Posture and Postural Defects

Posture can be defined as the relationship of the parts of the body to the line of the center of gravity. The posture is a gauge of mechanical efficiency of the neuromusculoskeletal system in the erect position.

Development of Posture

In the uterus the fetus is almost invariably in a position of flexion, with the convex curve of the spine lying against the curve of the uterine wall. The head, arms, and legs of the fetus are flexed on the torso.

The entire fetus lies suspended in the amniotic fluid, which has a specific gravity similar to that of the fetus. Following birth the development of posture is affected by constant forces exerted by gravity.

The newborn holds his shoulders, elbows, hips, and knees in flexion, with his limbs slightly bowed and rotated inward. Fifteen to thirty degrees of flexioncontracture of the knee is a normal physical finding.

The infant lies in a nearly horizontal position, unable to support his head or trunk. In either

the prone or the supine position, gravitational force is exerted on a horizontal plane and tends to unroll the “coiling” that was previously assumed within the uterus.

The rate of development of muscle strength varies in the different parts of the body.

When the infant is in a horizontal position, the hip flexors, the anterior muscles of the neck, and the abdominal muscles are stretched and used minimally, whereas the extensors of the neck, back, and thigh are relaxed and are the first to increase their motor power.

When the child is able to support his head and begins to sit up, the weight of the head, combined with the persistent flexion attitude of the hips and the associated of the pelvis on the spine, produces a long convex curve of the entire spine.

In the prestanding stage, this total convex curve of the back is normal.

When the child begins to stand and walk, the extensor muscles of the back, neck, and hips are well developed and the spine is usually straight.

In the upright position, the force of gravity is exerted in a vertical direction, causing an exaggerated lumbar lordosis and a protuberant abdomen. With further growth and development, the child improves his stance and becomes more agile in walking and running.

Normal Posture

Our posture should follow a vertical line through our ear, shoulder, hip, knee and just in front of our ankle.

In normal posture the body weight is carried forward on the balls of the feet, the lower limbs are straight with the hips and knees in neutral extension, the pelvic inclination is about 60 degrees to the vertical, the abdomen is retracted, the shoulders are level and flat, and the head is held erect.

The line of the center of gravity of the body passes from the mastoid process to the cervicodorsal junction, crossing the bodies of the vertebrae at the dorsolumbar junction, and falling just anterior to the sacro-iliac articulation and slightly posterior to the hip joint; it passes through the anterior knee joint and terminates at the front of the talus in the ankle.

Factor Affecting Posture

The posture of each person has characteristics that are uniquely his. Various factors affecting posture are:

Bony Contours

The shape of the vertebrae may be modified by diseases such as tuberculosis or Scheuermann's disease, which produce dorsal kyphosis.

Ligaments

The degree of ligamentous laxity varies in different individuals, giving rise to looseness or tautness of the joints. The spine is composed of many joints, and is itself dependent upon the articulation inferior to it, such as those of the feet, knees, and hips.

Fascial and Musculotendinous Tautness

Tautness of soft-tissue structures, especially the fascia lata, hamstrings, anterior hip capsule, and pectorals, affect posture.

Muscle Strength

Particularly important is the strength of the gluteus maximus, abdominal erector

spinae, and scapular adductor muscles.

Pelvic Inclination

The pelvis is the base upon which the vertebral column rests. Any change in its inclination will cause a corresponding change in the position of the fifth lumbar vertebra in relation to the sacrum, which in turn alters the posture of the entire spine. Inclination of the pelvis is ordinarily controlled by the muscles about the hip.

Pelvic inclination is increased by contraction of the extensors of the hip, i.e., the glutei, hamstrings, and the posterior portion of the hip adductors, and it is decreased by contraction of hip flexors.

Motion of the vertebral column is greatest in the lumbar region; in the thoracic spine, however, rotation is of considerable magnitude, but flexion and extension are limited.

The muscles of respiration (the diaphragm and intercostals) produce a secondary effect on posture, as there is some extension of the dorsal spine with each inspiration.

Perfect and Bad Posture

Posture can be classified into four grades

A- Excellent or almost perfect posture
B- Good, but not ideal posture
C- Poor, but not the worst possible posture
D- Bad and very possibly symptom-producing posture

In excellent (A) posture, the head and shoulder are balanced over the pelvis, hips, and ankles, with the head erect and the chin held in. The sternum is the part of the body farthest forward, the abdomen is drawn in and flat, and the spinal curves are within normal limits.

In bad (D) posture, the head is held forward to a marked degree, the chest is depressed, the abdomen is completely relaxed and protuberant, the spinal curves are exaggerated, and the shoulders are held behind the pelvis.

Postural Defects

There are three common postural defects:

- Kyphosis
- Lordosis
- Scoliosis

Kyphosis is an exaggerated curve of the thoracic region which causes the shoulders to be rounded, the neck to be shortened and the chin to poke forward. The muscles in the upper back are weakened, and the pectoralis major tightens.

Lordosis is the exaggerated curve in the lumbar region, and causes the pelvis to tilt forward. The abdominals and hip extensors are weakened and the trunk extensors and hip flexors tighten.

Scoliosis is lateral curvature of the spine. Muscles on the outside of the curve become weak, and muscles on the inside of the curve become tight.

With all of these postural defects there are measures to either avoid the condition or help correct the defect.

Treatment of Postural Defects

Poor posture in children should be observed, and corrective measures taken to increase the strength of the back so that it will be less susceptible in adult life to fatigue, back strain, and injury.

Children rarely complain of backache from poor posture.

Treatment consists of passive and active exercises. The aim is to gradually build up aerobic resistance in the postural musculature, i.e. the shoulder, back, abdominals and hip extensors.

This in turn would maintain or realign a correct posture. The effects of this are:

- An improvement in neuromuscular control, postural reflexes and muscle tone
- Reduction in the energy requirements needed to maintain correct alignment
- Reduction in wear and tear on the joints

Exercises to increase the motor strength of the key muscles affecting posture are also helpful.

The most important is the pelvic tilt. The patient is instructed to decrease the pelvic inclination by use of the abdominal and gluteus Maximus muscles. Initially, he/she performs the pelvic tilt exercise in a supine position, then standing against the wall.

Postural exercises should be carried out until the individual is able to maintain the correct

posture naturally. The patient should continue the exercises until they become part of his normal stance and gait.