

Case Study 3: Tootie – IVDD and hind end weakness
Dr. Shantel Julius, DVM

History of Case

Name: Tootie

Age: 13 years 5 months **DOB:** 04-12-2004

Breed: Shih Tzu

Sex: Male **Altered:** Neutered

Dog's lifestyle/occupation: House pet; companion to owner

Brief history of dog's family history: Owner has had Tootie since he was a puppy. No previous IVDD history. Chronic urolith concerns.

Brief history of problem in which dog is referred for: Tootie was seen on 03-27-2017 for Annual Exam. At that time, owner was concerned that Tootie's rear legs would frequently slip on non-traction surfaces, and sometimes he had difficulty ascending stairs and once he fell descending the stairs. On PE, Tootie had pain on palpation of L4-5, and joint flexion/extension of hind limbs was normal. On 04-03-2017, owner was contacted to see how Tootie was doing. Owner stated that Carprofen made no difference. Owner wished to try Cosequin to see if that results in improvement before seeking other options.

Interventions:

Cosequin DS – 1 tablet by mouth every 24 hours for 6 weeks; then give ½ tablet by mouth every 24 hours for maintenance

Carprofen 25 mg – 1 tablet by mouth every 12 hours for joint pain for 5 days

Referring veterinarian's diagnosis:

IVDD

DJD/OA

Test results:

06-09-2017 – Urine culture: no growth

06-19-2017 – UA: WBC 6-20/hpf; RBC 21-50/hpf; no crystals noted

Surgery: None

Past medical history:

08-14-2014 – Cystotomy for calcium oxalate urolith

02-25-2015 – Uroliths noted in urethra; flushed back into bladder; started on Royal Canin SO

08-20-2015 – 4Dx Plus: Faint Anaplasma positive; no treatment performed

Evaluation

Monday, June 19th, 2017 – Initial Exam/Consult

Observation: BAR. Tootie presented for evaluation for progressive hind limb weakness. Owner reports she has noticed Tootie has been weak on his back legs for about 6 months, but on Thursday it progressed to dragging back limbs. Tootie is eating and drinking well, with no vomiting, diarrhea, coughing, or sneezing. No known



trauma and owner notes Tootie does not seem overtly painful. Able to urinate and defecate on own, but difficulty standing. Current diet: Royal Canin SO.

Gait Assessment:

- Walk: Ambulates on all 4 limbs; drags hind limbs while walking; Grade 4/6 lameness, however more considered ataxia (Carr, BJ; Dycus, DL. Canine Gait Analysis. *Today's Veterinary Practice* 2016; 93-100.)
- Trot: Ambulates on all 4 limbs; drags hind limbs while walking; Grade 4/6 lameness

PROM – affected joints with a comparison to uninvolved joints: mild to moderate pain response over palpation of L2-5; no pain on palpation of limbs; decreased extension of hips; no pain on abduction of hips.

Neurological testing: Ataxic on back legs at a walk. Decreased to absent bilateral hindlimbs placement tests; deep pain and withdrawal present; able to weight bear, but weak, and will collapse within 3-5 secs of forelimb picked up. Anal tone good.

Pain Assessment (0-10) (using pain assessment scale from, Matthews, K.A., Pain assessment and general approach to management, Management of Pain, The Veterinary Clinics of North America, Small Animal Practice, July 2000, p. 729-755): 3/10

Assessment:

- Problems:
 - Ataxic
 - Decreased bilateral hindlimb placement
 - Pain on L2-5
 - Decreased hip extension
- Goals:
 - To improve pain, therefore improving mobility to allow greater comfort at home and improve quality of life.

Treatment Plan:

- Home exercises:
 - Forced weight bearing – gently sway Tootie by gently pressing on one hip then alternating to the other hip, making him shift weight from one back leg to another
 - Passive range of motion – with Tootie standing or laying, gently move his back legs (one at a time) through their normal range of motion, then extend his leg back to stretch it very gently. Do this 2 times a day prior to balance exercises.
- Medical management:
 - Carprofen 18.75 mg PO q12hrsx14d
 - Gabapentin 100 mg PO q12hrsx14d
- Recheck in 2 weeks

Actual History of Treatment

Monday, June 19th, 2017 – 1st Visit

- S: BAR. Owner reports she has noticed Tootie has been weak on his back legs for about 6 months, but on Thursday it progressed to dragging back limbs. No known trauma and owner notes Tootie does not seem overtly painful. Able to urinate and defecate on own, but difficulty standing.

