint sprain
      ii) Fractures
      iii) Direct trauma
      iv) Excessive or unusual exercise
      v) Acute trauma seen most commonly in
         (1) Performance dogs
         (2) Hit by car
         (3) Falls of any kind
         (4) “Weekend Warrior”
   h) Osteoarthritis

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i) Osteoarthritic joint dysfunction will lead to postural changes
j) Postural changes result in muscle mechanisms causing
k) Low level muscle contraction
l) Eccentric muscle contraction
m) Unaccustomed muscle contraction

21) Visceral somatic Pain
a) It is known in humans that visceral pain will perpetuate MTrPs in the area of referred pain
b) Dorsal horn of spinal cord receive input from viscera and from receptors in the skin and deeper tissues
c) Muscle pain due to visceral nociceptive activation of dorsal horn probably causes MTrPs in dogs as well
   i) Diseased organs and nerves can manifest themselves in both skin and muscle problems
   ii) Occasionally I see dogs that have MPS for no apparent reason but they also have Inflammatory Bowel Syndrome

22) Nutritional Inadequacies
a) In humans
   i) Cobalamine and folate is a perpetuating factor
   ii) Not known to cause issue in dogs
      (1) But: Often present in bowel disease in dogs which often have concurrent MPS
      (2) Possible future link?
   iii) Iron deficiency
      (1) Recognized as a perpetuating factor in people
      (2) No evidence in dogs as of yet

23) Metabolic
a) Hypothyroidism in humans causes
   i) Muscle pain and weakness
   ii) Cramps
   iii) Pain
   iv) Not known to cause MTrPs in dogs

24) Nerve impingement
a) Peripheral nerves
b) Spinal
   i) MTrPs are formed in the extremity corresponding to the involved spinal cord segment

25) Stress
a) Stress and tension in humans can cause trigger points to form.
   i) How do we measure this in dogs?

26) Neurologic Conditions
a) There can be postural changes and weight shifting brought about by any neurologic dysfunction
   i) Mechanical stresses result
   ii) Eccentric contractions
   iii) Unaccustomed concentric contractions
   iv) Low level sustained contractions
b) Development of MTrPs in muscles innervated by injured or damaged nerves
   i) Action potentials are generated at the site of compression in both directions
   ii) Radiculopathy
      i) Most common in thoracic limb
      ii) Usually a C6-T2 spinal cord injury causing MTrPs in long head of triceps

27) Treatment Techniques and Patient Evaluation
a) Principals of Management
   i) Identify and control perpetuating factors
      (1) Then and only then apply specific trigger point therapies
      (2) Treating the trigger points without treating the causes will result in temporary pain relief at best
   b) In Veterinary Medicine….
      i) Dry needling seems to be the most efficacious treatment in veterinary medicine
      ii) Palpation of taut bands just requires practice
      iii) Needling technique is different than needle placement for acupuncture
   c) Steps in Finding and Treating MTrPs
      i) Palpate muscles to locate taut bands and trigger points
      ii) Look for all of classic signs of painful palpation. Depends on dog and personality...licking lips, turning and looking, vocalization, jump, menace response
   d) Dry needling the points
      i) Twitch response is the desired response to treatment
      ii) Don’t confuse with a jump response, the animal voluntarily reacting to the painful palpation
      iii) You cannot feel the trigger point itself. You are looking for the taut band of muscle
      iv) You might find the trigger point by palpating along the taut band: The taut band is painful. The trigger point is very painful
v) Humans can report referred pain from palpation of the trigger point

28) Client Education
   a) Most veterinarians don’t know about MPS, even more true of your clients
   b) Explain role of perpetuating factors
   c) Always form a treatment outline and the rationale and expected outcome measures
   d) Enlist the owners help to modify the animal’s environment or routine
   e) Explain importance of schedule, medications exercises etc. etc.
   f) I try as hard as possible to make the next appointment before the client leaves my office.
   g) Usually weekly to start

29) The veterinarians role
   a) Identify and treat perpetuating factors
   b) Apply specific therapies as indicated (DN, medication, acupuncture, etc)
   c) Re-evaluate patient about every three weeks and reconsider diagnosis of perpetuating factors if poorly responsive

30) Palpation
   a) 4 kg of pressure on a muscle should not be painful
      i) If it is, then it is probably a trigger point
   b) Algometer
      i) Works great in people. Dogs quickly learn to think that the algometer is causing the pain
   c) Palpation Techniques
      i) For most muscles, a pincer technique is used.
         1) No matter the technique, never apply more than 4 kg of pressure
      ii) For muscles such as the triceps that can be grabbed
      iii) Single finger or flat hand palpation
         1) For muscles that don’t lend themselves to “grabbing”
         2) Infraspinatus, tensor fascia latae
      iv) Spade hand palpation
         1) Iliopsoas

