



1

MUSCULOSKELETAL PHYSICAL THERAPY

INCLUDING SUPERVISED CLINICAL PRACTICE
III

2

ASSESSMENT OF MSK DISORDER



3

PT DIAGNOSIS



- Comprehensive examination , most important aspect.
- PT's role to clarify the nature & extent of lesion Extent of resulting disability & record progress.
- Diagnosis by a therapist means ***naming or labeling the movement dysfunction or problem*** that is the object of therapy treatment.

4

- Information collected in examination set a **baseline** to get inference about **progress** and also about **effectiveness** of treatment.
- In addition to complete examination therapist must check some key point before , during and after treatment.
Whether a particular procedure is effective ?
- Progress on objective aspects rather subjective.(facts rather opinion)

5

- MSK Problem
- Clarify Nature and Extent of Lesion
- Physical Therapy Diagnosis & movement Dysfunction
- Baseline in Examination
,Progress & Effectiveness of Rx
- Progress record On Subjective Vs Objective Info
- Open ended Question

6

SHOULDER TENDINITIS

- Referred to Manual therapy practionaire.
- Easily manageable by PT over a short period... For effective management need
 - ❑ Site and name of involved tendon to direct Rx.
 - ❑ Acute/chronic..choice of Rx accordingly.
 - ❑ Secondary problems(weakness ,stiffness)must be deal side by side.
 - ❑ Possible behavioral effects of lesion.
 - ❑ ADLs to get a guess about **existing functional deficit**, present activity will aggravate or prolong condition.
 - ❑ Through Initial examination is necessary.



7

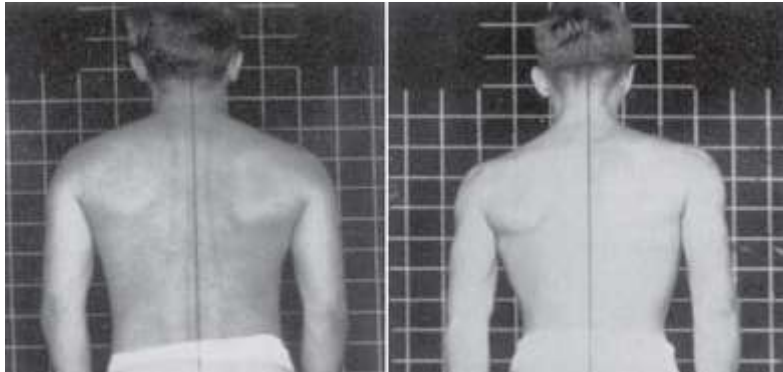
JAMES CYRIAX SOFT TISSUE EXAMINATION

- ❑ Observation,
- ❑ Subjective examination (patient's history),
- ❑ Objective examination (utilization of movements and special tests to elicit signs and symptoms of injury)
- ❑ Palpation of soft tissues
- ❑ Neurological testing.
- ❖ Problem oriented medical record method(SOAP)

8

○ A

B



9



10



A 34-YEAR-OLD WOMAN WHOSE MEDICAL DIAGNOSIS WAS LOW BACK PAIN WAS REFERRED FOR OUTPATIENT PHYSICAL THERAPY

- On interview, the patient reported symptoms including pain in the coccyx area that increased after sitting for a prolonged period and then arising.
- She also reported pain in the buttocks and sacroiliac joint areas. The symptoms began 4 months earlier.
- She initially sought medical treatment for 2 months.
- Medical intervention at that point included radiographs of the pelvis that were unremarkable,
- a prescription for painkillers, and a donut pillow for sitting.
- She continued to experience symptoms of pain, which made it difficult to sit.

11

5 STEPS OF PATIENT CARE

- Examination: Includes data obtained from the history, systems review, and tests and measures
- Evaluation : documentation & identification of problem
- Diagnosis
- Prognosis
- POC

12



- ✓ A musculoskeletal assessment requires a proper and thorough systematic examination of the patient.
- ✓ A correct diagnosis depends on a knowledge of **functional anatomy**, an accurate patient history, diligent observation, and a thorough examination.

13

- The differential diagnosis process involves the use of clinical signs and symptoms, physical examination, a knowledge of pathology and mechanisms of injury, provocative and palpation (motion) tests, and laboratory and diagnostic imaging techniques

14

- It is only through a complete and systematic assessment that an **accurate diagnosis** can be made.
- The purpose of the assessment should be to fully and clearly understand the patient's problems, from the patient's perspective as well as the clinician's,
 - ✓ and the **physical basis** for the symptoms that have caused the patient to complain.
- James Cyriax stated,
 - “**Diagnosis is only a matter of applying one's anatomy**”



15

PROBLEM ORIENTED MEDICAL RECORD METHOD

- One of the more common assessment recording techniques is the problem-oriented medical records method, which uses “SOAP” notes.
- SOAP stands for the four parts of the assessment:
 - Subjective, Objective, Assessment, and Plan.
 - ✓ This method is especially useful in helping the examiner to solve a problem

16

DURING MSK EXAMINATION WHAT IS THE
CRITERIA OF BEING NORMAL WITH WHOM
EXAMINER ASSESS A PARTICULAR BODY
PART

?



17

Total Musculoskeletal Assessment

- Patient history
- Observation
- Examination of movement
- Special tests
- Reflexes and cutaneous distribution
- Joint play movements
- Palpation
- Diagnostic imaging

18



19

SERIOUS
UNDERLYING
DISEASE



20

Persistent pain at night
Constant pain anywhere in the body
Unexplained weight loss (e.g., 4.5 to 6.8 kg [10 to 15 lbs] in 2 weeks or less)
Loss of appetite
Unusual lumps or growths
Unwarranted fatigue

21

Shortness of breath
Dizziness
Pain or a feeling of heaviness in the chest
Pulsating pain anywhere in the body
Constant and severe pain in lower leg (calf) or arm
Discolored or painful feet
Swelling (no history of injury)

22

Frequent or severe abdominal pain
Frequent heartburn or indigestion
Frequent nausea or vomiting
Change in or problems with bowel
and/or bladder function (e.g.,
urinary tract infection)

23

Fever or night sweats
Recent severe emotional disturbances
Swelling or redness in any joint with
no history of injury

24

Changes in hearing
Frequent or severe headaches with no
history of injury
Problems with swallowing or changes
in speech
Changes in vision (e.g., blurriness or
loss of sight)
Problems with balance, coordination,
or falling
Faint spells (drop attacks)
Sudden weakness

25

○ MUSCULOSKELETAL HISTORY

26



27



28

- A person who has been able to comb hair for all life but since the onset of problem is unable to do so. Lacks full pain free active elevation and external rotation...
- suggesting capsular restriction

29

YELLOW FLAG

signs and symptoms are also important for the examiner to note as they denote problems

- more severe or ***may involve more than one area*** requiring a more extensive examination
- relate to ***cautions and contraindications to treatment*** that the examiner might have to consider
- they may indicate overlying ***psychosocial issues*** that may affect treatment

30

SEQUENCE

- The patient's history is usually taken in an *orderly sequence*.
- It offers the patient an opportunity to describe the **problem** and the **limitations** caused by the problem as he or she perceives them.
- To achieve a good functional outcome, it is essential that the clinician heed to the patient's concerns and expectations for treatment.