- O:

- Treatments:
 - Medical management:
 - Carprofen 18.75 mg PO q12hrsx14d
 - Gabapentin 100 mg PO q12hrsx14d
 - Amoxicillin 250 mg PO q12hrsx14d
 - Hill's S/D canned – 1/3 can PO q12hrsx30d
- Owner education:
 - Keep Tootie restricted – no jumping, running, etc
- Home exercise program:
 - Forced weight bearing – gently sway Tootie by gently pressing on one hip then alternating to the other hip, making him shift weight from one back leg to another
 - Passive range of motion – with Tootie standing or laying, gently move his back legs (one at a time) through their normal range of motion, then extend his leg back to stretch it very gently. Do this 2 times a day prior to balance exercises.
- Program within hospital:
 - Obtained urine via a urinary catheter for UA, removed 5 small stones for analysis
- Measurable outcomes:
 - Weight: 20.5 lbs
 - BCS: 3.5/5
 - Radiograph: T10-11 disc space narrowed; moderate uroliths and nephroliths noted
 - Urinalysis: USG 1.027; RBC, WBC, bacteria; no crystals noted
 - Complete Blood Count (CBC): NSF
 - Chemistry panel: ALP and globulin elevation may be secondary to inflammation, however neoplasia cannot be ruled out. SDMA indicates early kidney dysfunction. Owner declines further testing at this time.
 - Urolith analysis: Calcium oxalate
 - Urine culture: no growth
- Observation of gait pattern, function, etc: Ambulates on all 4 limbs; drags hind limbs while walking; mild to moderate pain response over palpation of L2-5; no pain on palpation of limbs; decreased extension of hips; no pain on abduction of hips. Decreased to absent bilateral hindlimbs placement tests; deep pain and withdrawal present; able to weight bear, but weak, and will collapse within 3-5 secs of forelimb picked up. Anal tone good.

- Assessment:

- Progress:
 - None at this time.
- Deficits remaining from initial plan:
 - No changes at this time.

WBC	6.4	4.9 - 17.6	K/uL
RBC	6.54	5.39 - 8.70	M/uL
HGB	15.7	13.4 - 20.7	g/dL
HCT	46.6	38.3 - 56.5	%
MCV	71	59 - 76	fL
MCH	24.0	21.9 - 26.1	pg
MCHC	33.7	32.6 - 39.2	g/dL
% RETICULOCYTE	1.5	-	%
RETICULOCYTE	98	10 - 110	K/uL
% NEUTROPHIL	54.0	-	%

Patient History Report - 9/27/2017 - Tootie - Ownr

% LYMPHOCYTE	39.0	-	%
% MONOCYTE	3.0	-	%
% EOSINOPHIL	4.0	-	%
% BASOPHIL	0.0	-	%
PLATELET	364	143 - 448	K/uL
ANISOCYTOSIS	SLIGHT	-	
REMARKS	-		

SLIDE REVIEWED MICROSCOPICALLY.
NO PARASITES SEEN
NEUTROPHILS APPEAR SLIGHTLY TOXIC
WBC COUNT AND DIFFERENTIAL MAY BE INACCURATE DUE TO WBC CLUMPING
PLATELETS APPEAR ADEQUATE ON THE BLOOD FILM.
PLATELETS ARE CLUMPED ON THE BLOOD FILM.
FIBRIN STRANDS NOTED

NEUTROPHIL	3456	2940 - 12670	/uL
LYMPHOCYTE	2496	1060 - 4950	/uL
MONOCYTE	192	130 - 1150	/uL
EOSINOPHIL	256	70 - 1490	/uL
BASOPHIL	0	0 - 100	/uL

