

# Vertebral compression fractures in primary care

## RECOMMENDATIONS FROM A CONSENSUS PANEL

**Stephen Brunton, MD** ■ **Blaine Carmichael, RN, MPAS, PA-C** ■ **Deborah Gold, PhD**  
**Barry Hull, MD, FAAFP** ■ **Timothy Kauffman, PT, PhD** ■ **Alexandra Papaioannou, MD**  
**Randolph Rasch, PhD, FNP, FAANP** ■ **Hilmar H. G. Stracke, MD, PhD** ■ **Eric Truumees, MD**

Osteoporotic vertebral compression fractures (VCFs) represent a significant diagnostic and management challenge for primary care physicians (PCPs), and they are likely to become an increasingly important health issue for many patients as the population ages.<sup>1</sup> Persons with a VCF experience a decreased quality of life (QOL) and also show increases in digestive and respiratory morbidities, anxiety, depression, and death.<sup>2-7</sup> Most importantly, these patients have as much as a 5-fold increased risk of another fracture within 1 year of initial fracture.<sup>8</sup> Up to two thirds of VCFs are undiagnosed<sup>9,10</sup> and even if diagnosed, many patients are treated only acutely; few (18% in one study) are managed long term for prevention of fractures.<sup>4,10-14</sup>

Primary care physicians need to take a proactive role in assessing the risk for or presence of VCFs and in maintaining or improving general bone health: many patients consider back pain a normal part of aging and do not dis-

### Key points and recommendations

- Vertebral compression fractures (VCFs) are common but often silent consequences of osteoporosis (SOR: A)
- The risk of death is increased several-fold during the year following a VCF (SOR: B)
- Calcium and vitamin D supplementation, antiresorptive and anabolic agents, and weight-bearing exercises are helpful in preventing secondary VCF (SOR: A)
- The incidence of fractures can be reduced by 40% to 60% with pharmacologic therapies (SOR: A)
- Magnetic resonance imaging of the spine is probably the single most useful test for evaluating a fracture (SOR: C)
- Vertebroplasty or kyphoplasty should be considered for patients in whom a progressive kyphotic deformity or intractable pain develops (SOR: A)

**Stephen Brunton, MD**  
 Cabarrus Family Medicine Residency Program  
 Charlotte, North Carolina

**Blaine Carmichael, RN, MPAS, PA-C**  
 Alamo City Medical Group  
 San Antonio, Texas

**Deborah Gold, PhD**  
 Duke University Medical Center  
 Durham, North Carolina

**Barry Hull, MD, FAAFP**  
 The Doctor's Office, LLC  
 Peachtree City, Georgia

**Timothy Kauffman, PT, PhD**  
 Lebanon Valley College  
 Lebanon, Pennsylvania

**Alexandra Papaioannou, MD**  
 McMaster University  
 Hamilton, Ontario

**Randolph Rasch, PhD, FNP, FAANP**  
 Vanderbilt University  
 Nashville, Tennessee

**Hilmar H. G. Stracke, MD, PhD**  
 University Hospital Giessen  
 Giessen, Germany

**Eric Truumees, MD**  
 William Beaumont Hospital  
 Royal Oak, Michigan  
 Wayne State University  
 Detroit, Mich

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cuss it with their physician.<sup>15</sup> Further, the PCP needs to act as the central point of care for a patient with a VCF, working with an orthopedist, physical therapist, clinical social worker, pharmacist, and dietician to provide optimal management.<sup>16</sup>

This publication's recommendations stem from a review of the literature and panel members' clinical experience. Highlighted below are the impact of VCFs on overall QOL, risk factors for VCFs, and a discussion of management options for a patient with a VCF.