After all, the history is the patient's report of his or her own condition.

31

WAS THE ONSET OF THE PROBLEM SLOW OR SUDDEN?

- an insidious, mild ache and then progress to continuous pain.
- Does the pain get worse as the day progresses?
- Was the sudden onset caused by trauma, or was it sudden with locking because of muscle spasm (spasm lock) or pain?
- Is there anything that relieves the symptoms?

32

EASY TO UNDERSTAND QUESTION

- The clinician should ask easy to understand questions.
- For example, the examiner should not say, “Does this increase your pain?” It would be better to say, ***“Does this alter your pain in any way?”***
- The examiner should ask *one question at a time* and receive an answer to each question before proceeding with another question.
- **Open ended questions** ask for narrative information; closed or direct questions ask for specific information.
- Direct questions are often used to fill in details of information given in open-ended questions, and they frequently require only a one-word answer, such as yes or no.

33

WHERE ARE THE SYMPTOMS THAT BOTHER THE PATIENT?

- Finger sign
- Palm Sign
- Has the dominant or nondominant side been injured?
- Injury to the dominant side may lead to greater functional limitations

34

- 5 steps of patient care
- Red flags
- Capsular restrictions

35

PERTINENT QUESTIONS IN MSK HISTORY

- *What is the patient's **age and gender** :*
- Various growth disorders, such as Legg-Perthes disease or Scheuermann disease, are seen in adolescents or teenagers.
- Degenerative conditions, such as osteoarthritis and osteoporosis, are more likely to be seen in an older population.
- **Shoulder impingement** in young people (15 to 35 years) is more likely to result from muscle weakness, primarily in the muscles controlling the scapula, whereas the condition in older people (40+ years) is more likely to be the result of degenerative changes in the shoulder complex

36

WHAT IS THE PATIENT'S OCCUPATION?

- What does the patient do at work?
- What is the **working environment** like?
- What are the **demands and postures** assumed?
- For example, **a laborer probably has stronger muscles than a sedentary worker and may be less likely to suffer a muscle strain.**
- However, laborers are more susceptible to injury because of the types of jobs they have. Because sedentary workers usually have no need for high levels of muscle strength, they may overstress their muscles or joints on weekends because of over activity or participation in activity that they are not used to.

37

WHY HAS THE PATIENT COME FOR HELP?

- This is often referred to as the **history of the present illness** or **chief complaint**.
- In this part patients describe in their own words **what is bothering them** and the **extent** to which it bothers them.
- It is important for the clinician to determine what the patient wants to be able to do functionally and what the patient is unable to do functionally.

38

*WAS THERE ANY INCITING TRAUMA
(MACROTRAUMA) OR REPETITIVE ACTIVITY
(MICROTRAUMA)*

- what was the **mechanism of injury**, and were there any predisposing factors?

If the patient was in a motor vehicle accident, for example,

- was the patient the driver or the passenger?
- Was he or she the cause of the accident?
- What part of the car was hit?
- How fast were the cars going?
- Was the patient wearing a seat belt?

When asking questions about the mechanism(s) of injury, the examiner must try to determine the **direction** and **magnitude** of the injuring force and **how the force was applied**.

39

- Terrible triad
- Ant Dislocation



40

- For example,
- **anterior dislocations** of the shoulder usually occur when the arm is abducted and laterally rotated beyond the normal range of motion (ROM),
- and the “**terrible triad**” injury to the knee (i.e., medial collateral ligament, anterior cruciate ligament, and medial meniscus injury) usually results from a blow to the lateral side of the knee while the knee is flexed, the full weight of the patient is on the knee, and the foot is fixed.

41

WHERE WAS THE PAIN OR OTHER SYMPTOMS WHEN THE PATIENT FIRST HAD THE COMPLAINT?

- If the intensity of the pain or symptoms is such that the patient is unable to move in a certain direction or hold a particular posture because of the symptoms, the symptoms are said to be **severe**.
- If the symptoms or pain become progressively worse with movement or the longer a position is held, the symptoms are said to be **irritable**.

42

WHAT ARE THE EXACT MOVEMENTS OR ACTIVITIES THAT CAUSE PAIN?

Pain and Its Relation to Severity of Repetitive Stress Activity

- Level 1: Pain after specific activity
- Level 2: Pain at start of activity resolving with warm-up
- Level 3: Pain during and after specific activity that does not affect performance
- Level 4: Pain during and after specific activity that does affect performance
- Level 5: Pain with activities of daily living (ADLs)
- Level 6: Constant dull aching pain at rest that does not disturb sleep
- Level 7: Dull aching pain that does disturb sleep

43

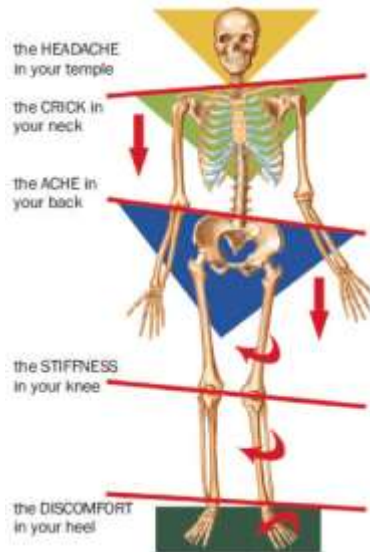
HOW LONG HAS THE PROBLEM EXISTED?

- 7-10days
- 10 days -6 wk
- >6 week

- Does the patient protect or support the injured part? If so, **this behavior signifies discomfort and fear of pain if the part moves**, usually indicating a more acute condition

44

*HAS THERE BEEN AN INJURY TO ANOTHER
PART OF THE KINETIC CHAIN AS WELL?*



45

○ SEVERITY
Vs
IRRITABILITY

46



47



48

*IS THE PAIN ASSOCIATED WITH REST?
ACTIVITY? CERTAIN POSTURES?
VISCERAL FUNCTION? TIME OF DAY?*

- Pain on activity that decreases with rest usually indicates a **mechanical problem** interfering with movement, such as adhesions
- Pain and cramping with prolonged walking may indicate lumbar spinal stenosis (neurogenic intermittent claudication) or vascular problems (circulatory or vascular intermittent claudication).