6/20/2017

Assay Name	Value	Ref. Range	Units
ALP	1448	5 - 160	U/L
RESULT VERIFIED BY REPEAT ANALYSIS			
ALT	79	18 - 121	U/L
AST	20	16 - 55	U/L
CREATINE KINASE	68	10 - 200	U/L
GGT	5	0 - 13	U/L
AMYLASE	827	337 - 1469	U/L
ALBUMIN	3.0	2.7 - 3.9	g/dL
TOTAL PROTEIN	7.2	5.5 - 7.5	g/dL
GLOBULIN	4.2	2.4 - 4.0	g/dL
TOTAL BILIRUBIN	0.1	0.0 - 0.3	mg/dL
BILIRUBIN CONJUGATED	<0.1	0.0 - 0.1	mg/dL
BUN	13	9 - 31	mg/dL
CREATININE	1.0	0.5 - 1.5	mg/dL
CHOLESTEROL	591	131 - 345	mg/dL
RESULT VERIFIED BY REPEAT ANALYSIS			
GLUCOSE	97	63 - 114	mg/dL
CALCIUM	12.1	8.4 - 11.8	mg/dL
PHOSPHORUS	2.5	2.5 - 6.1	mg/dL
TCO2 (BICARBONATE)	23	13 - 27	mmol/L
CHLORIDE	105	108 - 119	mmol/L
POTASSIUM	5.0	4.0 - 5.4	mmol/L
SODIUM	144	142 - 152	mmol/L
ALB/GLOB RATIO	0.7	0.7 - 1.5	
BUN/CREATININE RATIO	13.0	-	
BILIRUBIN UNCONJUGATED	0.0	0.0 - 0.2	mg/dL
NA/K RATIO	29	28 - 37	
HEMOLYSIS INDEX	N	-	
Index of N, 1+, 2+ exhibits no significant effect on chemistry values.			
LIPEMIA INDEX	N	-	
Index of N, 1+, 2+ exhibits no significant effect on chemistry values.			
ANION GAP	21	11 - 26	mmol/L
SDMA	15	0 - 14	ug/dL

- Remaining problems and goals:
 - Goals: To improve pain, therefore improving mobility to allow greater comfort at home and improve quality of life.
 - Problems:
 - Ataxic
 - Decreased bilateral hindlimb placement
 - Pain on L2-5
 - Severe hind limb weakness
 - Decreased flexion of left hip, right hip, left shoulder, right shoulder
 - Decreased hip extension
- Plan:
 - Recheck for pain assessment and further plan in 2 weeks



Monday, July 17th, 2017 – 2nd Visit

- S: BAR. Owner reports that she has been doing balance exercises at home, but is inconsistent. She thinks Tootie is walking slightly better. Tootie loves S/D. Tootie is eating and drinking well, with no vomiting, diarrhea, coughing, or sneezing. Tootie finished Gabapentin and Rimadyl a week ago. Owner does not think Tootie is painful at this time.
- Q:
 - Treatments:
 - Medical management:
 - None at this time
 - Owner education:
 - Keep Tootie restricted – no jumping, running, etc
 - Home exercise program:
 - Forced weight bearing – gently sway Tootie by gently pressing on one hip then alternating to the other hip, making him shift weight from one back leg to another
 - Passive range of motion – with Tootie standing or laying, gently move his back legs (one at a time) through their normal range of motion, then extend his leg back to stretch it very gently. Do this 2 times a day prior to balance exercises.



- Program within hospital:
 - None at this time
- Measurable outcomes:
 - Weight: 19.8 lbs
 - BCS: 3/5
 - Goniometry:
 - LH: Hock 30 LOW / 170; Stifle 30 LOW / 160; Hip 40 LOW / 160
 - RH: Hock 30 LOW / 170; Stifle 45 / 155 LOW; Hip 40 LOW / 160
 - LF: Carpus 25 / 190; Elbow 38 / 165; Shoulder 18 LOW / 170
 - RF: Carpus 30 / 220; Elbow 25 / 160; Shoulder 10 LOW / 170
 - Radiograph: VD hips, and lateral stifles: no definitive changes noted. Dr. Steve Levine, DVM, MS, DACVS
- Observation of gait pattern, function, etc: Ambulatory x4, very weak on hind limbs; will drag LH>RH; no pain on palpation of limbs or spine; no pain on abduction of hind limbs; 2-3 mm cranial drawer bilateral stifles. Sciatic and patellar reflexes WNL bilaterally; deep pain and withdrawal presentx4. Very weak – will collapse within 3-5 secs of lifting a forelimb – sinks on hind limbs; less sinking when lumbar musculature activated bilaterally; placement tests extremely delayed to absent LH; slight delay RH
- Assessment:
 - Progress:
 - Slight improvement in neurological function.
 - Pain appropriately managed
 - Deficits remaining from initial plan:
 - Ataxic
 - Hindlimb placement deficits

- Severe hindlimb weakness
 - Decreased ROM of limbs
 - Remaining problems and goals:
 - Goals: To improve pain, therefore improving mobility to allow greater comfort at home and improve quality of life.
 - Problems:
 - Ataxic
 - Decreased bilateral hindlimb placement
 - Severe hind limb weakness
 - Decreased flexion of left hip, right hip, left shoulder, right shoulder
 - Decreased hip extension
- Plan:
 - Recheck Thursday for in-house rehab exercises.

