Lecture Notes
The Locomotor System

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Symptoms

Main Symptoms

Pain

Stiffness

Swelling

Weakness

The History

Joints: involved

Pain: onset, precipitating & relieving factors

Stiffness: pattern e.g. *early morning*

Disabilities: arising *as a result of symptoms*

Past History & Family History

Pain

Pattern of onset: acute *or* gradual

Site: joints *or* part involved

Type: sharp *or* dull, aching

Severity: mild, moderate *or* severe

Time Course: onset, duration, progress

Diurnal variation: pain worse day *or* night

Effect on activity: work, home, ADL *(activities of daily living)*

Stiffness

occurs in inflammatory joint disease: Rh. arthritis

worse in mornings *or* after period of rest

usually clears in 30/60 mins: depending on severity

occurs in degenerative arthritis: less pronounced

Swelling

ask if there is a history of joint swelling

identify which joints are involved

establish time course: onset duration & progression

Weakness

Occurs secondary to the arthritis

Grade its severity: distance able to walk *or* not

Determine functional capacity of patient:

- independent at home & at work?
- require any aids *or* assistance?

Past History

Arthritis *or* arthralgia

Diseases causing arthritis: *e.g.* Rheumatoid, Gout

Hospitalizations *or* Surgery

Trauma: residual *or* resulting joint damage

Family History

Inflammatory arthritis

Connective tissue disease

Psoriasis

Ankylosing Spondylitis

Gout

Osteoarthritis

Social History

Occupation & home circumstances

Ability to stand/work for long periods

If disabled ask re ability to perform activities of daily living (ADL): self caring, toileting, dressing & feeding

Key Points

- Listen carefully to patient's symptoms
- Establish pain sites & which joints involved
- Determine the time course
- Assess if any systemic symptoms present
- Determine if any disability present

Examination

Examination

- Inspection
- Palpation
- Movement

The Principles

Anatomy: bones, synovium, cartilage, ligaments, tendons, muscles & nerves

Inflammation: heat, pain & swelling

Function: range of movement, activities: *walking*

Complications: deformity & disability

Inspection

Inspect: swelling, wasting, skin changes, deformity

Compare both sides: right & left

Swelling: over joints

Deformities: ulnar deviation,(Rh.A), subluxation, dislocation, valgus & varus

Wasting in muscles around joints: *e.g.* small hand muscles (Rh.A) & quadriceps (O.A)

Palpation

Feel the skin over joint for warmth: best done with backs of your fingers/hand

Tenderness is guide to inflammation: this may limit joint examination

Palpate the joint for: swelling & deformity

Determine if swelling is:
hard: *bony*
soft/spongy: *synovitis*
fluctuant: *effusion*

Movement 1

More information: by passive than by active movement

Ask pt to relax & allow: movement of joint

Attempt it gently: whilst looking at pts face for pain

Limitation may be due to: pain/effusion/fixed deformity

Limited extension is called: a fixed flexion deformity

Movement 2

Joint crepitus is palpable grating sensation: indicates irregularity of joint surfaces

Feel for joint crepitus with one hand: during passive movement of joint with the other hand

Measure degree of any restriction: of movement

Assess the pt’s: back & gait

Key points

- Determine which joints are painful *or* swollen
- Note range of movements & any restriction
- Note muscle wasting
- Check that the relevant nerves are intact
- Document any weakness *or* loss of function

The Gait

Abnormal gaits are: painful (antalgic) *or* nonpainful

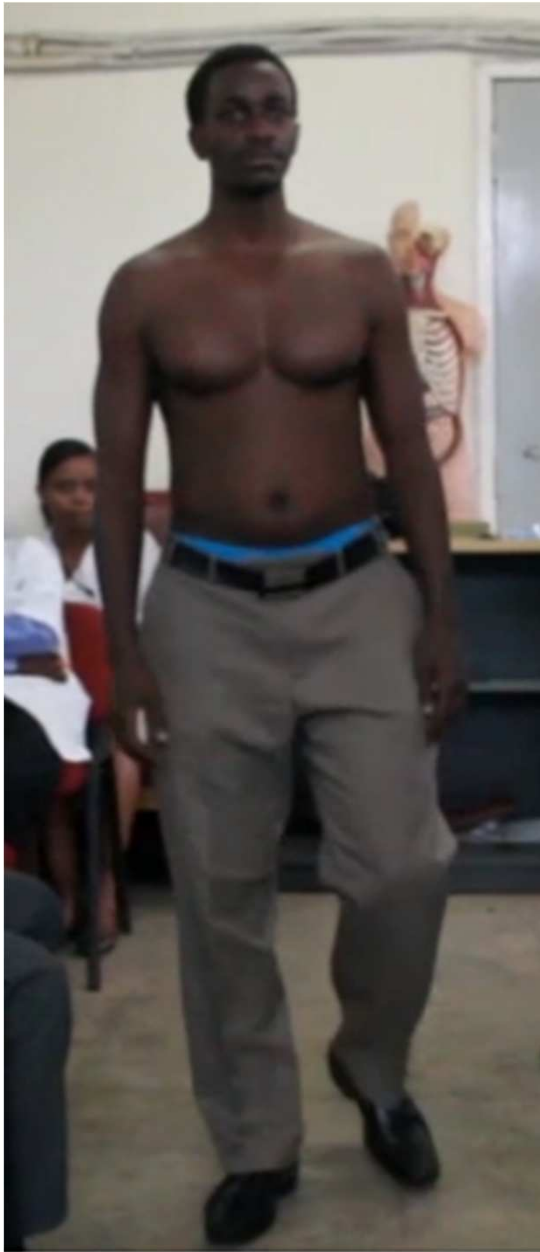
Painful limping: affected leg spends short time on ground