49



50

*DOES A JOINT EXHIBIT LOCKING,
UNLOCKING, INSTABILITY ,OR GIVING WAY?*

51

*ARE THERE ANY CHANGES IN THE COLOR
OF THE LIMB?*

52

*HAS THE PATIENT UNDERGONE AN X-RAY
EXAMINATION OR OTHER IMAGING
TECHNIQUES?*

53

*HAS THE PATIENT BEEN RECEIVING
ANALGESIC, STEROID, OR ANY OTHER
MEDICATION? IF SO, FOR HOW LONG?*

54



55

2.OBSERVATION

In an assessment, observation is the “looking” or inspection phase.

Its purpose is to gain information on **visible defects**, **functional deficits**, and **abnormalities of alignment**.

Much of the observation phase involves assessment of **normal standing posture**.

Observation may begin in the waiting room or as the patient is being taken to the assessment area. Often the patient is unaware that observation is occurring at this stage and may present a different picture.

56

GAIT

As the patient enters the assessment area, the examiner should observe his or her gait.

This initial gait assessment is only a cursory one(not thorough); however, problems, such as **Trendelenburg sign** or **drop foot**, are easily noticed.

57

- 1. What is the **normal body alignment**?
Anteriorly, the nose, xiphisternum, and umbilicus should be in a straight line.
- From the side, the tip of the ear, the tip of the acromion, the high point of the iliac crest, and the lateral malleolus (anterior aspect) should be in a straight line.

58

IS THERE ANY OBVIOUS DEFORMITY?

- ✓ Deformities may take the form of restricted ROM (e.g., flexion deformity), malalignment (e.g., genu varum), alteration in the shape of a bone (e.g., fracture), or alteration in the relationship of two articulating structures (e.g., subluxation, dislocation).
- ✓ **Structural deformities** are present even at rest; examples include torticollis, fractures, scoliosis, and kyphosis.
- ✓ **Functional deformities** are the result of assumed postures and **disappear when posture is changed**. For example, a **scoliosis due to a short leg seen in an upright posture disappears on forward flexion**.
- ✓ A pes planus (flatfoot) on weight bearing may disappear on non-weight-bearing

59

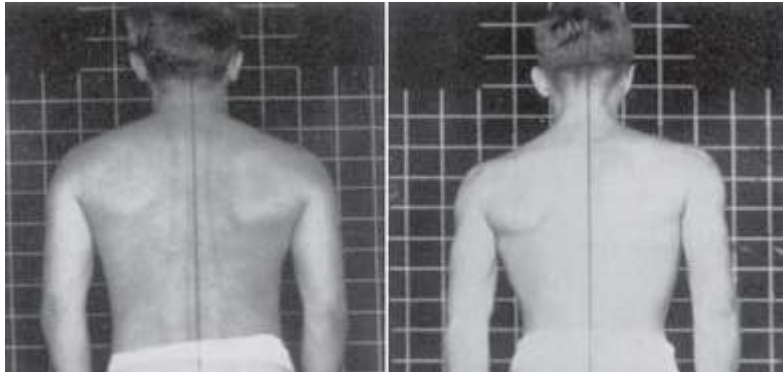
Are the bony contours of the body normal and symmetric, or is there an obvious deviation? The body is not perfectly symmetric, and deviation may have no clinical implications. For example, **many people have a lower shoulder on the dominant side** or demonstrate a slight scoliosis of the spine adjacent to the heart.

However, any deviation should be noted, because it may contribute to a more accurate diagnosis.

60

○ A

B



61

- Are the soft-tissue contours (e.g., muscle, skin, fat) normal and symmetric?
- Is there any obvious **muscle wasting**?
- **Pelvic alignment**
- Skin texture
- Scars indicating recent injury
- Is there any crepitus, snapping, or abnormal sound in the joints when the patient moves them?


62

- Is there any heat, swelling, or redness in the area being observed?
- What is the patient's facial expression? Does the patient appear to be apprehensive, in discomfort, or lacking sleep?
- Is the patient **willing to move**? Are patterns of movement normal? If not, how are they abnormal? Any alteration should be noted and included in the observation portion of the assessment

63

EXAMINATION

- Valid consent



Red Flags in Examination Indicating the Need for Medical Consultation⁵⁷

- Severe unremitting pain
- Pain unaffected by medication or position
- Severe night pain
- Severe pain with no history of injury
- Severe spasm
- Inability to urinate or hold urine
- Elevated temperature (especially if prolonged)
- Psychological overlay

64

- MSK Assessment
- ✓ Pt History
- ✓ Physical Examination.



65

PHYSICAL EXAMINATION

- The basic aims of the physical examination are
 - (1) to reproduce the patient's symptoms and
 - (2) to detect the level of dysfunction by provocation of the affected joint or tissues.
- Observation
- Inspection
- Selective tissue tension
- Neuromuscular tests
- Palpation
- Provocation tests
- Functional assessment
- Special tests
- Testing of related areas
- Other investigations

66

INSPECTION

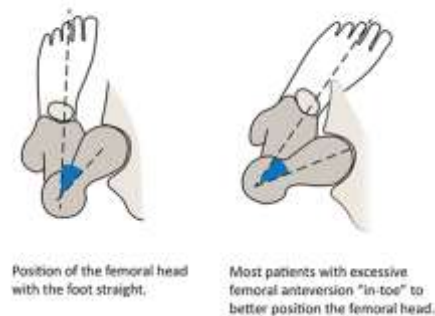
- The inspection part of the examination entails a closer assessment of the patient's physical status. It is usually performed in conjunction with palpation
- **BONY STRUCTURE AND ALIGNMENT :**
- Inspection of the bony structure and alignment is a critical component of the biomechanical examination.

67

****EXAMPLE

- A man with increased femoral antetorsion is likely to present with a loss of external rotation at the hip, but with respect to his structure, a decrease in average external rotation is normal.
- If a careful assessment of static alignment were not made, one might make the mistake of attempting to restore external rotation in this case.

