

# **The Challenging Rehab Patient Mini Series**

**Session Three: The complex  
Physiotherapy patient, how to treat,  
some case studies**

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### The Challenging Rehab Patient – part 3

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This lecture aims to put the last 2 into context with some different case studies.

With each of these case studies we shall briefly also consider the specific assessment

#### **The Neurological Patient**

Neuro Ax – Elements include: Mentation, Posture, Gait, Postural Reactions, Cranial Nerves, Spinal Reflexes, Pain (deep),

Mentation describes the mental state of the patient, & requires assessing if normal or abnormal – requires input from the owner

Determine; Level: alert, obtunded, stupor, coma and Quality: appropriate, inappropriate

Posture, consider Head: tilt is indicative of vestibular disease, turn indicative of forebrain disease. Limbs: wide BOS indicative of proprioceptive deficit, narrow BOS indicative of weakness. Whole body, look at the patient in: Stand, Sit, Lying; lateral & sternal and during Gait

Neurological gait assessment requires determining which limbs are effected; Mono = 1 limb effected, Hemi = TL & PL on the same side effected, Para = 2 limbs effected, Tetra = all 4 limbs effected. You also need to determine as to what severity; Ataxic = loss/reduced proprioception, Paretic = reduced motor activity, Plegic = total loss of voluntary motor activity

With the neuro patient you will also encounter the UMN & LMN picture. Upper Motor Neuron: Muscle tone normal → increased, Spinal reflexes normal → increased, Stride length = normal → increased & spastic. Lower Motor Neuron: Muscle tone decreased, Spinal reflexes decreased → absent, 'Bunny Hopping' gait, Stride length = normal → decreased

Most neuro patients will have altered gait, which we usually describe as ataxic. Ataxia describes the loss of order to the normal gait pattern, or more simply an incoordination of movement, 3 types of ataxia; Sensory or proprioceptive, Cerebellar & Vestibular

Postural Reactions requires integration of the proprioceptive sensory pathways & motor systems. Involve long pathways, travelling up to the higher centers, similar to those used during gait. Examples include; Paw positioning, Hopping, Wheelbarrowing, Hemiwalking, Extensor postural thrust & Placing

Spinal Reflexes which can be assessed Include; Patellar = Femoral nerve (L4-6), Biceps = Musculocutaneous (C6-8), Triceps = Radial (C7-T2) & Flexion withdrawal = Multiple TL (C6-T2), Sciatic PL (L6-S2)

Deep Pain requires the demonstration of conscious perception of pain, requires a behavioural response. Withdrawal *does not* indicate presence of deep pain

Can test superficial with skin pinch, or deeper with bone pinch. Deep pain presence or absence is a prognostic indicator

Neuro Ax – ROM & Palpation

ROM involves assessing Head & Neck; Dorsiflexion, Ventroflexion & Lateral flexion. With palpation we are assessing for: Evidence of pain specific to; Dorsal neck region, Thoracic spine & paraspinal region, Lumbar spine & paraspinal region

Neuro Case Study:

Signalment, Male neutered, Doberman Pinscher, 5 years old, Black & tan, Loyde: Rescue animal, now companion in permanent home

et Exam

Loyd was referred for neurological investigation of all 4 limb ataxia

Veterinary Surgeons Neuro Exam showed: Loyd was bright, alert & responsive on presentation. Physical exam was unremarkable. He was presenting with all 4 limb ataxia,

short forelimb gait & hypermetric hind limb gait. Neurological examination was suggestive of C6-T2 spondylomyelopathy. Differential diagnosis included degenerative, inflammatory, infectious or neoplastic

Diagnostic procedures included: Haematology, biochemistry & electrolytes – unremarkable, MRI of cervical spine – revealed dorsal compression at C4-5, C5-6 & C6-7, C5-6 being worst area. Vet Comments: MRI revealed dorsal compression caused by ligamentum flavum hypertrophy at 3 levels. We have recommended decompression surgery, this approach should prevent Loyd deteriorating further & improve his current neurological status. The prognosis for dogs with cervical spondylomyelopathy treated surgically is generally good. Success rates vary between 70-90%. Some dogs may need prolonged recovery with physiotherapy.

