

Description of fifty diagnostic tests used with osteopathic manipulation

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Fifty diagnostic tests used during videotaped examination and treatment of patients with low back complaint by five osteopathic physicians are described. The tests have been assigned to five classes: general impression, regional motion testing, position of landmarks, superficial and deep tissue evaluation, and local response to motion demand. Considerable variation was encountered among the physicians in choice of test and use of a single test in one or more modes or test class. Test selection and sequence were influenced by the conceptual orientation of the physician, patient position, outcome of previous tests, the status of developing hypotheses about the patient's problem(s), and the accessibility of the problem to treatment and to monitoring of its progress. Distinctions among the fifty tests and differentiation between treatment and diagnostic tests were often obscured. Nevertheless, each physician appeared to follow an orderly process of diagnostic inference leading to treatment. The tests and classification system provide a useful descriptive and analytical tool for research into osteopathic manipulation.

Clinical research into osteopathic manipulation inevitably encounters a broad diversity among practitioners, not merely in treatment methods, but in diagnostic methods as well. In practical terms, this diversity has important consequences. No two osteopathic physicians are likely to examine or treat a given patient in precisely the same way. Because of this variation, the reconstruction of underlying principles of diagnosis or treatment that can be demonstrated to apply to the majority of practitioners is very difficult.

Previously, we reported the levels of agreement found among several physicians examining the same patients, with and without constraints upon the diagnostic tests used.^{1,2} We have also reported the results of an effort to classify the kinds of diagnostic tests used in videotaped examinations by several physicians of different patients.³

The fifty tests used were assigned to five classes, which can be abbreviated as follows: I—general impression; II—regional motion testing; III—position of landmarks; IV—superficial and deep tissue evaluation; and V—local response to motion demand. Only class IV and class V tests appeared to be unique to osteopathic practice,³ but it was specifically these tests that were subject to the greatest individual variability in their application. The present report provides the detailed description of all fifty tests.

Several considerations should be kept in mind by the reader as these tests are examined:

(1) Not all the tests were used by any one physician.

(2) The same test was not necessarily used in the same way by two or more physicians. For example, a test might be used strictly as a regional motion test (class II) by one physician, or as a test of specific, localized tissue response to motion demand (class V) by another. Even when two physicians agreed that they used a test in the same

class, especially in class IV and class V, individual variances were likely to emerge in the following:

- (a) performance of the test;
- (b) the findings observed; or
- (c) the interpretation.

(3) Two different physicians might derive essentially the same information from the use of different tests.

(4) A single test was often used by a physician as more than one class of test. For example, straight leg raising with the patient supine could be used to evaluate regional responses to gross passive motion demand (class II); to define the end point of leg motion (class III); and to monitor localized tissue response in a particular area to the leg motion (class V). The assignment of a test to a particular class was facilitated by asking the physician what information he was seeking.

(5) In the present study, preselection of patients eliminated the necessity for other routine physical examination procedures at the time of the videotaping.

Synopsis of methods

A detailed description of methods was given in the previous report.³ Each of five osteopathic physicians was videotaped while he examined and treated three different patients (for a total of fifteen patients). Subsequently, each videotape was analyzed test by test in consultation with the physician, to determine kind of test used, the way it was used, the information derived from it, and its relationship to other tests and to the diagnostic process.

The fifty tests identified by videotape analysis are described in the following section.

The fifty tests

Test 1. Gait. (Class I.)

Description: Monitoring of the whole body, to answer the following questions:

- (a) Is length of stride within normal range?
- (b) Is length of stride of each leg equal?
- (c) Is weight transferred in a continuous manner from heel to toe for pushoff?
- (d) Is either leg internally or externally rotated?
- (e) Is flexion/extension of either leg restricted?
- (f) Is motion (hips, shoulders, arms) totally symmetrical?
- (g) Is the position of the head normal during the walk?
- (h) Is there an abnormality in spinal motion at the level of the hips or shoulders?

Comments: This test appeared to be used only selectively; that is, when gait appeared abnormal or whenever there was a symptom related to gait.