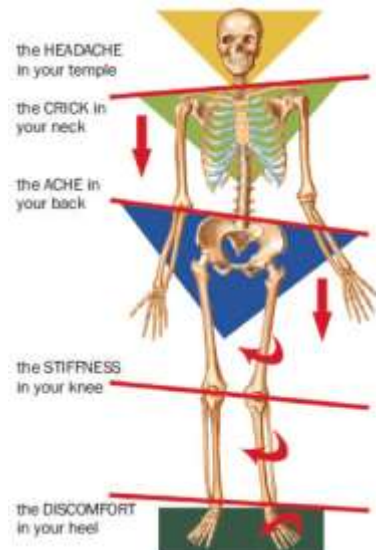
Excessive Femoral Anteversion



68

- Assessment of a particular part in which some pathologic lesion may exist should often include structural assessment of biomechanically related parts.
- In the case of a patient with a low back disorder, the clinician should examine the alignment of the lower limbs and vice versa. The same is true for the cervical spine and upper limbs.
- Each part should be assessed with respect to frontal, sagittal, and transverse planes

69



70

- Assessment of structural alignment is likewise of utmost importance following the healing of fractures.
- A person who has sustained a Colles' fracture invariably ends up with some residual angulation dorsally and radially; restoration of full wrist flexion and ulnar deviation should never be expected.
- Thus, structural assessment becomes important in planning treatment and in setting treatment goals



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71

INSPECTION :

1. BONY STRUCTURE & ALIGNMENT
2. SUBCUTANEOUS SOFT TISSUES

2. SUBCUTANEOUS SOFT TISSUES :

- The soft tissue is inspected and palpated for abnormalities. The examiner should look for swelling or increase in the size of an area, wasting or **atrophy** of the part, and alterations in the general contours of the region.
- When an increase in size is noted, an attempt should be made to distinguish the cause, whether **generalized edema**, articular effusion, **muscle hypertrophy**, or hypertrophic changes in other tissues.

72

- Measurements should be taken to document carefully soft tissue changes and to use as baseline measurements.
- **Volumetric** measurements of small parts, such as fingers, hands, and feet, can be made by measuring the displacement of water in a tub.
- Swelling or wasting elsewhere in an extremity can often be documented with circumferential measurements using a **tape measure**.

73

INSPECTION :

1. BONY STRUCTURE & ALIGNMENT
2. SUBCUTANEOUS SOFT TISSUES
3. SKIN AND NAILS

○ **SKIN AND NAILS :**

- Changes in color either from vascular changes accompanying inflammation (erythema) or vascular deficiency (pallor or cyanosis).
- Changes in texture and moisture:

These commonly accompany **reflex sympathetic dystrophy**, in which the sympathetic activity of the part becomes altered. Increased activity results in hyperhidrosis; smooth, glossy skin; cyanosis; atrophy of skin; and splitting of the nails.

Decreased sympathetic activity may result in pink, dry, scaly skin.

- Localized skin abnormalities

74

A 34-YEAR-OLD WOMAN WHOSE MEDICAL DIAGNOSIS WAS LOW BACK PAIN WAS REFERRED FOR OUTPATIENT PHYSICAL THERAPY

- On interview, the patient reported symptoms including pain in the coccyx area that increased after sitting for a prolonged period and then arising.
- She also reported pain in the buttocks and sacroiliac joint areas. The symptoms began 4 months earlier.
- She initially sought medical treatment for 2 months.
- Medical intervention at that point included radiographs of the pelvis that were unremarkable,
- a prescription for Vioxx to relieve pain, and a donut pillow for sitting.
- She continued to experience symptoms of pain, which made it difficult to sit.

75

- Systems Review: Vital signs were normal.
- Tests and Measures:

Observation revealed that the patient had a sitting posture of rounded shoulders, forward head tilt, and posterior pelvic tilt with most weight-bearing on the coccyx.

Palpation revealed trigger points over the area of the piriformis, gluteus maximus, and levator ani. Manual muscle testing of the hip complex was normal.

76

EVALUATION

- At the time of referral, a physician had diagnosed the patient with low back pain and recommended moist heat and ultrasound therapy to the lumbar and sacral spine and lumbar stabilization exercises.
- On physical therapy examination, signs and symptoms were consistent with coccygodynia (painful coccyx).
- Based on these findings, treatment of the lumbar spine was not an appropriate intervention.

77

□ MUSCULOSKELETAL ASSESSMENT

EXAMINATION



78

SELECTIVE TISSUE TENSION TESTS



JOINT TESTS :

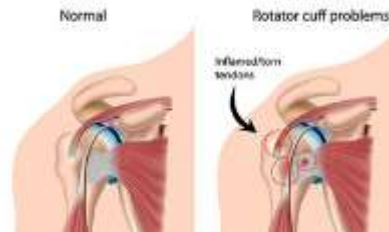
- Joint tests include active and passive physiologic movements of the joints and passive accessory movements underlying the symptoms and other relevant joints.
- Active movements : These yield very general information, relating primarily to the patient's **functional status**. They provide information **concerning the patient's general willingness and ability to use the part**.
- They offer no true indication of the range of motion or strength of a part.
- If a patient is asked to lift an arm overhead and only lifts it to horizontally, it cannot be determined at that point whether the loss of function is owing to pain, **weakness**, or **stiffness**.

79

THE FOLLOWING SHOULD BE NOTED AND DOCUMENTED FOR THE ACTIVE MOVEMENTS TESTED:

- A. The patient's account of the onset of, or increase in, pain associated with the movement, and at what point or points in the range of movement the pain occurs.
- ✓ The existence of a painful arc of movement is best detected on active, weight-bearing, or antigravity movements.

80



- A painful arc of movement, in which pain is felt throughout a small arc of movement in the midrange of motion, suggests an irritable structure being
 - (1) pulled across a protuberance or
 - (2) pinched between two structures.
- An example of the former is a nerve root pulled across a disk protrusion during straight-leg raises.
- An example of the latter is an inflamed supraspinatus tendon squeezed between the greater tuberosity and the acromial arch during abduction of the arm.

81

B. The **range of motion** through which the patient is able to move the part. This should be measured by some easily reproducible method

- C. The presence of **crepitus**. This can usually be best detected on active movement, with the forces of weight bearing or muscle contraction maintaining compression of joint surfaces.
- Crepitus usually indicates **roughening of joint surfaces** or increased friction between a tendon and its sheath because of **swelling or roughening** of either the tendon or the sheath.

82

CAPSULAR PATTERNS OF RESTRICTION INDICATE LOSS OF MOBILITY OF THE ENTIRE JOINT CAPSULE FROM FIBROSIS, EFFUSION, OR INFLAMMATION

- Only joints that are controlled by muscles have a capsular pattern.
- Thus, joints such as the tibiofibular and sacroiliac do not exhibit a capsular pattern.