31) Dry Needling
   a) You know you have got the spot when you get a localized twitch response
      i) This is actually a spinal reflex
   b) MTrPs are often clustered together. You keep pecking away at the same spot over and over. I find it very common to get 15-20 twitch responses in the same spot.
      i) The same needle can be re-sheathed and used over and over until it starts to feel dull or bend
   c) Dry needling also causes micro trauma, increased local blood flow helping to relieve the energy crisis and release of inflammatory agents.
   d) Muscles with taut bands feel different than normal muscles when you put a needle in them. There is a heavy “clay” feel to the muscle. Some people describe it as feeling “gritty.”
   e) Accurate needle placement produces a twitch response. The needle is moved in and out of the MTrP until the twitches stop.

32) Other Treatment Techniques
   a) Massage
      i) Massage brings some instant relief to any trigger point.
      ii) The relief is temporary compared to dry needling.
      iii) Twitch response is seldom attained
      iv) Massage compresses muscles
         1) These muscles are already compressed along with blood vessels
   b) Stretch
      i) Stretching the muscle provides relief from trigger points.
      ii) It usually involves a “spray and stretch” technique wherein a coolant is sprayed on the skin and the affected muscle is then stretched
         1) The coolant is really just a distraction for the patient
         2) Just as in dry needling, a twitch response should occur
      iii) As in massage, I question the wisdom of muscle compression when the muscle is already compressed, along with blood vessels.
      iv) This technique (without the coolant) is mostly used by physical therapists working with animals
   c) Procaine Injections
      i) Local anesthetic injected into trigger points allows longer periods of time between treatments.
      ii) It is necessary to know exactly where the trigger point is, not practical to inject procaine along the length of every taut band.
         1) In humans, this is easy because they can tell you when you are exactly on the most painful “spot.”
         2) We can’t get the same feedback in dogs
I don’t know of anyone who is using it in animals

d) Botulinum Toxin Injections
i) Not used in veterinary medicine
ii) As in the case of procaine injections, it is easy to identify the taut band in the dog, but unlike in people, it is difficult to impossible to identify the most painful trigger point
iii) Doesn’t allow for treatment of key points
iv) Toxic doses of botox can occur trying to treat all painful points
v) In theory, injection of a trigger point with botox would inactivate it for several months
vi) The U.S. Food and Drug Administration has approved the use of botox for migraine headaches that are the result of MPS
vii) There is not strong evidence for the use of botox outside of migraine treatments.
viii) More due to lack of good studies, lots of clinical evidence of its effectiveness.

33) Massage Techniques.
a) There are three techniques of massage.
i) Petrissage
ii) Effleurage
iii) Tapotement
b) I recommend the book Medical Massage by Narda Robinson to learn these techniques
c) Massage is one of the oldest forms of manual therapy used to employ pain relief.
d) Common treatment
i) Muscle Damage
ii) Degenerative Myelopathy
iii) Pain and relaxation, especially in cancer patients
1. Philosophy of the pain practice
   a. As much a state of mind as it is about a set of skills
   b. The Five Freedoms
      i. Freedom from thirst, hunger and malnutrition by ready access to fresh water and a diet to maintain full health and vigor
      ii. Freedom from discomfort by providing a suitable environment including shelter and a comfortable resting area
      iii. **Freedom from pain, injury and disease by prevention or rapid diagnosis and treatment**
      iv. Freedom to express normal behavior by providing sufficient space, proper facilities and company of the animal’s own kind
      v. Freedom from fear and distress by ensuring conditions that avoid mental suffering
   c. Euthanasia is the last pain treatment not the first
      i. Hospice is an option
      ii. People do get angry and will go elsewhere. But if enough of us say “no” the message will get across

2. Consideration of Pain in Animals
   a. Common pain misconceptions
      i. My dog doesn’t cry out, he isn’t in pain
      ii. My pet is just old
      iii. Animals don’t feel pain like we do
      iv. There is nothing we can do
      v. Post-op pain is a benefit
      vi. OHE’s, neuters and minor procedures don’t need pain meds
      vii. It is too dangerous to give sick and debilitated animals pain medication
      viii. My clients won’t pay for “that.”

3. A Pain Practice means a team approach
   a. Every person on staff needs to be on board
      i. If they are not, clients can tell
   b. Receptionist
      i. Should be handing out a chronic pain survey to every animal that is 6 years or older and walks into your door
      ii. Should be handing out the same questionnaire whenever a client voices a pain concern
   c. Technician and assistants
      i. Don’t underestimate their power of observations
   d. Kennel Help
      i. Sometimes they are the only ones that see an issue when the animal lets it’s guard down

4. Chronic Pain Questionnaire
   a. Many signs of pain not observable in clinical situation
      i. People write it off as “age”
   b. Use questionnaires designed for chronic pain, not acute pain
   c. If you get answers that you cannot reconcile with your own observations, go over the survey with the owners.

