DISUSE OSTEOPOROSIS IN PATIENTS WITH POLIOMYELITIS

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What is osteoporosis?

- **Skeletal disorder**
  - increased porosity
  - low bone mineral density

- **Bone fragility & fractures**
  - HİP FRACTURES-dangerous!!!
  - Wrist & spine fractures

- **Early diagnosis and preventative treatment should be instituted before a possible fall or fracture occurs.**

*NIH Consensus Development Panel on Osteoporosis. JAMA 285 (2001): 785-95*
Osteoporotic fracture is a problem

• 20% of those who suffer a hip fracture will **die within 1 year**

• 20% of the general population with a hip fracture will require nursing home care and **will not be able to return to living independently**

• A 50-year-old woman has an estimated **16% to 54% risk of suffering a broken bone** during her remaining lifetime
  • The estimated risk for male is 6%
What is disuse osteoporosis?

• **Weight-bearing pressure helps to build bone**
  – Anything that keeps a person off his feet for any amount of time can cause disuse osteoporosis

• **Immobilization, neuromuscular weakness are major risk factors.**
  – Bed rest for 1 week induced 1% loss of BMC

• **Disuse bone atrophy between is mainly seen in weight-bearing bones other than non-weight-bearing bones**

OUR AIM IS;

- In patients with poliomyelitis,

• To investigate the presence of osteoporosis at the hip and lumbar spine

• To measure and compare the T-scores of affected & non-affected hip on BMD
Study Design

• Between 2010-2011
  • 29 patients with poliomyelitis attending outpatient clinics in Ege University and İstanbul Sisli Etfal Teaching Hospital

• Inclusion criteria:
  • previous paralytic polio
  • the subjects had an ambulatory potential in daily living
  • premenopausal women and men with testosterone deficiency
  • with lower extremity paralysis and one-side more prominently affected

• Bone density of the hip and lumbar spine were taken in the BMD laboratory and t-scores were assessed by a physiatrist
Osteoporosis is diagnosed by bone densitometry

- DEXA scans check;
  - the 'density' of bones.
  - X-rays to show how strong bones are.
- Density means how much of something there is in a certain amount of space.
- The denser the tissue, the less X-rays pass through.

"the more dense the bone, the stronger it is, and the less likely it is to break"

** www.mayoclinic.com/health/bone-density-test/MY00304**
How is a DEXA scan done?

** www.mayoclinic.com/health/bone-density-test/MY00304**
WHO osteoporosis scores

Understanding your DEXA result
Study design

- We obtained total femur t scores
  - *It is most representative*
  - *It contains both trabecular and cortical bone*
RESULTS

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Number (%)</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>15 male (51)</td>
<td>14 female (49)</td>
</tr>
<tr>
<td>Paretic side</td>
<td>Left (24)</td>
<td>Right (76)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>26</td>
<td>65</td>
<td>39,6</td>
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</tbody>
</table>
RESULTS

Age distribution of polio patients

Most of our patients at the middle age
Mean of T-scores on BMD
Rate of osteoporosis on both sides

- **3%** non-paretic side
- **21%** paretic side, respectively...
Disuse osteoporosis in POLIO SURVIVORS

** Polio subjects are prone to hip fractures after even mild trauma due to;
1. Disuse osteoporosis "not same with generalized osteoporosis"
2. Muscle weakness

** BMD of lumbar region is normal opposite to normal population; may be due to; scoliosis; degenerative disease
Osteoporosis is an important issue for polio survivors

1. Many of them are over the age of 50

2. The polio-affected areas have less bone mass and weaker bones because of the lack of normal weight bearing.

3. Many of them will fall more often than persons with normal neuromuscular function.

*If you break your "good" hip or fracture an arm that you depend on to assist in walking with canes, crutches, or to propel a wheelchair, or for transferring, it makes a tremendous impact on your lives and your independence.*
High incidence of fractures in an aging post-polio population

Mohammad AF, Khan KA, Galvin L, Hardiman O, O'Connell PG

- 41 PPS subject included in this study

- Based on the bone mineral density data, 28 (56%) of the patients were diagnosed with OP and 20 (40%) had osteopenia

- Eight out of 9 fractures of the neck of femur occurred in the weaker leg
If a DEXA scan shows that you have osteoporosis:

- then you may be given advice and treatment to help strengthen your bones
Can further bone loss be slowed?

- Diet modification
- Pharmacologic treatment
- Exercise
- Life style modification
  - Avoid immobilization
- Regular bone mineral density measurement

www.mayoclinic.com/health/osteoporosis-treatment
Can bone loss be prevented or slowed?

**Calcium**
- Most people get about 700 or 800 milligrams/day.
- Recommended is **1,000 to 1,500 mgm**

**Vitamin D**
- Adequate amounts of (between **400 and 800 units per day**) are also needed.
- One glass of milk is fortified with 100 units of Vitamin D.
- You can get enough Vitamin D by a daily **15-minute exposure to sunlight**, which is possible even in wintertime when you are fully clothed because your hands or face are exposed.

www.mayoclinic.com/health/osteoporosis-treatment
Pharmacological Treatment

Hormone replacement
- for women (estrogen with or without progesterone) can slow bone loss, preserve bone strength, and decrease fractures by approximately 50%.
- A new drug, raloxifene (Evista), can be used in women who have had breast or uterine cancer or those at high risk for these forms of cancer.

Bisphosphonates
- The bisphosphonates have been shown to decrease fractures by 50% and are recommended for women who cannot take estrogen.

Calcitonin
- It increases bone density and prevents further mineral loss for at least one or two years, but the studies to date have not shown a decrease in fractures.

www.mayoclinic.com/health/osteoporosis-treatment
Exercise is important for maintaining strength, to prevent osteoporosis both in normal and polio subjects.

- Exercise is definitely an area that should require input from a polio specialist, so you do not overuse or overstress extremities that have already been weakened by polio.
- However, you may have unaffected or stronger muscles that can be safely used for exercise.
Exercise is a little bit confusing issue !!!

**Weight-bearing activities : WALKING & WEIGHT-LIFTING**

- Walking is better than non-weight bearing activities such as swimming
- Heavy Weight-lifting for lower extremities is not recommended for PPS subjects, but: submaximal resistive program may be planned individually
  - Weightlifting with upper extremities for axial loading while sitting can be done for PPS subjects

**So to help maintain bone density; we need to keep the muscles working as well as they can and exercise them**

**But this means within their capabilities without getting fatigue or overuse, which can cause further muscle damage and so will end up with even less muscle pull.**
Exercise for osteoporosis in polio subjects

- Gentle back extension exercises can be given
  - Flexion exercises are not suitable for posture

- Mobility is important;
  - absolute bedrest results in very rapid skeletal loss. This is seen in patients with spinal cord injury
  - Wheelchair users also under the risk of hip fracture!!
  - However, as little exercise as going to the bathroom is sufficient to prevent the rapid loss.

Fall Prevention

**RECOMMENDATIONS TO PREVENT FALLS:**

- Bars and other safety devices in bathroom
  (Or, are you using a towel bar that is just attached to the wallboard?)
- Handrails on all the stairs in your home
- Keep bathroom lights on
- Avoid loose rugs
- Remove clutter
- Keep wires behind furniture
- Hip protection cushions
- Gait & Balance training !!!

Clinical messages

• all poliomyelitis patients should be evaluated for osteoporosis at both hips and at the lumbar spine, even if they are younger than 50
• Diet modification, exercise and mobilization are important for prevention of further bone loss
• There are many pharmacological options for treatment of osteoporosis
• Fall prevention is extremely important to prevent fractures.
Warm wishes from İstanbul...