**Key points to cover**

1. Clinical OSCE marking sheets: lumbar, cervical, hip, pelvic, knee, shoulder, neurological

2. Netter’s orthopaedic clinical examination

3. Spine intervention: MBBB, TFI, RFN

4. Disease: diagnosis, and treatment (EDS, Asp. Chronic fatigue, CRPS)

5. Imagines: x-ray, CT, MRI, bone scan

6. Other investigations: NCT, EMG.

7. Pain: nociceptive, neuropathic, nociplastic

8. Review all previous notes.

General revision

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| Condition | Aetiology/History/ PE | Investigation | Natural history | Treatment |
| Chronic LBP | \* cause can’t be made by Hx  \* cause can’t be made by PE  75% causes can be determined  - Disc 29%-49% (IDD 40%)  - Z joint 15% (young) 40% (old)  - SIJ 15%  **LR**  PMH cancer 15.5  Age >50 2.7  Weight loss: 2.5  Failure to improve 3.1  ESR>50 15.3  Chest expansion<2.5cm LR 9. | **Conventional radiological imaging** (x ray, CT, MRI) is frequently unhelpful in diagnosing the source of CLBP。  - Asymptomatic finding  - Some pathologies do not show  **HIZ** on MRI: spec high, sensitivity mod. LR 6  **MODIC changes**: spec high, sens low. LR 7.  **Physiological tests:**  \* **IDD:**  - disc stimulation  - discography  **\* Facet joint**: MBB (*comparative, controlled blinded*) ( 2 blocks- 1 block 30% falce +ve. With 2 blocks, 75% CI)  \* **SIJ**: SIJ block | \* Weak association btw severity & disability  \* **principle risk factors** for chronicity of BP are psychosocial  \* Avoidance due to fear is a significant cause of disability  \* Single RF carries little prognostic significance. (PHx, dissatisfaction, wide-spread, leg pain, 2 or more restriction, gender)  Yellow flags  Red flags. | **\* Z joint pain:**  **RFN**: electro paralel to MB, between IAP and transverse process, 85-90°C heat  -LBP: 80% relief >6m, 58% and 53% achieve above criteria, ave 15mon duration (13mon for repeat RFN).  IA z joint CSI: no evidence for validity  \***Radicular pain (**not back pain, numbness, weakness**)**  **TFI**: 70% pt achieve 50% relief at 1-2 m; 30% pt full relief. No proven efficacy for back pain.  **\* SIJ pain**  **SIJ CSI injection**: 43-67% pt had >50% pain relief for 4-6wks, 28% reported 80% pain relief for 2 wks.  **SIJ RF ablation**: denervate SIJ joint by burning S1-S3 sacrolateral branches at the dorsal foramen. |
| Acute LBP | low diagnostic valule with Hx,PE  \* **Hx**: (lack validity, reliability)  \* **PE**: lack reliability, validity  95% non-specific  Serious causes: rare  85-95% of causes with no radiological evidence. | **\* x ray:** not routinely recommended (lack validity apart from red flags; good for osteophytes, disc space narrowing, sclerosis) | **Favorable**  \* Majority recover in 3mon  (70% recover and remain so at 12m)  \* Median time to recovery: 7wks  \* Recurrence: not uncommon.  \* status at 2m indicative of 12m.  \* psychological RF | **- stay active:**  **- heat wrap** : up to 3-4d  **- patient information**  **Conflicting evidence**: muscle relaxant, NSAIDs, manipulation  **No studies**: electromyographic biofeedback, lumbar support, massage, MDT, topical, traction. |
| Chronic NP | \* **PE** will not provide a diagnosis  **Idiopathic:**  **- Muscle, z joint**  **- Discs** unlikely to be source  **Whiplash Injury:**  - Muscle, disc, z joint (> 50%) | \* **Conventional imaging** does not reveal cause (xray, CT, MRI)  MRI: best screening tool.  \* **physiological test** needed  - **discography**: for disc pain, high false +ve,  - **MBB**: for z joint pain (*only validated dx tool for CNP*) | **Favorable**  20% acute NP develop Chronic NP  5% with severe pain. | \* **Z joint pain**:  - MBB: CSI  **- RFN**: 80% relief>6m, 74% and 61% achieve criteria, 17-20mon duration (15m repeat RFN)  \* **little benefit:** PT, MDT, exercise (better if instructed, intensive> light exercise)  \* **No effect**: collars, TENS, traction, trigger points, multimodal, acupuncture, botox, facet CSI, manipulation etc. |
| Acute NP | \* Most **commonly cause**:  - idiopathic or  - whiplash  \* Serious causes rare (<1%)  \* Degenerative, OA, Asp not cause/risk factors | \* Xray not indicated unless red flags  \* Canadian C-spine rule (sens 100%, spec 42%) | 40% fully recover  30% mild sx  30% mod- severe sx  RF for chronicity following whiplash  - older age at time of injury  - severity of initial sx  - past hx headache, head injury | - Stay active  - exercise  - Multi-modal therapy  - pulse electromagnetic therapy (PEMT) at 12w  **Insufficient evidence:**  Analgesia, NSAIDs, muscle relaxant, opioids, spray, stretch, acupuncture, TENS, collar, manual therapy, neck school electrotherapy, injection. |
| Cervical radicular pain | Common:  - disc protrusion,  - spondylosis  \* PE correlate poorly to NR compression  \* **Spurling**: high spec, poor sens. LR 4.8. | **Xray**: no use  **CT:** show bone, poorly soft tissue  **MRI**: best screening, shows bone mets, infection (sens 96% spec 94%)  **EMG**: no use. Unless diagnosis peripheral neuropathy vs radiculopathy. | **Favorable**  \* Most can improve  - 90% (normal, mildly incapacitated at 5y)  - **CT MRI**: disc protrusions diminish in size over time. (*larger protrusions 🡪 greater reduction*)  - 10% resolve in 12 m  - 45% partially decrease in size  - 2% worsened  -16% unchanged |  |
| Cervicogenic headache | **Common causes:**  1. **C2/3 z joint**(3rd occipital nerve, 53% after whiplash)  *TON is the MB of the posterior division of the 3rd cervical nerve.*  **2**. **lateral C1/2 joint pain**  Rare  1. Aneurysm  2. Tumours, infection  3. neck tongue syndrome  4. C2 neuralgia | Definitive dx: controlled MBB (TON)  If  \* H/A as dominant sx: more likely C2/3  \* neck pain as dominant sx: C5/6 | Causes of cervicogenic headache.  Convergence btw cervical and trigeminal afferents in the trigeminocervical nucleus. | \* Validated tx: manual, exercise,  \* **3rd occipital H/A:**  - CSI to C2-3 facet joint: good proportion  - RFN: 3rd occipital nerve (TON): 86% pain relief  \* **C2-3 disc pain**: arthrodesis of the disc (joint fusion)  \* No proven treatments for any other form of cervicogenic headache . |

