Principles of Osteoporosis Management

Laura Fogle PT
Suzanne Artz McIlwee PT, OMPT
Objectives

- Discuss general principles of osteoporosis management (exercises, ADLs, and diet).
- Present treatment of patient with Osteoporosis/lumbar compression fracture.
- Introduce VH rehabilitation's osteoporosis collaborative.
Principles of Osteoporosis Management

Women over 50 will experience osteoporotic fractures. As will men.
OSTEOPOROSIS

- There is a fracture every 20 seconds affecting 55% of the US population 50 and over
- It occurs in 1 of 2 women and 1 of 4 men
- Is estimated to affect 54 million persons in the US
- Is more prevalent than coronary heart disease (12.5 million), diabetes (17 million), or heart attack (1.1 million) - reference Surgeon’s General report of 2004
- Is more common than breast, uterine, and ovarian cancer combined
A systemic skeletal disorder with compromised bone strength that predisposes an individual to increased fracture risk.

PEAK BONE MASS
The amount of bone we accumulate as a young adult (generally age 30-35)

About 90-98% is accumulated by age 18-20
Determinants of Bone Mass

- **Heredity** - 60-80%
- **Physical Activity**
- **Nutrition**
- **Ethnicity**
- **Hormonal Status**
- **Lifestyle Factors**

Left: normal bone
Right: osteoporotic bone
All Health and Exercise Professionals Need to be Knowledgeable

- Regarding risk factors and first signs
- Incidence in our client’s population

- Management
- Guidelines and precautions
Vertebral Body and Osteoporosis

- Bones of the spine are usually the first to show signs of bone loss.
- Primarily effects trabecular bone.
- Fractures occur with spinal flexion (loads the vertebral body which is composed of trabecular bone).
- Sitting and forward bending puts the most pressure on the vertebrae.
Vertebral Fractures

- Risk for 2\textsuperscript{nd} fracture increases 5 fold

- 1 woman in 5 will suffer a 2\textsuperscript{nd} vertebral fracture within one year of their 1\textsuperscript{st} fracture

- Only 20\% of vertebral fractures are symptomatic.
Evaluation

Cluster to Support Likelihood of an Osteoporotic Vertebral Fracture
1. Older than 52 years
2. No presence of leg pain
3. BMI <22
4. Does not exercise regularly
5. Female gender

**2 or more demonstrated high sensitivity to R/O compression fracture
**4 of the 5 revealed a moderate value in ruling in compression fracture

<table>
<thead>
<tr>
<th>SYMPTOMS</th>
<th>SIGNS</th>
<th>FUNCTION</th>
<th>FUTURE RISKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back Pain (acute/chronic)</td>
<td>Height Loss</td>
<td>Impaired ADL’s</td>
<td>Increased Risk of Fracture</td>
</tr>
<tr>
<td>Sleep Disturbance</td>
<td>Kyphosis</td>
<td>Difficulty Fitting Clothes</td>
<td>Increased Risk of Death</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Decreased Lumbar Lordosis</td>
<td>Difficulty Bending</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>Protuberant Abdomen</td>
<td>Lifting, Descending Stairs</td>
<td></td>
</tr>
<tr>
<td>Decreased Self Esteem</td>
<td>Reduced Lung Function</td>
<td>Cooking</td>
<td></td>
</tr>
<tr>
<td>Fear of future: Falls and Fractures</td>
<td>Weight Loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced Quality of Life</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Satiety</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Bone Health and Osteoporosis
A Report of the Surgeon General October 2004
Hip Fracture

- Most disabling/life threatening
- Older women who fall backward are most likely to fracture a hip
- ½ of women with hip fracture die within 1 year
- At 6 months s/p hip fracture only 15% can walk across a room unaided.
- Women are 2-3x’s at a higher risk for fx than men
Mortality rate for men is almost 2 x women’s

80,000 men per year have hip fractures, 1/3 of these die within 1 year

Risk factors for hip fracture include needing arms to go from sit to stand and on feet less than 4 hours a day
DEXA Scan Results/Definitions

- Normal: 1 standard deviation (+1 to -1) as compared to young adult mean
- Osteopenia: 1 to 2.5 standard deviation below as compared to young adult mean
- Osteoporosis: >2.5 standard deviation below as compared to young adult mean

www.nof.org (National Osteoporosis Foundation)
FIRST signs to look for in the clinic