Painless limping: Causes: a short or deformed limb, stiff joint *or* muscle weakness

Pelvic Weakness

Unilateral: gives a Trendelenburg gait

Bilateral: gives a waddling gait



Examination of Gait

The Spine

Spine: Cervical, Thoracic, Lumbar segments

Establish pain: site, referral pattern, aggravating/relieving factors

Establish pain response: to cough, movement & rest

Establish mode of: onset, duration & course or progression

Ask re neurological symptoms: power, sensation & bladder *or* bowel control

Cervical Spine

Inspect neck for abnormal posture, position etc: e.g. *torticollis*

Palpate: outline of spines

Movements

Active

Look right & left: normal lateral rotation = *70-80 degrees*

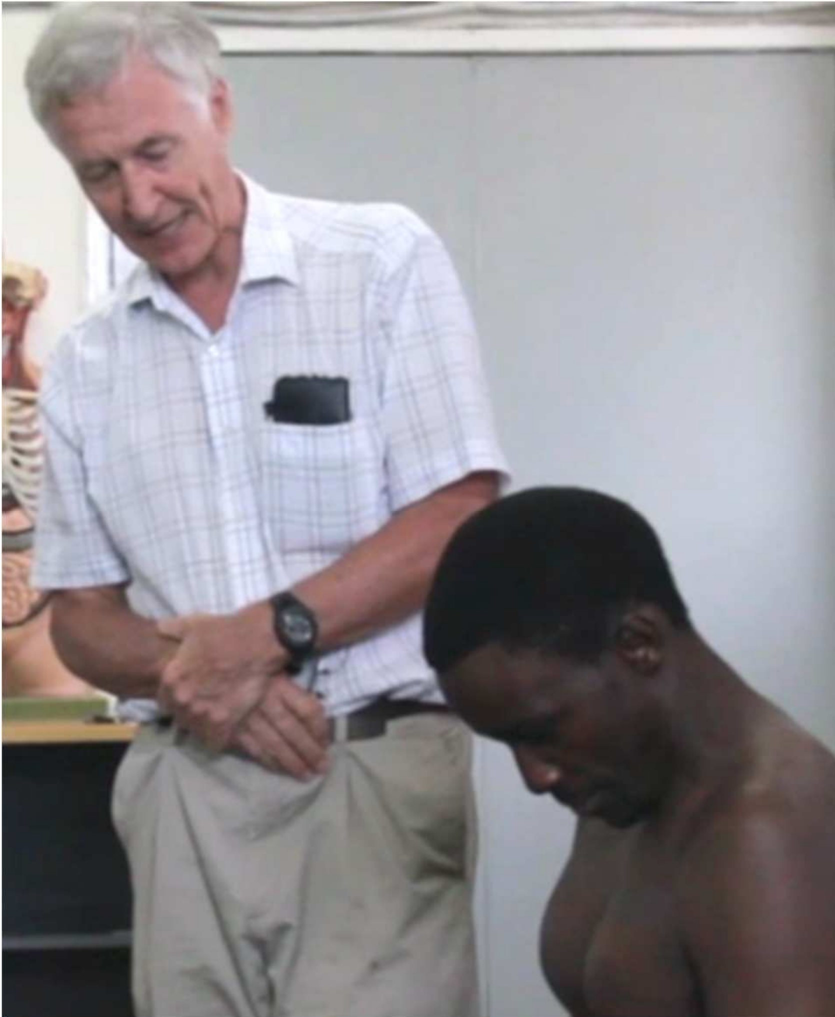
Tilt head sideways: normal lateral flexion = *45 degrees*

