TUTORIAL 11

THE EXAMINATION OF MUSCULO- SKELETAL SYSTEM

OVERALL OBJECTIVE

At the end of this module, the student should be able to do a full clinical examination of musculoskeletal system and to be able to make a reasonable differential diagnosis of swollen joints, rheumatic fever, systemic lupus erythematosis, dermatomyositis, gait problems, muscular atrophy or hypertrophy in infants and children.

Extra General features include:

- Malar rash of SLE
- Supraorbital rash of dermatomyositis
- Muscular hypertrophy or pseudohypertrophy
- Muscle atrophy
- Muscle fasciculations
- Signs of acute rheumatic fever
- Rickety rosery, craniotabes, widening of wrists – rickets

Screening questions

1) Do you have pain or stiffness in your muscles, joints, back?
2) Can you dress up yourself without difficulty?
3) Can you walk up and down stairs without difficulty?

EXAMINATION OF A JOINT

Introduce yourself to the patient and the caregiver

- Sit in front of the patient: good position is confruntation position
- Do a good observation
  - Ask the patient to walk a short distance and watch gait
  - Ask the patient to take off a jumper or shirt and observe upper limb function
  - Ask the patient to write his name and observe his hand function
  - Ask the patient to undress and observe the upper limb function

General examinatin will include:

- Sequence: Look, Feel, Move, Measure
- GALS screen: Gait, Arms, Legs, Spine

SEQUENCE

1. Look

- General inspection, see if the patient is:
  - Thriving, has any bandages or is on a wheelchair.
  - Having any prosthesis e.g. calipers or special shoes

- Has any spine deformaties e.g. kyphosis, scoliosis or kyphoscoliosis
- Has any limb deformaties like:
    - **Amelia** (birth defect of lacking one or more limbs)
    - **Hemiamelia** (upper part of limb well developed but the lower part is rudementary or absent)
    - **Phocomelia** (the upper part of limb is extremely underdeveloped or missing and lower part is directly attached to the trunk"
    - Contracture
    - Joint swelling

- Also look for any:
    - Skin changes or rash like erythema or trophic skin changes
    - Muscle wasting

2. Feel

Enquire first if any part is painfull and what exacerbates pain.

Then feel for

1) **Move** to assess Temperature
2) Tenderness (watch expression)
3) Enlargement
4) Effusion
5) Synovial thickening
6) Bony enlargment

3. Move to assess

Move to assess active before passive movements

1) Range of active movements (normal or limited)
    a. Range of passive movements (normal or limited)
2) Is movement painful
3) Is movement accompanied by crepitus
4) Is there any fixed deformaity: when joint cannot be placed in the neutral anatomical position due to inability of movement or laxity of joint ligaments.
5) State of peripheral circulation

4. Measure

Limb circumference for muscle wasting

- 5-10 cm above tibial tuberosity
- 5-10 cm below tibial tuberosity

Limb length for length discrepancy

- True leg length: from anterior superior iliac spine to medial maleolus
- Apparent leg length: from umbilicus (or pubics symphysis) to medial maleolus

Causes of true leg length discrepancy

1) Undetected CDH
2) Previous trauma/bone surgery
3) Increased limb growth – arthritis of the knee
4) Ollier's disease
5) Osteogenesis imperfecta
    - Blue sclera
    - Hyperextensible joints
6) Ployostotic fibrous dysplasia
    - Café a lait spots
    - Sexual precosity
7) Causes of apparent leg length discrepancy
    - Severe hemiparesis
    - Adductor spam causing pelvic tilt

GALS SCREENING

1. Gait

- Watch patient walking in straight line
    - Bare foot
    - In shoes
- Walking fast or running will unmask any abnormality
- Evaluate from, behind, front and the side
    - Foot, Ankle, Knee, Hip, Pelvis, Spine
- Note for limp or abnormal gait
    - Pain – antalgic gait – dot dash
    - Structural – limb length discrepancy
    - Weakness
    - Trendlengurg gait – Duchenne sign
    - Drop foot – common peronial nerve palsy – the gait is high stepping to lift the drop foot
- Note for increased tone
    - UMNL – Crouch gait
    - CP
    - CVA

2. Arms

Advise the patient to:

1) Put your hands behind your head. Note elbows going backward. In frozen shoulder or rotators cuff problems there will be painful abduction
2) Bend arms & touch shoulders: note elbow flexion
3) Straight arms: extension at 180 degree

4) Prayer sign: assess wrist 90 degree extension
5) Reverse prayer sign: assess wrists for 90 degree flexion
6) Clinch fists and open hands flat: observe any abnormality in wrists and hands
7) Squeez your index and middle finger: note strength of power grip
8) Touch each finger tip with your thumb; note precision grip or if any problems in co-ordination or concentration
9) Assess pronation & supination for radio-ulner joint
10) Squeez patient's metacarpal heads and note for tenderness like in rheumatic arthritis

