WHEN YOU CAN'T REFER THE NEUROLOGIC PET

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Most of you are going to be in the position of seeing a patient in need of advanced neurodiagnostics with a family that cannot afford to take that next step. I welcome consults from any family that wants one, so I will also see owners who are very limited in what they can allow us to do. This is my essential approach for these cases.

DIAGNOSTICS

Your physical and focused neurologic exam and taking a thoughtful history are all included in your office visit fee and this is one of your most important tools. At best, you might find the answer without needing to do any other tests. At the very least, you will be able to identify the essential problem and localize the lesion to help you narrow your differential list. The neurologic exam will also be a crucial tool in helping to gauge patient progress over time. Your office visit will be your time for owner education. You should talk about what you find on the exam and how those findings and the details they shared in the history have helped to shape the current differential list. I usually have to explain that the neurologic exam gives us clues to WHERE in the nervous system the problem is coming from, but it doesn't tell us WHAT is causing it. To answer that, we get clues from the history and have to discuss some testing. I talk about the rationale behind each test I want to suggest and the step-wise approach that I would take. We discuss costs, the chances of finding an answer, and what we might have to think about doing next based on certain scenarios. When discussing tests, whether it is radiographs or an MRI, the considerations are the same:

1. Tests do not provide any treatment. Clients have to look beyond the tests to what decisions we will need to make with the information. If all the family can afford is the test in question and you have wiped out the finances for any additional medications, then it might not be the most practical decision.
2. Families should do tests if:

-They can afford it and can afford steps that might come after that.
-It will change what we do - like if we have to change our plan based on high liver values or otherwise focus our medical plan better, or if it might give us an answer for diseases like cancer that limit costly testing and therapy plans.
-They know they won't do big things like surgery, but it will give some peace of mind to know what we can rule in or rule out. When choosing a very conservative path, the minimum database tests at least help us to rule out easier-to-find diseases and make sure the pet is otherwise systemically healthy.
-They can accept any adverse effects from tests like stiffness after positioning for radiographs or some exacerbation of problems like encephalopathy or weakness after anesthetized tests.
-Owners can accept that we can spend money on tests and still not get a discrete answer when we are done.

3. They DON'T do the tests if:

-They can't afford them.
-It won't change the fact that they will only use basic medication efforts to help
-If they can be comfortable with the fact that their doctors won't know what they are treating - that we are only making our best guesses based on the appearance and progress
-If they cannot accept any level of risk or chances of not finding a specific answer.

Remember that with any test we perform, we can have one of the following scenarios:

1. We find the direct, clear answer for the problems and can talk about what our options are for managing it.
2. We find a problem that is likely causing the signs they see at home, but we have narrowed it down to a few diseases that might look similar in the test results (like how infections and autoimmune diseases can look similar at first). We might discuss other tests or treatment plans to help get to the bottom of things.
3. We find a problem, but we aren't convinced that it is the clear cause of the signs. Sometimes we find unrelated problems because we are looking.
4. We might do lots of tests and have trouble finding the answer. This can lead to further tests and sometimes tests of treatments to try to help the pet.

Finally, even when we find answers, response to treatment can be highly variable in the individual so predicting a specific outcome is not always easy. This is the nature of medicine, no matter what disease we are dealing with.

At this stage, if you are discussing the potential for costly testing or therapies and the owners express limitations, then this is the time to communicate openly about an approximate budget. Choices you might make for a budget of $100 might be very different than what you might make for a budget of $1000. Remember to be kind and empathetic – many people are simply doing their best with what they have and shouldn't be made to feel badly about that.

When I have to prioritize testing, I usually think in the following order:

- Is there a minimum database with at least CBC, chemistry, and urinalysis? This can look for systemic causes of weakness and encephalopathies. This will also look for any organ diseases that might affect your medication choices or monitoring needs (like underlying liver or kidney disease).
- Are there any additional focused tests that might be diagnostic in specific situations and can fit into a budget like blood pressure, bile acids, cortisol levels, acetylcholine receptor, or 2M antibody titers, etc? For certain "classic" presentations (like exercise-induced weakness with myasthenia gravis), these tests can be confirmatory and a key basis for a long-term therapy plan. Making the investment early on can tell you if you are on the right track or if you need to re-think your approach before the owners invest a lot in medications and follow up visits.
- Is there a problem like spinal pain that you can use radiographs to try to look for problems that may not require MRI like discospondylitis, atlantoaxial subluxation, bone tumors, etc? Consider how you can balance detail with getting the most useful information in one image. For example, I might focus on the lumbar and thoracic and cervical spinal segments separately instead of taking a "dog-o-gram", but I might include the entire abdomen and pelvis with the lumbar views and the entire thorax with the thoracic views. Be careful with over-interpretation of common findings like vertebral malformations and intervertebral disc mineralization in situ.
- Is there room in the budget for more advanced or costly tests beyond this like spinal fluid sampling, biopsies, infectious disease panels, etc?