Flex & extend neck: normal flex = *75 degrees*, ext = *60 degrees*

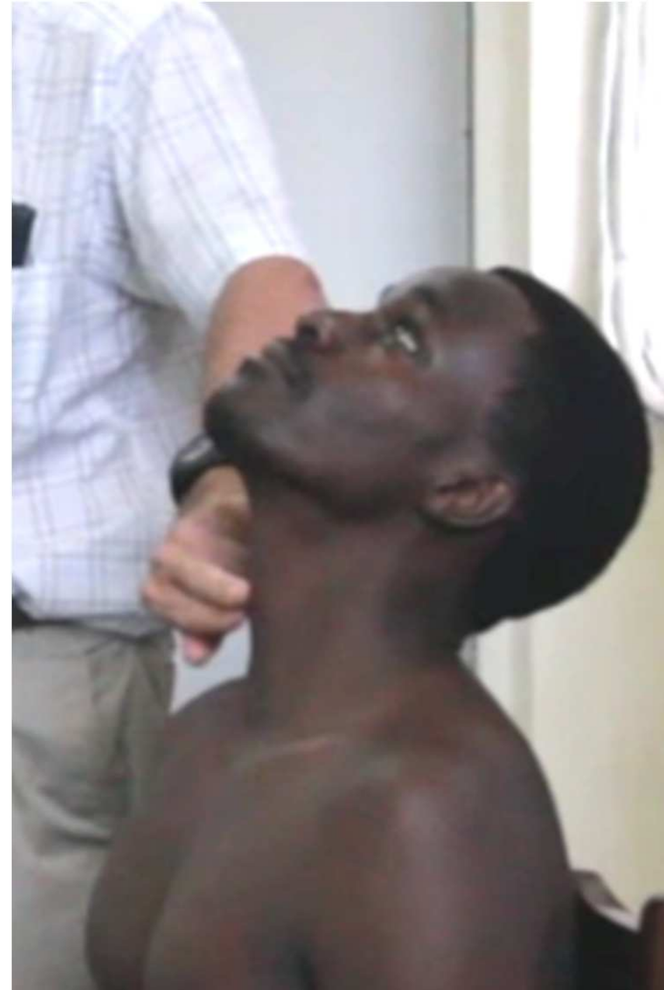
Passive: Perform same movements passively but gently

