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## CLINICAL EXAMINATION AND THE PHYSIOTHERAPIST

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Physiotherapists have been criticized at times on the grounds that some of their treatments are unscientific, palliative in nature or of psychological benefit only. This criticism has stimulated many of us to improve methods of physical examination so that treatment can be accurately applied to the structure at fault. Detailed examination and the ability to interpret findings are also essential in the assessment of progress and the modifications of treatment that may be required.

In this Department students are first taught the general principles of how to examine a patient; this is followed by instruction in the detailed examination of certain systems of the body and in particular the musculo-skeletal system. The ability to assess accurately restriction of joint function in the different spinal joints is considered to be as important as in peripheral joints.

Although this paper is intended to present the general principles of examination as applied to the musculo-skeletal system, some reference will be made to the cardiovascular and respiratory systems where signs and symptoms might be confusing to a student.

Examination of the patient is taught as follows:

- I. Subjective Examination.
- II. Objective Examination.

### SUBJECTIVE EXAMINATION

This comprises the patient's account of his present pain and/or disability and the history of the complaint.

1. *Case-Notes and X-Ray reports* are read.
2. *Pain.*

This is the symptom which most often prompts a patient to seek treatment and a great deal can be learnt about pain.

#### (a) Severity

Reliable assessment of pain is essential as a guide to treatment techniques and progress, but accurate measurement is impossible because of the subjective nature of pain. However severe pain can produce certain signs such as muscle spasm, postural attitudes, limb withdrawal, changes in respiratory rate and depth, pallor, faintness and sweating. There is a wide variation of pain tolerance between individuals but severe pain is usually reflected in the facial expression. Equally, it is reasonable to assume that existing pain is not severe in a person who smiles and moves in a relaxed manner and at the same time describes the pain he is feeling as "agonizing".

Trigeminal neuralgia, pleurisy, and the presence of renal or gall stones are some of the conditions which can give severe pain.

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Although lesions of certain thoracic spinal joints can give pain with similar distribution to gall bladder disturbance, the pain is usually not as severe, and the patient does not roll about the bed groaning; in addition careful examination of vertebral movement will show localized joint restriction.

Muscle ischaemia, for example, anginal pain, or severe calf pain, can cause severe pain which may mimic skeletal pain.

Some patients describe their pain as severe merely because it is present constantly; the patient's appearance and behaviour while he has the pain is of some assistance in assessing the degree of pain.

#### (b) Nature

The patient is asked to describe his pain. Pain arising in the skin and only present for a short time is more likely to be pricking in nature—if the sensation is prolonged the pain is more burning in nature (*e.g.* finger lacerations, scars, Herpes Zoster).

Pain arising in deep structures is a more diffuse aching sensation which the patient often describes as "like deep toothache", or a "gnawing, aching pain deep in the bone" (pain from an osteo-arthritis hip or a pulpy disc protrusion is frequently described in this way).

Pain may be sharp, stabbing or catching as with acute low back strain; or throbbing where an inflammatory process of bacterial origin is present, for example, sequestrum of bone, osteomyelitis.

#### (c) Site and radiation

The patient is asked to indicate as accurately as possible the area where the pain is felt and this area is drawn in on a body chart.

Localization of pain is more accurate in structures from which sensory stimuli are frequently relayed to consciousness such as the palmar surface of the hand.

Pain felt in the trunk is less readily localized as is visceral pain, with one or two exceptions.

Radiation of pain from the main site may be due to:

- (i) Progression of the causative disease.

- (ii) Referred pain—deep pain may be felt in, or radiate to, areas away from the main site. For example, pain from hip joint pathology may be felt in the hip and/or knee.

The distribution of the pain in relation to dermatomes, myotomes and sclerotomes is noted.

#### (d) Duration and frequency

The pain may be fleeting or it may last some hours (*e.g.* aching after chewing when the temporomandibular joint lacks full mobility).

Ischaemic calf pain brought on by walking usually disappears in 2-3 minutes if the patient stands still.