5. The Pain Exam
   a. Observe for gait abnormalities
      i. Take the time to walk the dog on a non-slip surface, often that means a parking lot or sidewalk
   b. Exam room
      i. Choose your quietest room
      ii. Consider a non-slip floor
         1. Elephant bark
      iii. Exam best done on the floor, not the table
         1. Small dogs cats and aggressive dogs may need a table
      iv. Make it easy to get to the exam room
1. If you have slippery tiles, roll out a carpet or a roll of yoga mat

6. The Pain Patient
   a. Examination techniques will vary based on the number of modalities you are familiar with
   b. Range of motion
      i. The flexion and extension of a joint
      ii. Normal ranges and “end feels” of the joint can be hard to determine unless you have rehab experience. Even still, if you look at the painful limbs of every dog, you will start to learn normal and abnormal feels
   c. Cruciate disease
      i. Learn the anterior tibial thrust technique to look for partial tears of the CCL
      ii. Look for medial buttressing in the cases of chronic rupture
   d. Myofascial exam. One of the most important exams to look for underlying pathology
      i. Really a two day lecture
      ii. In a nutshell, constant overuse of muscles because of underlying pathology will cause painful areas called trigger points to appear within a band of muscle
      iii. These areas are painful to palpation and only the most stoic dog will not react to firm palpation of the muscle.
      iv. These trigger points are almost always a symptom of underlying pathology. Finding them and having the owners see the dog’s reaction to palpation will invariably convince the owner that further diagnostics are necessary
   e. Direct digital pressure on joints
      i. Usually unrewarding unless there is joint infection or osteosarcoma
   f. Age should be considered when looking for an etiology
      i. Young dogs congenital disease and trauma
      ii. Old dogs, acquired disease and trauma
   g. Radiology. If you don’t look, you won’t know. Many cases of CCL have the precipitating cause of an osteosarcoma. Always radiograph suspect areas of pain
   h. Blood Work is necessary to look for concomitant issues and should always be done BEFORE the start of long term NSAID therapy
   i. Cats. History becomes more important and conversations about what the cat used to be able to do compared to what it can do now are essential
      i. History
         1. Jumping
         2. Sleeping
         3. Grooming
            a. Self grooming and being brushed can be painful
         4. Being picked up and held by the owner
      ii. Distant observation. Hair coat, mats, spindly legs
      iii. Palpation

7. Don’t forget other conditions
   a. Neurological conditions can mimic pain
   b. Neuropathic pain
      i. See notes on neuropathic pain lecture

8. Treatment Goals and Outcome measures
   a. The key to success
   b. If you don’t ask what they hope to achieve, how can you even start treatments
      i. If you think YOU did everything right but you didn’t get to the owner’s goal, they will be unhappy
   c. Ask the owner what they hope to accomplish
      i. Discuss if their desire is reasonable
      ii. Give time frame for re-evaluation
         1. This enlists the owner as part of the pain team and gets them to work with you.
      iii. Fill out the pain questionnaire at regular intervals and compare results.