Intervention

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| Procedure | Indication | Efficacy /key point | Needle localization |  |  |
| MBB | Diagnostic test to confirm the medial branch | - 0.4-0.5ml local anesthetic  - Both of the nerves that innervate each targeted z joint will need to be blocked | **L1-L4 medial branches**  Junction of the SAP (dog ear) and transverse process (dog nose)  -where the target nerve crosses midway between the superior border of the transverse process, and mamillo-accessory ligament (MAL) notch  - the eye of the **Scotty dog**  **L5**  Dorsal ramus :  - at the middle of the base of the SAP, slightly below the sacral ala. | Lateral view | AP view |
| RF |  | Up to three 90-second cycles  At 80-85°C  Median period of pain relief 270-440days  **Cervical RF:**  -**74%** and 61% pt achieved successful outcome (*80% relief for >6m*)  - relief 17-20m from 1st RFN, 15m for repeat  - **Median duration** 20-26m, with 60% still having pain relief at follow up  **Lumbar RF**  - 15m from 1st RFN, 13m from repeat RFN.  - **Medial duration**: 17-33 m, 70% still having relief at fu | Similar to MBBB |  |  |
| Epidural | \* Lumbar radicular pain  Due to disc herniation. | \* significant reduction of leg pain  \* No significant difference in functional outcome, return to work, or social disability  **Caudal**  \* Temporary effect: pain relief whilst the disc prolapse naturally resolves. | \* **Traditional**: posterior mid line at L3-4 or L4-5, through interspinous ligament, ligamentum flavum  \* **Caudal**: inserting a needle into the epidural space through the sacral hiatus.  \* **Transforaminal**: | \* Dural puncture (Lumbar 5%, caudal 0.6%)  \* exacerbation of pain  \* headache (1% vs 4% )  \* hypotension (2.5% vs 0%)  \* spinal anaesthesia  \* bloody tap  \* Nerve-root injury: rare |  |
| TFI | \* lumbar radicular pain due to disc herniation.  \* spinal stenosis (possible) | **TFI**  -**IVDP** 70/50/30: 70% get 50% pain relief for 1-2 months, 30% get longer pain relief at 12 months. NNT 3.  - More effective for acute than chronic pain.  \* Size of the prolapse most predictive or relief  -Success rates are higher in pt with contained herniation (*High compression: only 26% respond, low grade 75%)*  - TFI have no proven efficacy for back pain.  - (Clark et al., 2019): 63% get >50% at 1m, 74% at 3m, 64% at 6m, 64% at 1 yr.  -**spinal stenosis**: 50% pt achieve 50% relief of pain for >=6months (*lack of high-quality evidence*) | **1. Sub pedicular**:  AP: tip at 6 O-clock of pedicle  Lateral: tip is superior in the foramen, not touching the vertebral body  Safe triangle: trajectory view  -superomedially by SN (spinal nerve)  - superiorly by P (pedicle)  **2. Infraneural approach**: Kambin triangle. | **Embolization** due to particulate corticosteroids entering the spinal cord and/or brain arterial supply.  (use non-particulate steroids)  **How to reduce risk**  1. real time injection of contrast medium  2. digital subtraction angiography  3. test dose of lignocaine  4. non-particulate steroids. |  |
| SIJ injection |  | 43-67% pt had at least 50% pain relief for 4-6 weeks  28% reported 80% pain relief for 2 weeks | **Indication:**  Diagnosis pain is SIJ origen  Avoid unnecesary surgery to SIJ if not the origin |  |  |