Test 2. Visual screen—patient standing. (Class I.)

Description: Visual screen of the whole body from each of three views. The following questions were addressed:

1. Posterior view

- (a) Are levels of shoulders and scapulae unequal (asymmetric)?

- (b) Is there a lateral curvature (asymmetry) of midspinal line?
- (c) Is head held to one side?
- (d) Is pelvic position asymmetric (are iliac crests level)?
- (e) Is there special flatness or fullness of paravertebral tissue mass?
- (f) Is placement of feet asymmetric or irregular?
- (g) Are positions of the knees asymmetric or irregular?
- (h) Is the whole body position rotated?
- (i) Are Achilles tendons asymmetric or medially deviated?
- (j) Are positions of malleoli irregular or asymmetric in relation to calcanea?
- (k) Is there asymmetry of arm position?
- (l) Is there asymmetry of fat folds at the waist (crease)?
- (m) Are there special morphologic asymmetries of the posterior skin surface such as scars, bruises, et cetera?

2. Lateral view

- (a) Is there exaggeration or reversal of the normal spinal curvature?
- (b) Is there displacement of the body relative to the line of gravity? For example, is the anterior/posterior position of head normal?
- (c) Are there special morphologic asymmetries of the lateral skin surface such as scars, bruises, et cetera?

3. Anterior view

- (a) Are shoulder levels asymmetric at midsternal line?
- (b) Is head held to one side?
- (c) Is there some deviation from the normal horizontal clavicular line?
- (d) Is pelvic position asymmetric (are iliac crests level)?
- (e) Are patellae deviated laterally or medially?
- (f) Are there special morphologic asymmetries of the anterior skin surface such as scars, bruises, et cetera?

Comments: The test was performed to determine morphologic asymmetries and marked anomalies. It did not include finite measurement and as such was not specific. The findings were used for an initial impression of a patient's structural problem. Not all parts of this test were used by all physicians or on all patients.

Test 3. Palpatory screen of arch of foot—patient standing. (Class I.)

Description: Palpation of arches for deviation or asymmetry in (a) arch height or (b) tissue tone.

Comments: Although this test could be extended to a geometrical landmark test, it was used primarily as a general impression test, especially with respect to weight bearing.

Test 4. Palpatory screen of legs—patient standing. (Class I.)

Description: Palpatory screen for asymmetry between left and right leg in:

- (a) surface tension
- (b) masses—size, shape, and consistency
- (c) texture—muscle size and tone
- (d) tenderness

Comments: In performing this test the examiner also looked for possible edema in the tissue.

Test 5. Palpation of back—patient standing. (Class I.)

Description: Palpatory screen for asymmetries, regional differences and other departures from normal expectations in:

- (a) skin temperature
- (b) skin surface texture, moisture, and skin drag
- (c) structure and contour (surface elevations, depressions, or masses)
- (d) muscle size, mass, firmness, and tone
- (e) soft tissue response or resistance to palpation (includes firmness, tension, and tone)
- (f) red response to skin stroking

Comments: Usually this test was performed as a quick screening test and hence classified as general impression. However, part (e) of the test was sometimes extended to include class III (landmarks), class IV (tissue evaluation), or class V (response to motion demand; for example in connection with respiration) tests.

**Test 6. Levels of landmarks—
patient standing. (Class III.)**

Description: Palpatory definition of bony landmarks followed by comparison of levels for asymmetry, at the following locations:

- (a) trochanters
- (b) iliac crests
- (c) posterior superior iliac spines (PSIS)
- (d) inferior angles of scapulae
- (e) shoulders

Comments: This test sometimes was part of a battery of tests used for a general impression (class I) of bony landmarks.

**Test 7. Response to lateral motion
at the hips—patient standing.
(Class II.)**

Description: Determination of asymmetry in side-to-side motion induced by the examiner at the trochanters, moving the whole body away from the midline with feet in place.

Comments: Some examiners may determine and compare only the initial forces required to move the patient from the balanced position. Others may determine end points of motion.