- Postural changes (increased thoracic kyphosis, Dowager’s Hump, protruding abdomen)
- Loss of body height
- Wrist, compression, stress, hip, or low trauma fracture
- Loss of teeth due to periodontal disease
- Transparent skin
- Persistent back pain
Diseases that Increase Risk

- Hypo or hyperthyroid
- Congenital disorders
- Burns
- Cushing's Disease
- CA
- Chronic inflammation
- TB
- RA
- Organ transplants
- Eating disorder
- Mental illness
- Ankylosing spondylitis

- Primary hyperparathyroidism
- Liver dysfunction
- DM
- COPD
- Seizures
- Neurological Disorders
- Malabsorption Syndromes
- Kidney Dialysis
- Endometriosis
- Idiopathic scoliosis
- Multiple sclerosis
- Pernicious anemia
- Osteogenesis imperfecta
Medications that increase Risk

- Corticosteroid
- Diuretics
- Heparin
- Methotrexate (CA medication)
- Cyclosporine A (immunosuppressant)
- Long term thyroid meds
- Excessive alcohol
- Anticonvulsants
- Coumadin
- Cholestyramine (Cholesterol medication)
- Antacids with aluminum
- GnRH (hormones for endometriosis)
- Cigarette smoking
- Lithium
Other Risk Factors

- Female
- Caucasian or Asian
- Post menopausal
- Small boned
- Family history
- Delayed puberty
- Early menopause
- Weight below 130 lbs

- Smoking
- Sedentary life style
- Advanced age
- Over exerciser
- Nulliparous (female never having a child)

Vertebral Compression Fracture
Nutritional Risk Factors

- Eating disorders
- High protein diet
- High alcohol intake
- Low calcium
- High sodium
- Caffeine
TRIANGLE OF MANAGEMENT

Psychological

Beliefs about Health & Illness

Cultural Issues

Social

Spiritual & Religious

Financial Issues

EXERCISE****

MEDICATION

Co-morbidities

DIET

Cognitive Condition
Optimum Nutrition for Bone Health
www.nof.org

- **Daily Calcium**
  - WOMEN under 50 = 1000 mg
  - age 50 and over = 1200 mg
  - MEN under age 70 = 1000 mg
  - age 71 and over = 1200 mg

- **Daily Vitamin D**
  - Under age 50 = 400 to 800 IU
  - (international units)
  - Over age 50 = 800 to 1000 IU
  - Some people may have to take more than 1000 IU
Vitamin D

Osteoporosis Education Project has initiated a call for universal vitamin D as the primary basis for osteoporotic fracture prevention.

Vitamin D serum should be at least at 32 ng/ml

Ideal serum level goal is between 50-60 ng/ml

Patients may have to take additional daily doses to maintain
Prevention of Fracture is the “bottom line”

Focus on Exercise to Reverse the Patterns of Postural Change
References

• Walk Tall! An Exercise Program for the Prevention & Treatment of Osteoporosis, Sara Meeks, PT
  • www.nbha.org
  • www.sarameekspt.com
  • www.ownthebone.org
  • www.therapilates.com
  • www.nof.org
  • www.betterbones.com
  • www.iofbonehealth.org
  • www.frailityfracturenetwork.org
Patient - Paula (Subjective History)

- 74 year-old female
- Acute L1 Compression Fracture
- Past Medical History
- DEXA Scan
- FOTO - 41/100
- Pain at 2/10 presently, flares of 4/10
- 2 weeks post-injury - 8/10
1. Clean horse stalls.
2. Regain ability to ride and perform dressage.
3. Return to fitness at VH Wellness.
4. Return to household chores.
5. Get up/down off of floor.

*Not Paula’s X-Ray*
Patient (Objective Findings)

- Posture
- Gait
- Balance
- Strength
- Range of Motion (ROM)
Initial Treatment

- **Realignment Exercises**
  - Decompression
  - Head Press
  - Shoulder Press
  - Leg Press
  - Leg Lengthener

- **Body Mechanics and ADL’s**
  - Bending
  - Sit-to-stand
  - Turning
Decompression & Head Press

DECOMPRESSION EXERCISE

A.

B.

HEAD PRESS

A.

