THE IMPORTANCE OF EXAMINATION FOR INTERVERTEBRAL JOINT MOVEMENT

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Examination for the movements which take place at the intervertebral joints is done to assess changes in the range of motion from the normal, that is, either a lessening or an increase of movement. Why is intervertebral movement, as distinct from spinal movement, looked for, and how are the findings interpreted? These questions must be answered before discussing methods of examination because without the ability to interpret the findings, the examination is valueless.

It may be felt that this aspect of examining the spinal column is new, but in principle this is not so. Examination of joint movement is fundamental to physiotherapy, although its application to the individual vertebrae may not have been considered. Actually it is no less important, nor, for that matter, any more important, than the examination of movement in the foot, shoulder, or any other joint, nor is the examination any more complicated.

The intervertebral joint is capable of certain movements, and symptoms may arise when there is an alteration of its normal range. These symptoms could be expected to be similar in type to those found when other joints of the body are affected in the same way. Unfortunately, when one thinks of symptoms arising from the spine, the disc immediately comes to mind and tends to overwhelm other possibilities. It is obvious that symptoms, both local and referred, may arise from lesions of the intervertebral disc, but the articulation between two vertebrae also includes synovial joints.

The Anatomy of an Intervertebral Joint

Each vertebra consists of a body in front and a vertebral arch behind, which is formed by a pedicle and lamina on each side. Superior and inferior articular facets project from this vertebral arch at the junction of the pedicles and laminae. The articulation of the inferior articular facets of one vertebra with the superior articular facets of the vertebra below form the apophyseal joints.

Although the facets face different directions at different levels of the spine, the superior ones mostly have a backward-facing component. The intervertebral foramen is formed by the vertebral notches of adjacent vertebrae, and lies anterior to the apophyseal joint. The transverse process projects laterally from the arch at the junction of the pedicles and laminae while the spinous process projects posteriorly from the junction of the two laminae. The vertebrae are bonded anteriorly by the disc and the anterior and posterior longitudinal ligaments. The apophyseal joint with its capsule, together with the supraspinous and interspinous ligaments, intertransverse ligament and the ligamentum flavum complete the bonding posteriorly.

The muscles which produce movement at these joints can be considered in two groups: the larger and longer muscles of the more superficial group, and the shorter muscles of the deep group. The latter muscles effect movements at individual intervertebral joints, rather than at several intervertebral joints. Consideration of the positions of the interspinales, intertransversarii, multifidus and rotatores muscles of the deep group in relation to the vertebrae makes it clear that fine movement can be controlled at these joints.

Symptomatology

Nerve root compression may cause symptoms referred far from the source of trouble, but it must also be noted that pain may be referred by means other than nerve root
The symptoms of some joint conditions in other parts of the body will now be considered and compared with similar conditions in the vertebral column. In a "frozen shoulder," the range of movement in the glenohumeral joint is markedly limited in all directions, and although it may be painful, pain is usually less than one might expect with such limitation of movement; the patient is usually in pain only when the joint is stretched. This may be momentary pain with movement, or an ache from a sustained stretch. There is thickening of the capsule of such a joint, and adhesions of the same type have been found in an apophyseal joint (Harris and MacNab, 1954). Patients may be recalled who complained of backache which would develop after adopting a fixed position for any length of time, or after long periods of standing, or who have had pain on certain movements of the spine. These symptoms may have been caused by strain or stretch on a thickened capsule of one or more of the apophyseal joints, and if so examination of the intervertebral movements would have revealed a limitation of intervertebral movement as one of the signs.

Another condition is one in which joint movement is limited by pain and muscle spasm. If such a joint is passively moved, a point is reached beyond which the movement is limited, not by the tightness of a thickened capsule, but by local pain and muscle spasm. These symptoms may readily be compared with those of the patient with back pain who is unable to move easily and who also exhibits muscle spasm which prevents certain movements. On examining patients who fit into this category, a deep muscle spasm localised to a span of two or three vertebrae can be felt on attempting a passive movement of the intervertebral joint.

Loose bodies in the knee joint are well-known phenomena, and the same condition may occur in the apophyseal joints (Harris and MacNab, 1954). Manipulation of this joint to free its movement can be as successful in its result as it is with the knee. Radiographs may show a loose body within an apophyseal joint.

The radiological and clinical effects of rheumatoid arthritis and gout on the joints of extremities are well known. These diseases also occur in the apophyseal joints, and the abnormalities of movement which occur in the joints of the limbs are also found in spinal joints. Arthritic changes are readily found in the apophyseal joints, and also in the neurocentral joints of Luschka in the cervical spine.

These examples supply sufficient evidence to substantiate the claim that adequate examination of the range of movement of individual vertebral joints is necessary in a patient presenting with symptoms which may be caused by abnormalities at these joints.