Throughout this process, you must also keep in mind the cost of therapy – will this be a "short-term" treatment plan or something that could require months of medication, recheck visits, monitoring tests, and other needs? Are these costs that can fit into the budget for the owner over time?

Even if your owner cannot afford to do advanced diagnostics, can a neurology referral fit into the budget? This might help to get a more focused diagnosis and plan from the benefit of specialist experience, or at least can reinforce your ideas for the owner. When families are so limited that an

appointment visit will carve out a significant part of the budget, then I am always happy to offer the best advice that I can over the phone to the referring veterinarian. If you can get a detailed history, can communicate an observant physical and neurologic exam, and can get any useful photographs or videos, then these can be very helpful in giving your neurologist as much information as possible to help guide you. Talking to your veterinarian friends or looking through message boards like VIN can also be helpful – you never know when someone else has seen the same weird thing that you have and might be able to offer some advice in these limited situations.

THERAPY

If you have a clear diagnosis, then your therapy plan should be focused and appropriate for the disease.

If you are limited in what you can invest for testing, then there will be many times that you will have to make empiric choices without a clear diagnosis. In these situations, your first question should be, "Does this pet NEED medication?" For example, a pet with acute onset vestibular signs that is already improving may have idiopathic vestibular syndrome or a similarly benign ischemic infarct that may continue to improve with simple time and essential support. A pet with acute onset of paraparesis that is improving might have an FCE or non-surgical disc herniation that can continue to get better with time and basic physical therapy at home. A single self-limiting seizure in a pet with normal neurologic exam might not yet need an anticonvulsant.

In these situations sometimes medication might be complicating. First, you might not be sure if the pet is getting better from the medication or if it would have improved anyway (making it harder to narrow your differential list). Second, some medications can create complicating signs like weakness, behavior changes, poor appetite, etc. For example, gabapentin might worsen weakness and lethargy and it can be hard to know if the pet is getting worse or just experiencing medication side effects. If the pet isn't painful, then this confusion can be avoided by holding off on that type of medication. It is easy to feel like you have to prescribe a medication, but sometimes focusing on other things like a monitoring diary, serial videos, physical therapy, and other tools can be the better medicine.

When I have pets that are clearly getting worse, in pain, or otherwise demonstrate a need for therapeutic intervention, then you should not blindly fill medications. Instead, do your best to make rational choices for that individual situation. Here are some examples for more common situations:

<u>Seizures</u>

I usually start anticonvulsants when a dog has more than one seizure in 1-2 months, more than one seizure in 24 hours, if the seizures are clearly accelerating (more severe or more frequent), if they are very severe or long in duration, or if we can identify an underlying brain disease that will likely predispose to an ongoing seizure condition. When choosing a long-acting maintenance anticonvulsant drug for families with financial constraints, you will have to consider the cost of medication as well as the cost of any monitoring blood tests when making your long term plan. Costs for anticonvulsants can vary widely, so I always encourage families to shop around for the best prices in their area.

Remember that for most dogs on appropriate seizure medications, the drugs will not stop the seizures completely (especially in cases with underlying progressive brain disease), but the goal is to decrease the frequency and severity of the seizures. Even in an epileptic without underlying brain diseases, some dogs may never be controlled easily and may require other medications to be added on later.

Discussing the details of seizure management is beyond the scope of this article. If you ever have trouble deciding which medication to start with or how to adjust a medical plan, you can reach out to your local specialist for advice.

Owners should keep a diary of any seizure-like events as well as any unusual interictal behaviors. This will be a very important tool to help you make rational choices over time based on the animal's progress, especially with any medication changes.

You will also have to decide if the pet needs more than just anticonvulsants. Is there enough concern for something like hepatic encephalopathy to warrant a comprehensive treatment plan for hepatitis and hepatic encephalopathy? Are there progressing interictal neurologic abnormalities that raise the concern for intracranial disease like encephalitis or a tumor?