B.
Shoulder Press, Leg Press, & Leg Lengthener
Treatment #2

- Pain - 1/10
- Treadmill Warm-Up
- HEP Review
- Prone Exercises
- Standing Hip Abduction/Extension Machine
- Standing T-band Hip Exercise
- Body Mechanic Review with Hip Hinging (stick)
Prone Exercises
Treatment #3

- Pain - 2/10
- Riding In Car - 1 hour
- Standing - 1.5 hours
- Treadmill Warm-Up – 3.2 mph for 20 minutes
- Reviewed Previous Exercises

*Initiated referral for Spinomed IV brace*
Treatment #4

- Pain - 2/10
- Reviewed Home Program & Activities
- Prone Scapular Exercises
Treatment #5

- Pain - 1/10
- Wearing Spinomed IV (2 hours a day)
- Cleaned animal stalls
- Excellent body mechanic knowledge
Treatment #6

- Pain - 0/10
- Spinomed and Lumbar Support while riding
- Systematic Progressive Resistance Training Program
Components of the 3 times a week yearly community fitness program

- Warm Up (5-10)
- Progressive Weight Bearing (25)
- Resistance Exercises - large muscle groups (20)
- Resistance Exercises - small muscle groups (10)
- Abdominal Strengthening (5)
- Stretching and Balance (5)
Paula’s Fitness Workout (Overview)

- Treadmill Warm-Up
- Leg Press
- Standing Overhead Press (dumbbells)
- Lat Pull Down
- Seated Rowing
- Progressive Wall Sits
Treadmill Warm-Up
Leg Press
Standing Overhead Press (Dumbbells)

Phase 1

Phase 2

Phase 3
Lat Pull Down
Seated Row
Progressive Wall Sits
Treatment #7 (2 Week Follow-Up)

- Pain - 2/10
- Now doing dressage 30 minutes every other day
- Stadiometer (1) - height is unchanged
- Prone Extension Endurance Test (2) - 2 min.
- Loaded Stance Test (3) - 2 min. & 3 sec.
Treatment #8 (One Month Follow-Up)

- Pain - 2/10
- FOTO - 54/100
- Stadiometer - Height Maintained
- Prone Extensor Endurance Test - 3 minutes
- Loaded Stance - 3 minutes
March 24 – 25, 2018 - Level 1 Meeks Method comprehensive exercise and movement approach to the treatment of osteoporosis was sponsored by Valley Health.

Many therapists throughout Valley Health attended this course and became aware of a need to incorporate this valuable training into the services we provide across the system.

The initial organizational meeting took place on January 18, 2019.
Goals of the VH Osteoporosis Collaborative
To establish an organized and consistent approach to identifying and addressing the needs of Physical and Occupational therapy patients (in-patients, out-patients and home health patients) who suffer from or are at risk for developing osteoporosis/osteopenia no matter what their referring diagnosis may be.
(Collaborative Goals)

- To offer training to the VH Rehab staff that is easily accessible and offers a way for our therapists to effectively treat the physical effects of osteoporosis without requiring them to take a formalized training course.
(Collaborative Goals)

- To compile educational materials for:
  * patients
  * caregivers
  * medical professionals
  * the community

To assist in their understanding of this disease and how to identify, manage and reduce the effects of osteoporosis on functional mobility and quality of life.
How did we achieve these goals??
### VALLEY HEALTH OSTEOPOROSIS EVALUATION

#### PATIENT PORTION

<table>
<thead>
<tr>
<th>Date: _____________</th>
<th>Pt label</th>
</tr>
</thead>
</table>

Email address: ____________________________

Bone Fracture History (please check all that apply):

- ___ Hip fracture; Date/age: _____________; Fall related? Y / N
- ___ Spinal compression fracture; Date/age: _____________; Fall related? Y / N
- ___ Wrist fracture; Date/age: _____________; Fall related? Y / N
- ___ Other fracture _______________________; Date/age: _____________; Fall related? Y / N
- ___ Family history of osteoporosis? Y / N; Who?