**Test 8. Response to rotation at the hips—
patient standing. (Class II.)**

Description: Observation of response to whole body rotation to the left and to the right, introduced by the examiner at the level of the hips, to look for reduced, exaggerated, or painful mobility, unilateral or bilateral.

**Test 9. Standing flexion (forward
bending). (Class I, II, or III.)**

Description: The test has two main components: (1) examination of the active forward-bending motion and (2) comparative examination in the forward-bent and standing positions.

1. Motion test (class I, II, or III):

- (a) visual observation of the continuity of motion.
- (b) visual observation of the range of motion.
- (c) palpatory monitoring of the resistance to motion at the PSIS.
- (d) visual comparison of the amounts of anterior-superior movement of one PSIS relative to the other, with the points defined by palpation.

2. Comparative examination in forward-bent and standing positions, addressing the following questions (classes I, III):

- (a) Does the geometric relationship of the two PSISs in the forward-bent position differ from that in the standing erect position?
- (b) Are there paravertebral areas of special flatness or special tissue mass as determined visually or by palpation?
- (c) Is there some special lumbar or thoracic midline curvature as evaluated visually or by palpation?
- (d) If so, where is its apex?
- (e) Is there asymmetry at the knees?

Comments: Test 1(c) was performed as a class II test; however, this is easily extended to class V.

**Test 10. Visual screen—
patient sitting. (Class I.)**

Description: The following questions are addressed:

- (a) Are shoulder levels unequal?

- (b) Is there some special curvature in the relaxed (sitting slouched) position?
- (c) Is there some special curvature in the erect (sitting tall) position?
- (d) Is the head held to one side?
- (e) Is the cervical region asymmetric?
- (f) Is the thoracic region asymmetric?
- (g) Is the lumbar region asymmetric?

Comments: The same comments that follow the description of test 2 are applicable here. If performed after test 2, findings with test 10 may be used to confirm findings with test 2, but new findings may also emerge.

**Test 11. Seated flexion (forward
bending). (Class I, II, or III.)**

Description: The test has two main components: (1) the active forward-bending motion and (2) comparative examination in the forward-bent and seated erect positions.

1. Motion test (I, II, or III):

- (a) visual observation of the continuity of motion
- (b) visual observation of the range of motion
- (c) palpatory monitoring of the resistance to motion at the PSIS
- (d) visual comparison of the amount of anterior-superior movement of one PSIS relative to the other, with the points defined by palpation.

2. Comparative examination in forward-bent and seated erect positions, addressing the following questions (classes I, III):

- (a) Does the geometric relationship of the two posterior superior iliac spines in the forward-bent position differ from that in the seated erect position?
- (b) Are there paravertebral areas of special flatness or special tissue mass as determined visually or by palpation?
- (c) Is there some special lumbar or thoracic midline curvature as evaluated visually or by palpation?
- (d) If so, where is the apex?

Comments: Same comments about 1(c) that follow test 9 description are applicable here.

**Test 12. Palpation of the back—
patient sitting. (Class I.)**

Description: The examiner looks for asymmetries, regional differences, and other departures from normal expectations in:

- (a) skin temperature
- (b) skin surface texture and moisture, skin drag
- (c) structure and contour (surface elevations, depressions, or masses)
- (d) muscle size, mass, firmness, and tone
- (e) soft tissue response or resistance to palpation (includes firmness, tension, and tone).
- (f) red response to skin stroking

Comments: Same as test 5, except that the use of test 12 as class IV or V test ordinarily implied a previous finding in a particular location, with this or another test.

**Test 13. Segmental palpatory
scan—patient sitting. (Class III or
IV.)**

Description: Palpatory scanning of deep tissues, often with alternating local pressure (springing) of the spinal column, segment by segment, for asymmetry and/or geometrical evaluation of transverse processes.

Comments: The emphasis in this test was on muscle and tissue reaction, although segmental mobility can also be explored (class V).