Loyd was readmitted a few days later for surgery, C4-7 dorsal laminectomy was performed. He was also diagnosed with hypothyroidism

Anatomy – Spinal cord is made up of functional segments: C1-C5, **C6-T2**, T3-L3, L4-S3, Caudal. The nerve tracts in the spinal cord are arranged so that the nerves supplying the TL are superficial so they divert off into the limb, as the tracts that give rise to the lumbosacral plexus continue along their course

#### Initial physiotherapy Assessment

Subjective: Bright, alert & interactive – mentation normal, Poor control of postural transitions & poor quality movement on gait & postural transitions – posture & gait abnormal. Objective: Moving head & neck well – neck ROM normal & pain free, Attempting to move around kennel independently, Can carry out independent posture transitions on occasions – posture & gait. Stepping all 4 limbs on gait, occasional knuckling – gait & postural reactions abnormal. Able to walk unsupported, Ataxic on all 4 limbs – postural reactions & proprioception, Increased tone in TL (worse on right), Weak flexion withdrawal right thoracic & pelvic limb – spinal nerves, Comfortable on palpation of neck

Problem Lists: Superficial wound following surgical intervention, Trauma to spinal cord 2<sup>o</sup> to disc trauma & surgical trauma, Altered Muscle tone, Reduced AROM globally, i.e. reduced muscle strength, Reduced physical activity, i.e. reduced functional ability, Altered sensation, Reduced proprioception

Goals – SMART: Maintain current ROM & muscle strength & endurance, Prevent 2<sup>o</sup> complications of reduced physical activity, Re-educate movement pattern & proprioception, Return to full function including consistent independent gait, posture transitions, toileting... Prevention of injury whilst movement control is suboptimal

Treatment involved the integration of therapeutic handling, soft tissue techniques, electrophysical therapies, movement therapies... Consider specifically; LASER, used in this example to promote the healing of the surgical site, good for promoting the regeneration of the nervous system, pain relief...

Risk Assess for the use of LASER

Summary of in-patient stay; Loyd was an inpatient for 7 days, discharge criteria usually depends upon a number of things; how well the patient is doing, cost, owner, toileting ability, etc. From the physiotherapist's point of view we are trying to achieve the best possible function of the patient on discharge, not only for the patient's well-being but also for the owner's sake

Loyd was re-examined 1 month later, owners were pleased with his quality of life but were concerned about his gait. Neurological Exam revealed: All 4 limb ataxia, Short stride length in TL, long stride length in PL. Vet Comments:

*'I explained to the owners that it is too short a time after surgery to make assumption of no further improvement'*

Unfortunately not all cases are a success following the initial intervention. Spinal patients can have other discs 'go' & it is not uncommon for a patient to have multiple spinal surgeries. The choice with regards to perform another surgery is primarily surgeon then owner led

Loyd was readmitted with a deterioration in his gait, all 4 limb ataxia, worse in RF & RH. Diagnostics: MRI was performed & showed; More chronic appearance of the dorsal laminectomy sites, with signal void now replacing the hyperintense tissue at the laminectomy (fibrous tissues most likely). There is the impression that there is less cord compression at C5-6 & C6-7 although the chronic intramedullary changes remain as previously here and at C4-5. There is progression of the degeneration of C6-7 intervertebral disc, & a degree of increase of tissue ventral to the cord, thought to be slight protrusion

Veterinary surgeon opted for conservative management as it was felt that surgery would relieve the increased pressure in the caudal cervical vertebra however this would then transfer the pressure, causing further problems at other sites

Initial physiotherapy Assessment; Subjective: Mentation - Very quiet & withdrawn, Palpation - Apparently comfortable around head & neck on palpation. Objective: Unable to move independently in kennel, Posture - Unable to hold independent postures (sternal, sit, stand), Moving head & neck (well, through normal active range) Gait - Unable to walk unsupported, required assistance on both TL & PL. Low head carriage on gait, Proprioception - Consistent knuckling of all 4 paws, worse on right (approx 90% of time) Not correcting paw placement on right fore or hind, Increased base of support on all 4 limbs, Increased tone in TL, worse on right, Reduced PROM in right TL

Problem List: Trauma to spinal cord due to compression from surrounding structures, Recumbent so at risk of 2<sup>o</sup> problems: Muscle atrophy, Soft tissue shortening... Reduced AROM & PROM, Loss of independent function, Proprioceptive deficit +++

Conservative Management was Loyd's only option

Goals: Prevent further loss of ROM & muscle, & other secondary complications of recumbency, Facilitate the recovery of the nervous system, Re-educate movement patterns & proprioception, Return to independent function