Cervical spine movements active

Flexion



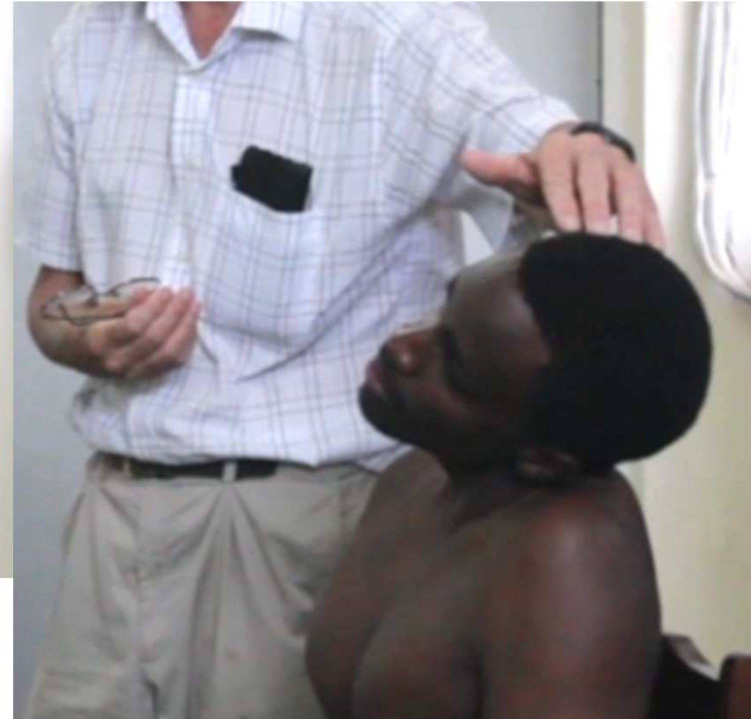
Extension



Sideways

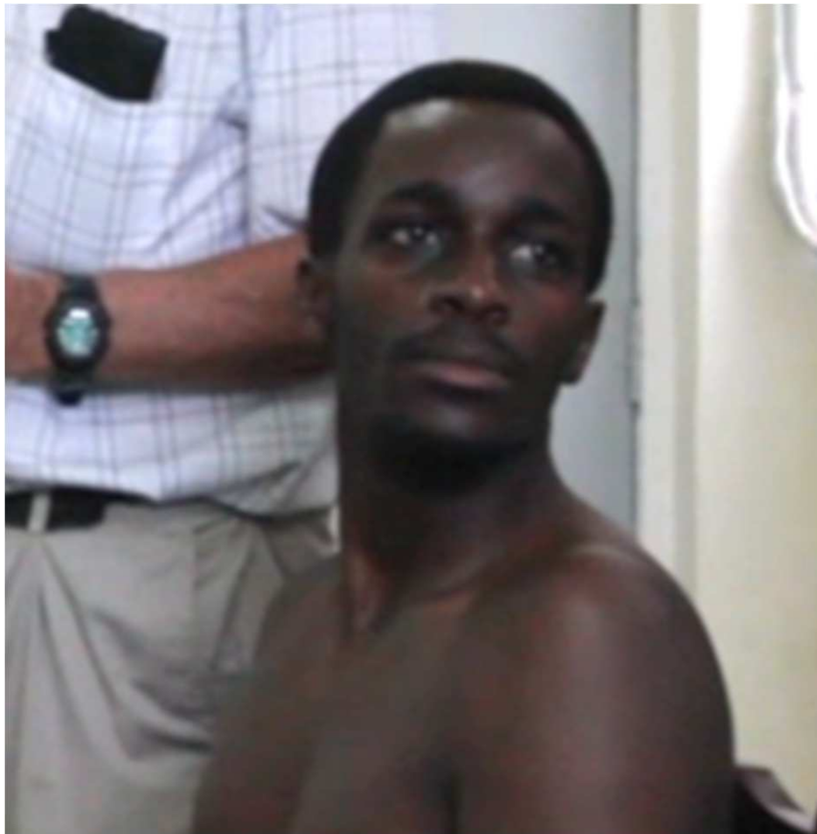
Side flexion to right

Side flexion to left



Rotation

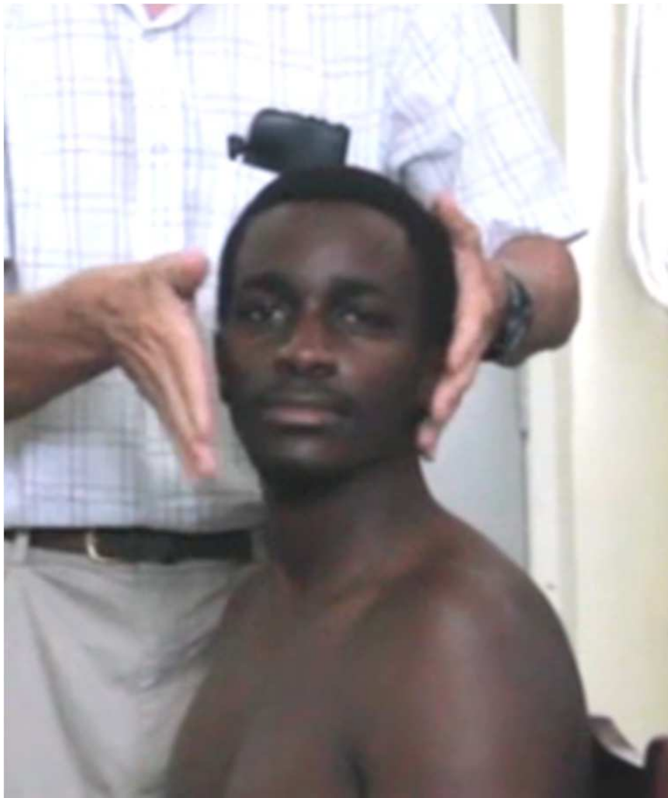
To left



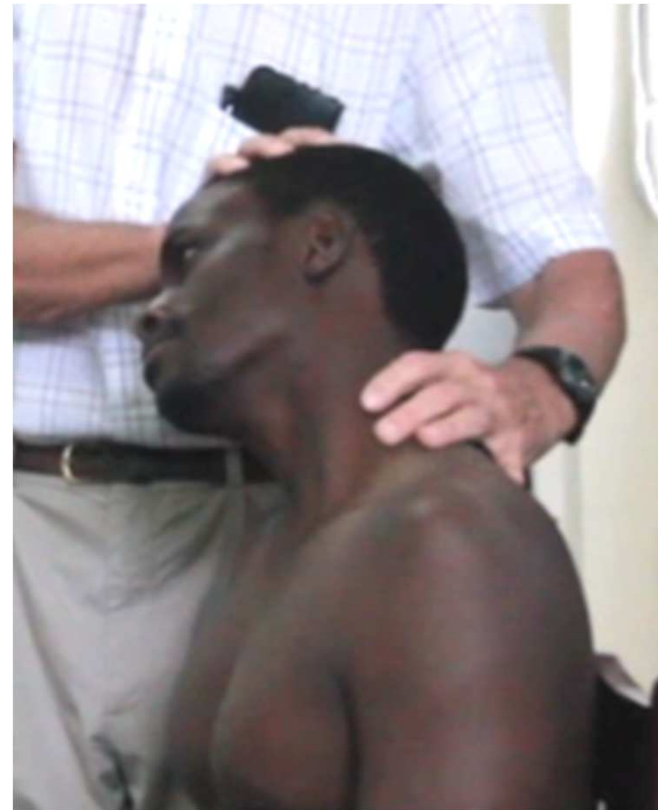
To right

Cervical spine movements passive

Rotation

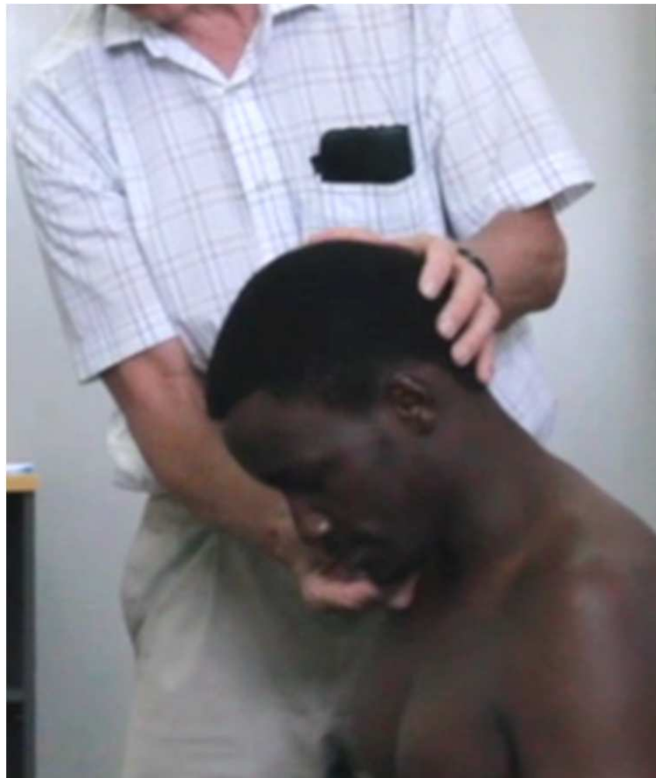