**Imaging revision**

A close-up of a medical chart

Description automatically generated **XRay -spine**

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| X ray in Acute LBP | Indication for x ray | AP view | Lateral view | Cervical spine | Lumbar spine |
| - do not show pain  - good for disc space narrowing, sclerosis, osteophytes  - Poor for facet sclerosis  - Miss VB cancer (*41%* )  - Osteomyelitis: delay sign 2-8wks  Hazard:  - 40 x CXR  - cancer: 1 in 80K per mSV. | \* should not be a screening test for pt with acute LBP, unless red flag  - cancer  - significant trauma  - weight loss  - T > 37.8  - RF for infection  - neurological deficit  - minor trauma but >50y.o. osteoporosis, CS use  - No improvement in 1 month | - vertebral body  - Intervertebral disc  - articular pillar  - first rib | - anterior arch/post. arch (C1)  - spinous process  - vertebral body  - facet joints  Inferior articular process  Superior articular process  - Intervertebral disc space  - prevertebral soft tissue  C2/3<7mm  C6/7 <21mm | **Odontoid view**  - Odontoid process  - C1 lateral mass  - C1-2 atlanto-axial joint  - C2 body  - C2 lateral mass | **AP:**  - Scoliosis.  - 5 lumbar vertebra  - Sacroiliac joints  - Hip integrity  - intercrestal line (L4/5)  - facet countours  **Lateral**  - lordosis  - discal height (L4/5 largest)  - pars integrity  - |
| **Spondylolysis**  -7.2%  - Symp= asymp (+LR 1.0)  - Pars defect (acquired #)  (*one ossification centre*)  -Definite Test: pars block | **Spondylosis**  -26%-48%  - low correlation btw pain & spondylosis | **Spondylolisthesis**  - 8% (M) 5% (F)  -G I: ≤25% lippage  G II: ≤50%  G III: ≤ 75%  G IV: ≤100%  G V: >100% | **Disc degeneration**  -22% asymp.  -56% symptom  Loss of disc height  Nitrogen gas w/I disc space  - marginal osteophytes | **Congenital anomalies**  - 5-10%  - symp = asymp  - no correlation with BP. |  |

**MRI spine**

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| Basic MRI | Different series |  | Disc herniation | Sagittal view | Axial view |
| -High cost,  -not justified for acute LBP  - validity: *high +ve findings*  - **Asymptomatic in** >60y.o  36% herniated NP  79% *disc bulge*  21% spinal stenosis  92% *disc degeneration*  L4/5 disc protrusion 0-40%  L5/S1 disc protrusion 10-30%  **- Asymptomatic in any age**  14% annular defects  8% degenerative joint ds  7% spondylolysis  7% spinal stenosis | T1 WI: water-dark  Fat-white  T2 WI: water-white  Fat-white  STIR: fat suppressed  Water-white  Fat-dark | MODIC 1: T1 Dark, T2 white  MODIC 2: T1 white, T2 white  MODIC 3: T1,T2 dark  *Sens 24%, spec 83% LR 3.4*  **HIZ lesion**: high T2 signal at AF  (associated with LBP, Grade 4 annular fissure )  *(Sens 45%, Spec 88%, + LR 3.8)*  Disc desiccation (dried) | **Location:**  central,  paracentral,  foraminal,  extraforaminal  **Bulge**: herniation >50%  **Protrusion**:  Focal: <25%  broad-based: 25-50%  **Extrusion**: *narrow neck*  **sequestration**: loss of continuity  ***90%*** *disc herniation at L4/L5*  *Impinge traversing L5 nerve* | (Mid) Sagittal view  - vertebral body  - spinal canal  - intervertebral disc  Parasagittal view  - neural foramen  Coronal view | - disc  - neural foramen  - Spinous process  - pars  - facet joint  - Lamina  - sup. Art. Process (upper L)  - inf. Art. Process (lower level)  - pedicle  - Transvers process  L5 disc level cut: micky mouse  (S1 NR out of thecal sac) |
| **IDD**  **- Radial fissures** extend into AF.  -Grade 1-4*(<1/3, mid 1/3, out1/3, circumferent*)  -40% chronic LBP (*nerve ending supply outer 1/3 AF*)  - not degenerative changes | **Spondylosis**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | age | Asymptomatic | | | Symptomatic | | | | N | n | % | N | n | % | | all | 217 | 102 | 47 | 387 | 208 | 57 | | 40-49 | 64 |  | 22 |  |  | 34 | | 50-59 |  |  | 49 |  |  | 54 | | 60-69 | 69 |  | 74 |  |  | 73 |   \*no relationship btw spondylosis and symptoms  \* older the pt, more likely to find | **Disc degeneration:**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | age | Asymptomatic | | | Symptomatic | | | | N | n | % | N | n | % | | all | 217 | 48 | 22 | 387 | 218 | 56 | | 40-49 | 64 | 4 | 6 |  |  | 34 | | 60-69 | 69 | 33 | 48 | 78 | 48 | 62 |   \*disc height loss >2mm  \* relationship btw disc degeneration and LBP is significant (P<0.05)  \* *sen. 0.56, Spec 0.77, LR 2.5* | **Disc bulges**  \* more common than protrusion  \* common at lower Lumbar sp  \* Increasing frequency with age  **Disc protrusion on MRI**  \* correlated positively with LBP  \* correlation with sciatica not reported | **Prevalence of abnormalities on MRI of 67 asymptomatic individuals**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | N | HNP | D/bulge | Stenosis | D/degen | | All age | 67 | 16 24% |  | 3 4% |  | | 20-39 | 35 | 7 20% | 19 54% | 0 | 12 34% | | 40-59 | 18 | 4 22% |  | 0 |  | | 60-80 | 14 | 5 36% | 11 79% | 3 21% | 13 92% | | |