Thursday, July 20th, 2017 – 3rd Visit

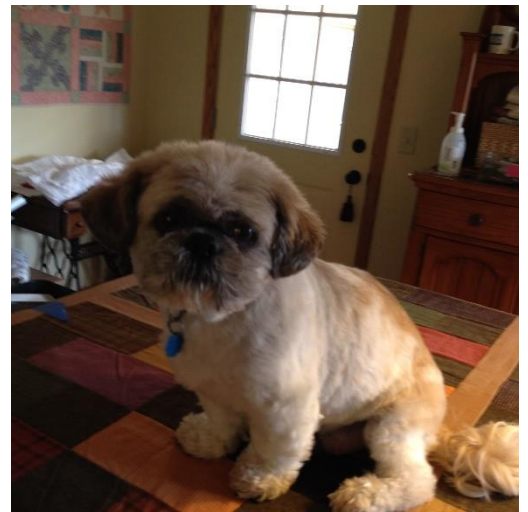
- S: BAR. Tootie is doing well, however he does seem to have trouble urinating and defecating. Owner thinks the stones are bothering him. And the defecation may be secondary to strength.
- Q:
 - Treatments:
 - Therapeutic Exercises:
 - PROM each hind limb 5 times each while in lateral recumbency.
 - Fitpaw pad – stand square for 20 seconds with weight shifting by gentle placement on sides and swaying back and forth. Then progressed to treats feeding to back digits 3 times each side. Lifted each forelimb individually for 2-3 seconds. Tootie would become weak quickly.
 - Fitpaw Egg – placed Tootie over and gently rocked back and forth, placing weight on hind limbs and stretching spine.
 - Medical management:
 - Carprofen 18.75 mg PO q12hrsx3d for urethral inflammation
 - Owner education:
 - Keep Tootie restricted – no jumping, running, etc
 - Home exercise program:
 - Passive range of motion – with Tootie standing or laying, gently move his back legs (one at a time) through their normal range of motion, then extend his leg back to stretch it very gently. Do this 2 times a day prior to balance exercises.
 - Balance on couch cushion – have Tootie stand square, and gently shift his weight side to side (very gently). Do for 5 seconds twice daily, if possible.
 - Kiddie pool – fill up to shoulder height, and slowly walk Tootie for 2 mins each direction. Do 3 days a week once daily.
 - Program within hospital:
 - Outpatient therapy.
 - Measurable outcomes:
 - None at this time.
 - Observation of gait pattern, function, etc: Ambulatory x4, very weak on hind limbs. Placement deficit LH moderately delayed; paper slide – able to abduct to normal position bilaterally, LH slightly more delayed; Gastrocnemius, sciatic, withdrawal, patellar reflexes WNL bilaterally
- Assessment:
 - Progress:
 - Slight improvement in neurological function.
 - Deficits remaining from initial plan:

- Ataxic
 - Hindlimb placement deficits
 - Severe hindlimb weakness
 - Decreased ROM of limbs
- Remaining problems and goals:
 - Goals: To improve pain, therefore improving mobility to allow greater comfort at home and improve quality of life.
 - Problems:
 - Ataxic
 - Decreased bilateral hindlimb placement
 - Severe hind limb weakness
 - Decreased flexion of left hip, right hip, left shoulder, right shoulder
 - Decreased hip extension
- Plan:
 - Continue in-house rehab exercises twice weekly.