Lateral flexion

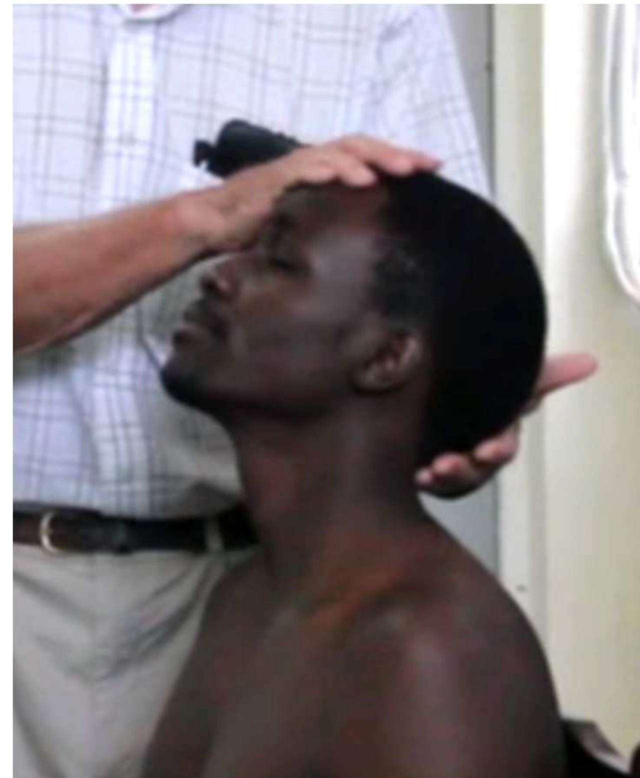


Cervical spine movements passive

Flexion



Extension



Thoracic Spine

Inspect in standing position for abnormalities: from front, back & sides

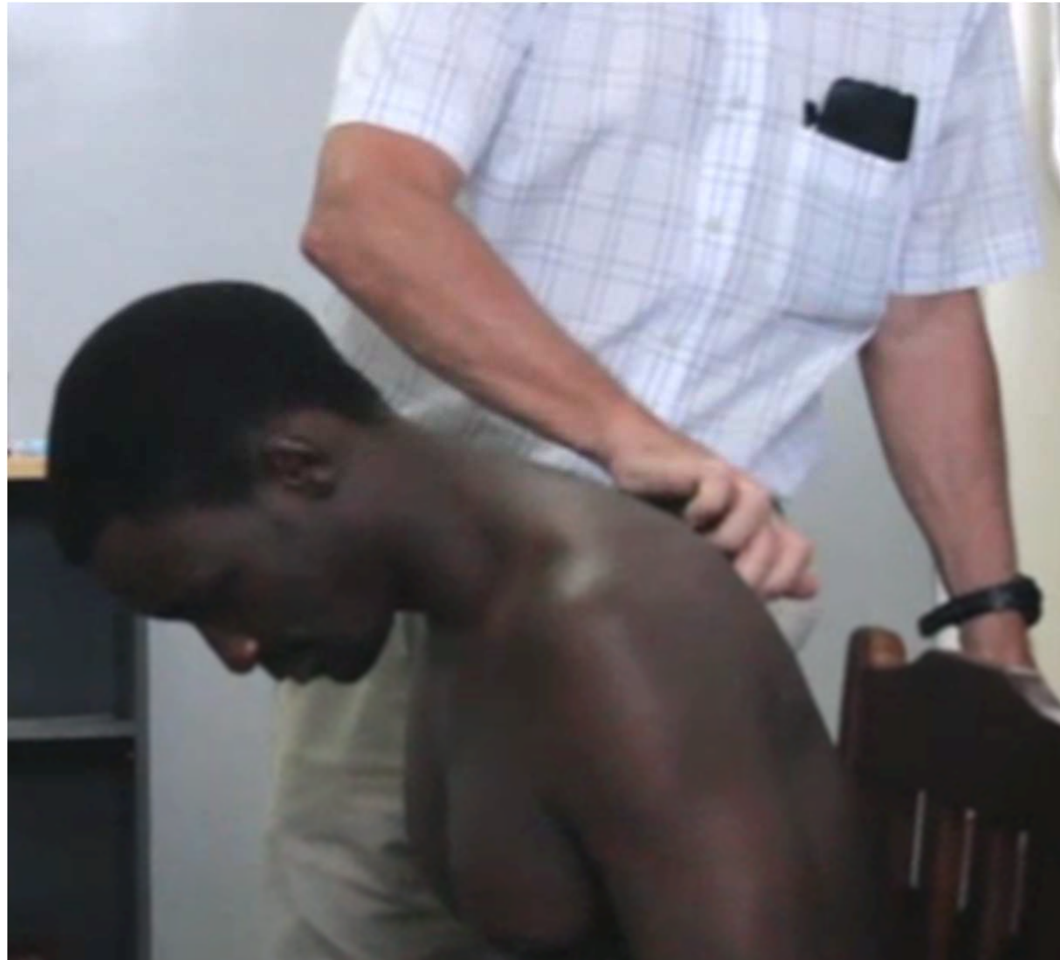
Palpate: spines & bony outlines

Define area of tenderness: confirm by percussion using finger tip *or* tendon hammer