New progressing neurologic disease that could be compatible with inflammatory disease

In these cases, I have to consider both infectious and sterile, auto-immune-type inflammatory diseases. Because both can be very serious in early stages, I tend to treat for both conditions together until I can narrow my focus with positive infectious disease test results or the test of time and clinical progress. When taking this approach, I tell families that we are trying to "treat for the more easy-to-treat" diseases. This will mean using a steroid and antibiotic combination for a few weeks. Some diseases may resolve with this plan (like a susceptible bacterial infection or limited inflammatory disease), while others may only be managed for a while (like a difficult inflammatory disease or a tumor). Others may not respond at all. The following are examples of plans that I choose for dogs and cats. These include an anti-inflammatory steroid that is tapered over a few weeks as well as antibiotic combinations that penetrate well into the nervous system and treat a relatively broad spectrum of bacterial and some protozoal diseases.

- **Dogs**
  Prednisone 1-2mg/kg/day to start, then taper off over 4-8 weeks
  Doxycycline at 5-10mg/kg BID for 3-4 weeks
  Clindamycin 12-25mg/kg BID OR sulfadimethoxine 15mg/kg BID for 3 weeks
- **Cats**
  Prednisone 1-2mg/kg/day to start, then taper off over 4-8 weeks
  Clindamycin 12-25mg/kg BID
  +/- Doxycycline at 5-10mg/kg BID for 3 weeks
  +/- Capstar (for cuterebra candidates) use the label dose every 48 hours for 2-3 doses

When choosing to start a steroid, I also warn owners that if they change their minds about pursuing further testing later, this can make it harder to find certain diseases like sterile inflammatory disease or lymphoma that might become "hidden" with steroid use. For example, if we sample the spinal fluid while on prednisone and it is abnormal, then we know it would probably be more abnormal off of the medication. However if the spinal fluid is normal or border-line then we cannot be sure if it would have been normal anyway or if there is disease being hidden by the prednisone. For that reason, we will ideally do these tests before we start a steroid or when an animal has been off of the drug for a few weeks. That being said, if a pet is already on steroids and cannot function without it, then we can only do our best to interpret tests in light of the needed medication.

Longer-term case that is dependent on prednisone

When I have cases that initially do well in the first few weeks, but then cannot go to lower doses or off of the steroid with relapsing neurologic signs, then I have to consider if this might be a an autoimmune-type disease versus other prednisone-responsive diseases like tumors or IVDD. In these cases, you can trial using a secondary immunomodulatory medication like Atopica that might allow you to control the disease while re-attempting tapering the prednisone over several weeks. If you have a pet that does well

with this plan, then it is supportive of sterile inflammatory disease. If the pet does not do well, then you still have to consider transiently responsive infections that weren't treated with the antibiotics, difficult sterile inflammatory diseases, lymphoma or tumors that might only respond for a limited period of time, and some other structural diseases like growing cysts or compressive disc disease.

IVDD suspect

If I have a typical breed and presentation (like a dachshund with acute onset of T3-L3 myelopathy), then I will focus more on a typical conservative therapy plan for IVDD. In these cases, it is important to educate the family about the consequences of not acting quickly when needed. As long as this is not an issue of misunderstanding the potential urgency, then there should be no judgment about what a family can or cannot do. Spinal surgery is expensive for the average family and often out of reach. A more conservative approach is multi-faceted.

This can include ***medications*** for inflammation and pain. Although it is controversial, I prefer to use anti-inflammatory steroids (ie 0.5-1.0mg/kg/day starting dose prednisone) tapered off over about 2-3 weeks in cases that are affected with substantial paresis without a definitive diagnosis. My clinical impression is that it helps function and progress in severely affected IVDD cases more than an NSAID in the short term. I DO NOT use high-dose protocols like those described in human medicine and find serious complications like gastric ulceration and pneumonia with lower doses used for a limited period of time to be very rare. Additionally, without a concrete diagnosis, this also gives you the opportunity to treat other "treatable" diseases like GME. Is the pet painful? Pain medications can include drugs like gabapentin and tramadol and sometimes muscle relaxers. You will also ask, "Can this dog urinate? Will drugs help with urination or bladder expression?" For UMN urine retention, you can use medications like diazepam and prazosin for urethral sphincter relaxation. For very anxious dogs that aren't calm enough on pain medications, consider additional anxiolytics like trazodone.

