



*Dynamic Chiropractic* – April 8, 1994, Vol. 12, Issue 08

## **Management of Osteoporosis of the Spine -- A Clinical Enigma**

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Osteoporosis of the spine involves a reduction in the number and size of bony trabeculae and results in a reduction in the resistance of the vertebrae to physical stresses. The effect of this adverse trabecular change results in spontaneous fracture with deformity and respective pain. The most prominent changes involve the spine, the ribs, and the components of the pelvis. As the spine responds biomechanically to the effects of vertebral osteoporosis, it slowly, but progressively, presents with a configuration common to kyphoscoliosis. This configuration progresses under the influence of gravity, until it is stopped when the lower ribs come to rest upon the iliac crest bilaterally.

Etiologically, osteoporosis is a product of postmenopausal hypoestrogenism, either physiological or surgical, senility, Cushing's syndrome, cortisone and ACTH treatment, hyperthyroidism, immobilization, and malabsorption osteopenia. Of course, osteoporosis and osteomalacia may coexist. Of course, the most common finding is in the postmenopausal female subject to hypoestrogenism.

Pathologically, the vertebrae become soft and fragile and the centrum in the thoracic region becomes wedge shaped due to anterior compressive forces. In the lumbar region, the superior and inferior surfaces of the centrum becomes indented due to exposure to the expansile forces of the intervertebral discs.

Macroscopically, the spine appears as a series of biconcave vertebral bodies possessing increased intervertebral disc spaces. Radiographically, the transverse trabeculations disappear and the vertebral body margins become indistinct. The thoracolumbar junction is a common site for compression fractures of the effected vertebrae.

Clinically, these patients complain of pain in the bones, especially in those of the spine. Such patients exhibit a distinctly rounded thoracic spine, a short stature with a stoop shouldered habitus. Otherwise trivial trauma commonly results in minute fractures which are radiographically unidentifiable. Such an episode of trauma historically is of acute onset, has a point of tenderness consistent with the site of spontaneous

fracture and is relieved to some degree by recumbency.

Although treatment for osteoporosis is somewhat controversial, this author recommends the following at a stage of progress early enough in the patient's history not to constitute a danger to compression fracture. Daily therapeutic exercise, primarily involving aerobics, with the intention that the exercise will result in gravitational forces along the trabecular stress lines of the vertebral bodies thereby employing the principles of Wolff's law in bone physiology. The patient should be instructed to use a bed board between the mattress and box springs, unless some contraindication exists, which serves the purpose of providing a planar surface for the spine to conform to biomechanically. Also, this will tend to enhance the density of bone, again in accordance with Wolff's law.

In the presence of a spontaneous vertebral fracture, the patient will have the least pain in a recumbent position to avoid the axial forces of gravity on the spine. Moist heat may be applied to the area of the fracture site to relieve pain and spasm. The author recommends the alternate application of pulsed ultrasonic energy in order to complement the effect of Wolff's law relative to the trabecular stress lines without the presence of gravitational forces. Shortwave diathermy is contraindicated. Thoracic hyperextension orthosis may be applied as tolerated by the patient. Swimming is an excellent rehabilitation exercise. Walking, with assistance, is highly recommended as soon as possible with the patient wearing a soft shoe.

Bed rest is recommended only for as long as is necessary to allow the patient sufficient recovery to begin ambulation, which should begin as soon as possible. The following time factors are intended as guidelines for the projected recovery process. Relief of pain should take place within about two weeks. Gradual mobility to ambulation should be within about five weeks with therapeutic exercise commencing as soon as pain permits. This author cannot resist the need to mention the oral administration of calcium orotate, 1500 mg daily as a divided dose, b.i.d., the greater portion of this being taken at bed time. In my degree work in nutrition I was impressed with the effectiveness of this salt in treating this metabolic problem. Of course, the patient must ingest a balanced diet daily and must have adequate sunlight exposure to ensure vitamin D conversion.

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