Loyd is a complex clinical case; we know that he has significant neurological deficits, there is evidence of degeneration of more discs so potential for cord compression due to this, there may also have been trauma, so oedema causing compression. Surgery is not an option. Therapeutic clinical reasoning process; influence the regeneration of the nervous system as much as possible, once there is some recovery from the acute stage re-educate muscle strength & movement patterning, need to optimise the peripheral proprioceptive function as much as possible to attempt to compensate for central issues that can not be influenced, also need to ensure no 2<sup>o</sup> additional complications occur

Proprioception is the sense of position of our bodies, limbs, joints... Good proprioception is key for good movement, fine tune motor control, & injury prevention. Primary proprioceptive organs include: Golgi tendon organs, Muscle spindles, Pacinian corpuscles. Secondary proprioceptive organs include: Sensory receptors. Inner ear receptors

Soft tissue techniques, therapeutic handling, movement therapies & water & aqua therapies are incredibly proprioceptively enriched when used individually, think about the effects when used in combination... Using reflexive movement patterns including flexion withdrawal & crossover extensor thrust, will also influence the CPG's & so the reflexive foundation of gait, as well as causing change of length which will effect muscle spindle & golgi tendon organs... As well as tapping into the keys muscles we need to strengthen

PEME has documented effects on positively influencing nervous system regeneration. Work from the periphery & from central systems, PEME can be placed to effect the site of the lesion within the central nervous system, sensory soft tissue work, movement therapies, & therapeutic handling will effect the peripheral system. Don't forget your muscle memory, can

be engaged with facilitated land based movement patterns & gait, or during water based & hydro therapies

Why is the water environment so proprioceptively enriched? Thermal effects, Hydrostatic pressures, Exaggerated movement. Shower work, in combination with movement & posture techniques. Entrance & exit techniques using therapeutic handling & incline/decline work. Posture & movement therapies, soft tissue techniques, therapeutic handling when in the water

Although we have considered predominantly the proprioceptive re-education, the aforementioned treatment strategy combinations will also positively influence the other issues mentioned in our problem list: Trauma to spinal cord due to compression from surrounding structures – PEME, LASER, Recumbent so at risk of 2<sup>0</sup> problems – soft tissue techniques, movement therapies including water therapy. Reduced AROM & PROM – soft tissue techniques, movement therapies. Loss of independent function – electrotherapies, soft tissue techniques, movement therapies

Loyd did not have a urine catheter in-situ & consequently had to go out for regular controlled walks to prevent urine scold & complications 2<sup>0</sup> to being in a wet dirty bed. Loyd was incredibly fatigueable, so there was close communication between the therapy staff & nursing staff to ensure walks were done, but not over done. Also it was key to communicate with the veterinary team with regards Loyd's progress.

HEP on discharge was aimed to be: Progressive & individualised for Loyd, Including soft tissue sensory techniques & movement therapies. Adapted to ensure the owner can manage, without hurting themselves or doing anything detrimental for Loyd, Taught & reviewed with owner & therapist together, Reinforced with written communication. Aimed at continuing Loyd's rehabilitation & preventing injury or further reoccurrence

Expert advice included : Education regarding the condition & risk factors for reoccurrence, Husbandry advice, Education regarding element of fatigue, Education with regards the principles of exercise prescription

Always ensure your owner feels comfortable to contact you with any queries  
Ensure that the owners are aware of any signs of deterioration & in the case of these signs to contact the vet asap

Out-patient Follow-up is absolutely key with cases such as Loyd's, Even if the distance is too far for you to directly follow-up then ensure an appropriate therapist closer to home is sourced. Good communication with the follow-up therapist essential, both from the veterinary surgeon & the original therapist

Out-patient Follow-up frequency of follow-up dictated by numerous factors: Best outcome for rehabilitation process, Distance owner needs to travel, Economics , Therapists diary. Loyd was followed-up as an outpatient, initially twice weekly, then reduced as both the owner & myself were confident he continued to progress & the owner was managing his home program well.

### **The Orthopaedic Patient:**

Ortho Ax – Elements include: Observation, then palpation of ... Thoracic Limb, Pelvic Limb working Distal to Proximal, always Compare left to right

Observation – (déjà vu...) Gait Ax – think about your kinetics, kinematics... look from Front, behind, side, observe on Soft, hard ground, doing Straight lines and circles. Consider your patients Postures in: Stand, Sitting, Lying. Look at Loading & position of the limbs, evidence of Abduction and/or Circumduction. Observe for evidence of Muscle wastage/atrophy, Swelling, Butressing, any Obvious 'deformities' including: Valgus, Varus or Hyperextension

Palpate Comparing contralateral limbs, palpate for; Asymmetry, Swelling, and Any other anomalies.