**Nerve conduction study**

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| Indications | Principles of NCS |  | Limitations, pitifalls |
| 1 localise site. Level of the lesion (peripheral nerve, NM junction, plexus, nerve root, anterior horn cells).  2 Identify the pathophysiology (*axional loss vs demyelination*)  3 diagnose mononeuropathies (nerve entrapment)  4 diagnose more diffuse processes (generalised peripheral neuropathy due to DM, inflammatory neuropathy etc)  **White papers**  - exclusion of more distal nerve damage  - verification of subjective muscle weakness  - Recurrent disc operation: NCS pre OP.  \* Can determine the chronicity and severity of spinal nerve root lesions (appropriate when clinical situation is less clearly delineated) | - Sensory, motor or mixed nerves can be studied.  - parameters measured  Amplitude  Latency  Duration of response  Conduction velocity  F wave: motor fibres (CMAP)  H reflexes: Group 1a sensory afferents (SNAP)  **EMG** (*Electromyography*)  Insertion of fine needles to muscle.  Examine the effects of Aα fibres (*pain is mediated by Aδ and C fibres*) |  | 1. NCS test large, myelinated fibres (fine touch, vibration, proprioception), but small fibre neuropathies with pain may have normal sensory studies.  2. Early in the course of disease (CTS), changes may be subtle and missed.  3. Referrence values may differ  4. Nerve conduction varies across different age group.  5 cannot accurately determine the precise spinal nerve level associated with disc herniation.  **Validity**  \* low sensitivity, specificity  \* not clinically necessary to confirm the presence of radiculopathy  \* Patient’s radicular pain Cannot be explained by NCS |

Likelihood ratio

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| +LR | -LR | interpretation |
| >10 | < 0.1 | Significant shift |
| 5-10 | 0.1-0.2 | Moderate shifts in probability |
| 2-5 | 0.2-0.5 | Small shifts. May be important |
| 1-2 | 0.5-1.0 | Rarely important shift |

Kappa

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| κ | <0.1 | 0.11-0.4 | 0.41-0.6 | 0.6-0.8 | >0.81 |
| Measure of the proportion of potential agreement after chance is removed | No reliability | Slight reliability | Fair reliability | Moderate reliability | Substantial reliability |

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| History |  |  |
| **Pain**  - Onset,  - Site, distribution  - Quality (*describe in own words*)  - Intensity  - Duration  - Temporal factors/periodicity  - Aggravating / Relieving F  - Impact on activities of daily living  - Associated symptoms  - Previous similar symptoms  - Previous treatment  - Current treatment | **Other history**  - MSK hx: current, past  - medical Hx : current, past  - Family hx  - Social hx (marital status)  - Employment status  - Work hx  - Interests (spots/hobbies)  **Medication**, treatment  **Allergies** /intolerances  **Smoking hx** | **Red flags:**  Yellow flags:  Systemic review  Pain scores  Scan: X ray, MRI, CT, NaF |

Neurological exam

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| Observation | Reflexes | Power | Dermatome dance | Special tests |
| Gait  Arm swing  Tremor  Fasciculation  Deformity | Triceps  Biceps  Brachioradialis  Knee  Ankle  Plantar  **Sensory test**  C6: thumb  C7: middle finger  C8: little finger  L3: ant. medial thigh  L4: knee, medial leg, ankle  L5: dorsal/plantar foot, 1st web space  S1: lateral foot, posterior leg  Vibration (128Kz)  Position sense  Temperature  2-point discrimination | **Shoulder** abduction: C5 *(deltoid)*  Adduction:  **Elbow** flexion C6 *(biceps brachii)*  Extension C7 *(Triceps brachii)*  **Wrist** Extension C6  Flexion C7  **Finger** flexion C8  Extension *C7*  Abduction T1 *(interossei)*  Gluteal bridge  **Hip** flexion L2  Adduction: L3  Extension L4  **Knee** flexion L5  Extension L4  **Ankle** Dorsiflexion L5  Plantarflexion S1  Eversion, Inversion  **Great toe** dorsiflexion L5 | C1,2: I nod to you  C3, don’t tickle me (neck lateral flexion)  C4: I am not sure(shoulder elevation)  C5: feel alive (shoulder flexion, abduction)  C6.7.8: close the gate (shoulder ET, ADD)  C5, 6: flick my wrist (supination)  C7,8: time is late (pronation)  C6.7: fly up to heaven (wrist FL, ET)  L2-3: lift my knee (hip flexion)  L3,4: kick the door (knee ET, KJR)  L4,5: foot point to the sky  L4,5: extend my thigh (Hip ET)  L5,S1: kick my bum (knee FL)  S1,2: stand on my shoe (ankle PF)  L2,3,4: modestly close the door  (hip ADD, IR)  L4-S2: opposite is true (hip ABD, ER) | Straight Leg raise  Femoral nerve stretch  Slump test  Carpal tunnel: *phalens/Tinels/compression*  Other nerves  Ulnar  Peroneal nerve  Lateral cutaneous nerve  Clonus  Cerebellar function  **Cervical myelopathy**  - sensory disturbance  - Intrinsic muscle wasting in hands  - unsteady gait (ataxia)  - Hoffman’s  - Babinski  - Clonus  - hyper-reflexia  - Blower /bladder issues  - multi-segmental weakness |