83

JOINT(S)	PROPORTIONAL LIMITATIONS
Temporomandibular	Limitation of mouth opening
Upper cervical spine (occiput–C2)	
OA joint	Forward bending more limited than backward bending
AA joint	Restriction with rotation
Lower cervical spine (C3–T2)	Limitation of all motions except flexion (sidebending = rotation > backward bending)
Sternoclavicular	Full elevation limited; pain at extreme range of motion
Acromioclavicular	Full elevation limited; pain at extreme range of motion
Glenohumeral	Greater limitation of external rotation, followed by abduction and internal rotation
Humeroulnar	Loss of flexion > extension
Humeroradial	Loss of flexion > extension
Forearm	Equally restricted in pronation and supination in presence of elbow restriction
Proximal radioulnar	Limitation; pronation = supination
Distal radioulnar	Limitation; pronation = supination
Wrist	Limitation; flexion = extension
Midcarpal	Limitation equal all directions
Trapeziometacarpal	Limitation abduction > extension
Carpometacarpals II–V	Equally restricted all directions
Upper extremity digits	Limitation flexion > extension

84

PASSIVE MOVEMENTS



- Passive range of motion testing. The part is passively put through the major motions in the frontal, sagittal, and transverse planes that normally occur at the joint being moved.
- Very specific information concerning both the **nature and extent** of a disorder may be obtained by making the following assessments:
 - 1. **Range of movement**. The examiner should determine whether movement is **normal**, restricted, or **hyper-mobile**. The degree of any abnormal movements is measured carefully.
 - If there is restriction of movement at a joint, the first determination that should be made is **whether the restriction is in a capsular or noncapsular pattern**

85

a. Capsular patterns of restriction indicate loss of mobility of the entire joint capsule from fibrosis, effusion, or inflammation.

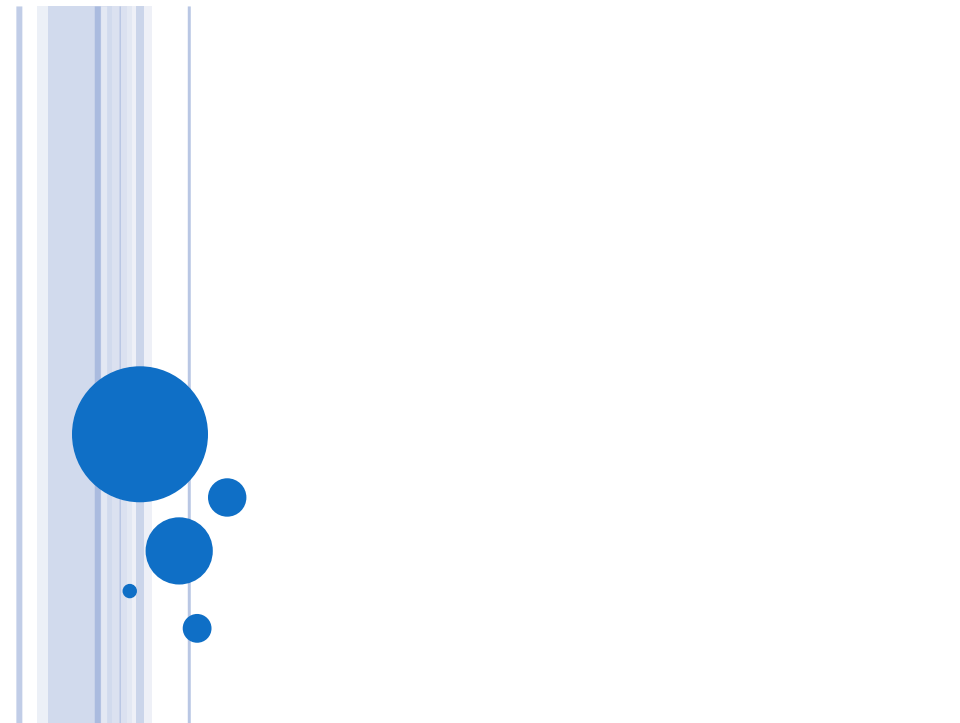
- Differentiation can be made by assessing the “end feel” at the extremes of movement.
- ✓ **Capsular restrictions typically accompany arthritis or degenerative joint disease (fibrosis, inflammation, or effusion) prolonged immobilization of a joint (fibrosis), or acute trauma to a joint (effusion).**
- **Only joints that are controlled by muscles have a capsular pattern. Thus, joints such as the tibiofibular and sacroiliac do not exhibit a capsular pattern**

86



- A 35 yrs old worker suffered a fall injury, 5 weeks ago, resulted in MCL sprain.
 - Sprain has healed clinically but Patient is unable to flex the injured knee beyond 90 Flex but Ext is wnl.
 - Comment on this in terms of ...?
- ✓ Tibiofemoral (knee) Flexion grossly limited;
slight limitation of Ext (Capsular Pattern)

87



88

NONCAPSULAR PATTERNS

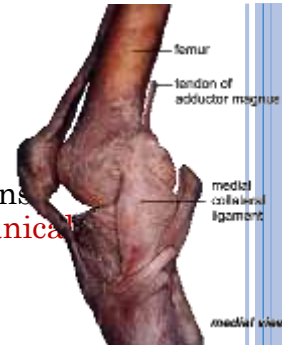
b. Noncapsular patterns of joint restrictions typically occur **with intra-articular mechanical blockage** or **extra-articular lesions**.

Common causes include:

i. Isolated ligamentous or capsular adhesion:

isolated ligamentous adhesion is that of **adherence of the medial collateral ligament** at the knee to the medial femoral condyle **during healing of a sprain**.

- This results in restriction of knee flexion to approximately 90°, with extension being of full range



89

ii. Internal derangements,

such as displacement of pieces of torn menisci and cartilaginous loose bodies.

These typically produce a mechanical block to movement in a noncapsular pattern.

The most common example is a **“bucket handle”** medial meniscus tear, resulting in **blockage of knee extension**, with **flexion remaining relatively free** in the absence of significant effusion.

90

iii. **Extra-articular tissue tightness**, such as reduced lengthening of muscles from contracture (fibrosis) or myositis ossificans.

iv. **Extra-articular inflammation or swellings**, such as those accompanying acute bursitis and neoplasms.

91

PASSIVE MOVEMENT

1.ROM

2.END FEEL

This is the quality of the resistance to movement that the examiner feels when coming to the end point of a particular movement.