Tuesday, July 25th, 2017 – 4th Visit

- S: BAR. Tootie is doing well, and no current urinary issues. Owner not performing all exercises and still has not gotten a pool.
- O:
 - Treatments:
 - Therapeutic Exercises:
 - PROM each hind limb 5 times each while in lateral recumbency.
 - Fitpaw pad – stand square for 20 seconds with weight shifting by gentle placement on sides and swaying back and forth. Then progressed to treats feeding to back digits 3 times each side. Lifted each forelimb individually for 2-3 seconds. Tootie would become weak quickly, especially on LH.
 - Fitpaw Egg – placed Tootie over and gently rocked back and forth, placing weight on hind limbs and stretching spine.
 - Placed rock tape on anterior aspect of hind paws. Noted a mild increase in proprioceptive movement.
 - Medical management:
 - None at this time.
 - Owner education:
 - Keep Tootie restricted – no jumping, running, etc
 - Home exercise program:
 - Passive range of motion – with Tootie standing or laying, gently move his back legs (one at a time) through their normal range of motion, then extend his leg back to stretch it very gently. Do this 2 times a day prior to balance exercises.
 - Balance on couch cushion – have Tootie stand square, and gently shift his weight side to side (very gently). Do for 5 seconds twice daily, if possible.
 - Kiddie pool – fill up to shoulder height, and slowly walk Tootie for 2 mins each direction. Do 3 days a week once daily.
 - Program within hospital:
 - Outpatient therapy.
 - Measurable outcomes:
 - None at this time.
 - Observation of gait pattern, function, etc: Not assessed at this visit.
- Assessment:
 - Progress:

- Stable from previous visit.
- Deficits remaining from initial plan:
 - Ataxic
 - Hindlimb placement deficits
 - Severe hindlimb weakness
 - Decreased ROM of limbs
- Remaining problems and goals:
 - Goals: To improve pain, therefore improving mobility to allow greater comfort at home and improve quality of life.
 - Problems:
 - Ataxic
 - Decreased bilateral hindlimb placement
 - Severe hind limb weakness
 - Decreased flexion of left hip, right hip, left shoulder, right shoulder
 - Decreased hip extension
- Plan:
 - Continue in-house rehab exercises twice weekly.



Thursday, July 27th, 2017 – 5th Visit

- S: BAR. Tootie is doing well, and owner reports he is getting around better and acting like his old self again.
- O:
 - Treatments:
 - Therapeutic Exercises:
 - PROM each hind limb 5 times each while standing.
 - Fitpaw pad – stand square for 30 seconds with weight shifting by gentle placement on sides and swaying back and forth. Then progressed to treats feeding to back digits 3 times each side. Lifted each forelimb individually for 2-3 seconds.
 - Fitpaw Egg – placed Tootie over and gently rocked back and forth, placing weight on hind limbs and stretching spine.
 - Spinal traction for 10 secs.
 - Medical management:
 - None at this time.
 - Owner education:
 - Keep Tootie restricted – no jumping, running, etc
 - Begin controlled leash walks for 2-5 mins (whatever Tootie allows) once daily
 - Home exercise program:
 - Passive range of motion – with Tootie standing or laying, gently move his back legs (one at a time) through their normal range of motion, then extend his leg back to stretch it very gently. Do this 2 times a day prior to balance exercises.
 - Balance on couch cushion – have Tootie stand square, and gently shift his weight side to side (very gently). Do for 5 seconds twice daily, if possible.
 - Kiddie pool – fill up to shoulder height, and slowly walk Tootie for 2 mins each direction. Do 3 days a week once daily.
 - Program within hospital:
 - Outpatient therapy at this time.
 - Measurable outcomes:

- None at this time.
 - Observation of gait pattern, function, etc: Tootie was less weak today. Mild improvement in ataxia.
- Assessment:
 - Progress:
 - Slight improvement in strength and ataxia.
 - Deficits remaining from initial plan:
 - Ataxic
 - Hindlimb placement deficits
 - Moderate hindlimb weakness
 - Decreased ROM of limbs
 - Remaining problems and goals:
 - Goals: To improve pain, therefore improving mobility to allow greater comfort at home and improve quality of life.
 - Problems:
 - Ataxic
 - Decreased bilateral hindlimb placement
 - Moderate hind limb weakness
 - Decreased flexion of left hip, right hip, left shoulder, right shoulder
 - Decreased hip extension
- Plan:
 - Continue in-house rehab exercises twice weekly.