**Test 14. Sitting tall and slouched.
(Class II, III, or V.)**

Description: The patient is alternately instructed to sit tall

(erect) and slouched (relaxed). The lumbar and lower thoracic regions are palpated for contour, muscle mass, and other properties, both in transition between the two postures and at the end points.

Comments: The instructions to the patient were the same as in tests 10 b and c. This test may seem like a class I test, but monitoring was primarily palpatory and either regional (II) or local (V) in focus. Certain landmarks may also be monitored (V).

**Test 15. Levels of landmarks—
patient sitting. (Class III.)**

Description: Palpatory definition of bony landmarks followed by comparison of levels for symmetry, at the following locations:

- (a) iliac crests
- (b) inferior angles of scapulae
- (c) shoulders

Comments: The geometrical evaluation was done by identifying the landmarks by palpation, and then comparing levels visually. This test may be used with tests 6, 23, and 46 as a battery of general impression tests (class I).

**Test 16(a). Response to sidebending—
patient sitting. (Class II or V.)**

Description: Class II—Introducing alternate sidebending of the trunk by pressure on shoulders. With both hands on shoulders, any asymmetry in resistance to gross motion demand is estimated. Class V—Monitoring by palpation the segmental response to (usually passive) sidebending. One hand introduces the motion while the other monitors the response at thoracic or lumbar segments. Both tests involve looking for reduced, exaggerated, or painful mobility, unilateral or bilateral, in response to sidebending.

**Test 16(b). Response to translation
in the coronal plane. (Class V.)**

Description: Monitoring by palpation the segmental response to (usually passive) side-to-side motion induced without sidebending. (See test 16(a), class V.)

Comments: The class procedure in both (a) and (b) was used either as a scanning device where each local segment was evaluated in turn, or for a more careful localization of findings at one segment.

**Test 17. Response to rotation—
patient sitting. (Class II or V.)**

Description: Class II—Rotation of trunk in alternate directions by pressure at shoulders. With both hands on shoulders, asymmetry in resistance to gross motion demand is estimated. Class V—Palpatory monitoring of the segmental response to rotation. One hand introduces the motion while the other monitors the response at thoracic or lumbar segments. Both tests involve looking for reduced, exaggerated, or painful mobility, unilateral or bilateral, in response to rotation.

Comments: Same as for test 16.

**Test 18. Response to respiration—
patient sitting. (Class I or II.)**

Description: Visual and palpatory evaluation of the continuity of motion of the entire rib cage during exhalation and inhalation, to determine restrictions or departures from expected symmetry and mobility.

Comments: This test was used as a class I test, to provide a quick impression of total breathing function: for example, was the patient dyspneic? However, the test also served as a regional motion test (class II) and can be focused to determine localized restrictions in mobility (class V). The test is also used in supine position.

Test 19. Rib evaluation—

patient sitting. (Class V.)

Description: Palpatory scan of the entire rib cage to assess rib mobility during respiration.

Comments: The test calls for a separate evaluation of each rib throughout inhalation-exhalation range. Local responses were monitored to define the exact part of the respiratory cycle where a rib showed resistance to motion.

**Test 20. Response to rotation of
head and neck—patient sitting.
(Class II, III, or V.)**

Description: Class II—Evaluation of asymmetry in resistance to motion in (usually passive) rotation of the head and/or neck. Class III—Measurement of the end points (in degrees) of active and/or passive rotation of the head and neck. Class V—Monitoring of the response to (usually passive) rotation of head and neck, as in tests 16 and 17, at predefined locations anywhere along the spinal column.

**Test 21. Response to sidebending
of head and neck— patient sitting.
(Class II, III, or V.)**

Description: Same as test 20, with sidebending replacing rotation.

**Test 22. Response to forward and
backward bending of head and
neck—patient sitting.
(Class II, III, or V.)**

Description: Class II—Evaluation of restriction to motion in (usually passive) forward and backward bending of the head and neck, and definition of limitations. Class III—Measurement of the end points (in degrees) of active and passive forward and backward bending of the head and neck. Class V—Monitoring of the response to (usually passive) forward and backward bending of the head and neck at predefined segments anywhere along the spinal column.