Always be looking for feedback/behavioural changes from your patient. When testing ROM note evidence of crepitus, end feel, available range. Test supporting structure integrity. Palpate the individual components of the limbs, soft tissue & bony, think about your anatomical landmarks

#### Case Study

Signalment: Male Neutered, Golden Retriever, Bros, Gold, 6 years old, Registered assistance dog (slowly being retired & rehabilitated back to being a companion animal)

Past Medical History: Dermatitis, Bilateral TPLO (carried out on separate occasions), Lumbo-sacral pain – MRI carried out, Vets comments; *'no structural abnormalities relating to the lumbar & lumbosacral areas with regards the spinal column itself or the paraspinal structure. There was no evidence of nerve root impingement at any level. The owner reports that Bros has improved relatively well on gabapentin therapy.'*

Anatomy – The Stifle Joint is comprised of: Femorotibial joint, 2 fibrocartilagenous menisci, Femoropatellar joint, Proximal tibiofibular joint, Joints between femur & paired sesamoids in the origins of gastrocnemius, Joint between tibia & sesamoid in popliteus tendon. Ligaments of the stifle joint include: Medial collateral ligament, Lateral collateral ligament, Cranial cruciate ligament, and Caudal cruciate ligament

The Stifle Joint functions as a hinge joint, free movement restricted to flexion & extension. Femoral condyles roll on menisci, these in turn slide over tibia plateau. Spiral configuration of femoral condyles tightens ligaments & slows movement when joint moves toward extended position. Stability of the joint depends much upon cruciate ligaments. Cruciate rupture in dogs is usually chronic, *but* can be traumatic, and can be accompanied by medial meniscus injury. Treatment options include conservative or surgical. Considerations post-operatively; graft healing, stifle ROM, muscle bulk, global movement pattern

Past Medical History: Ms S (owner) noticed an exercise intolerance, low carriage & head dropping, with increased external rotation of RH, ? Tension in the back. This was in Nov 2011, Treatment received included: Physiotherapy, Hydrotherapy & Acupuncture

Ms S was advised to stop all therapy & return to normal exercise & activities, even though Bros still had exercise intolerance & poor movement pattern  
Ms requested further follow-up & investigation

Bros was referred for ortho & neuro review & assessment. Both assessments found no marked pathology requiring veterinary intervention. Bros was referred for therapy, as it was felt that although no marked pathology Bros had a significantly altered movement pattern that needed correcting

Initial physiotherapy Assessment HPC: Bros not managing well on walks, & deteriorated generally with regards functional ability, DH: Gabapentin, SH: Bros is the only pet, was a working assistance dog, now retired but still tries to help, Lives in a flat with laminate flooring

Subjective Ax: Poor quality movement in core & PL during gait & postural transitions, Fatigued in PL & core within 5 minutes evidenced by a deterioration in movement quality, Reluctance to perform some functional/movement tasks

Objective Ax: Grade 2-3/10 lame RH, External rotation bilateral PL, worse on right, Low head & neck carriage on gait, Overload of TL both statically & dynamically, Global muscle atrophy in PL, visible bony landmarks & easily palpable, Palpable active trigger points around caudal dorsal neck region & dorsal border of scapula, Pain behavioural response on palpation of thoracolumbar paraspinals. Neurological Assessment – nil else of note

Pelvic levels: Normal & symmetrical, Hips: Bilateral good pain free available range, same ROM left comp with right, Gluteal atrophy ++. Stifles: Full bilateral pain free available ROM, Medial buttressing present, Atrophy in hamstrings & quads ++, Hypertrophy in gastrocnemius. Hocks: Nil note. MTP's, PIP's & DIP's: Nil of note. Feet: Nil of note

Problem List: Global poor movement pattern – chronic, Altered myofascial tensions – globally, Muscle atrophy – globally in PL, Pain – on palpation of paraspinala, Functional limitations

Short term goals: Manage pain, Prevent further deterioration of movement pattern & muscle atrophy, Begin re-educating movement pattern & engaging PL & core. Long term goals: Aim for good function as demonstrated by no reluctance when asked to perform 'normal' functional tasks, Regain good muscle bulk in PL, Good global movement patterns, Managing 'normal' walks easy