Pain and aching in osteo-arthritis joints often results when activity is first commenced; it tends to recede after loosening up activities, returns later in the day when the patient is fatigued, is relieved by bed rest in the first part of the night but re-occurs in the early hours of the morning owing to resting stiffness. Minor joint sprains, restrictions of movement and degeneration may follow a similar pattern.

Migraine may be present for some hours or days.

The pain of Herpes Zoster tends to be protracted with little variation in intensity and is not appreciably affected by posture or activity.

The pain may occur at regular or irregular intervals one or more times per day, or there may be weeks or even months between attacks. A constant pattern may emerge—for example, that the pain occurs in the morning, afternoon or evening; headache from arterial hypertension is often present on waking.

The menstrual cycle may have some bearing; in the 7-10 days preceding menstruation there is fluid retention in the body which frequently causes symptoms of headache and irritability. Nasal and sinus congestion, increased aching and stiffness in structures already giving symptoms (*e.g.* knees, lower back, varicose veins) are also common at this time.

## (e) Factors which aggravate pain

Posture may significantly affect pain. For example, sitting for a long period immediately after a meal, lying flat or bending over may cause pain and reflux of stomach contents if a hiatal hernia is present; driving long distances, or confinement to bed in a semi-propped-up position can aggravate lumbar and sciatic pain.

If a patient blames a particular incident or a regular activity for his pain this must be verified—sometimes the incident is found to be co-incidental. For example: a man who was gardening felt sudden pain in the upper back which radiated to the front of the chest and was followed by mild shortness of breath. He told his doctor that he had hurt his back gardening, and was sent for physiotherapy. He was found to have restriction of thoracic cage movement more marked on one side than the other, and increased breathlessness lying flat. Lesions of the thoracic spine do not cause increased breathlessness when the patient lies down unless there is some other factor such as cardiac failure. This breathlessness and decreased movement was noticed by the physiotherapist, and the patient was referred back to the doctor. He was found to have a ruptured bullous on the lung surface with a slow air leak into the pleural space.

Fatigue tends to aggravate pain in many conditions. Hot weather can help some conditions and make others worse: rheumatic type conditions are worse in winter than summer whereas certain neurological conditions such as disseminated sclerosis show greater muscle weakness in summer.

Joint pain can be increased by sudden changes in barometric pressure—rheumatoid joints and sensitive maxillary and frontal sinuses react readily to barometric changes.

Often the patient can readily indicate some form of activity which regularly aggravates the pain. If he cannot offer any suggestions he may be asked if he can put himself into any position lying, standing, sitting or bending that will make his pain worse. If he then demonstrates such a position, one can carefully note the position of the involved

structure, as it may well be a guide to treatment, assessment, support, or advice given to the patient.

## (f) Factors which relieve pain

These factors can be made use of in treatment. After fractures of the os calcis, metatarsals or ankle, patients frequently say "I have less pain and walk better in my slippers". This is usually because the slipper sole is softer and more resilient, causing less jarring; it substitutes to a small degree for the loss of joint mobility in the foot. A sponge rubber insole with an extra layer where the heel rests will relieve pain and enable better gait—which in turn reduces oedema, mobilizes the joints and further relieves pain.

Wearing a "roll-on" or elastic girdle may relieve pain. Applying superficial heat to the part—bath, shower or hot water bottle—may relieve pain for a few hours (this type of pain frequently responds well to passive mobilizing techniques).

Sitting in an upright chair supports and relieves aching in the lumbar spine, whereas aching in the dorsal or cervical area is relieved by a chair with a long sloping back which supports the whole weight of the upper trunk and head allowing the musculature to relax.

A light supporting bandage, or elevation of the part may relieve pain. Stretching or rubbing the part may relieve muscle cramps.

If the patient insists that nothing aggravates or relieves the pain then the cause is likely to be found in the central nervous system or to be psychogenic.

## (g) Pain provocation

Pain may be easily provoked and, if so, it is necessary to know how bad this pain is, and how long it lasts. This is an important factor in determining the treatment techniques to be used and how they are applied.

## (h) Alteration of intensity

Enquire whether the pain has become worse or improved over the last week.