**Cervical spine**

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| Inspection | Palpation | Movement | Neurological exam | Special test |  |
| Posture  Scoliosis  Muscle asymmetry, atrophy  Skin lesions | Muscle:  - suboccipital  - upper traps  - Levator scapulae  - Pec minor  Bone  - spinous process - articular pillars  - upper ribs  - ACJ  - Sternoclavicular J  Others  - Masses  - Trigger points | ROM  - Flexion:  - extension  - Rotation: *C1-C2 (in FL)*  - side bend  - Retraction  - Protraction | Shoulder abduction  Flexion/Extension  IR/ER  Elbow: flexion/extension  Forearm: supination/pronation  Wrist: flexion/extension  Finger: Flexion  Extension  Abduction  Adduction | Spurling test: *Sens 0.3-0.95, Spec>0.9*  *+LR 9.1 -LR 0.29*  **Spurling A**: lateral bend  **Spurling B**: lateral band+ rotation  **Neck distraction** and traction test  *Sens 0.44 Spec 0.9. +LR 4.4, -LR0.62*  **ULTT** *sens 0.5, Spec 0.86, +LR 3.5, -LR 0.58*  **ULTT1** (median):  *Shoulder ABD110°, supination, wrist, finger ET*  *+/- neck side bending*  **ULTT2A / ULTT2** test (median)  *Shoulder ABD 10°, supination, wrist, finger ET*  **ULTT2B /ULTT3** (radial)  *ABD 20-30°,IR, pronation, wrist, finger FL, elbow ET+/- neck side bending*  **ULTT 3/ ULTT 4** (ulnar)  *Shoulder ABD 110° , ER, pronation, wrist, finger ET, elbow FL +/- neck side bending.* | **Instability**  - **Sharp-Purser test**: 1st web at C1 SP, other hand on forehead, counter pressure. Sens 0.69 Spec 0.96. + LR: 17.25,  **Arm squeeze test**  Squeezes mid 1/3 upper arm  Sens 0.96m Spec 0.96. +LR24, -LR0.04.  **Thoracic outlet**  **Roos test**: *sen 0.84, spec 0.3*. 3 min. heaviness, weakness, pain, numbness, discoloration of the hand  **Adson test**: *sens 0.79, spec 0.76* |

**Lumbar spine**

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| Inspection | Move | Feel | Special test | Other exam |
| Lumbar  - **Alignment**: Coronal, Saggital  *Lumbar lordosis*  - **Pelvic** alignment  Thoracolumbar  - Alignment: coronal, saggital  Gait:  Trendelenburg  Leg length | - **ROM**: standing  flexion κ 0.74  Extension κ 0.61  Side-bend: κ 0.81-0.89  Extension/rotation test  κ 0.29  Rotation restriction  - **ROM**: sitting  L4/5 rotation:  L4/5 extension:    -***Segmental mobility***:  PA translation LR 2.52, κ -0.78  Side bend  rotation | - Skin drag  - Skin rolling  **Palpation: bone**  Spinous processes  Interspinous spaces,  Transverse processes  Iliac crest  PSIS  LPSL  SIJ  - Vertebral springing tenderness  κ 0.25-0.55 (poor)  **Palpation**: **soft tissue**  - paraspinal, erector spinae  - Iliopsoas: TrP  - Gluteal: med, min, piriformis TrP.  - quadratus lumborum | **Provocation test**  - **SLR (***Lasague***)**:sciatic pain btw 35-70°  Sens 92%, Spec 28%, +LR 1.3, -LR 0.29  (*does not corelate with size of disc herniation*)  - *Bragard’s sign*: SLR + ankle DF  - *Neri’s sign*: SLR + neck FL.  **- Slump test**: sens 0. 84, Spec 0.83  - **Femoral stretch test**  - **Iliopsoas length test**, tenderness,  - Centralisation  **Schober test**: 5cm↓,10cm↑L5, FL increase <5cm sens 0.30 ,  **Modified Schober test**: 5cm↓, 10cm↑PSIS. LR 2.14, κ 0.79  **Modified modified Schober test**:  15cm↑PSIS, increase *<5cm is +ve*. | **SIJ test:**  - distraction  sen 60%, spe 81%  - compression test  - Sacral thrust  - FABER  - SIJ sidelying shear  **Hip joint:**  - ROM  - hip thrust  **Ankylosing spondylitis**  - **chest expansion**: <2.5cm LR 9  - Schober test:  - ↓lumbar lordosis  - Tenderness over SIJ |

**Pelvic exam**

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| Land marks | Screen tests | SIJ mobility test | SIJ stress test | Additional tests |
| **Bone**  - Iliac crests  - ASIS  - Symphysis pubis  - PSIS  - L4 spinous process  - Lumbosacral junction  - Sacral spinal processes  - Sacral hiatus  - Ischial tuberosities  - Greater trochanter  **Ligaments**  - iliolumbar ligament  - sacrotuberous /spinous Lig  - Dorsal sacroiliac lig.  Muscle  - Piriformis  - Gluteus medius, mini. Max | Symmetry of pelvis (sheer, uplift)  Symmetry of Natal cleft  Gait and symmetry of movement  **Iliac crest height and symmetry**  - standing ↑, sitting N (long leg)  - standing↑, sitting ↑ (innominate upshift)  **Seated flexion test**: SIJ shift forward🡪 SIJ issue  **Standing forward flexion**  **Hip drop test** (Gillet test): S2, PSIS, hip lifting🡪 PSIS does not drop🡪SIJ dysfunction  *Sen 43% Spec 68%*  **Long-sit test**: *leg shorter when supine, lengthens when sitting up*. 🡪 SIJ dysfunction  Schober test: | - **Sacrum thrust**. *LR1.14, Sen 63%m Spe 75% κ-0.06*  - Crossed pisiform thrust  - Innominate lift (shear) | 1. FABER: LR 0.96-1.43, κ 0.4-o.6  2. Compression test:  3. Distraction test  4. Sacral thrust:  5. Thigh thrust  6. Gaenslen test: *sen 53%, spec 71%* | Lumbar spine  Hip exam |

**Shoulder** (*No clinical test is both reliable and valid for any specific diagnostic entity, but useful to identify serious condition*)