Some end feels may be normal or pathologic, depending on the movement they accompany at a particular joint and the point in the range of movement at which they are felt.

Other end feels are strictly pathologic. The testing of end feel can be performed on both classic (osteokinematic) and accessory motions

92

CAPSULAR END FEEL

This is a firm, “leathery” feeling felt with a slight creep.

for example, when forcing the normal shoulder into full external rotation.

When felt in conjunction with a capsular pattern of restriction, and in the absence of significant inflammation or effusion, it indicates

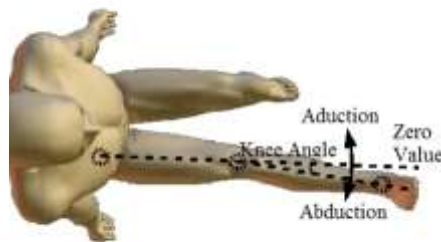
capsular fibrosis.



93

LIGAMENTOUS END FEEL

This is a firm end feel with no give or creep. An example of normal ligamentous end feel is abduction of the extended knee



94

BONY END FEEL

This feels abrupt, as when moving the normal elbow into full extension.

When accompanying a restriction of movement, it may suggest hypertrophic bony changes, such as those that occur with degenerative joint disease, or possible malunion of bony segments following healing of a fracture.



95

Soft tissue approximation end feel. This is a soft end feel, as when fully flexing the normal elbow or knee. It may accompany joint restriction in the presence of significant muscular hypertrophy

96

Muscular end feel. This more rubbery feel resembles what is felt at the extremes of straight-leg raising from tension on the hamstrings. It is less abrupt than a capsular end feel

97

PATHOLOGICAL END FEELS

Muscle-spasm end feel.

Movement is stopped fairly abruptly, perhaps with some “rebound,” owing to muscles contracting reflexively to prevent further movement.

It usually accompanies pain felt at the point of restriction.

When occurring with a capsular restriction, it indicates some degree of **synovial inflammation** of the portion of the joint capsule being stretched during the movement

98

Capsular (abnormal) end feel. The range of motion is obviously reduced, in a movement pattern characteristic for each joint

Internal derangement end feel. This is often a pronounced, springy rebound at the end point of movement. It typically accompanies a non capsular restriction from a mechanical block produced by a loose body or displaced meniscus.

99

EMPTY END FEEL

The examiner feels no restriction to movement, but movement is stopped at the insistence of the patient because of severe pain. This end feel is relatively rare except with **acute bursitis at the shoulder** or a few other painful extra-articular lesions such as **neoplasms**.

100

SIXTH LECTURE

○ Review Of SELECTIVE TISSUE TENSION TEST cont..

- Active Movements
 - Crepitus
- Passive movements
 - Pattern of movement restriction
 - End Feel (quality of resistance to movement)

- ☐ Muscle Spasm End Feel (abrupt stop in ROM d/t Pain)
- ☐ Capsular End Feel
- ☐ Internal Derangement
- ☐ Empty (acute bursitis + neoplasm)

- DJD (inflammation)
- Acute Jt trauma (Effusion)
- Prolong Immobilization (Fibrosis)

- ✓ Ligament / capsular adhesions
- ✓ Internal derangements
- ✓ Extra articular tissue tightness
- ✓ Ext articular Inflammation

- ❖ Capsule
- ❖ Ligamentous
- ❖ Bony
- ❖ Soft tissue approximation
- ❖ Muscular (SLR)

101

PAIN ON MOVEMENT AND THE POINT IN THE RANGE IN WHICH IT IS FELT

- Pain at the extremes of a movement indicates:
 - i. A painful structure is being stretched

If the lesion lies in a muscle or tendon, resistance to the movement opposite the direction of the painful passive movement will be painful, whereas with capsuloligamentous lesions resisted movements are painless



102

- A painful structure is being **squeezed**
Occur with Ext Articulr e.g. tendon / bursa

- Subdeltoid impingement beneath acromion
- Squeeze sub trochanteric bursa in hip Abd



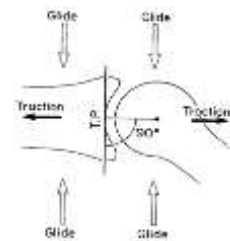
- A painful arc may occur with passive movement tests.

103

PASSIVE JOINT PLAY MOVEMENTS

The treatment plane is at right angles to a line drawn from the axis of rotation to the Center of the concave articulating surface and lies in the concave surface.

Passively moving either bone in a direction perpendicular to the treatment plane constitutes a **traction** or distraction joint-play assessment, and moving either bone in a direction parallel to the treatment plane constitutes a **gliding** or oscillation joint-play assessment.



104

Joint-play movement should be assessed in the **loose (resting) position** in which laxity of capsule and ligaments is greatest and there is the least bone contact (minimal congruency between the articular surfaces).

The greatest amount of joint play is available in the resting position that is usually considered in the midrange, or it may be just outside the range of pain and spasm (position of most comfort).

105

If joint motion is to be avoided, the close-packed position can be used. For example, the spinal segments above and below a segment to be mobilized may be “locked” into a close-packed position in order to isolate the mobilizing force to a particular level. Generally speaking, **rotation will cause a close-packed position.**

106

RESTING JOINT POSITIONS

JOINT(S)	POSITION
Vertebral	Midway between flexion and extension
Temporomandibular	Jaw slightly open (freeway space)
Sternoclavicular	Arm resting by side
Acromioclavicular	Arm resting by side
Glenohumeral	55–70° abduction; 30° horizontal adduction; neutral rotation
Elbow	
Humeroulnar	70° flexion and 10° supination
Humeroradial	Full extension and supination
Forearm	
Proximal radioulnar	70° flexion and 35° supination
Distal radioulnar	10° supination
Radioulnocarpal	Neutral with slight ulnar deviation
Hand	
Midcarpal	Neutral with slight flexion and ulnar deviation
Carpometacarpal (2 through 5)	Midway between flexion/extension, midflexion, and midextension
Trapeziometacarpal	Midway between flexion/extension and between abduction/adduction
Metacarpophalangeal	First MCP joint: slight flexion
Hip	30° flexion, 30° abduction, and slight lateral rotation
Knee	25° flexion
Ankle/Foot	
Talocrural	Midinversion/eversion and 10° plantar flexion
Subtalar and midtarsal	Midway between extremes of range of motion with 10° plantar flexion
Tarsometatarsal	Midway between supination and pronation
Toes	
Metatarsophalangeal	Neutral (extension 10°)
Interphalangeal	Slight flexion