Ms S had been through a lot trying to get Bros reviewed & was very concerned that his needs had not been address & that he still needed help. Good communication between therapist & clinicians required to ensure all information was collated, also key in this case to ensure confidence of owner

Good communication with owner to explain why she was seeing what she was seeing, & how this could be addressed, including the importance of a progressive exercise regime in combination with HEP & husbandry issues

This was an interesting case as Bros had very specific verbal commands due to his being a working dog. It was important that correct commands were being used

Treatment involved the integration of therapeutic handling & good communication with patient & owner/ Ttouch utilised in combination with soft tissue techniques was used to relax the patient & begin to positively effect the mind body associations Bros had developed with regards movement & manipulation

Evidence base – when considering evidence base for treatment techniques there are 2 bases from which you can draw - research evidence & experiential evidence

Integration of movement therapies, ttouch, soft tissue techniques, electrophysical therapies, water & aqua therapies, & expert advise & education was used to address the issues of pain, altered myofascial tensions & poor global movement pattern. To address an altered movement pattern requires integrating pain management strategies, addressing altered myofascial tensions restricting normal movement, & motor re-education

Example of treatment session: Therapeutic handling, ttouch & massage to relax Bros, Heat, myofascial release, massage & PEME to address myofascial tensions, active trigger points, pain relief, & stimulate muscle groups we want to engage. Facilitated transitions & balanced gait to move from dry room to wet room. Shower work with rhythmical stabilisations & posture re-education, Entrance & exit balanced gait, Stand with rhythmical stabilisations & posture re-education in water, Gait patterning in water, Treadmill work with facilitation of movement pattern to balance, not overload TL, & engage in core & PL, Shower work & towelng, then assuring Bros was well dried off after his session

Initially Bros was seen twice a week for a month, sessions were then dropped to once a week, then every 2 weeks... As well as his contacts with myself Bros had an individually structured HEP which was reviewed each session, this was aimed at further addressing myofascial tensions, pain management, altered movement patterns & motor re-education. On each session, Bros was re-assessed & his HEP reviewed with his owner, this involved: Closely monitoring any situations of flare-up, Closely monitoring exercise – walks: length, surface, on/off lead, & amount of exercise around home & garden, Frequency of hands on rehab sessions, Owners perception of how Bros was doing

As Bros progressed, showed no signs of fatigue & evidence of consistently good movement patterns, improving muscle bulk & comfort on movement so his HEP was progressed – remember principles of exercise prescription

On his final assessment Bros demonstrated: Good consistent movement pattern & postures, engaging well in core & PL, No reluctance to perform functional tasks, No pain on palpation, Good global muscle bulk, No evidence of flare-up for a number of months, Managing long

walks, including off lead around the park with no issue, Excellent quality of life. Both Ms S & Bros were happy

### **The Respiratory Patient**

Respiratory Ax – Elements: Observation; Respiratory pattern, Respiratory rate, How the patient is breathing.... Auscultation; Added sounds, Absent sounds. Palpation; Palpable fremitus, Volumes

Observation of Respiratory Pattern: Quiet breathing, During exertion, Movement of the thorax, Movement of the abdomen, Right vs left. Observation of how the Patient is Breathing: Nasal versus Mouth, the amount of Effort. Also observe: Mucous membrane colour, Tongue colour, Patient as a whole, Position of patient & limbs

Auscultation is used to determine if there are any added sounds that should not be there, or any absent sounds that should. Consider inspiration & expiration, Large airways & peripheral airways, Different lobes. Compare left to right

Palpation is Useful to help determine volumes & presence of secretions. Need light touch & be aware of pain issues, again Compare left to right

### **Can's & Cant's of Respiratory Treatment**

Can Treat: Secretion Retention, Reduced volumes, Global & respiratory muscle weakness, Increased WOB, Prophylactically. Can't Treat: Pulmonary Oedema, Pleural fluid (haemothorax, pyothorax), Pneumothorax

Treatment Options include: Manual Techniques, Positioning (– body & limb) & Functional Techniques

Manual Techniques: definition = hands on techniques aimed at influencing the mechanics of respiration, they Include: Coupage/percussion, Vibrations, Peripheral neuromuscular facilitation technique aka 'Rib springing'

Coupage is aimed at facilitating the removal of secretions. Technique = relax patient, cover with thin blanket, cup hand, flex & extend loosely & rhythmically from the wrist whilst gently tapping the chest wall, continue this for approx. 30sec or until the animal coughs, rest & then repeat as appropriate