Please provide the following information:

1. Have you had a bone density test in the last 2 years? Y / N (if yes, please bring results)

2. Have you fallen or had any near falls in the past 3 months? Y / N; Explain:

3. Do you ever get dizzy or lightheaded? Y / N; Explain:

---

#### THERAPIST PORTION

<table>
<thead>
<tr>
<th>Clinician: ____________________________</th>
</tr>
</thead>
</table>

Date: ____________________________

4. Are you up on your feet at least 4 hours per day? Y / N

5. How many hours per day do you spend sitting, reading, watching TV, doing needlework, other seated activity? (circle answer) 1 2 3 4 ____________

6. Do you have any difficulty with everyday activities such as: Getting in/out of bed, standing up from a chair, dressing, brushing teeth or hair, cooking, taking care of your home? Y / N

   Explain: ____________________________________________

   ____________________________________________________________________________________________________________________________

7. Is there anything else you would like to add that you think might help in your treatment?

   ____________________________________________________________________________________________________________________________

   ______________________________________________________

---

### VALLEY HEALTH OSTEOPOROSIS EVALUATION

#### THERAPIST PORTION

<table>
<thead>
<tr>
<th>Pt label</th>
</tr>
</thead>
</table>

Clinician: ____________________________

Date: ____________________________
Healthy Bones: Treatment Guidelines
for People with Osteopenia, Osteoporosis or Vertebral Compression Fracture

I. Prevention
   a. Patient Education
   b. Positioning
   c. Body Mechanics
   d. Postural Correction
   e. Body Alignment
   f. Therapeutic Exercise
      i. Meeks decompression position
      ii. Core activation
   g. Balance
   h. Gait
      i. Home Exercise Program
         i. Walking program
   
II. Acute
   a. Pain Relief Modalities
      i. Hot, cold, ES, FIC, TENS
   b. Positioning
      i. Appropriate positioning in bed to include use of pillows for support and to encourage position of spinal decompression, elongation of spine as much as possible
      ii. No out of bed to chair orders due to increased compressive forces in sitting vs supine, sidelying, and standing
      iii. Schedule position changes at regular intervals
   c. Body Mechanics
      i. Logroll technique
      ii. Sit to stand
   d. Bracing

   
i. Advise and train in use of braces that support muscle reeducation (i.e., spinomed or osteomed)
   c. Isometric Strengthening
      i. Initiate 5 realignment exercises (decompression, head press, bilateral shoulder press, leg press, leg lengthener)
   f. Staff Education
      i. Appropriate positioning
      ii. Strategies for assisting patient mobility with minimal spinal loading
   g. Dietary Recommendations
      i. Discuss general guidelines for calcium and Vit D
      ii. Dietician referral as needed

III. Subacute & Chronic
   a. Modalities for pain relief and soft tissue mobility
   b. Positioning
   c. Body Mechanics
      i. Review of proper body mechanics for ADLs, home management, etc
   d. Bracing
      i. Spinomed or Osteomed
      ii. Lumbo/brac or Lordoloc – more rigid bracing for heavier work
   e. Physical Therapy/Rehab, PTA
      i. Consider Rock tape to thoracolumbar area (consider skin integrity)
   f. Therapeutic Exercise
      i. Strengthening
         1. Back and scapula per Meeks presentation in SharePoint
         2. LE exercises such as QS, GS, standing hip abd/ext, marching, standing heel raises, standing toe raises, wall slides/sits, SL hip abd/ER, standing resisted abd/ext with TBand
         3. UE: include rotator cuff
Principles of Osteoporosis Management

WOMEN OVER 50 WILL EXPERIENCE OSTEOPOROTIC FRACTURES. AS WILL MEN.

ValleyHealth
Healthier, together.
Exercise Programs
(Available in SharePoint under “Healthy Bones”)

Phase I Beginner Osteoporosis Exercises

1). Decompression
Position: Lie on back with knees bent, feet flat, arms resting on floor/table, and palms turned upward and out from the side of the body about 35 degrees. Head, neck, and arms supported as needed. Hold 3-10 minutes.

Accomplishes: takes compression off vertebral bodies (spine). Increases tolerance for lying on back. Help relieves back pain.

2). Shoulder Press

Accomplishes: Strengthens upper back extensors and scapular retractors.

3). Head Press
Position: Bring cervical spine into neutral position (either tuck chin towards the chest or tilt chin upward). Feel the weight on the back of your head. Press head downward into supporting surface. Hold 5-8 seconds. Relax. Repeat 3-5 reps

Accomplishes: Strengthens neck extensors

4). Leg Press
Position: Straighten one leg down to table/floor surface. Keep leg in alignment with hip. Press entire leg downward (as if making impression of leg in sand). Engage buttock and low back muscles as well as leg. Hold 5-8 seconds. Repeat 3-5 times. Repeat on other leg.