3. *Stiffness.*

Is it present? When is it most troublesome? Does it prevent any activities? Is it getting worse? Does the joint lock or give way?

4. *Effusion.*

Is this present? Is it present all the time? How quickly did it come after injury (if there were injury)? How quickly does it come after activity?

5. *Associated Symptoms*

Does the part feel weak, heavy, cold, numb, full, tingling? Is there any breathlessness, oppression in the head or chest, nausea, vomiting, disturbance of gait, dizziness, incontinence, visual disturbance, weight loss?

6. *History of the present attack.*

This is purposely left until near the end of the subjective examination because it is easy to be misled and to jump to false conclusions.

7. *History of any previous episode or related condition.*

Note the effects of previous treatment.

8. *Medication at present.*

What medication, if any, has been prescribed.

When the above information has been obtained one can then plan how the objective examination will be carried out by listing:—

- (a) those joints and muscles which must be examined as a possible source of pain;
- (b) all other factors which must be considered or examined (muscle imbalance, shortening, etc.);
- (c) joint irritability—whether this gives the impression of being mild, moderate or severe.

## OBJECTIVE EXAMINATION

*Observation*1. *Posture*

The posture of the part, the whole body, the way of moving and the gait, should be studied.

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2. *Asymmetry*

Altered contour or asymmetry may denote such conditions as the bony enlargement of a joint, the presence of effusion; the extrusion of a pin or bending of a femoral plate; the wedging of thoracic vertebrae, giving increased kyphosis, or collapse of a vertebra causing local kyphosis. The contour, posture and movements of the chest may be informative. For example, the patient with emphysema usually shows over-inflation of the upper chest, over-use of the accessory neck muscles, prolonged noisy expiration, and a wide flared costal margin. A sub-diaphragmatic abscess also causes a wide costal margin but the lower ribs are immobile and the patient has a swinging temperature. Ascites may cause costal margin flaring with poor basal respiratory movement but the swelling is readily observed and felt in the abdomen. Unilateral scarring, certain lung diseases or collapse can cause flattening of an area of chest wall, lack of inspiratory movement with, sometimes, scoliosis concave to the affected side.

3. *Colour Changes*

Pigment may be present in the skin—brown or brownish-black pigment is common with venous and cardiac insufficiency.

The skin may appear red from irritative conditions such as eczema and dermatitis, inflammatory cellulitis or an inflammatory reaction to bacterial invasion or the presence of a foreign body.

The rubor of arterial insufficiency is readily detected when the limb is hung down as is the slow blanching that occurs when the limb is elevated.

New grafts and scars tend to be red then gradually become bluish and finally fade to white. Bruising may gravitate to the surface on the upper inner arm or thigh after fractures around the neck of the humerus or femur, or on either side of the tendo-achilles from calf bleeding. Ecchymosis is common under the skin of elderly patients or in patients where the blood clotting factors are altered.

Colour changes show readily in the face although artificial lighting may partially mask them. For example, pale complexion

seen in anaemia, fear or shock; florid complexion in people with high blood pressure; greyish tinge in heavy smokers; blue tinge across nose, cheeks and lips in central cyanosis.

Blueness of hands is seen in the presence of vaso spasm, and in limbs which are badly paresed, with consequent poor circulatory interchange.

#### 4. *Oedema*

Note whether oedema is localized or gravitational.

#### 5. *Trophic Changes*

Dry, scaly skin is noted after immobilisation and following peripheral nerve lesions.

Papery, shiny skin with ridged or thickened nails and diminution or loss of hair is seen in arterial insufficiency and general debility.

Dry skin with excessive wrinkling as the finger is dragged along it is seen in dehydration or recent marked weight loss.

Look for hyperkeratosis.

#### 6. *Breathlessness*

Note the presence of breathlessness, excessive sweating or cough.

### *Palpation*

#### 1. *Outline*

Irregularities of shape or position may be felt that are not otherwise apparent.

#### 2. *Temperature*

Heat indicates increased metabolism in the area.