### PREVALENCE OF VCFs

Mild to severe VCFs are the most common consequence of osteoporosis. Of the 1.5 million fractures that occur each year in the United States, 700,000 are spinal fractures.<sup>16</sup> One in 2 women and 1 in 4 men aged 50 years and older will have an osteoporosis-related fracture in their remaining lifetime.<sup>17,18</sup> The incidence of VCF increases progressively with age throughout later life, and prevalence is roughly the same in men (21.5%) and women (23.5%), as measured in one study using radiologic evidence.<sup>19</sup>

### CLINICAL CONSEQUENCES OF VCFs

Active efforts to diagnose VCFs are critical because only about one third of radiographically diagnosed VCFs cause symptoms,<sup>20</sup> often just moderate back pain.<sup>9</sup> Still, vertebral and other osteoporotic fractures produce cumulative, often irreversible, damage,<sup>2,4</sup> fracture-related medical problems,<sup>14</sup> and increased risk of death. For example, lung function is reduced significantly in patients with a thoracic or lumbar fracture: 1 thoracic compression fracture may cause a 9% loss of the forced vital capacity (FVC).<sup>21</sup> A 4-fold higher prevalence of severe VCFs has been reported in patients with chronic obstructive pulmonary disease compared with matched controls, as well as impaired lung function as measured by the percentage decrease of FVC.<sup>10</sup>

Multiple VCFs cause height loss, thoracic hyperkyphosis, loss of lumbar lordosis, and subsequent compression of the internal organs as the spine no longer holds the body upright.<sup>3,22</sup> The rib cage presses on the pelvis, reducing the thoracic and abdominal space; with severe disease, this space may measure less than 2 finger-widths. **TABLE 1** provides some examples of the other effects of VCFs on a patient's life.<sup>2,3,10,23</sup>

### ASSESSMENT AND DIAGNOSIS

Symptomatic VCFs usually present as acute thoracic or lumbar back pain.<sup>1</sup> Importantly, little correlation exists between the degree of vertebral body collapse and pain level. Evaluating the patient's risk, taking a history, conducting a physical examination, and ordering radiologic studies are essential parts of the assessment and diagnosis of a suspected VCF (**FIGURE 1**).

**TABLE 1**

### Clinical consequences of VCFs

Protuberant abdomen Difficulty fitting clothes due to kyphosis, protuberant abdomen Back pain (acute and chronic) Height loss Reflux Early satiety Weight loss Reduced lung function Shortness of breath Impaired physical functioning Fear of fracture and falling Impaired activities of daily living (eg, bathing, dressing) Depression Sleep disturbance Difficulty bending, lifting, descending stairs, cooking Increased fracture-related hospital length of stay by 2.0 days Mortality
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Papaioannou A, et al. *Am J Med.* 2002;113:220-228;<sup>2</sup> Yamaguchi T, et al. *J Bone Miner Metab.* 2005;23:36-40;<sup>3</sup> Papaioannou A, et al. *Osteoporos Int.* 2003;14:913-917;<sup>10</sup> Papaioannou A, et al. *Osteoporos Int.* 2001;12:870-874.<sup>23</sup>

### Risk factors

**Low bone mineral density.** Bone mineral density (BMD) is a better predictor of osteoporotic fracture than cholesterol is for coronary heart disease or blood pressure for stroke.<sup>1,4</sup> The PCP should determine if the patient has had a workup for or diagnosis of osteoporosis; absent a previous diagnosis of osteoporosis, the patient should be re-tested. Many VCFs occur in women with normal or osteopenic BMD scores, suggesting the presence of contributing risk factors, which include long-term corticosteroid use.

**Medical conditions and agents.** Corticosteroids interrupt healthy bone metabolism in males and females of all ages and require therapy to slow or prevent progression of osteoporosis.<sup>24</sup> Celiac disease, common in premenopausal women with idiopathic osteoporosis, also may be a risk factor.<sup>25</sup> Other diseases or treatments that may affect risk include cancer and calcium malabsorption (diarrhea, gastrointestinal diseases, recent immobilization).

### Patient history

**Previous fracture.** A history of a VCF and other fractures, such as of the wrist, are also strong predictors of a subsequent VCF.<sup>8,26</sup>

**Onset and duration of pain.** The patient's activities at pain onset may help determine the cause. A recent event resulting in acute pain suggests a compression fracture. Pain lasting for months or years may stem from age-related spinal disorders.

Leg pain or weakness indicates that there may be a neurologic deficit and may warrant an immediate referral to a surgeon.