9. Finding Pain Patients
   a. Satisfied clients will be the #1 source of pain referrals
   b. Veterinary referrals
i. Most veterinarians will not refer
   1. Afraid of losing clients
   2. Think that having three NSAIDs and two glucosamine products on the shelf make them pain vets
c. Dedicated pain website.
   i. Include testimonials, written or video
   ii. Services
   iii. General pain information
10. Learn new skill sets
    a. Acupuncture
    b. Rehabilitation
    c. Become a Certified Veterinary Pain Practitioner with the IVAPM
    d. Learn Myofascial pain diagnostic and treatment techniques (www.myopainseminars.com)
    e. Attend Pain seminars
       i. Listing on www.ivapm.org
11. Learn when to admit you are in above your head and refer. Working with a pain veterinarian, like working with an internist or ophthalmologist only instills confidence with your clients.
Using Cannabidiols to Treat Pain
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1. Hemp v Marijuana
   a. Marihuana
      i. High THC (5-30+%), low CBD
      ii. No known use in veterinary medicine
   b. Hemp
      i. Low THC, (<0.3%) high CBD, other cannabinoids and terpenes
      ii. Suggested uses in veterinary medicine
2. Both Marijuana and Hemp
   a. Medicinal, rope, cloth, canvas, paper and traditionally used for caulking ships
3. Marijuana
   a. Schedule I
   b. Can’t prescribe in veterinary medicine
   c. Research largely prohibited
      i. Federal regulation
4. History
   a. China
      i. Evidence of use as long ago as 5000 years
   b. Book of Exodus 30:23
      i. Moses was instructed by God to use hemp
   c. Egyptians
      i. Evidence of use 3500 years ago
   d. Indians (Atharvaveda)
      i. 3000 years
5. Mechanism of Action
   a. Endocannabinoid system THC
      i. Receptors in the brain and PNS
   b. Physiological effects
      i. Appetite
      ii. Pain
      iii. Nausea
      iv. Mood
      v. Inflammation
   c. Endocannabinoid Receptors CBD
      i. Mostly in the PNS
      ii. Especially immune system
      iii. In CNS as well
   d. THC and CBD
      i. Deeply involved in communication or neurotransmission
      ii. Act as modulator; telling some transmissions to speed up and others to slow down
      iii. Purpose it to return the body to a normal state
6. So why CBD?
   a. Was probably the active ingredient in marijuana that made it work
   b. Not psychoactive
   c. Higher safety levels than THC
   d. Many attributes given to CBD
7. Client Attitudes
   a. Are they using it?
      i. Many people that visited the Canna-Pet website bought it
   b. Why do they use it?
      i. Pain
      ii. Sleep aid
      iii. Anxiety
      iv. Nervous system support
      v. Reduce inflammation
      vi. Seizures
      vii. Nausea
   c. Perceived Problems with use
i. Increased appetite
ii. Lack of Energy
iii. Panic Reactions
iv. Dry mouth
v. Sedation
vi. Nausea
vii. Increased Seizures
d. How did it stack up compared to conventional medications?
   i. Better than any 19.3%
   ii. Better than most 24.7
   iii. Better than some 18.4%
   iv. As well as some 20.8%
   v. As well as most 9.3%
   vi. Worse than many 2.8%
   vii. Worse than any 2.6%
   viii. Worse than most 2%

8. Safety
   a. Over 1000 research papers on CBD
      i. Most all are human
   b. CBD found to be non-toxic
   c. Rare side effects
      i. Possible interference with cytochrome P450
      ii. Ivermectin? Discontinue CBD for 2-3 days
d. Not addictive, actually anti-addictive
e. In humans can be used as adjunct treatments to addictions such as tobacco, alcohol, opiates

9. Evidence
   a. Mostly from human research
   b. Anecdotal in animals
   c. Anxiety
d. Stress areas of brain (e.g. amygdala) are rich in CBD receptors
   e. Noise aversion
   f. Separation anxiety
g. Fear of strangers
   h. Cognitive Dysfunction

10. CBD’s in particular
   a. Cognitive Dysfunction
   b. Neuroprotective
c. Anti-inflammatory
d. Antioxidants
e. Regenerate new neurons in the part of the brain responsible for memory and can improve memory.
f. Autoimmune disorders
   i. Autoimmune thyroiditis
   ii. Immune Mediated Hemolytic Anemia
   iii. Immune Mediated Thrombocytopenia
   iv. Pemphigus
   v. Lupus
g. Bone Health
   h. Helps Heal Fractures
   i. Cancer
      i. Manage signs of cancer
      ii. pain
      iii. nausea
      iv. Reduce inflammation
      v. Induce cancer cells to die
      vi. Slow cancer growth
      vii. Inhibit neovascularization of tumors
      viii. Protect non-cancerous cells
   j. Inflammatory Bowel Syndrome
      i. Reduces mobility and inflammation
   k. Degenerative Myelopathy
      i. No evidence in dogs
      1. Works well in ALS
   l. Glaucoma
i. Actual cat study!
   1. Unfortunately they used CBG cannabigerol
   2. Relieves pressure
m. Degenerative Joint Disease
   i. Reduces inflammation and pain
   ii. Inhibits release of TNF
n. Inflammation is the underlying basis of a number of diseases
   i. Pain suppression through attaching to receptors in parts of the brain responsible for pain reception
   o. Reduction of neuropathy
11. Endocannabinoid Deficiency Syndrome
   a. For some animals, there may be a problem where the endocannabinoids fail to do their job
   b. Supplementation may help
   c. Acupuncture has been shown to help as well
12. Sources of CBD
   a. Hemp plants absorb heavy metals, toxins and radiation from the soil at a high rate
   b. China produces 1/4 of the worlds hemp
      i. Very high percentage has heavy metal contamination
   c. US hemp is high quality but not allowed to be used commercially
   d. European hemp is the best and safest option
13. Production of Hemp
   a. Cold Press extraction produces low CBD
   b. CO2 extraction is best
      i. Most effective and safest extraction method
      ii. Similar to decaffeinating coffee
      iii. Expensive method