Examination of Joints

The examination of gross movements of the spine is not enough. One important reason for the inadequacy of this technique is that a patient may have an apparently full active range of movement and yet have a limitation of movement in one intervertebral joint which could cause symptoms. When the movement in any joint is examined, its range both active and passive should be checked. There are two aspects of the passive range to be noted: firstly, passive movement which is a copy of an active movement, and secondly, passive movement for which there is no active counterpart. The latter type of passive movement is present because a joint has a certain amount of joint play or "slack" to permit varied active movements. Two examples of this joint play are the up and down gliding of the head of the humerus in relation to the glenoid cavity and the range
of circumduction possible at the metacarpo-phalangeal joints. Therefore, in the examination of the intervertebral joint, active, passive and joint play movements must be tested.

The amount of joint play which exists in a joint appears to vary directly with the area and shape of the joint surface and the range of movement possible at the joint. There is little joint play in an apophyseal joint. This limited range of movement makes accuracy in testing difficult and small changes hard to detect. However, the changes in movement can be assessed, and this does result in more accurate and more effective physical treatment.

There are two factors which must be borne in mind when attempting to assess the significance of a limited range of movement found during examination. Firstly, there is the presence of a disc, abnormality of which may alter the movement which takes place between two vertebrae. Secondly, structural change and adaptive shortening of soft tissue arising from congenital anomalies or postural habits will also influence movements.

The intervertebral disc undergoes changes from the day it is formed until the individual's death. Within the limits of these normal changes the nucleus may rupture in crescentic or radial tears and the nucleus may be forced through the weakened areas until it forms a protrusion into the vertebral foramen. Following injury or strain, bony spurs can form from the upper and lower margins of the vertebra. These abnormal changes, and normal degenerative changes, affect the range of movement possible at an intervertebral joint. The extent to which these changes are responsible for any limitation of intervertebral movement can be assessed only approximately from the radiological evidence. Congenital abnormalities such as partial lumbarisation, sacralisation or alternating tropisms also influence ranges of intervertebral movement.

The vertebrae may be deformed by very bad posture. It is reasonable, therefore to assume that minor postural faults will produce some vertebral changes and ligamentous adaptive shortening. If a nine-stone person stands and sits for fourteen hours a day, in a moderately poor position, such that the weight is being transmitted through the intervertebral joints in an unnatural line, some adaptive changes, both bony and ligamentous, must take place over a period of years. These changes in their turn must influence the range of intervertebral movement.

Bony changes, or alterations in intervertebral movement, need not necessarily give rise to symptoms. If limitation of movement is found unaccompanied by relevant symptoms, this limited movement may be classed as being within normal limits.

Among these interwoven problems some constructive signs may be found. The active range of movement in a joint during examination requires only careful observation of each active movement of the spine in a weight-bearing position. Limitations in active flexion, lateral flexion and rotation are readily detectable. Extension is more difficult to assess.

**Examination of the Passive Movements**

Any alteration from the normal at the various intervertebral joints must be noted. The most easily tested movements in the cervical spine are forward flexion and lateral flexion. In the thoracic and lumbar spines all movements are reasonably easily assessed with the exception of rotation in the lumbar spine.

The joint play which exists within the joint, variations from the normal in the position of one spinous process in relation to its neighbours, protective muscle spasm around the joint, localised tenderness or crepitus associated with passive movement of the joint and reproduction of pain, whether local or referred, are all palpable while testing joint movement.

These tests are made by localised pressure against the spinous processes, both posterolaterally and laterally, in order to assess the degree of movement which can be produced in this vertebra in relation to its neighbours.

It must be remembered that there are abnormalities of position and movement which can be classed as being within normal limits.
for different individuals. Therefore it is only
when the above findings are taken together
with all other factors that the importance or
significance of the abnormalities can be
assessed.

Demonstration

The methods of examination were demon­
strated by the lecturer. Lateral flexion, rota­
tion, flexion and extension of the occipito­
atlantal joints and the remainder of the cervi­
cal joints were tested with the patient lying
supine as described by Stoddard (1959) on
pages 43 to 55. Movements of the thoracic
spine were tested with patient sitting but with
different techniques for the upper and lower
thoracic spines. These are also described by
Stoddard on pages 57 to 61. In the lumbar
spine only a flexion to extension movement
was shown as described by Stoddard on page
62.

Rotation of the thoracic spine was also
demonstrated with the patient in a side lying
position (Stoddard, page 146), as this was
considered to be a more satisfactory position
for testing this movement.

As well as the tests demonstrated above,
emphasis was placed on testing the acces­
sory movements of joint play. These were
tested by thumb pressure on the tip of each
spinal process and on its lateral surfaces.
The presence of the protective muscle spasm
and crepitus can be felt during these tests.

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