**Test 23. Levels of malleoli—
patient supine. (Class III.)**

Description: Standardization of patient position, followed by measurement of the relative levels of the malleoli.

Comments: This test is often called the apparent leg length test, but a discrepancy in malleolar levels in supine position does not necessarily indicate difference in actual leg length.

**Test 24. Pelvic landmarks—
patient supine. (Class III.)**

Description: Palpatory definition of bony landmarks followed by comparison of levels for symmetry at the following locations: iliac crests, anterior superior iliac spines (ASIS), pubic tubercles.

**Test 25. Visual screen of thoracic
cage—patient supine. (Class I.)**

Description: Visual evaluation of rib cage during respiration, for symmetry of contour and excursion. Is the patient a costal or abdominal breather?

**Test 26. Arms over head—
patient supine. (Class I, II.)**

Description: The patient is instructed to raise arms over head (parallel to the body). The examiner looks for exaggerated, or painful mobility, unilateral or bilateral.

Comments: This test was used as a class I test to get a quick impression of upper extremity motion. When it was used as a class II test, specific asymmetric regional response to motion was evaluated. Measurement can include determination of specific degrees of restricted motion (class III).

Test 27. Straight leg raising
(active or passive)—patient supine.
(Class II, III, or V.)

Description: Straight leg raising one after the other. The examiner looks for reduced, exaggerated, or painful mobility, unilateral or bilateral.

Comments: If this was used as a class II test, motion was introduced passively to test regional response to motion. In some cases class III end points were measured. (Since there were various criteria for end points, they must be carefully defined.) In other instances a local area was predefined for monitoring response to the leg raising (class V).

Test 28. Chest and abdominal wall—patient supine.
(Class II or III.)

Description: Palpatory and visual examination, using the palmar surface of the whole hand, is made to monitor regional responses to inhalation and exhalation throughout the chest and abdominal wall. Departures from normal expectations, including asymmetries, regional differences in tension and response to respiratory movement are noted. If a positive finding is made, localization of the finding usually follows by class IV or V tests at individual ribs.

Comments: The examination of the abdominal wall often precedes palpation of abdominal organs during the physical examination.

Test 29. Lower extremity palpation—patient supine.
(Class I, IV, or V.)

Description: Palpatory evaluation of muscle tension and muscle tone of the lower extremity.

Comments: This test may be used for general impression (class I); for localization of areas with tissue texture abnormalities, pain, or tightness of ligaments (class IV); or for determination of local response to motion (class V).

Test 30. Motion testing of knee—patient supine. (Class II or V.)

Description: Class II—Evaluation of the continuity of movement and the resistance to motion demand introduced through the legs by active or passive flexion and extension. Class V—Local monitoring of the response at the knee to (usually passive) motion demand introduced through the leg. A variety of motions can be used and monitored at a number of specific locations at the knee; for example, cartilage, ligaments, muscles, and patella.

Comments: If positive findings result, orthopedic tests for joint damage may be appropriate, such as the McMurray test, drawer sign, Apley's test and others.

Test 31. Motion testing of ankle and foot—patient supine. (Class II or V.)

Description: Class II—Evaluation of the continuity of movement and the resistance to motion demand introduced passively through the ankle (dorsal and plantar flexion, inversion and eversion of ankle and foot). Class V—Local monitoring of the response at the ankle and foot to passive motion demand introduced through the ankle. A wide variety of motions can be used and monitored at a number of plantar or dorsal locations on the ankle or foot; for example, bony prominences, ligaments, and tendons.

Test 32. Motion testing of hips—patient supine. (Class II.)

Description: Testing of hip motion in flexion, internal and external rotation, in response to motion demand introduced by the examiner through the lower extremities, one at a time or

both together. The examiner looks for reduced, exaggerated, or painful mobility, unilateral or bilateral.

Comments: This test is sometimes used as a class V test to monitor local response to motion demand.

Test 33. Motion testing of pelvis and lower spine—patient supine.
(Class V.)