STRICT REST is one of the most important parts of the recovery process. I have had too many cases that were initially improving after a few days of medication then acutely decompensated after chasing a bunny or falling out of the owner's bed. I tell families that it takes at least 3-4 weeks to build scar tissue over a disc herniation. This is the most critical time for very strict rest with cage confinement when not under the owner's DIRECT control. No running, jumping, or rough play as well as can be controlled. Then after a 4-6 week period of rest, the length of walks and controlled activity is slowly increased until back to a more typical level. Strict rest and cautious handling costs nothing and might help to keep a non-surgical issue from becoming surgical.

Physical therapy is one of the most important non-surgical tools for helping pets walk again. For owners with financial constraints, I give a basic outline of simple therapies like massage, passive range of motion, and weight bearing exercises. I still encourage a consult with a physical therapist since many have lots of great tricks for daily "homework" exercises that families can do that I haven't thought about. A visit every week or two might be affordable and reasonable for updating "homework" daily therapies.
Acupuncture, laser, hyperbaric, underwater treadmill, expensive herbs and supplements, and other modalities are ideal to add to a multimodal plan, but the cost adds up quickly and should never be a replacement for budgeting that money to urgent surgery when possible.

If families choose to only support the paralyzed dog with medications and it does not help, then there will be some hard choices to make. You will have to think carefully about quality of life. Some dogs adjust well to the big change in lifestyle that comes with paralysis while others do not seem happy being

unable to do their normal activities. For dogs that do not seem very discouraged by their condition, there are ways to help improve their daily experiences including using a wheelchair/cart to improve mobility, increasing daily interactions including diligent physical therapy exercises, and finding ways to modify playful activities like ball-play and playing with other dogs. It will be important to remember that taking care of a dog that is unable to walk is a big job and will involve a big life-style change for the family as well – this is not something that everyone can accommodate. Sometimes reading how others have dealt with similar experiences can be helpful so I encourage families to reach out to support groups and information resources like *www.dodgerslist.com* for another perspective and some tips from others going through the same thing.

Cats can also experience intervertebral disc herniations and therapeutic considerations are very similar.

Senior pet with mixed mobility difficulty

Senior dogs and cats can sometimes have mobility difficulties from a combination of problems which might include:

- Pain and reduced joint flexibility from progressing degenerative joint disease
- Neurologic weakness from intervertebral disc disease or other structural CNS pathologies (like degenerative myelopathy or growing tumors)
- Decreased strength and endurance from loss of muscle mass due to chronic disease, endocrine imbalances, relative inactivity, etc.
- Some geriatric larger breed dogs are also prone to peripheral nerve slowing which can manifest as very slowly progressing exercise intolerance, decreased muscle mass, reduced reflex quality, and sometimes laryngeal weakness.

It is not uncommon for families with geriatric pets to not want to pursue costly advanced diagnostics and therapies. In these cases, I might suggest a multi-faceted approach to improving mobility as well as possible. This can include:

- Use medications as needed for joint pain - This can include anti-inflammatory medications like NSAIDs and similar drugs (safe for dogs) Carprofen, Deramaxx, meloxicam, and Galliprant. Others can include pain medications like gabapentin, tramadol and amantadine. Chondroprotective and anti-oxidant, anti-inflammatory nutritional supplements and options like Adequan injections can be helpful. Other dogs with serious neurologic dysfunction might need a steroid like anti-inflammatory doses of prednisone or dexamethasone.
- Consider laser and acupuncture - both of these can help with pain and acupuncture can help some dogs quite a bit with function. This can become costly over time, so this may not be an option for more financially restricted families.
- Gentle physical therapy can help with mobility. This can include muscle massage, gentle range of motion of the limbs, and low-impact exercise like walking, underwater treadmill, and swimming. Physical therapy can be one of the more important components of your management plan because this will be what can help to maintain as much strength and flexibility as possible for as long as possible. Very inactive pets can lose mobility much faster from loss of muscle mass and restricted joint movement.
- At home, owners should modify the environment to protect the animals from falling on slick floors, stairs, from high furniture, etc. Rugs and yoga mats, stairs, and blocking stairs can help prevent injuries. Thicker bedding to limit joint pain, raised food and water bowls to be more comfortable to reach, and having a sanctuary from rambunctious animals and children are other considerations. Additionally supportive tools like traction booties and harnesses or slings can be

used to help get up and around better. In cats, you can use a more shallow litterbox or cookie tray to make it easier to step in and out of the litterbox.
- Keep a lean body condition to limit pain from excess weight on sore joints and weak legs.
- Stay on top of general body health issues. Heart disease, high blood pressure, kidney disease, gastrointestinal disease, and other general body health concerns can exacerbate weakness, exercise intolerance, stiffness and trouble getting up and around.