Evidence shows this technique most beneficial when performed in combination with other techniques. Contraindications & cautions include; rib #, pain, poor bone density, metastatic lung conditions, poor skin integrity, haemoptysis, unstable cardiac conditions, severe bronchospasm

Vibrations are aimed at facilitating the removal of secretions (sometimes better tolerated than coupage). Technique = place hands on the chest wall then during the expiratory phase transmit a vibration from your hand to the chest in the direction of the normal movement of the ribs, repeat this for a few expiratory cycles then rest & reassess

As with coupage this technique has been evidenced to be most effective when used in combination with other techniques. Contraindications & cautions are the same as with coupage. It is possible to perform both these techniques on smaller animals using either 2 fingers, or a small oxygen mask

Rib Springing is aimed at increasing tidal volumes, often used in combination with vibrations. Technique = place your hand on the chest wall in the orientation of the ribs, feel the rhythm of insp. & exp. then gently compress on exp using gentle over pressure right at the end of exp. followed by a rapid release for insp.

Works by utilising both the reflexive contraction of muscle opposing stretch, & elastic recoil of the cartilaginous & passive structures. Can you guess the cautions & contraindications....

Yes the same as coupage & vibrations



Positioning: Body position will influence drainage & so clearance of secretions  
Body position will influence V/Q matching. Whole body position & limb position will influence volumes & respiratory muscle mechanics

Positioning for Clearance involves determining the most effected lobe & position with this region uppermost so utilising gravity to assist movement of secretions  
Evidence shows that positions need to be maintained for at least 10-15minutes to be effective. Evidence also shows that position used in conjunction with manual techniques significantly improves secretion clearance, compared with either technique in isolation.  
Contraindications & cautions include; raised ICP, cardiovascular instability, pain, trauma, reflux/vomiting, last meal

Positioning for V/Q: Blood perfusion (Q) is best in the dependent region of the lung, Ventilation (V) is best approx  $\frac{1}{3}$  from the dependent region  
Areas of consolidation or atelectasis position dependent, can lead mismatch & poor gas exchange, increased WOB, fatigue, further atelectasis, increased secretion retention.....

Positioning for clearance & V/Q match usually compliment well. Regular change of position is vital even in the critical patient, however less aggressive changes should be employed

Thoracic limb position can influence respiration in 2 ways: Adding stretch to the accessory muscles so assisting in movement of the rib cage & Removing the weight of the limb from the cranial rib cage making excursion easier. Placing the patient in left lateral recumbency with the right thoracic limb protracted can assist in ventilating the right lung

Functional Treatment; By using supported & facilitated positions & movement, multiple benefits can be achieved: Improve volumes, Maintain/improve muscle strength & Loosen secretions

Examples of functional techniques include: Supported sternal, sit & stand (to improve FRC), Facilitated postural transitions (to improve TV), Facilitated/supported gait (improves both). Functional treatment also benefits psychological well being

Other Strategies which will assist respiratory treatments include: Pain management strategies: Electrophysical therapies; TENS, PEME, Heat, Cryotherapy, Massage... Release strategies: Massage, Myofascial Release, Heat...  
The most successful treatment strategy always involves combinations of techniques & is unique to the individual animal

#### Case Study

Signalment : 6 years old. Female entire, Irish Wolfhound, Cora, Grey, Companion animal/farm dog

Vet Examination: Presented as an emergency to investigate a week long history of lethargy, inappetance, tachypnoea & coughing. Physical Examination: Dull yet responsive, body score 2.5/5, Wilma appeared tachypnoeic & dyspnoeic with marked increase in abdominal effort. Bilateral crackles evident on auscultation over both lung fields. The remainder of her clinical exam was unremarkable

Diagnostics: Haematology & biochemistry – unremarkable. Thoracic radiographs – diffuse alveolar pattern with consolidation of the right cranial & middle lung lobes. Presumptive diagnosis – aspiration pneumonia

Vets Comments: Aspiration pneumonia results from inhalation of materials (usually stomach contents) into the lower respiratory tract. Infection is seldom important in the initial component of aspiration due to the low bacterial burden of the stomach content. However the damage to the respiratory tract by stomach acid & other irritants predisposes to 2<sup>o</sup> bacterial colonisation. Aspiration pneumonia occurs in phases beginning with an acute airway response, followed by inflammation & culminating in opportunistic bacterial infection. A variety of conditions predispose to aspiration pneumonia including regurgitation (megaesophagus, motility disorder), vomiting (primarily gastrointestinal disease,

pancreatitis, uraemia), forced feeding, impaired swallowing (cranial nerve deficits), & impaired consciousness (GA, sedation, seizures), or reduced protection of the airway (LP, myasthenia gravis). With Wilma none of the above predispositions were recognised therefore a definitive cause for her aspiration pneumonia was not made.