**Diagnosis**

**Physical examination.** The physical examination should be performed with the patient standing, so that signs of osteoporosis, for example, kyphoscoliosis, are more apparent. Otherwise, the patient should lie on one side. The recommended procedure is as follows:

Beginning at the top and working down, depress the thumb on or over the spinous processes to examine the spine. While VCFs can occur from the occiput to the sacrum, most often they occur in the midthoracic region (T7-T8) and at the thoracolumbar junction.<sup>27</sup>

Ask the patient to indicate presence of pain; repeat the spine examination, as necessary, to pinpoint the actual pain location. Pain associated with spinal palpation may indicate a compression fracture.

Often, there is an accentuation of the normal spinal contour at the level of injury with associated prominence of the spinous processes in the painful area. The presence of a spinal deformity by itself does not indicate the cause or timing of the fracture. If there is no identifiable sharp pain, suspect other age-related spine problems.

Have the patient flex and extend the spine; these movements often exacerbate pain resulting from VCF. Moderate muscle spasm or splinting may occur as the antigravity muscles of the spine attempt to unload the pressure on the wedged anterior vertebral body. A neurologic examination should also be performed. In rare cases, osteomyelitis mimics symptoms of a VCF.

Other findings associated with an increased risk of osteo-

porosis or spinal fracture are listed in **TABLE 2**.<sup>28</sup>  
**Radiology.** During the physical examination, a radiopaque marker may be applied to the skin next to the most painful region; this may, however, obscure evidence of neoplasm or