Description: Local monitoring of the response throughout the pelvis and lower spine to various motion demands introduced by the examiner through the lower extremities, one at a time or both together.

Test 34. Lateral swing of legs—patient supine. (Class II.)

Description: Examiner introduces lateral swings of both legs together, looking for reduced, exaggerated, or painful mobility.

Test 35. Motion test for effect on apparent leg length—patient supine. (Class III.)

Description: Measurement of lengthening or shortening of apparent leg length as the examiner induces internal or external rotation of the hip with flexed hip and knee.

Comments: Some physicians draw inferences about sacroiliac mobility from this test. However, the measurements are all made at the malleoli, which may change in their relative positions following rotation of the hip. Absence of expected change is basis for finding of restricted mobility.

Test 36. Response of sternoclavicular joint to abduction of the arm—patient supine.
(Class III or V.)

Description: Class III—Measurement of the response of the sternoclavicular joint to abduction of the arm by comparing initial and final positions of the medial end of the clavicle. Class V—Monitoring of the response of the sternoclavicular joint to motion demand.

Test 37. Response to rotation of head and neck—patient supine.
(Class II, III, or V.)

Description: Class II—Introduction of rotation of head and neck in alternate directions by hand contacts on the head. Estimation of resistance to gross motion demand and comparison of directions for asymmetry. Class III—Measurement of the end points (in degrees) of rotation (active and/or passive) of head and neck. Class V—Monitoring, by palpation, the segmental response to rotation. One hand introduces the motion while the other monitors the response at cervical segments. In each test, examination is made for reduced, exaggerated or painful mobility, unilateral or bilateral, in response to rotation.

Comments: Same as for test 16.

Test 38. Response to sidebending of head and neck—patient supine.
(Class II, III, or V.)

Description: Same as Test 37, with sidebending replacing rotation.

Test 39. Paraspinal palpation—patient supine. (Class I or IV.)

Description: Class I—The examiner looks for departure from normal expectations or predictions, including asymmetries and regional differences in (a) tissue texture; (b) structure and contour (masses, surface elevations, and depressions); (c) soft tissue response to palpation (firmness and tension). Class IV—

Palpation of all spinal regions or costotransverse articulations for tissue characteristics which depart from normal expectations.

Comments: This test can also be used to determine position of the bony landmarks (class III).

Test 40. Gluteal palpation—patient prone. (Class I or IV.)

Description: Class I—Palpation of the gluteal muscles for a general impression of muscle tension and tone. Class IV—Palpation, superficial and deep, of the entire gluteal area.

Test 41. Low back palpation—patient prone. (Class I or IV.)

Description: Class I—(a) Tapping the back throughout the thoracic and lumbar regions, checking for general impression of differences in tissue firmness; (b) palpating for general impression of tissue differences along the sacroiliac junctions. Class IV—Superficial and/or deep palpation of the thoracic, lumbar, and sacroiliac regions.

Comments: This test can also be used to determine bony landmarks (class III).

Test 42. Segmental palpatory scan—patient prone. (Class III or V.)

Description: Class III—Geometrical evaluation of the transverse processes, segment by segment. Class V—(a) Local motion testing by palpation of the spinal column, segment by segment, through superficial and deep paraspinal tissues, looking for asymmetry of transverse processes; (b) springing test of the spinal column, segment by segment, for asymmetry of response of transverse processes.

Comments: This test can be repeated in the hyperextended position by positioning patient on elbows.

Test 43. Local response to respiration—patient prone. (Class V.)

Description: Monitoring of the motion of ribs and/or overlying tissues in response to the demand of respiration.

Test 44. Pelvic landmarks—patient prone. (Class III.)

Description: Palpatory definition followed by positional measurement of the following bony landmarks:

- (a) PSIS
- (b) depth of sacral sulcus
- (c) inferior lateral angle of sacrum (ILA)
- (d) ischial tuberosities
- (e) sacrotuberous ligaments

Test 45. Sacroiliac evaluation—patient prone. (Class V.)