In arterial insufficiency a clear line of demarcation is felt where the temperature drops suddenly when the examiner's hand is moved down the limb. On a normal limb there is a gradual drop in temperature from proximal to distal.

A local cyanosed area is usually cold, whereas in central cyanosis from poor oxygen uptake in the lungs, the part looks blue but feels normal in temperature.

#### 3. *Tissue Tension*

Primary or referred pain can cause tension and tenderness felt in the area of pain which is easily detectable with stretching strokes along the plane of the skin and subcutaneous tissues.

#### 4. *Tenderness*

Tenderness can be noted over the site of an inflamed vein or thrombus; in tissues with increased tissue tension or over soft tissue lesions; and over certain body prominences such as the spinous processes or the tibia when tapped lightly with a reflex hammer.

#### 5. *Spasm*

Discussed later.

#### 6. *Swelling*

Swelling may fluctuate from one area to another when compressed, *e.g.*, fluid in the suprapatella pouch of knee joint. It may be firm and rubbery as with a haematoma. It may be indurated as with long standing venous back pressure in the legs, or pitting in nature in the presence of extracellular fluid as a result of congestive cardiac failure, renal disease or thrombosis of a deep vein in the leg.

A combination of induration and pitting usually occurs in patients with venous ulceration.

#### 7. *Pulses*

The presence or absence of the dorsal pedal and posterior tibial pulses should be noted, especially if the patient has calf pain on activity or has been ordered short wave diathermy or infra red to any area below the knee. The volume, regularity, and speed of the radial pulse should also be checked together with any breathlessness or blueness if the patient is to have short wave to abdomen or thorax or strenuous exercises.

#### 8. *Incompetent Perforator Veins*

Such veins may be felt (and often seen) as small local bulges on the medial side of the lower leg just behind the posterior border of the tibia, when the patient is erect. When the leg is elevated the bulge disappears and

instead a small depression where the vein has stretched the opening through the deep fascia is felt.

#### 9. *Sensation*

Sensation to pinprick and to light touch with a wisp of cotton wool may be conveniently tested at this stage of the examination.

#### *Active Movements*

##### 1. *Function of the part and the patient's willingness to move.*

Ranges observed can be mentally noted and compared later with the passive ranges, e.g. a patient who walks with a reasonable stride but refuses to allow his leg to be raised a few inches off the bed in supine is suspect. A patient who pushed his arm readily down his sleeve but will not allow the elbow to be passively extended to the same range also falls under suspicion.

##### 2. *Alteration in the way the movement is performed.*

An unskilled assessment of, for example, neck rotation may give the impression that it is equal in range on both sides. A closer look may show that on the painful side the pattern of movement has changed at the point where pain is felt, and has been pivoted to a neighboring joint or to a different component of movement of the same joint.

The ability to touch the toes in standing is often assumed to indicate full lumbar flexion whereas the trained eye may observe an area of lumbar restriction with compensatory excessive mobility of the other spinal joints and compensatory lengthening of the hamstrings.

##### 3. *Muscle spasm.*

In middle and upper lumbar joint restrictions the action of the erector spinae when the trunk is side flexed to alternate sides shows muscle spasm very clearly. Muscle spasm around the shoulder girdle in painful conditions of the gleno-humeral joint is also readily observed. Any evidence of spasticity would lead to further neurological examination for other signs, such as exaggerated tendon jerks.

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##### 4. *Faulty co-ordination of movement.*

If co-ordination is found to be impaired further neurological tests would also be carried out.

##### 5. *Resisted static muscle contraction*

Resisted static muscle contraction indicates the ability of the muscle to contract strongly and painlessly against resistance without joint movement. Implication of joint structures cannot be completely excluded, as the strong muscle tension applies compression to one aspect of the joint or may put considerable tension on the capsule through contraction of a muscle which blends with, or passes close to the capsule. However if the test is strongly positive and full passive stretch of the muscle is painful a lesion of muscle is likely.

This test may have to be carried out in different part of the range, e.g. resisted static quadriceps contraction may be painless with the knee flexed to 45° but may be very painful performed close to the fully extended position.