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| Observation | Palpation | movement | Special test |  |
| Asymmetry  Wasting  Scapulothoracic motion  Winging  Shoulder position | **Bone, joints**  - Sternoclavicular joint  - Acromioclavicular joint  - Clavicle  - Humeral head & tuberosity  - Acromion  - Coracoid  - Scapular spine  **Muscles**  - Trapezius  - Levator scapulae  - Deltoid  - Supraspinatus  - infraspinatus  - Pectoralis  - Glenohumeral interval  - LHB, groove  - Axilla  - supraclavicular fossa | ROM: active, passive  - ABD (painful arc)  - FL  - ET  - ER  - IR(IR+ ABD thumb reaching up)  End feel, Crepitus  Resisted movement  - ABD: supraspinatus  - FL: BC  - IR: subscapularis  - ER: teres minir, infraspinatus  Instability  - **Apprehension test**: *sen 0.72-1, spec 0.86-0.96, LR 7.1-20.2*  - **Relocation test** (reduced pain or apprehension) LR 3.2, *more sensitive using apprehension not pain*  - **Sulcus sign** *κ 0.03- 0.06*  - **Load and shift test**/ anterior drawer test.  LHB  - **Speed test**: LHB (poor validity)  - **Yergason’s test** (elbow 90°FL, resisted supination🡪pain LHB): LHB  *Sens 0.12, Spec 0.95, -LR 0.91.* | **Labral tear:**  **- Speed test: poor validity**  **- Crank test**: GHJ160°ABD, elbow 90°FL. IR/ER+ axial load🡪 click (*κ 0.2, sens .34, spec .75*)  - **O’Brient test**: GHJ 90° FL+ 10°ADD + max IR/ER, pain worse in IR. Top or inside GHJ🡪ACJ vs labral (*poor validity*)  - **Anterior slide test** **(Kibler test):** hand on hips, thumb posterior, stabilize scapula, force superior and anterior direction🡪 clinic /pain  - **Kim test**: GHJ ABD 90°, elbow FL 90° + hold *lateral upper arm*, axial load, then elevate to 135°🡪 pain (*Sens 0.8, Spec 0.94*)  - **Jerk test**: GHJ ABD 90° elbow FL 90°, *fix scapula*, axial load, *horizontal ADD* GHJ🡪 pain (*sen.73, Spec .98*)  Rotator cuff tear  - **Lift-off test**: (subscapularis)  - **lift-off lag**: lift hand off back, hold.  - **Drop arm**: ABD 90°, hold. (*supraspinatus*) +LHR 2.7 (FT) 0.6 (PT)  -**belly press**: (subscapularis)  - **empty can/ jabe**:  - **External rotation lag**: (*infraspinatus*): *LHR 7.2, sens .46, spec .94*. | Subacromial impingement  - **Painful arc**: ABD shoulder, painful 60-120° sens .53, spec .76. +LR 3.9 (*2.7 FT/ RC tear, 1.3 PT/tear, 1.3 bursitis*)  **- Hawkins- Kennedy**: sensitive not spec  - **O’Brien**: pain in IR>ER. *Poor reliability, poor validity*  - **Empty can test (Jobe):** *LR 3.9. κ 0.47, sen 0.5, Spec 0.87*  - **Neer test**: fully FL arm *LR 1.9, κ 1. Sens 0.59-0.72, spec 0.6.*  - **lift-off test**: *Sen 0.42, Spec 0.97, LR 14*  -**Cross-body adduction (scarf test):**  - **Horizontal adduction** (add elbow FL)  -**Yocum test** (hand to CL shoulder, lift elbow🡪pain) *Sen 0.8. LR poor*  - **External rotation resistance test***: sens 0.56, Spec 0.87, LR 4.4*,  - **IRRS** (*internal rotation resistance strength test*): GHJ, elbow in 90°FL. IR weaker🡪 intra-articular pathology, ER weaker🡪 impingement (*sens 0.88, spec 0.96 +LR 22.* ) |

Knee

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| Observation | Landmarks & tenderness | Palpation, ROM | Special tests | Other test |
| Gait  Alignment: whole limb, patella  Deformity  Swelling κ 0.02-0.65  Wasting  Crouch, duck walk | Patella  - margins  - Supra-patellar pouch  Joint line LR1.6-3.3,  Femur  - Femoral margins.  - Epicondyles  - Adductor tubercle  Tibia:  - Tibial margins  - Gerdy’s tubercle (lateral) ,  - Tibial tuberosity  Fibula:  - Head of fibula  Patella tendon,  Medial ligament  Lateral ligament  Popliteal fossa | - Sweep test: κ 0.64  - Patellar tap: LR1.6, κ 0.21  - Elicit crepitus  **ROM**  - active: FL, ET  - passive: FL, ET, ER  **Ligaments**  - Valgus stress: MCL  - Varus stress: LCL  - Anterior drawer: ACL LR 2-7.3  - Posterior drawer: PCL | - **Apprehension test**: LR 8.3  - **Clarke test**: PFS (quads contracts + pressure distally 🡪 pain.) *weak clinical*  - **Lachman test**: ACL tear. LR1.2-4.2, κ 0.02-0.6  - **Pivot shift test**: ACL tear LR 1.5-36.5  *Knee 10-20d FL, tibia in IR, Valgus force🡪tibial plateau subluxes anteriorly*  **Meniscal tests**  - **McMurray**: LR 7.8, κ 0.16, sen.29, spec.96  - Thessaly: LR 16.5  - Ege test: LR1.3-6.4  - Apley: LR1.8-2.4,sens .16, Spec.80 | Hip exam  Foot & ankle exam |

Hip (no data for reliability, validity re inspection, palpation)