Tuesday, July 31st, 2017 – 6th Visit

- S: BAR. Tootie is doing well at home. Tootie reacted when owner did spinal traction at home. Tootie is urinating in a back room.
- O:
 - Treatments:
 - Therapeutic Exercises:
 - PROM each hind limb 5 times each while standing.
 - Fitpaw pad – stand square for 30 seconds with weight shifting by gentle placement on sides and swaying back and forth. Then progressed to treats feeding to back digits 3 times each side.
 - Fitpaw Egg – placed Tootie over and had weight bearing on his hind limbs for 30 seconds. Tolerated well.
 - Spinal traction for 10 secs twice.
 - Medical management:
 - Doxycycline 75 mg PO q12hrsx21d
 - Owner education:
 - Keep Tootie restricted – no jumping, running, etc
 - Begin controlled leash walks for 2-5 mins (whatever Tootie allows) once daily
 - Discussed Anaplasma positive with owner; recommend treating this year, as it may be contributing to neurological status. Owner approves.
 - Home exercise program:
 - Passive range of motion – with Tootie standing or laying, gently move his back legs (one at a time) through their normal range of motion, then extend his leg back to stretch it very gently. Do this 2 times a day prior to balance exercises.
 - Balance on couch cushion – have Tootie stand square, and gently shift his weight side to side (very gently). Do for 5 seconds twice daily, if possible.

- Kiddie pool – fill up to shoulder height, and slowly walk Tootie for 2 mins each direction. Do 3 days a week once daily.
 - Program within hospital:
 - Outpatient therapy at this time.
 - Measurable outcomes:
 - 4Dx Plus: Anaplasma positive (however tested positive previously)
 - Observation of gait pattern, function, etc: No pain on spinal or limb palpation. Tootie seemed less weak.
- Assessment:
 - Progress:
 - Slight improvement in strength and ataxia.
 - Deficits remaining from initial plan:
 - Ataxic
 - Hindlimb placement deficits
 - Moderate hindlimb weakness
 - Decreased ROM of limbs
 - Remaining problems and goals:
 - Goals: To improve pain, therefore improving mobility to allow greater comfort at home and improve quality of life.
 - Problems:
 - Ataxic
 - Decreased bilateral hindlimb placement
 - Moderate hind limb weakness
 - Decreased flexion of left hip, right hip, left shoulder, right shoulder
 - Decreased hip extension
- Plan:
 - Continue in-house rehab exercises twice weekly.



Tuesday, August 22nd, 2017 – 7th Visit

- S: BAR. Tootie is doing well at home. Owner reports Tootie is doing well and seems to be more stable while walking.
- O:
 - Treatments:
 - Therapeutic Exercises:
 - Placement – placed back paws upside down, Tootie righted them immediately. No delay in placement today. Performed 3 times each side.
 - PROM each hind limb 5 times each while standing.
 - Fitpaw pad – stand square for 30 seconds with weight shifting by gentle placement on sides and swaying back and forth. Then progressed to treats feeding to back digits 3 times each side. Tootie seemed to have more endurance today.
 - Fitpaw Egg – placed Tootie's front feet on, and had weight bearing on his hind limbs for 30 seconds. Tolerated well.
 - Spinal traction for 10 secs twice.
 - FitBone – had Tootie place front paws on fit bone, and balance for 15 seconds. He did very well.
 - Sit to stand – performed a nice, square sit 3 times.
 - Medical management:

- None at this time.
- Owner education:
 - Keep Tootie restricted – no jumping, running, etc
 - Begin controlled leash walks 10 mins once daily
- Home exercise program:
 - Passive range of motion – with Tootie standing or laying, gently move his back legs (one at a time) through their normal range of motion, then extend his leg back to stretch it very gently. Do this 2 times a day prior to balance exercises.
 - Balance on couch cushion – have Tootie stand square, and gently shift his weight side to side (very gently). Do for 5 seconds twice daily, if possible.
 - Sit to stand – have Tootie sit squarely, then stand. Repeat 3 times once daily.
 - Placement – place back paws upside down, and allow Tootie to fix them. Repeat 3 times once daily.
- Program within hospital:
 - Outpatient therapy at this time.
- Measurable outcomes:
 - 4Dx Plus: Anaplasma positive (however tested positive previously)
- Observation of gait pattern, function, etc: Tootie has more strength and control over his back legs than previously.
- Assessment:
 - Progress:
 - Moderate improvement in strength and ataxia.
 - Deficits remaining from initial plan:
 - Ataxic, minimal
 - Hindlimb placement deficits
 - Mild hindlimb weakness
 - Decreased ROM of limbs
 - Remaining problems and goals:
 - Goals: To improve pain, therefore improving mobility to allow greater comfort at home and improve quality of life.
 - Problems:
 - Ataxic, minimal
 - Decreased bilateral hindlimb placement
 - Mild hind limb weakness
 - Decreased flexion of left hip, right hip, left shoulder, right shoulder
 - Decreased hip extension
- Plan:
 - Continue in-house rehab exercises twice weekly.