Accomplishes: strengthens gluteus maximus, lower erector spinae, ankle dorsiflexors

5). Leg lengthener
Meek's Theraband Scapular Stabilization Exercises for Osteoporosis

1). Side Pull

Position: Grasp band with both hands. Wrap band around your hand, not your fingers or thumb. With your elbow straight, bring arms up to shoulder height (right angle) about shoulder width apart. Keeping your elbows straight, pull band out to the sides bringing hands down towards the floor/bed. The band should be at chest and collarbone level. Hold 3 seconds and slowly return to starting position controlled. Repeat 10 times.

3). The Overhead

Position: Grasp band with both hands around hip level with your elbows straight and palms facing down. Put tension on the band by pulling hands apart outward. Keep elbows straight and with steady tension on the band, bring your arms up and overhead as far as you can. Hold for 3 seconds and then return to start. Repeat 10 times.

2). Sash

Position: Grasp band with left hand, place left hand on prominent left front hip bone. Bring right hand with thumb pointed down over left hand. With some tension on the band, pull the band up and in a diagonal direction across your chest/upper body. Continue pulling as able and make a straight line between your left hip and right shoulder. The band should cross the sternum. Hold position 3 seconds and then return slowly to starting position. Repeat 10 times and then switch to the right hand holding the band and left hand pulling upward.

4). Arm rotation

Position: With hands turned towards face/palms up. Lay the band across the palms of your hands as if it's a ribbon. Grasp the band and bend elbows to right angle (90 deg) while tucking your elbows in close to your side. If you need...
(prone exercises)

Prone Osteoporosis Exercises - Beginner to Advance

Prone lying
Position: Begin lying on your stomach with your head resting on your hands or a towel roll, looking straight down. Can place a pillow under abdomen for support as needed. Hold position for 3-5 minutes.

Prone Pelvic Press
Position: Begin lying on your stomach with your head resting on your hands or a towel roll, looking straight down. Maintain this position and gently press front part of pelvis down into bed or pillow. Make sure to continue breathing during contraction as well as to not fire buttock muscles solely.
Hold 5-10 seconds, repeat 10 times.

Prone Press up
Position: Begin lying on your stomach, with your hands placed by your shoulders resting flat on bed or floor. Make sure they are shoulder width apart as well. Gently push against bed/floor with hands bending your back upward. Keep your hips in contact with the floor/bed and maintain a gentle chin tuck. Breathe in as you go up and out before you go down gently sagging your stomach into bed/floor. Can use a pillow for support under pelvis region if needed.
Hold 3-5 seconds, slowly return down. Repeat 10 times.

Prone press up on elbows

Prone Knee flexion
Osteoporosis Vertical Sequence/exercises for higher functioning patients

Wall slides/sit
Narrow base of support wall slide
Single leg wall slide with stability ball
Angels in Snow
Wall push up
Lift Aways (facing wall, keep arms straight overhead and lift away from wall)
Lift Aways with arm lengthener
Lift Aways with heel raises and arm lengthener
Modified Plank
Hip flexor stretch in standing
Gastroc stretch in standing
Sit to stand in 30 seconds

Walking
Walk 15 steps, 13 steps, 11 steps
Side step
Backwards walk
Cone tap/cone hip circle

Pendulum hip swing
Karaoke/Braiding

Balance
Single leg stance
Tandem
Romberg

Foam roller exercises
Gray Cook Standing theraband exercises for core and lower extremity stability
Patient Education
Calcium/Vit D Tip Sheet / Body Mechanics and ADL’s
Where we are now???

- Ongoing staff training/skills labs in process for clinicians in VH entities

- Needed tools to perform pt evaluations and treatments have been added to the Rehab clinics
Healthy Bones
Stand Tall for Life — A Program for Osteoporosis Management and Prevention

Healthy Bones is a program designed to reverse the patterns of postural change and restore normal body alignment through education and exercise. Benefits include:

- Improved posture, balance & gait
- Increased bone & muscular strength
- Minimized fracture risk
- Enhanced body image
- Safer return to regular exercise

Participants will receive an evaluation by a Physical or Occupational Therapist and a customized program which may include:

- Pain relief measures
- Muscular stretching & strengthening
Meeks II Course

Hopefully coming in 2020!
Thanks For Listening, Are There Any Questions?