

Clinical Aspects

AN ANALYSIS OF SOME EXERCISES, THERAPIES AND TECHNIQUES CAPABLE OF CORRECTING POSTURE AND MUSCLE IMBALANCE

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It is well recognised that a number of different types of resting habitual upright posture, or posture in the standing-at-ease position, exist. Thus there is the Harvard University chart for grading body mechanics into four categories as follows:

A excellent mechanical use of the body with the head "straight above the chest, hips and feet, the abdomen in or flat," and the usual curves of the back "not exaggerated"

B good mechanical use (compared with A)

C poor mechanical use

D very poor mechanical use of the body compared with A, with the head markedly protracted, the abdomen "completely relaxed, slouchy," and all the spinal curves "exaggerated to the extreme" (Goldthwait et al., 1952).

There are also the "mean posture patterns" of an army series carried out by Goff (1952). He did "orthograms of posture" and distinguished four types of "valid mean postures of white males in good, general health". These were: 1) fat body, 2) balanced, 3) muscular, and 4) thin, elongated types.

Other non-invasive methods suggested in the past for grading posture include that of Wiles (1937) in which the pelvic inclination is determined by drawing a line from the upper border of the symphysis pubis to the posterior superior iliac spine. He considered posture was normal if that angle with the horizontal was between 28 and 31 degrees. Cailliet (1979) also emphasises the importance of the size of the lumbosacral angle (with the horizontal) as the key to posture. Burt (1950) used a plumb-line and measured the distance of the occiput and the thoracic curve from the gluteal cleft. Williams (1965) used a graded system of 1+ to 4+ to indicate the degree of the various physiological curves.

Even if we use the more expensive and sophisticated but non-invasive methods now available such as holograms and Moire photography the problem remains as how best to analyse the individual's resting habitual upright posture. In our Centre we still consider measurement of the angles of the quadrangle formed by joining the jugular notch, tragon (the notch directly above the tragus of the ear), spine of the seventh cervical vertebra and the tip of the acromion to be a

simple, convenient and meaningful method of assessing posture. This may be done by direct measurement or photography. The angles must of course be referred to the vertical or horizontal planes. This is not to minimise the importance of the points of maximum curvature of the thoracic and lumbar curves which are also considered.

Another way of looking at posture is to consider where the line of gravity passes in the frontal or coronal plane. Here we find the interesting situation that textbooks of anatomy, orthopaedic surgery, kinesiology, posture and physiotherapy differ widely when they describe where that line passes in the "normal" human upright posture. Joseph (1976) puts it "invariably in front of the ankle and knee joints and slightly behind the transverse axis of the hip joints". He states that the body is thus falling forwards at the knee joints (resisted in most people by their posterior ligaments), while at the hip joints the trunk is extended on the lower limbs, this being resisted by the very powerful anterior ligaments, especially the iliofemoral. Concerning the position of the line of gravity more superiorly, Warwick and Williams (1973) in Gray's Anatomy states that it is "related to the curvatures of the spine in such a way that they are on the whole exaggerated by gravity." However, Sinclair (1978) states that the line passes through the external auditory meatus, the tip of the acromion process, behind the hip joint, through the middle of the knee joint and in front of the ankle joint.

There is another school of thought which describes posture as an individual matter. Answering the question "What is the 'best' posture?", Metheny (1952) stated: "There is no single 'best' posture for all individuals. Each person must take the body he has and make the best of it. Posture is an individual matter". Mennell (1960) made the confusing statement that individual variations from 'normal' may be normal for an individual and must not be confused with 'abnormal'. Rathbone (1959) thought it is "probably incorrect to hold up a common standard for all individuals, and it is quite unscientific to accept one standing posture as ideal and urge all individuals to aim for it." Phelps, Kiphuth and Goff (1956) claimed that "normal posture may be defined as the average or mean of a large number of postural examinations under the same set of circumstances." They pointed out (as do a number of other workers) that if the large group were subdivided into body types, there would be a number of other normals, each corresponding to the particular body type. "Thus, the normal for the slender or linear type would differ markedly from the normal for the obese type." They went on to claim that the normal posture for the individual, as opposed to the group normal, is the position assumed habitually by the individual. Following this line of reasoning it is difficult to know how it would ever be possible to conclude that any posture at all was abnormal.