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| Inspection | Palpation | Move | Special test | Other test |
| Gait,  Symmetry of  - movement  - pelvis (sheer, uplift)  - Natal cleft  - Iliac crest height  **Trendelenburg test**  **Leg length:**  - **Measure**  - Umbilicus🡪MM  - ASIS 🡪 MM  - **Compare**:  - after Pelvis equalisation  - lying, long leg sitting,  - Supine: knee bent  - Prone: knee bent  Passive hamstring test | Landmark  -Iliac crests  -PSIS  -ASIS -Symphysis  -Greater trochanters  -Ischial tuberosities  Muscle attachments:  - adductors  - abductors  Iliopsoas  Piriformis  Gluteus: max, med, mini | Flexion: 135°  Extension 20°  Adduction 20°  Abduction 45°  IR 35°  ER 45° | FABER *LR 0.96-1.43 κ0.4-0.6*  Thomas test:  FADIR test  Cough impulse for hernia  Straight leg raise test  Femoral stretch test  Slump test | Lower limb neurological exam  Screening lumbar exam |

**EDS exam**

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| **EDS basic** | hEDS 2017 ds Criteria 1 | Criteria 2 | Criteria 3 |
| **Ehlers-Danlos syndroms**  - a group of inherited disorders  - Defects in collagen:  (ligaments , soft tissue)  - **Rare**: 1:5000, F>M  - **Types**: hEDS (common), cEDS, vEDS, and other rare 10 types  To diagnose hEDS, all 3 criteria must be met  **Other features**  - sleep disturbance  - chronic fatigue  - POTS (postural orthostatic tachycardia syndrome)  - functional GIT disorders  - dysautonomia  - Raynaud’s  - OA 2° joint instability  - Headaches  - TMJ dysfunction  - anxiety , depression  **Severity**: variable: minor 🡪bed-ridden | Generaized joint hypermobility  **Beighton score**: kids ≥6, adult<50yo ≥5, >50yo≥4  If below cutoff  **Beighton score**  1. little fingers (2) : >90°extension  2. Thumbs (2): thumb touch palmar forearm  3. Knees (2): bent backwards>10°  4. Elbows (2): extension >10°  5. Feet on floor (1)  **5-Point questionnair** (≥ 2 +ve items)  1. Can put hands flat on the floor (now/past)  2. Bend thumb to touch forearm (now/past)  3. contorting body into strange shapes/splits  4. shoulder/kneecap dislocate ≥ 1  5. Consider self as double-jointed. | 2 or more of the following  A: Systemic features of generalized connective tissue disorder  - velvety skin, unsually soft skin  - Mild skin hyperextensibility  - Unexplained Striae  - B/L piezogenic papules of the heel  - Recurrent/multiple hernia: umbilical, inguinal, crural  - Atrophic scarring  - Pelvic floor prolapse unexplained  - Dental crowding and high or narrow palate  - **Arachnodactyly**:  1) +ve b/l wrist sigh (Steingberg sign)  2) +ve b/l thumb sign (Walker sign)  - **Arm span-to-height ratio** ≥ 1.05  - Mitral valve prolapse (ECHO)  - Aortic root dilatation with z-score >+2    B: Positive FHx: 1 or more 1° FM  C: MSK complications (1 of the following)  - MSK pain in ≥ 2 limbs, daily, ≥3months  - wide spread pain  - Recurrent joint dislocation/ instability | All of below  1. No skin fragility that prompt other type of EDS  2. Exclude other heritable and acquired CTD (Marfan’s )  3. Exclusion of other disorders that could cause GJH. |

A diagram of a person's body

Description automatically generated

**CRPS**

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|  | Diagnostic checklist | |
| 1. Pain: | disproportionate to cause □ |
| 2. Symptoms  ≥3 | Sensory: □  hyperalgesia  Allodynia  Vasomotor: □  Temperature asymmetry  Skin color changes  Skin color asymmetry  Sudomotor/edema: □  Edema  Sweating changes  Sweating asymmetry  Motor/trophic □  ↓ROM  Motor dysfunction: weakness, tremor, dystonia  Trophic changes: hair, nails, skin |
| Signs  ≥ 2 | Sensory: □  Vasomotor: □  Sudomotor /edema: □  Motor/trophic □ |
| Exclusions | No other diagnosis |

Radicular pain

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| Radicular pain definition | Features of radicular pain | **SLR** | Natural history |
| \* Pain due to compression to  - **DRG**  - **inflamed nerve root**  is *chemically mediated inflammation*. (*occlude vasa nervorum🡪 nerve ischaemia*)  🡪 gives rise to **ectopic activity** in Aδ, C and Aβ fibre  \* Common causes: **disc herniation** (98%) | \* Sharp, lancinating, stabbing, electric shock like  \* travels in a narrow band  \* deep or superficial (somatic referred pain is deep)  \* **Pain** correlates with the size of the disc herniation  **Dermatome:**  \* Does not follow a dermatomal distribution  \* Typically travels along full length of entire leg  \* **Pain below knee** is **not** a valid indicator of **radiculopathy** (*sens 0.9, spec 0.28, LR 1.3*), abnormalities on **electrodiagnostic studies** (*sens 0.81, spec 0.25 LR 1.1*), or of **compressive findings** on CT (*sens 0.81, spec 0.28, LR1.1*)  \* mild radicular pain or in early stage: only at thigh  \* **Somatic referred pain** can extend below the knee to feet.  \* Radicular, somatic referred pain can co-exist | \**White paper*  SLR is **specific predictor** of **neurological sign** (*sens 0.45, spec 0.82 LR 2.5*), positive findings on **electrodiagnostic tests** (*sens 0.35, spec 0.79, LR 1.7*), compressive findings on **CT** (*sens 0.30, spec 0.84, LR 1.9*)  \****Netter:***  ***SLR*** has poor specificity and LR for detecting **disc bulge** or **herniation**:  (*sens 0.92, Spec 0.28, LR 1.3*)  \* SLR Does not correlate with size of disc herniation. | \* **natural hx** on imaging:  10% resolved in 12m,  45% partially decreased in size,  2% worsened.  16% unchanged.  **\* Natural hx of radicular pain. (favourable)**  **4wks**: 50% free of leg pain  12m: 50%M, 33%F free of leg pain  60-70% still had back pain.  \* **Bugdok (red book)** : **back pain**  - 70% recover and remain so at 12 months,  - median time to recover: 7 weeks, but relapses  - status at 2m indictive of 12 m  - 80% may remain disabled to some degree at 12 months, 10-15% highly disabled.  \* **Acute MSK guideline: back pain**  -Majority recover within 3mon  - Median time to recover : 7weeks |