107

CLOSE PACK POSITION

JOINT(S)	POSITION
Vertebral	Maximal extension
Temporomandibular	Maximal retrusion (mouth closed with teeth clenched) or maximal anterior position (mouth maximally opened)
Glenohumeral	Maximum abduction and external rotation
Sternoclavicular	Arm maximally elevated
Acromioclavicular	Arm abducted 90°
Elbow	
Humeroulnar	Full extension and supination
Humeroradial	90° flexion, 5° supination
Forearm	
Proximal radioulnar	5° supination, full extension
Distal radioulnar	5° supination
Radiocarpal	Full extension with radial deviation
Hand	
Midcarpal	Full extension
Carpometacarpal	Full opposition
Trapeziometacarpal	Full opposition
Metacarpophalangeal	First MCP: full extension
Interphalangeal	Full extension
Hip	Ligamentous: full extension, abduction, and internal rotation Bony: 90° flexion, slight abduction, and slight external rotation
Knee	Full extension and external rotation
Ankle/Foot	
Talocrural	Full dorsiflexion
Subtalar	Full inversion
Midtarsal	Full supination
Tarsometatarsal	Full supination
Toes	
Metatarsophalangeal	Full extension
Interphalangeal	Full extension

108

GRADING ACCESSORY JOINT MOVEMENT

GRADE	JOINT STATUS
0	Ankylosed
1	Considerable hypomobility
2	Slight hypomobility
3	Normal
4	Slight hypermobility
5	Considerable hypermobility
6	Unstable

109

MUSCLES PRONE TO TIGHTNESS (MAINLY POSTURAL [TONIC] FUNCTION)	
Sternocleidomastoid	Hip flexor
Scalenes	Iliopsoas
Levator scapulae	Tensor fasciae latae
Pectoralis major (clavicular/sternal end)	Rectus femoris
Trapezius (upper part)	Lateral hip rotators
Flexors of the upper limb	Piriformis
Quadratus lumborum	Short hip adductors
Back extensors	Hamstrings
Erector spinae	Plantar flexors
Longissimus thoracis	Gastrocnemius
Rotatores	Soleus
Multifidus	Tibialis posterior

110

MUSCLES PRONE TO WEAKNESS (MAINLY DYNAMIC [PHASIC] FUNCTION)

Short cervical flexors	Rectus abdominus
Pectoralis major (abdominal part)	External/internal oblique
Trapezius (lower part)	Gluteus maximus
Rhomboids	Gluteus medius and minimus
Serratus anterior	Vastus medialis and lateralis
Subscapularis	Tibialis anterior
Extensors of upper limb	Peronei

111

ISOMETRIC MUSCLE TESTING

There are four possible findings on resisted movement tests:

- A. **Strong and painless**—There is no lesion or neurologic deficit involving the muscle or tendon tested.
- B. **Strong and painful**—A **minor lesion** of the tested tendon or muscle exists; usually the tendon is at fault.
- C. **Weak and painless**.

There may be some interruption of the nerve supply to the muscle tested.

- 2. There may be a complete rupture of tendon or muscle.

- D. **Weak and painful**

Partial rupture of Muscle

112

- Neuromuscular tests Dermatome ,Reflexes ,
Myotomes :refer to neurological PT for further investigations
- NEURAL EXTENSIBILITY TEST (MOBILITY OF THE NERVOUS SYSTEM)

SEGMENTS	KEY MOVEMENTS TO TEST
C1	Upper cervical flexion
C2	Upper cervical extension
C3	Cervical side flexion
C4	Shoulder elevation, diaphragmatic function
C5	Shoulder abduction, external rotation
C6	Elbow flexion, wrist extension
C7	Elbow extension, wrist flexion
C8	Thumb extension
T1	Finger adduction
L2	Hip flexion
L3	Knee extension, hip flexion
L4	Ankle dorsiflexion, knee extension
L5	Extension of the big toe, ankle dorsiflexion
S1	Hip extension, contraction of buttock
S2	Toe standing, ankle plantar flexion

113

PALPATION

Palpation tests are usually conveniently performed at the same time as the inspection tests.

Tests are organized according to layers, assessing the status of the skin, subcutaneous soft tissues, and bony structures (including tendon and ligament attachments).

Significant findings are documented.

114

Skin

- Tenderness
- Moisture & texture
- Temperature
- Mobility

Bony Structures :

- Tenderness
- Enlargement
- Structural Malalignments

115

PROVOCATION TESTS

- Provocation tests (auxiliary tests) are used only when no symptoms have been produced by full active movements and other selective tissue tension tests.
 - Over Pressure at the End of AROM or PROM
 - Avoidance of End range Symptoms by the Pt
 - Repeated active motions and repeated motions at various speeds and sustained pressures.
 - In case of failure by using gentle overpressure / repeated movements then greater stress on the structure by combined movements.
- e.g. Quadrant test in spine

116

SPECIAL TESTS

- vascular tests,
- respiratory tests,
- tests for intermittent claudication,
- measurement for muscle bulk or edema,
- tests of bony deformities or soft tissues (such as ligamentous laxity or meniscal tears in the knee).
- Other tests may include tests for malingering or nonorganic pain.

117

EXAMINATION OF RELATED AREAS

- when assessing the lumbar spine, one may need to consider the sacroiliac or hip joint instead of, or in addition to, the spine.
- a herniated cervical disk may radiate pain to the shoulder or scapula,
- an elbow or distal humeral pathologies can radiate pain proximally (uncommon),
- myocardial infarction may radiate pain to the left shoulder.
- Shoulder symptoms may also be related to irritation of the diaphragm,
- A general physical examination including the chest may be necessary.

118

FUNCTIONAL ASSESSMENT

An important role in assessment of Pt.

Common functional tests carried out at this point for the lower quadrant include gait analysis, stair climbing, lifting, balance reach, single-leg squat excursions, and lunge distance.

After any examination, the patient should always be warned of the possibilities of exacerbation of symptoms as a result of the assessment.