Description: Palpation is used at four locations along the sacroiliac articular junction (that is, cephalad and caudad to the PSIS bilaterally) to evaluate local response to a variety of (passive) motion demands; for example, pelvic rocking, sacral springing, or to active respiration.

Comments: This test can also be used to define bony landmarks, either static or in motion (class III). It can also be used as a class V test with patient supine.

Test 46. Levels of malleoli—patient prone. (Class III.)

Description: Standardization of patient position followed by visual and palpatory determination of relative positions of heel pads or malleoli.

Test 47. Hip rotators—patient

prone. (Class II.)

Description: Evaluation of hip rotator muscles is made by introduction of passive motion through the lower extremities with internal and external rotation of thigh with knee flexed 90 degrees, looking for reduced, exaggerated, or painful mobility.

Test 48. Sidebending—patient on the side. (Class V.)

Description: Palpatory monitoring of spinal segmental response to motion demand of sidebending, introduced passively by raising or lowering of both legs while they are moderately flexed (about 90 degrees) at hip and knee.

Comments: This test can also be used as a regional motion test (class II).

Test 49. Paraspinal palpation—patient on the side. (Class IV.)

Description: Palpation of spinal areas and/or costotransverse articulations for tissue characteristics that depart from normal expectations.

Comments: This test also can be used to determine local response to motion demands (class V) or bony landmarks (class III).

Test 50. Movement in the sagittal plane—patient seated. (Class V.)

Description: The patient is moved passively in the sagittal plane, by flexion or extension of the back, or by anteroposterior translation of the straight back, while seated erect. Local response to motion is monitored by palpation, segment by segment.

Discussion

Selection of tests and test sequences

At the start of the typical examination, test sequences tended to follow the order of the five test classes. However, as diagnosis proceeded, considerable departure from this sequence was often evinced. Each physician exhibited a preference for his own selection of tests; no physician used all fifty. Test selection and sequence were guided by several elements, including, though not limited to, the following:

- (1) the patient's position (for example, standing examination tests were usually followed by seated tests, then by supine, prone, or on-the-side tests, the latter three positions often in different orders, or repeatedly interspersed as diagnosis proceeded;
- (2) the outcome of previous tests (that is, one or more of them might direct the examiner logically to perform a potentially related or confirmatory test);
- (3) the status of one or more developing hypotheses about the locus and nature of the patient's problems;
- (4) the accessibility of the problem to treatment and to monitoring of the progress of treatment; and
- (5) conceptual orientation of the physician—more will be said of this in a later paragraph.

Flagging

As analysis of the videotapes progressed, we, by

mutual agreement, adopted the term "flagging" to describe the underscoring by an examiner of findings with a particular test. Thus, a flag was initially "raised" at a region, or with a test, when preliminary findings suggested a hypothesis as to the origin, location, or accessibility to treatment or to monitoring of a problem. The initial raising of the flag was subject to further confirmation or elaboration by subsequent tests. When an asterisk was added (flag*) it meant that the importance of the region or the finding to the patient's problem(s) had been *established*. Flags usually represented clusters of findings combined into a unit, and associated with a particular region. *Established* flags(*) represented major problems or points of departure.

To illustrate, with patient 1 physician C erected flag 1 in the lumbar region, as a result of the apparent convergence of several predominantly class I (general impression) findings in this region. Each of these had previously been isolated in character, but now appeared confluent in test 9—standing flexion (forward bending), used as a class II and III test. Flag 2 was erected for a scoliosis, including in this instance the lumbar region. It was detected by visual screen—sitting (test 10, class I) and palpation of the back—sitting (test 12, class I). Flag 3 was erected for an aberrant thoracic anteroposterior curve detected by the same tests; flag 4 for a somatic dysfunction of the cervical spine detected in tests 20-22 used in class II and III modes; flag 5 for arthritis in the spinal segments, apparently inferred from previous tests but still to be confirmed by x-rays.