CONTINUE TO ASSESS AND ADJUST BASED ON YOUR PATIENT'S PROGRESS

When choosing a symptomatic medical plan, good communication with the owner and periodic examination of the pet are crucial. Especially when choosing longer-term use of medications like steroids, immunomodulatory medications, anticonvulsants, and any controlled substances, it is very important to be able to reassess your patient to be sure you are on the right track without developing new complications. Your careful physical assessments will be one of your most important tools in helping you make decisions about how to adjust the treatment plan over time. I also like to give families a timeline for when we might want to see substantial improvement. It could be that you need to re-evaluate a pet within 24-48 hours when you are dealing with serious dysfunction from rapid onset disease. When adding steroids and/or antimicrobials, I generally like to see some improvement within a week if it might be helping. In other situations, it could mean giving a more stable pet 1-2 months with a new therapy before deciding if it is helping. Generally, I tell families that the rate and degree of improvement we see over the next 1-2 weeks will tell us what to expect over time. If an animal is getting better and improvement is rapid, then we expect progress to continue to be more rapid and is more likely to allow a complete recovery. When progress is more slow, then it will likely continue to be slower and can be incomplete. Most animals with stabilized spine or brain disease can show the most functional improvement over the first 2-3 months, so there is usually a lot of time to keep getting better. Animals and the therapy plan need to be reassessed sooner than planned when:

- Any time the animal is regressing instead of continuing to improve
- When you have a case that is not progressing the way you would expect for the problem you think you are treating
- If new problems develop
- Progress is not rapid enough to allow for good functional quality of life within a reasonable period of time
- If the owner is worried about anything

Remember that you don't know what you are treating and time will tell if you are dealing with a "good" disease versus a "bad" disease. Some consequences of picking a symptomatic approach can include:

- Spending a lot of time and money ineffectively treating the wrong disease
- Making the underlying disease worse (like worsening fungal infection while on a steroid)
- Having more difficulty getting a diagnosis later in a pet on chronic steroid medication
- You might miss your opportunity to definitively treat a treatable disease like paralysis from a surgical disc herniation

In cases that continue to progress over time or otherwise do not respond as well as needed to therapy, it will be important to keep an open dialogue with families about quality of life considerations for both the pet and the family. Everything we want for our patients is to be as comfortable and happy as possible. When I have patients that are in slow decline, it can be very difficult for families to know when it is time to make decisions about euthanasia. This is because families will slowly accommodate to a "new normal" as things change over time. It is important to remember what the pet used to enjoy – is she still enjoying these things regularly? If not, then owners need to reach out to their veterinarians to

see what options there might be to improve things. If you are getting to a point of medical interventions not helping to improve quality of life, then this is a reason to start thinking about end-of-life decisions. Sometimes a sudden change in health will force this decision, but many pets can have a slower decline where families might have to make this choice at a time when it might be hard to know if it is the clear thing to do. In these cases, I encourage families to have weekly meetings to look critically at the previous week. Has the pet had a good week or a bad week? If there are up and down days, are there more good days than bad days? Is she eating well, pain-free, able to get around well, and able to urinate and defecate easily? Spending more time at home than in the hospital? If any of these are not going well and there have not been easy medical solutions, then it is time to start thinking primarily of the pet's quality of life and happiness – and if it may be time to consider humane euthanasia to end suffering if she is more often than not feeling pain or unhappiness. This is not an easy topic to discuss but I try to let families know that it can be reasonable to start thinking about it in cases where end-of-life considerations are inevitable, and I try to make myself available to help answer questions they have about this process over time.

Remember that you are trying your very best within the limits you are given. Your biggest asset in these cases will be your time for careful examination, detailed history-taking, and taking time for owner communication and education. Be thoughtful, keep excellent records, and don't hesitate to reach out to your local specialist for advice when needed.