Rasch and Burke (1975) similarly belong to this school of thought: "The term 'good posture' often conveys the thought of a standing position fulfilling certain aesthetic and mechanical specifications... Whatever the values of a prescribed posture, expecting everyone to meet any given standard is to ignore the fact that posture is largely an individual matter". It is thus easy to see how workers who hold this opinion all avoid the use of the words 'correct', 'incorrect', 'good' and 'bad' in relation to posture.

However, there does exist another school of thought which considers that bipedal man has the potential for the situation described as postural homeostasis by Barlow (1952). This refers to the posture in which the line of gravity passes

through the transverse axes of the atlanto-occipital, shoulder, hip, knee and ankle joints. This is a posture of balance, and the individual cannot attain this position at any one time by conscious muscular effort. It is not the position of "active alerted posture" as described by Tucker (1973). However, assuming that position, and carrying out Tucker's so-called home treatment, can assist the individual to move towards the situation of postural homeostasis as his resting habitual upright posture.

Williams and Worthingham (1957) point out the obvious axiom that a weight-bearing joint will only be mechanically balanced and in equilibrium if the gravity line of the mass it supports falls exactly through the axis of rotation. Stafford and Kelly (1958) describe the good alignment of the main segments of the body when posture is "well aligned" and "well balanced".

It is not the purpose of this paper to go further into this controversy but rather to step back from the problem and attempt to present a cross-cultural perspective. A number of different exercise and therapeutic techniques have been developed over the centuries in different parts of the world, apparently independently amongst different cultures, but all producing the same effect of improvement in posture towards this position of postural homeostasis.

Having worked in Asia since 1965 and being in the position of treating patients who not only consulted practitioners of 'Western' medicine but also those of traditional Chinese medicine I became inquisitive and embarked on an investigation into acupuncture in 1969. Since T'ai chi ch'uan (Chinese shadow boxing) is allegedly closely related to acupuncture, I decided to try and understand what T'ai chi is all about by attempting to learn it (Plummer, 1980c). This was accomplished in a sort of a way in 1974 but the only features which made any impression at that time were:

- 1 the masters of t'ai chi claim to be able to feel the 'chi' or 'energy' flowing through the meridians or channels of acupuncture, and they claim they can feel in themselves when and where it is 'blocked'.

- 2 all masters of T'ai chi claim that if it is performed regularly about 20 minutes daily, and correctly, it is able to improve posture. I was profoundly impressed by the excellent 'straight-backed' posture of my teacher who at that time was 79 years old.

- 3 many lay people learn t'ai chi because of the almost universal belief amongst Chinese that it is able to cure a host of illnesses and postpone the effects of aging. Once again I was very impressed with the health and alertness of my teacher, old in years but not in appearance.

- 4 t'ai chi is an antigravity exercise which is more effective the more slowly it is performed.

- 5 t'ai chi is not easy to learn nor is it easy to perform correctly.

Being unable in 1974 to perceive any relationship between t'ai chi and acupuncture, and being impatient and busy, I soon desisted from regular practice of t'ai chi and before long could not remember how to do it in spite of consulting several books with detailed instructions. Despite returning briefly to learn from my teacher on several occasions, I nevertheless found that the relationship between acupuncture and t'ai chi continued to elude me tantalisingly until 1979. At that time during a vacation in the United States, as part of the continuing search to determine if there was a logical scientific basis for acupuncture points

and meridians, traditional Chinese acupuncture theory and the numerous therapeutic effects claimed for acupuncture (analgesia being only one of them), I grasped the opportunity to follow up a clue which I had stumbled across some six years previously. A fellow hockey player had passed on several papers discussing a form of deep, powerful and vigorous massage called "Rolfing" or "structural integration". It was claimed that ten one-hourly sessions with a therapist could produce marked and permanent changes in posture towards that same elusive goal of postural homeostasis.