Initial physio Assessment Observations:HR - 100 bpm, RR – panting, Temperature – 38.9°C, Open mouth breathing obvious increased WOB both at rest & during exertion, Abdominal breathing, Not moving round kennel independently, not changing position much, Pink tongue & mucous membrane

Auscultation: Reduced air entry throughout lung fields, worse on right compared with left.  
Palpation: Reduced thoracic expansion, worse on right, nil palpable secretions, Global skeletal muscle atrophy, No evidence of increased/abnormal tension anywhere

PMH: Skin problems, GDV, Issues with appetite, Previous episode of neck pain, Previous episode of PL ataxia

Problem list: Reduced physical activity, Poor respiratory volumes, Segmental lung collapse, At risk of secretion retention, At risk of 2<sup>o</sup> complications of recumbency

Short term goals: Prevention of further deterioration in respiratory function, Maintenance of musculoskeletal function & prevention of 2<sup>o</sup> complications of recumbency, Assist in management of any secretion retention, Assist in opening up areas of collapse. Long term goals: Return to normal musculoskeletal function, Restore normal respiratory function

Treatment involved the integration of therapeutic handling strategies, soft tissue techniques, manual techniques, positioning, & movement techniques to treat Wilma's issues

Respiratory rate & pattern influenced by respiratory complications, & also pain & stress, we know therapeutic handling & soft tissue strategies will relax the patient & reduce stress & tension, also positively influencing the respiratory rate & pattern

Movement therapies, including facilitated & supported postures & gait, will engage correct movement patterns & so engage muscle groups reducing muscle atrophy, strengthening global musculoskeletal systems, as well as improving tidal volumes, inspiratory reserve capacity and loosening secretions

Positioning of whole body & thoracic limb will also assist in improving volumes, improve V/Q matching, reduce WOB

Wilma was placed in left lateral recumbency, with right thoracic limb protraction & support. I Stayed with Wilma in this position for 10-15minutes, intermittently using rib springing to further facilitate in opening up the airways. Every couple of minutes re-ausc to re-assess the air entry in the upper lung & dependent lung

Wilma's RR & pattern, as well as colour & WOB were continually assessed during Rx

Wilma had a therapy assessment 2-3times a day. Each re-assessment involved both respiratory & musculoskeletal components. There was also communication between the therapist & nursing staff to request monitoring of Wilma's position, especially for longer periods in between therapy sessions. Also advised short but frequent walks out & taught key points of control to facilitate a reluctant dog to get up to go out...

Upon discharge advised the owner as to progressive return to exercise. Advised & taught how to check for evidence of soft tissue, myofascial tension, & how to manage if found. Ensure owner is happy to make contact if any queries or worried with regards function

## The Feline Patient

Signalment: Male neutered, Domestic long haired, 3years old, Grey tabby, Companion animal outdoor cat, Jenson

HPC: Brought into referring vets by a member of the public post RTA. RR & effort elevated, HR elevated, temperature 37.4°C. Hind legs no obvious withdrawal but did have some movement when struggled especially on the RH, rectal tone not good. Pulses weak but present, hind leg extremities cooler than front. Pupils same size

Jenson was placed on IV fluid therapy & given buprenorphine  
Veterinary Examination: Conscious x-ray @ referring vets: Diaphragm looked in tact, pelvic fracture, bladder looked in tact. Referring vet gave the owner a guarded prognosis & was concerned about the nerve function in the PL

Further examination & investigation continued at referral center, found: Left ilial fracture, Plegic left hind with no deep pain/nociception present, Luxation of right SI joint, Plegic tail. MRI also showed: Suspected thickening (neuritis?) of the left sciatic nerve., Changes in the musculature are a combination of inflammation (contrast uptake), & oedema/haemorrhage, Syringohydromyelia: congenital & incidental most likely (no compressions identified cranial or caudal to this area of the spinal cord)