Radiculopathy

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| Definition | Statistics | **Key point** | Dermatome |
| \* Is a pathological state caused by a disorder affecting the function of one or more nerve roots  \* The presence of numbness and/or paraesthesia in a dermatomal distribution and/or weakness in a myotomal distribution. | Numbness—electrodiagnostics  *Sens 0.76, spec 0.33 LR 2.3*  Radiculopathy—compressive findings on CT  *Sens 0.37 spec 0.88 LR 3.1*  Electrodiagnostics—CT findings  *Sens 0.49, spec 0.88 LR 4.1* | \* A **history** of sciatica has sen 98%, spec 88% for herniated lumbar disc, LR 8.17.  \* **Physical exam** does not provide diagnosis of back pain. Commonly used tests lack reliability, validity, or both.  \* **older** the pt, pretest probability of disc herniation becomes less, stenosis (*foraminal or spinal canal*) increases.  \* The cause of radiculopathy is determined NOT by clinical signs but by the age, history, and pretest probabilities of possible causes. | (**paraesthesia** linked to dermatome:  Thumb/ **C6**: sens. 0.87, spec 0.73. LR 3.2  Mid finger/ **C7**:sens. 0.85, Spec. 0.89. LR 7.7  Little F/**C8**: sens 0.68, spec 0.98, LR 34 ) |

**Fibromyalgia**

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| Definition. Key point | Diagnosis criteria AAPT 2019 | Treatment |  |
| \* A chronic centralized pain syndrome characterized by disordered processing of painful stimuli.  \* 2% , F>M  \* Cause: disordered central nociceptive signal processing🡪 sensitization, hyperalgesia, allodynia | 1. Multsite pain>=6 sites (9)  Head, L/R arm, chest, abdomen,  Upper/lower back and spine,  L/R leg  2. Mod to severe sleep proglems or fatigue  3. ≥ 3months  \* clinical diagnosis. | Nonpharmacological  1. patient education, self-management  2. exercise: low-intensity, low-frequency  3. CBT: can decrease pain and disability  4. alternative: yoga, pilate, tai chi, massage, myofacial release | Medication  1. TCA (dry mouth, constipation, dizziness, urinary retention, somnolence)  2. muscle relaxant (sedation, seizure, arrhythmia, confusion)  3. Duloxetine (nausea, dry mouth, somnolence, fatigue, constipation, reduced appetite)  4. Pregabalin: (dizziness, somnolence, dry mouth, blurred vision) |
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Ankylosing spindylitis

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| Definition, key points | Diagnostic criteria : Axial Spa | Diagnostic criteria: peripheral SpA | Treatment |
| \* Chronic seronegative inflammatory autoimmune arthritis  \* Involving SIJ & vertebrae  \* M: F=#:1  \* FHx  \* Young pt 15-45  \* 0.5-1% pregalence  HLA-B27  \* an MHC class I molecule, antigen on cell surface  \* Occurs in 8-10% normal healthy Caucasian  \* 50-95% AS pt have +ve HLAB27  \* 2% HLA-B27 +ve individuals have SpA. | Age <45y. with >3months inflammatory back pain  **Sacroiliitis on imagine** Plus ≥ 1 AS Sx  **HLA-B27** Plus ≥ 2 AS Sx  **AS features**  - *HLA-B27 positive*  *- Inflammatory back pain*  *- Good response to NSAIDs*  - Arthritis  - Uveitis  - **Enthesis** (heel)  - Dactylitis  - *Psoriasis*  - *Crohn’s /colitis*  - FHx: AS  - *Elevated CRP*  **Sacroiliitis on imagine**  1. active inflammation on MRI  2. Radiographic sacroiliitis ≥grade 2 bilateral or grade 3-4 unilateral | **Arthritis or Enthesitis or Dactylitis**  PLUS ≥1 of  - psoriasis  - IBD  - Preceding infection  - HLA-B27  - Uveitis  - Sacroiliitis on imaging (x ray or MRI)  PLUS ≥2 of the remaining  - Arthritis  - Enthesitis  - Dactylitis  - IBP in the past  - Positive FHx for SpA. | 1. Non-pharmacological  - educations  - exercise  - physio (*refer early*)  - smoking cessation  - patient associations, self help group  2. Pharmacological  - NSAIDs  - Steroids: topical eye drops, injection  - **DMARDs**: **only for peripheral arthritis** (*Sulfasalaizine, MTX*)  - **Anti-TNF** for **axial / peripheral involvement**  (*adalimumab . Etanercept . infliximab)* |