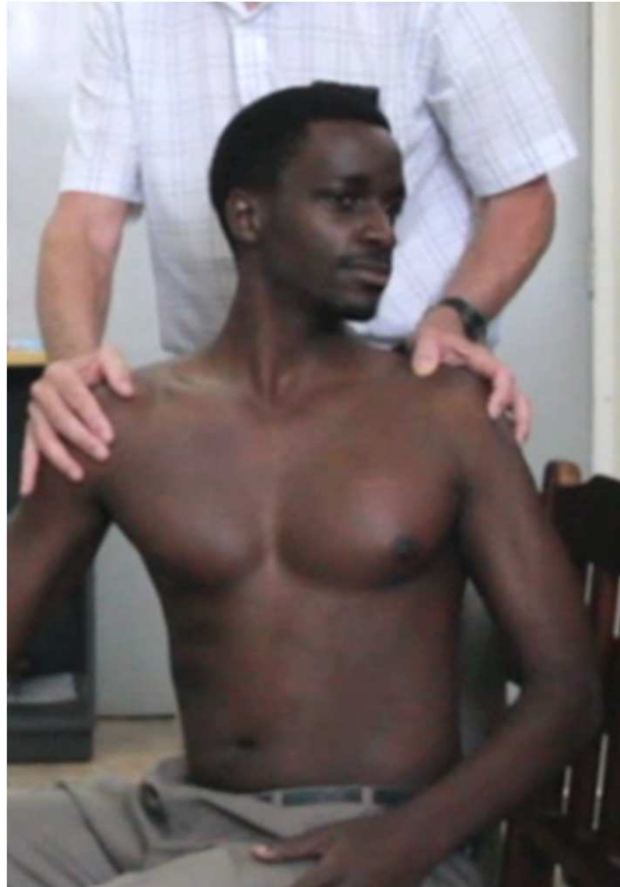
Inspect in seated position: for rotation movements

Common abnormalities: kyphosis, scoliosis & local tenderness *e.g* Pott's disease, malignancy