### Anatomy – Nervous System

Lumbosacral plexus gives origin to the nerves of the hind limb. Begins around L4 & ends S2. Gives rise to: Femoral nerve, Saphenous nerve, Obturator nerve, Short cranial gluteal nerve, Caudal gluteal nerve, Sciatic nerve, Common peroneal nerve & Tibial nerve

Veterinary intervention involved Surgical repair & reduction of fracture & luxation respectively, Conservative management was opted for with regards the nerve pathology

### Healing & Considerations for Therapy

With this case we have 2 tissue healing processes occurring: Bone/fracture healing & Healing of nerve

Bone Healing: With a good reduction of the iliac fracture could heal by 1<sup>o</sup> bone healing processes. If good reduction of fracture site can not be achieved then healing will occur by 2<sup>o</sup> processes. Therapy considerations with regards bone healing are: Promoting bone healing process, Pain management & Limiting stress through the repair site

Nerve Healing: Occurs via perineural current. Therapy considerations include: Prevention of contractures, Prevention of muscle fibrosis & Desensitization initially followed by sensory re-education

### Initial physio Assessment

Subjective Assessment: Jenson seemed very withdrawn & shut down, Not interacting & not grooming when buster collar removed, 'Panics' when tried to move leading to increased reluctance to move, Currently little evidence of muscle atrophy, (visual Ax & on palpation)

Objective Assessment: Not moving round kennel independently, Unable to maintain independent sit, or stand, Unable to walk, even with support, Movement present in right hind – withdrawal & voluntary, No movement in left hind – withdrawal or voluntary, Left hind globally bruised & swollen, Full pain free PROM bilateral PL in all joints, Comfortable on global palpation & palpation specifically around pelvis, Nil of note around cranial body/thoracic limb – with regards excess tension, pain...

Problem List for Jenson included: Recumbent so at risk of: Muscle atrophy, Soft tissue shortening, Secondary complications... Nerve damage causing paralysis, & also potential complications secondary to nerve injury, Potential Pain, Unable to perform any functional tasks, including independent toileting & grooming, Psychological complications

Short Term Goals: Facilitate the healing process of both the bony & neural structures, Maintenance of current muscle bulk, soft tissue length... Prevention of any secondary complications/deterioration, Rehabilitation aiming for Jenson being able to hold independent postures, & walk on 3 legs. Long Term Goals: Aim for return to full independent function

Prior to any initiation of 'formal' treatment a large part of the initial contact was utilising knowledge & skills to relax Jenson, including knowledge of behaviour & body language relevant to the feline patient, as well as therapeutic handling strategies. This initial contact is key to set up the success of any future therapy contacts

Treatment also included combinations of soft tissue work, movement therapies, electrophysical therapies. These interventions were aimed at not only influencing the physical function of the patient, but also having a behavioural modification impact thus reducing stress & reluctance to move & interact

Therapeutic handling used in combination with soft tissue techniques, including touch & massage, will reduce the stress levels of the patient, as well as have positive influences on the nervous system & any potential pain in the stoic patient. Used in combination with movement therapies will assist again in the re-education of movement patterns, slowing/preventing muscle atrophy & fibrosis, tackle issues with oedema

Integration of the aforementioned soft tissue techniques, therapeutic handling, & movement therapies will further be enhanced by the use also of electrophysical therapies. PEME again used in combination with sensory soft tissue techniques will help in the recovery, regeneration & re-education of the nervous system. NMES may also assist in treating the 2<sup>o</sup> complications associated with nerve damage

Jenson was treated twice a day utilising the techniques mentioned previously  
Research shows us that techniques including PEME & movement therapies have better results when used intensively. As Jenson improved both psychologically & physically so he was much more keen to try & do more, & work with us more readily

As with any in-patient a therapist is involved in both the morning & evening ward rounds. Morning rounds are important to gain information from overnight that may impact upon the therapy plan for the day. Evening rounds are important for the therapist to pass on information to the rest of the team from the sessions during the day. Also need good communication between therapist to ensure no information is missed

Continuation of Care for Jenson involved a Home Exercise Program which was Individualised & Progressive, as well as Husbandry advise for owners to Facilitation his HEP, aid in Prevention of injury. Jenson & his owners were supported by Follow-up outpatient appointments

So to conclude, the lectures in this series has been aimed at introducing you gently to what physiotherapy is and how it can help the small animal patient  
Introduced you to the multiple different treatment options available and finally given some context in which to apply these assessment & treatment strategies  
I hope you have found them useful, thank you for listening.