Next, flag 1* was *established* at L4 by respiratory and other localized motion (class V) tests. Flag 6 was erected as a presumption of lower extremity and/or pelvic dysfunction, to which previous tests had pointed, but the hypothesis was strengthened by local (class V) and regional (class II) information from test 17, response to rotation—sitting. Finally, flag 6* was *established* by anteroposterior motion testing at the hips (test 50) with the patient once again seated while the examiner monitored the local response (class V) at the level of S3, and by palpatory findings in the gluteal muscles with the patient prone (test 40, class IV). The S3 monitoring point was carried over into later evaluation of the effectiveness of treatment.

Test selection and treatment

During videotape analysis, it was learned that physicians were sometimes reluctant to *establish* a flag until at least preliminary treatment procedures had been initiated. Initiating a trial of manipulative treatment will often help to evaluate an

initial hypothesis and test tentative findings. On these occasions, treatment procedures may be considered an essential part of the test battery.

Choice of tests and conceptual orientation

Significant diversity was observed among the five physicians with respect to the kinds of tests selected. This diversity was expressed in the kinds of findings that determined their flagging decisions. For example, physician A apparently relied principally on general impression (class I) palpation in his diagnosis, believing that distinctions between procedures of general impression tests and of tests involving specific, localized palpation (class IV) were often difficult to make. In addition, A thought that class I palpation alone gave him most, if not all, the information he might have secured from class II motion testing.

By contrast, B used about the same number of tests in all classes, whereas C used many more tests than did A or B, in all classes except landmarks (class III). Both B and C reported that they monitored motion restrictions by what they palpated in local tissues (class V), but B visualized motion of bone on bone, whereas C denied using such images. Correspondingly, B's written findings typically included notations such as "T12 restricted in left rotation," while C was uncomfortable with notations implying a concept of localized joint restriction. So was A, although both A and C admitted to use of such terms under certain constraints. C preferred to define segmental findings in terms of tissue compliance with motion demands.

D characterized himself as being "a bone man," whose typical findings were almost always phrased in terms of altered bony positions. Yet while he relied on class III landmark tests more than any of the other physicians, he also employed a great many soft tissue tests of class IV and class V, almost always with reference to particular joints. E, whose use of tests from the five classes was decidedly eclectic, expressed discomfiture with definition of problems in terms of either joints or soft tissue, preferring to characterize them relative to his cranial concepts.⁴

From these considerations, it seems quite plain that test selection was influenced to a significant degree by the conceptual model(s) applied by the particular physician to the process examined. The use of different testing procedures and/or different concepts might still lead to agreement on location of patients' problems, but our previous observations^{1,2} argue that one cannot in general assume such a favorable outcome.

Blurred distinctions among tests

To observers of the videotapes, distinctions among tests were sometimes obscured. For example, one observer commented that physician A's "gross motion testing of the knee and hip" (A's description) with his second patient was apparently eversion, inversion, and flexion of the hip, together with similar tests for the knee, blended into one test. Sometimes it was only after careful step-by-step analysis of the videotape procedures, in the presence of the examining physicians and their recorded findings, that individual tests could be clearly identified. The analysis led to five distinct classes of tests based on agreement regarding underlying principles. Although the classification scheme for musculoskeletal tests may appear somewhat arbitrary, we believe it provides a useful descriptive and analytical tool. If, in fact, the physician blends tests, the scheme enables us at least to describe and perhaps to analyze the elements of the blend, whereas without some such scheme, to do either is difficult.

Conclusions

The fifty tests described allow characterization of the musculoskeletal diagnostic process observed among five osteopathic physicians, each examining and treating three different patients. The classification scheme devised for comparing and differentiating the fifty tests cannot be construed as exhaustive, nor even necessarily representative of osteopathic practice in its entirety. Nonetheless, the tests and classification scheme provide a unifying probe for exploring the underlying method-

ological and conceptual differences and similarities among physicians who practice osteopathic manipulation. Employment of this probe has enabled us to visualize quite different diagnostic styles, as approaches that measure different attributes of a common underlying process within the patient. Fortright recognition and detailed characterization of the considerable differences among diagnostic styles is a prerequisite, in our judgment, for ultimate understanding of the process.

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