119

OTHER INVESTIGATIONS

- Radiographic Investigations

120

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Partial rupture of Muscle

121



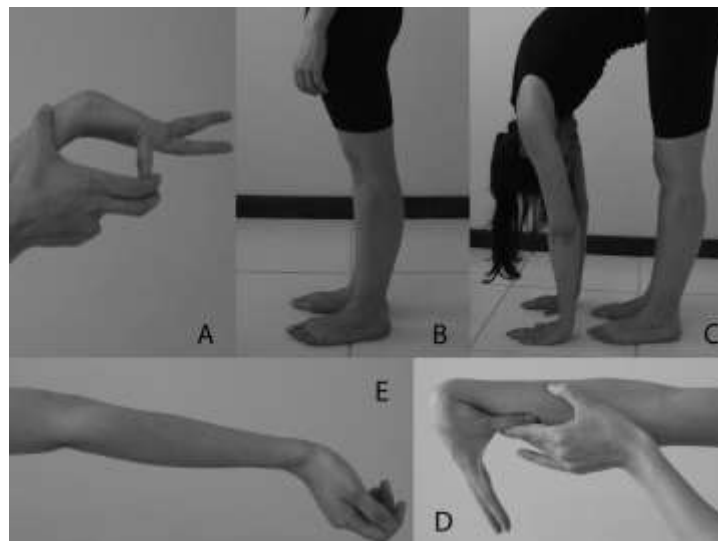
122

BEIGHTON SCORE (BEIGHTON ET AL. 1973)

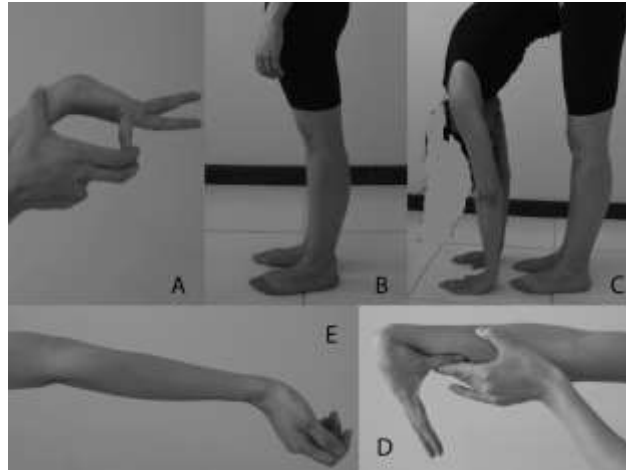
The Beighton score is a 9-point scale with points awarded for 5 manoeuvres (1 point for each joint). Patients scoring 4 out of 9 or more are considered to have hypermobility syndrome.

Passive dorsiflexion of little fingers beyond 90°
Passive apposition of the thumbs to the flexor aspects of the forearm
Hyperextension of the elbows beyond 10°
Hyperextension of the knees beyond 10°
Forward flexion of the trunk with knees straight so that palms rest easily of the floor.

123



124

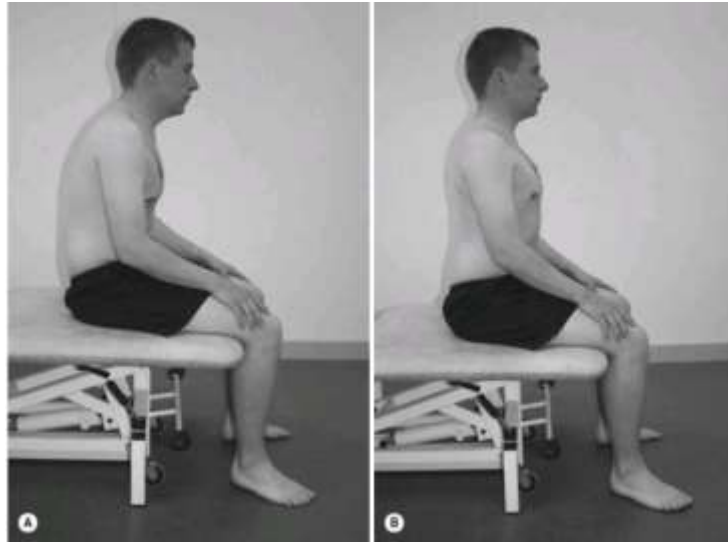


125

LINK OF CERVICAL PAIN WITH PELVIC TILT



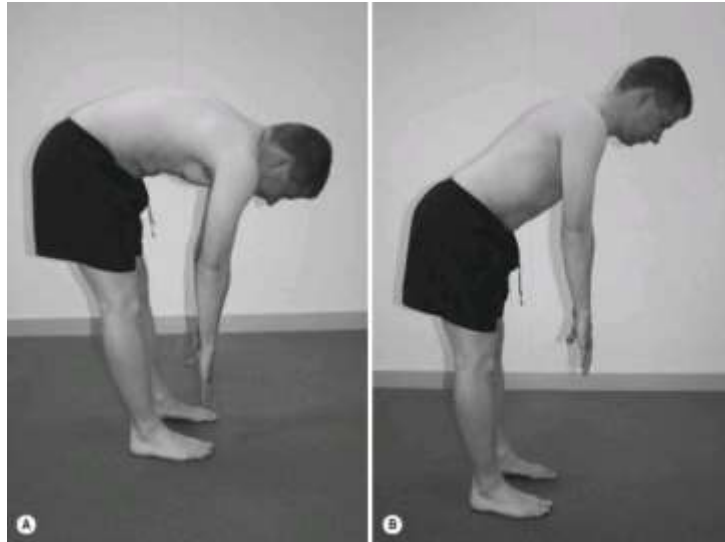
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127

- A patient with neck pain when sitting, for example, may be observed to have an extended cervical spine and forward head posture as well as holding the pelvis in posterior pelvic tilt.
- When the clinician corrects this posture to determine its relevance to the patient's problem, by guiding the pelvis into anterior pelvic tilt, the forward head posture may be lessened and the neck pain reduced

128



129

HABITUAL MOVEMENT PATTERN

- An example of habitual movement pattern may be a patient with lumbar spine pain who has pain on bending forwards. The patient may flex predominantly at the lumbar spine or predominantly at the hips.
- If movement mainly occurs at the lumbar spine then this region may be found to be hypermobile and the region where movement is least may be found to be hypomobile

130

REACTION OF MUSCLES TO STRESS (JULL & JANDA 1987; JANDA 1994; COMERFORD & KINETIC CONTROL 2000)

Muscles prone to become tight	Muscles prone to become weak
Masseter, temporalis, digastric and suboccipital muscles, levator scapulae, rhomboid major and minor, upper trapezius, sternocleidomastoid, pectoralis major and minor scalenes, flexors of the upper limb, erector spinae (particularly thoracolumbar and cervical parts), quadratus lumborum, piriformis, tensor fasciae latae, rectus femoris, hamstrings, short hip adductors, tibialis posterior, gastrocnemius	Serratus anterior, middle and lower fibres of trapezius, deep neck flexors, mylohyoid, subscapularis, extensors of upper limb, gluteus maximus, medius and minimus, deep lumbar multifidus, iliopsoas, vastus medialis and lateralis, tibialis anterior and peronei