Resisted static contractions may be:

- (a) strong and painless, indicating a normal muscle;
- (b) weak and painless, which may indicate disuse, atrophy, muscle rupture, or partial nerve palsy.

Where one muscle or muscle group is found to be considerably weaker than other muscles controlling the joint in the absence of increased pain on static contraction, objective neurological signs such as loss of sensation, loss or exaggeration of reflexes, decreased or increased muscle tone should be sought in case nerve root or cord pressure has occurred.

- (c) moderately strong but painful, indicating mild tendinitis or relayed tension *via* the contracting muscle on an inflamed capsule as previously mentioned.
- (d) weak and painful, indicating severe lesion of muscle, tendon or tendon sheath.

### Passive Movements

These movements include the usual movements of the joint as well as combinations of movement and accessory gliding movements which are not under the patient's active control.

Passive movements indicate the mobility of the joint and periarticular structures while the patient is relaxed; they may also be used to test the painless full length of a muscle or nerve (*e.g.* straight leg raising).

During passive tests some or all of the following signs may be elicited:—

#### 1. *Crepitus*

Crepitus may be felt as the knee is passively flexed and extended, indicating degeneration of cartilage between the tibia and femur. It is usually painless when elicited off weight bearing.

Painful crepitus is frequently felt when the patella is pressed against the femur and glided passively in different directions as in the presence of patello-femoral arthritis.

#### 2. *Limitation of range*

Limitation of range, if present, is frequently less limited than the active range.

#### 3. *Muscle spasm*

Muscle spasm is usually protective in nature and may be:

- (a) Unsustained—present only at the painful extremes of motion or throughout a painful arc. It can be partially relaxed voluntarily and is not usually associated with severe constant pain. The affected joint can be safely and effectively mobilised passively or with active exercises in the presence of this type of spasm.
- (b) Sustained — sustained and marked spasm of superficial and deep muscle groups is not influenced by voluntary effort or comfortable positioning. It indicates more severe joint pathology or that the lesion is acute. The condition is likely to be made worse by movement, and is usually better left to settle on drugs, rest and perhaps

heat. This spasm can be readily felt in the small deep muscles of the back especially in cases of nuclear protrusion.

#### 4. *“End feel”*

It is important to try to analyse the “end feel” of any passive movement.

- (a) Tight springiness (with or without muscle spasm) indicates adaptive shortening of soft tissues and joint restriction and is likely to respond fairly readily to techniques for increasing range.
- (b) A hard, unyielding resistance, without spring and without spasm, indicates a bone block, dense adhesions, or dense scarring. It is unlikely to respond much to physiotherapy techniques.
- (c) A sudden halt with marked spasm is met with where there is painful pinching or stretching of an inflamed structure or mechanical derangement in the joint. This type of resistance will respond to contract-relax and hold-relax techniques and to passive mobilizing done carefully and just at the point of discomfort rather than pain.

If the patient lies prone and the knee is flexed limitation of flexion could be due to loss of length in the quadriceps, in which case tight springiness will be felt, or to loss of mobility of the femoral nerve which is on stretch in this position, in which case sudden spasm will be felt to prevent further knee flexion. In either instance flexion of the knee with a flexed hip could be full and painless.

### INTERPRETATION

When a full examination has been carried out interpretation of the signs and symptoms is usually possible and the technique which is most likely to help the condition at its present stage can be selected.

Objective improvements or deterioration is readily assessed at later treatments. The relevant objective examination must be carried out at each treatment and in some cases several times during treatment (*e.g.* in manipulation of the spine).

## CONCLUSIONS

We must be able to examine expertly and apply our knowledge intelligently in treatment for the mutual benefit of the patient and the physiotherapy profession. This necessitates a highly developed capacity for observing, and for palpation; a thorough understanding of the anatomy of the part, especially as related to function; and a systematic and painstaking approach to detail.

## SUMMARY

1. The value of adequate examination in relation to pain has been emphasized.
2. A general method of examination for the musculo-skeletal system has been

outlined with some reference to cardiovascular and respiratory signs and symptoms which may have bearing on pain or choice of treatment.

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