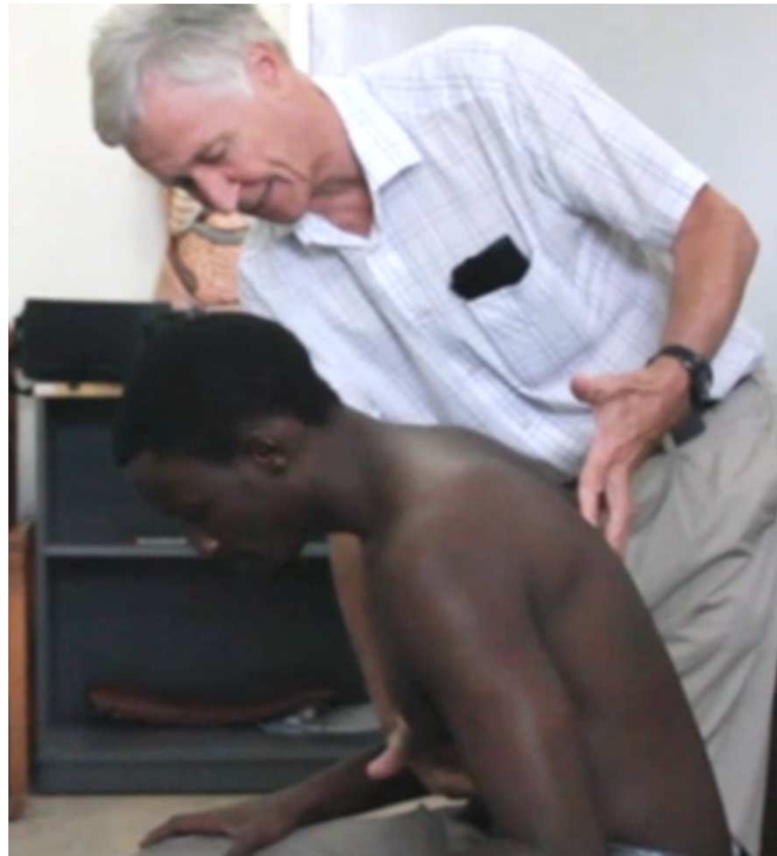
Thoracic spine percussion



Thoracic spine rotation



Thoracic spine flexion



Lumbar Spine 1
Standing Position

Inspect for: deformity *e.g.* loss of normal lordosis

Assess spinal movements: actively & passively

Assess effects on: spinal cord & nerve roots

Lumbar Spine 2

Standing Position

Observe from behind that: spine is straight

Observe from side that: spine is lordotic *or* forward facing

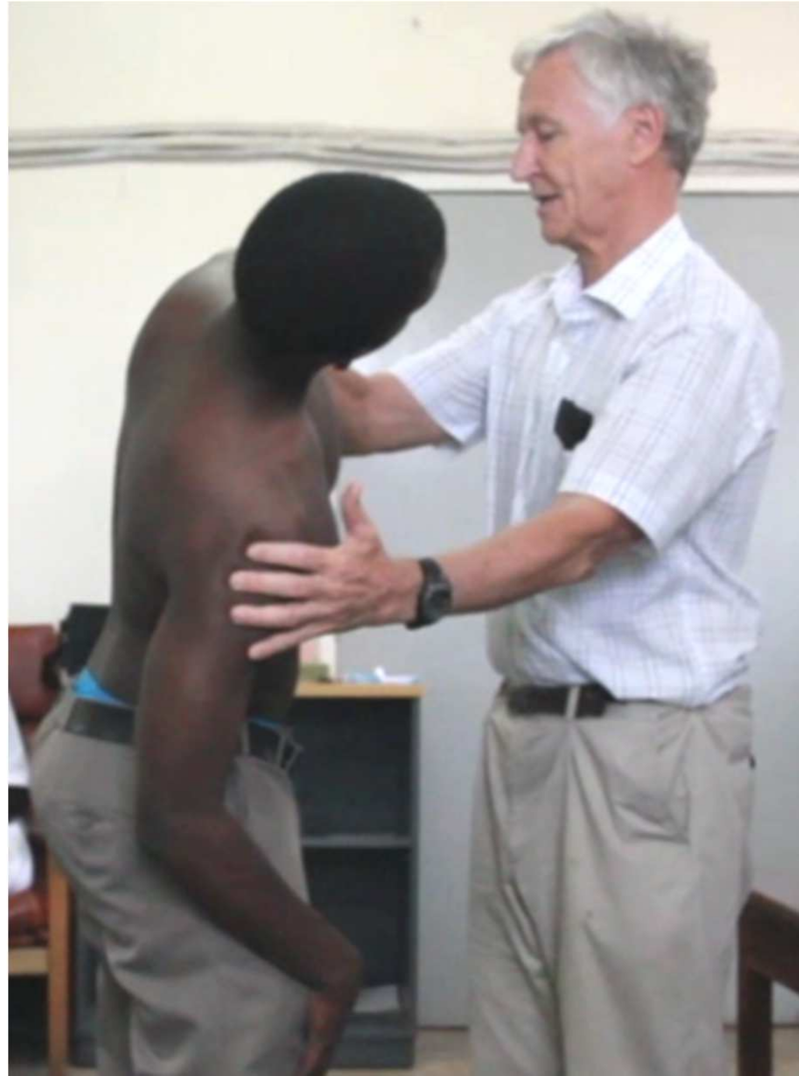
Ask the patient: to flex *or* bend *forward, backwards* & *sideways:* Note range of movement: in each direction

Check for: local tenderness by palpation & light percussion

Lumbar spine flexion

Lumbar spine extension

Lumbar spine lateral flexion



Straight Leg Raising Test

Examine pt in lying position

Flex knee & check that hip flexion: is normal

With the leg fully straightened: raise heel from bed with one hand whilst preventing knee flexion with other hand

Ask pt to report: as *soon as* leg becomes painful *or* develops any numbness

Gently: dorsiflex the ankle joint also checking for pain

Femoral Nerve Stretch Test

Ask pt to: lie prone *or* on their stomach

Flex knee slowly: on the affected side

Ask pt to report: any pain in back, thigh or leg

If above fails to produce pain: gently extend hip

Key Points

- Note abnormal posture: distinguish between structural & postural scoliosis
- Bony tenderness localizes pathology to same site
- Assess range of spinal movements & any restriction
- Acute loss of neurological function is an emergency

The limbs

Multiple joints *or* just one joint involved

Inflammatory *or* non-inflammatory

Review history: joint pain, stiffness, swelling, restricted movement & its diurnal pattern

Is pain referred: *e.g. shoulder → lateral arm, elbow → forearm* or *hip → knee*

Any specific risk factor: *e.g.* trauma, occupation

Examining the upper limb

Joints: hand, wrist, elbow & shoulder

Inspection for: skin changes, swelling, deformity, muscle wasting

Feel, palpate & move joints: passively

Check function: *e.g.* hand grip

The hand & wrist 1

Inspect dorsal & ventral aspects: hand & wrist

Inspect following:

wrist joints

metacarpophalangeal (MP) joints

proximal interphalangeal (PIP) joints

distal interphalangeal (DIP) joints

Look for: *red shiny skin, swelling, deformity & wasting*

Dorsal hand and wrist

Ventral hand and wrist

The hand & wrist 2

Palpate joints to find: heat, tenderness & swelling

Palpate tendons for: local swellings, crepitus

Note limitation in: range of movements (ROMs)