3. Legs

- Examine hip joints: stabilise patient's pelvis and passively test abduction, adduction, flexion, internal & external rotation with hip & knee at 90^{o}
- In newborn look for congenital hip dislocation (CDH) by Barlows & Ortolani maneuvers
- Examine knee joint for
    1) Flexion and extension
    2) Bow legs or genu varum
    3) Knock knees or genu valgum
    4) Palpate antheses at 10, 2, 6 oclock positions and patella and synovial thickening or effusion
    5) Buldge sign for effusion
    6) Patellar tap
    7) Check knee stability - Drawer sign for anterior cruciate ligamants and posterior cruciate ligaments
- Examine the ankle joint
    1) Tibiotalor joint for dorsi flexion and planter flexion
    2) Subtalor joint for inversion and eversion
    3) Midtarsal for medial and lateral movement of foot
    4) Metatarsal joints
- Note any abnormalities like
    1) Flat feet: benign, failure of arch to develop in collagen disorders and cerebral palsy
    2) High arched feet in spina bifida, Friedreich ataxia, Charcot-Marie-Tooth disease
    3) In-toeing or out toeing
    4) Toe walking
    5) Talipes EV
    6) Syndactyly – 2^{nd} and 3^{rd} toes
    7) Overlapping of 3^{rd}, 4^{th}, and 5^{th} toes

4. Spine: Neck, Cervical, Thoraco–lumber Spine

Watch child standing and then bending forward: note for scoliosis, kyphosis or kyphoscoliosis. Palpate for tendeness

Neck

1) Flexion, extension, lateral rotation, lateral flexion
2) Common abnormality noted is Klippel Feil syndrome in which there is low hair line and fusion of cervical spine vertibrae or hemivertibrae resulting in short neck
3) Webbing of skin of neck seen in Turner's syndrome
4) Torticollis
5) Cervical spina bifida
6) Thoracic hemivertebra
7) Hypoplasia of shoulder girdle muscles
8) Cervical rib
9) Temporomandibular joint: open mouth as wide as possible and palpate over joint for crepitus
10) Sprengel's shoulder: one scapula fixed high due to failure to descent during fetal development resulting in reduced abduction and bracheal plexus compression

Cervical spine: Check range of movements (ROM)

1) Flexion – chin touches chest
2) Extension – head touches back
3) Rotation – turning chin to be in line with shoulders 80 degree
4) Lateral flexion – era to shoulder 40 degree

Thoracolumber spine: check for

1) Flexion – able to touch toes
2) Extension – arching back 30 degree
3) Lateral bending – 50 degree to each side
4) Lateral rotation with child sitting – 30 degree at each side

NORMAL RANGE OF MOVEMENTS

Wrist				
Flexion	80 ^{o}	Extension		70 ^{o}
Radial deviation	20 ^{o}	Ulnar deviation		30 ^{o}
MCP				
Flexion	90 ^{o}	Extension		30 ^{o}
PIP				
Flexion	100 ^{o}			
DIP				
Flexion	90 ^{o}	Extension		10 ^{o}
Elbows				
Flexion	135 ^{o}	Extension		0-10 ^{o}
Supination	90 ^{o}	Pronation		90 ^{o}
Knees				
Flexion	135 ^{o}	Extension	up to	10 ^{o}
Hips				
Internal rotation	35 ^{o}	Extension		35^{o} (hips flexed 9^{o})
Abduction	50 ^{o}	Adduction		30 ^{o}
Ankles				
Planter flexion	50 ^{o}	Ext dorsiflexion		20 ^{o}
Subtalar joint				
Inversion	50 ^{o}	Eversion		5 ^{o}
Mid tarsal joints				
Abduction	10 ^{o}	Adduction		20 ^{o}
First metatarsophalangeal joint				
Planter flexion	45 ^{o}	Ext dorsiflexion		70 ^{o}

Note any crepitus: pain on moving the 1st MTJ may be selectively involved in spondyloarthropathies

TESTS TO ASSESS CONGENITAL HIP DISLOCATION IN NEONATES

Be gentle in performing these tests as the undue force can cause avascular necrosis of the head. Following are high risk babies with congenital dysplasia

1. Breech deliveries
2. Family history of hip dysplasia
3. Preterm babies

Ortolani test

Baby should lie supine. Now flex the hips and knees at 90 degrees and abduct the legs until each knee touches the examining couch. If there is congenital hip dislocation, a clunk can be felt and it can be audible as the femoral head slips in the acetabulum. This test is difficult to elicit after neonatal period.

Barlow's test

Is the hip is not fully dislocated but is noted o be unstable then this can be diagnosed by pressing the femur (90 degree flexed at the hip join) backwards and outwards. Keep the thumb over the lesser trochanter medially and it is possible to feel the femoral head sliding over the posterior acetabular rim. When the pressure is exerted with the middle finger over the greater trochanter, it can be felt how the femoral head slips back into the acetabulum.

Work out your differential diagnosis for mono & polyarthritis in children

At completion of examination summarise positive findings

1) No of joints involved
2) Symmetry: symmetrical in JRA and asymmetrical in psoriatic
3) Activity of disease: active with pain and redness
4) The functional severity
5) Differential diagnosis

CAUSES OF WEAKNESS AND HYPOTONIA

1) Muscles (myopathy, myositis, muscle dystrophy, steroids use)
2) Neuromuscular junction disorders (Myasthenia, organophosphate poisoning, botulism)
3) Central nervous system (Poliomyelitis, Guillain-Barre Syndrome)
4) Spinal cord: tumours, gibbus formation
5) Electrolyte disturbances: Hypokalaemia, hyponatraemia, hypoglycaemia, hypocalcaemia
6) Hypothyroidism or lax ligaments