The rationale for grasping the opportunity while in the United States to investigate this rather staggering claim was as follows: t'ai chi is able to improve posture and is closely, although elusively, related to acupuncture; since Rolfing is also allegedly able to produce the same changes in posture, then Rolfing must also in some way be related to acupuncture. I decided that it would be worthwhile to pay the fee of US\$45 and be "Rolfed" once at least in order to find out what it was all about. The experience is related elsewhere (Plummer, 1980a). The astonishing finding was that Rolfing is nothing more or less than very strong, deep painful massage at acupuncture points (acupressure) and occasionally along acupuncture meridians or channels. Immediate obvious and measurable changes take place in posture depending on the region treated. For example, the resting position of the shoulder may change by as much as 2 cm. The founder, Ida Rolf (1977), claimed that it is the connective tissue and fascial adhesions on which the "Rolfer" is acting, physically and forcefully breaking down the latter. My observations on patients on several hundred occasions over the past year, together with a re-evaluation of the numerous and somewhat confusing reports of findings at trigger points (which are acupuncture points; see review by Simons, 1975, 1976) has caused me to come to a somewhat similar conclusion. The changes in posture, muscle balance, gait and even the psyche, which follow Rolfing have been investigated in depth by Hunt et al. (1977).

After my discovery that Rolfing was actually massage at acupuncture points it immediately became very obvious that the missing link between acupuncture and t'ai chi was posture. One could draw the analogy that t'ai chi is to acupuncture (and acupressure) as physiotherapy is to orthopaedic surgery. One could hardly understand how one had missed the obvious association for so many years. Every acupuncturist (including the author) knows that any condition with acute muscle spasm (e.g. acute torticollis or wry neck) responds immediately and dramatically to acupuncture/acupressure. These are acute posture problems. Why had the association with chronic posture problems been overlooked?

My fruitful 1979 vacation in the USA was followed by a short vacation in my home town of Sydney and the opportunity was taken to pursue the search and obtain more information on Rolfing, especially since there had been insufficient time in the USA to track down literature on the subject. A visit to the Department of Psychology, University of Sydney, in particular Dr. J. Chapman, provided more pieces in the jig-saw puzzle. Apart from literature on Rolfing he came up with a short but invaluable paper he had written on body/mind therapies (Chapman, 1978). He did not seem to have realised, however, that the connecting link between virtually all of the therapies he discussed was posture.

We now come to the various techniques developed throughout the world for changing posture (Table 1). Analysis of these techniques reveals that they may be

Table 1 *A classification of techniques for restoring postural homeostasis*

Continuous	Active (requires active participation, therapist-independent once learned)		Passive (subject is passive, therapist-dependent)	
	Intermittent	Peripheral	Central	
Alexander technique	1. Antigravity exercises t'ai chi ch'uan, yoga 2. Sensory awareness bioenergetics Feldenkrais technique psychophysical re-education gestalt posture therapy 3. Muscle 'lengthening' exercises orthotherapy kung fu karate 4. Respiratory techniques chi kung/ne kung	acupuncture-acupressure shiatsu polarisation trigger point therapy neural point therapy neural therapie Rolfing (structural integration) psychoperistaltic massage connective tissue massage	chiropractic other spinal manipulation methods	

divided into two groups from the subject's point of view. Firstly, active techniques: these involve the active cooperation and participation of the subject who must be motivated to improve his posture or else there is no way these techniques can be used by the therapist. Secondly, passive techniques: these are therapist-dependent techniques in which it is the therapist who is actively intervening by means of regular massage or manipulation. In considering the relative merits of the various techniques, one needs to take into consideration the advantage of the individual having within his grasp a method which is quite independent of any doctor or therapist once it is learned. On the other hand some techniques or exercises are not easy to learn or perform correctly as mentioned earlier. Moreover since the active techniques depend on the active cooperation of the subject, one encounters the problem of how highly motivated the subject is. This is a complex problem and depends on such things as how effective and worthwhile he himself considers the technique to be especially when in the short term there is usually little to show for the hours of time spent. It also depends on how busy he is and how much time he decides to spend on those methods which consist of performing a regular set of exercises. With the other active type, it depends on how quickly he improves his sensory awareness, how well he remembers to perform the new movement and thus how quickly he learns to break a habit and relearn a new one. Let us take a closer look and make a more detailed analysis of the various techniques.

Active techniques

These methods may be divided into (a) continuous and (b) intermittent depending on whether they involve the subject or patient consciously using his