Check: hand & pinch grip strength

The Elbow

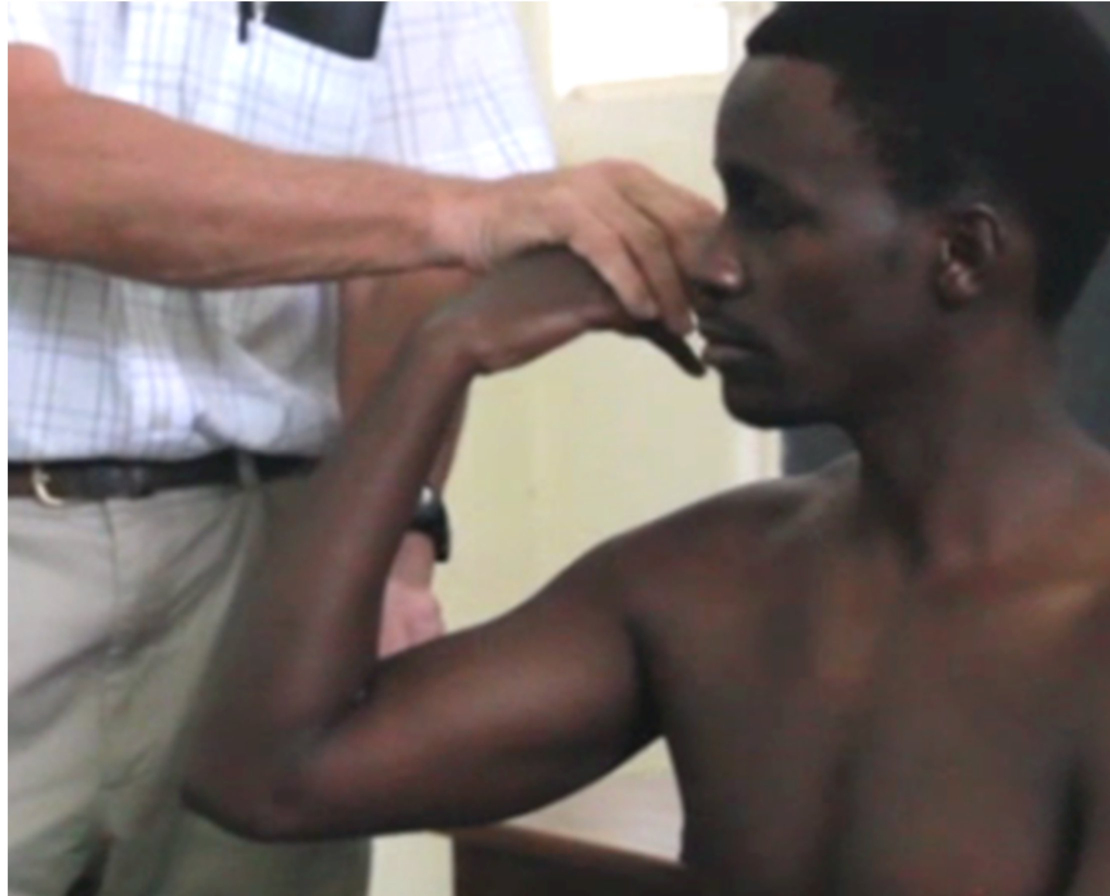
Inspect both elbows: noting any swelling, deformity

Palpate elbow joints: tenderness, swelling, nodule/bursae

Compare range: active flexion/extension *n=150 degrees*

Check supination & pronation with elbows flexed by sides: whilst at same time palpating head of radius

Elbow flexion



Elbow extension

The Shoulder

Inspect from *the front* & *the back* noting any: wasting, swelling *or* differences in shape

Note any: tenderness

Inspect ROMs by asking to: abduct & adduct, flex, extend & circumduct

Proceed with examination: if abnormality present

Check the: glenohumeral joint *and* the rotator cuff

Elevate arms

Abduct arms

Arm flexion

Arm extension

Arm internal and external rotation

Key points

- Determine which joints are painful *or* swollen
- Note range of movements & any restriction
- Note wasting
- Check that the relevant nerves are intact
- Document any weakness *or* loss of function

Examining the lower limb

Joints: hip, knee, ankle & foot

Inspection: skin changes, swelling, deformity, muscle wasting

Feel & move: passively

Check function: e.g. walking, rising & sitting

The Hip Joint 1

Pain is usually presenting complaint of hip joint disease

Inspect in 3 positions: standing, walking & lying

Inspect spine from behind looking for: scoliosis & pelvic tilt

Look for limb: shortening & abnormal limb/foot position *e.g.* eversion

Palpate: for any joint tenderness

The Hip Joint 2

Trendelenburg's gait/sign

- ask pt to stand first on one leg & then on the other affected leg & observe from behind
- normal is upward pelvic tilt on the non standing leg
- in gluteal weakness when standing on the affected or weaker leg: look for a *downward direction of pelvic tilt*: on the unaffected side non standing leg

The Knee 1

Examine in: standing, walking & lying positions

Check: deformity (valgus/varus) *or* other abnormality

Inspect for: joint swelling & wasting in quadriceps

If wasting present: measure at fixed point *above upper border/patella* & compare to same point on other side

Confirm suspected effusion: with a *patellar tap*

The Knee 2

Examine knee joint in lying position for: tenderness, swelling, range of movement, stability

Knee stability: check for intact collateral ligaments & cruciate ligaments

Common findings: joint tenderness, flexion deformity, effusion, popliteal *or* Baker’s cyst, wasting in quadriceps

The ankle and foot

Inspect walking for abnormality in gait: dropped foot, equinus deformity

Inspect standing: flat feet *(pes planus)*, arched foot *(pes cavus)*

Inspect lying position: deformity in shape feet & toes (valgus/varus)

Palpate for: tenderness, swelling *or* decreased movements

Inspect ROMs: flex, extend, invert/evert actively & passively

Key Points

- Pain may be referred from another site *e.g*. pain at knee but coming from hip
- Localize the joint/area of maximum tenderness
- Check full ROMs at joints including hips & knees
- Deformity at one site can cause secondary deformity at another
- Assess function & disability