**FIGURE 1**

**Management algorithm for acute painful VCFs**

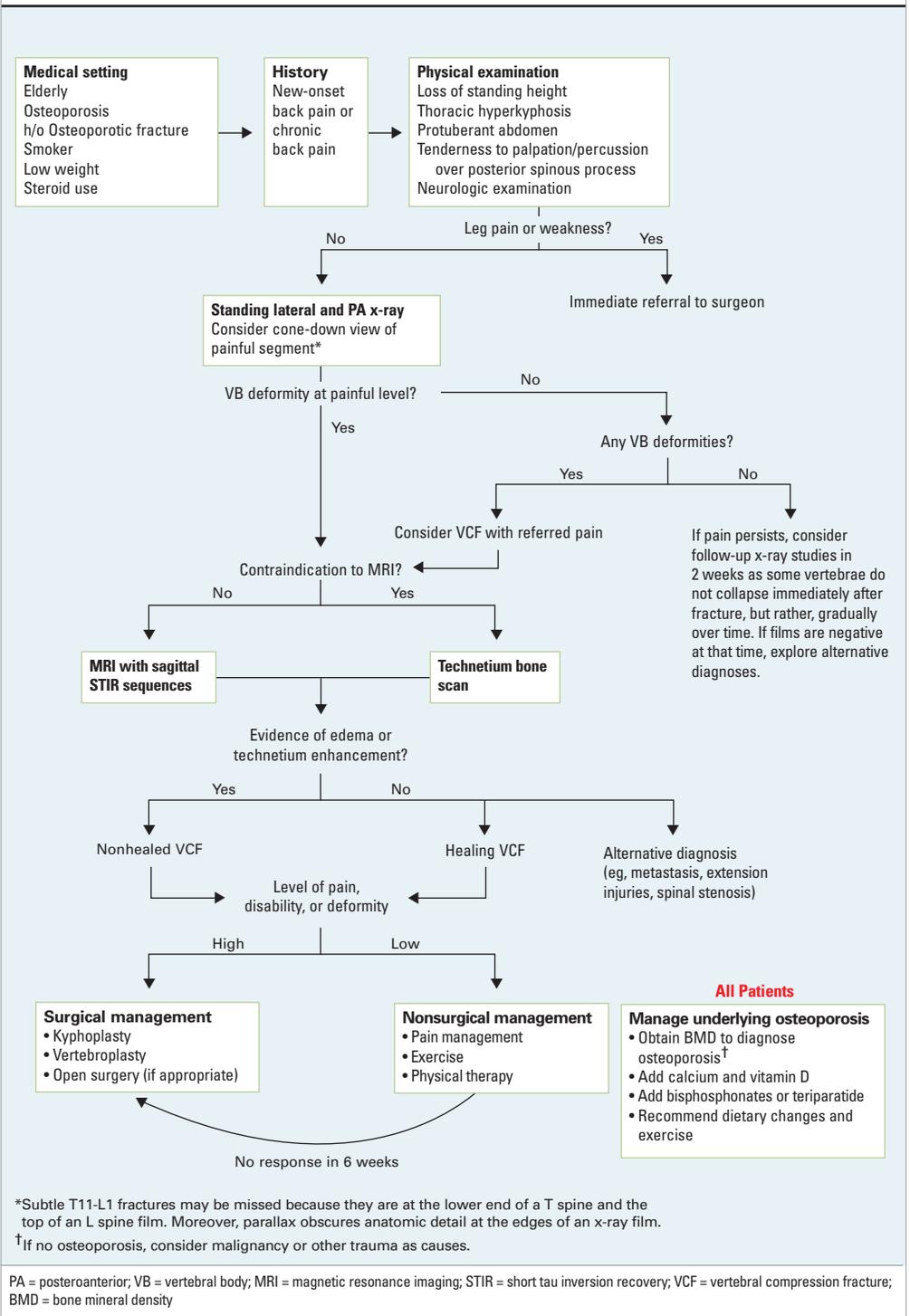


TABLE 2

### Findings on physical examination suggestive of multiple osteoporotic vertebral body compression fractures

- Rib-pelvis distance: < 2 finger-breadths between the inferior margin of the ribs and the superior surface of the pelvis in the midaxillary line
- Self-report of humped back
- Tooth count less than 20 teeth
- Wall-occiput distance: inability to touch occiput to the wall when standing with back and heels to the wall
- Weight less than 51 kg (women)

Green AD, et al. *JAMA*. 2004;292:2890-2900.<sup>28</sup>  
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endplate erosions suggestive of osteomyelitis. Standing posteroanterior and lateral x-ray studies may be ordered with instructions to the radiologist that the objective is to rule out a VCF. A symptomatic VCF does not always show collapse on the initial x-ray.

**Magnetic resonance imaging.** If the source of pain remains undetermined, magnetic resonance imaging (MRI) may rule out a malignant tumor, identify the presence of a fracture, and help identify appropriate treatment.<sup>1</sup> A T1 sequence of an acute fracture will be darker than other vertebral bodies; a T2 sequence will be brighter. A short tau inversion recovery (STIR) sequence is ideal, because it is very sensitive for osseous edema following a VCF. Routine imaging of the entire spine is probably not appropriate because of the expense. If the MRI does not reveal edema, the fracture has most likely healed and is not the cause of the pain. When an MRI is contraindicated, a technetium bone scan may be ordered instead.

### PRIMARY CARE MANAGEMENT OF VCFS

For patients with or at risk of VCF, PCPs should seek to prevent or rehabilitate fractures with nonpharmacologic and pharmacologic therapies, as well as with lifestyle changes and other practices that protect bone (**TABLE 3**).<sup>29</sup> Organizations have developed management guidelines<sup>16-18,30</sup> that focus on (1) decreasing pain; (2) preserving or increasing function; (3) preventing additional fractures; and (4) restoring spine alignment,<sup>31</sup> if possible (**TABLE 4**).<sup>9,17,18,23,24,32,33</sup>

In the past, conventional treatment included bed rest, opioid analgesics, and back bracing to reduce the pain. Unfortunately, prolonged bed rest can contribute to further bone loss, thereby increasing the risk of subsequent fractures.<sup>34</sup> Opioid analgesics should be used cautiously as their central nervous system effects may increase the risk of falling.

### Nonpharmacologic prevention strategies

Many nonpharmacologic therapies for osteoporosis also help prevent secondary VCF, as described below. A home assessment may help reduce environmental factors that increase risk.<sup>32</sup>

**Exercise.** Weight-bearing and resistance exercises may maintain or increase BMD and promote mobility, agility, and muscle strength, which may help prevent falls.<sup>18</sup> Some clinicians are interested in high-impact exercises including bouncing, vibrating, and jumping activities,<sup>35</sup> but such exercises should be supervised, as they may aggravate arthritis in weight-bearing joints. If a fracture has been diagnosed, care should be taken to avoid further fracture, especially until BMD has improved. Long-term participation in an exercise program increases patients' QOL with respect to symptoms, emotion, leisure time, and social activity. Further, as energy levels increase, pain levels decline.<sup>36</sup>

**Diet.** Adequate daily intake of dietary or supplementary vitamin D and calcium is essential. In one meta-analysis, the cholecalciferol form of vitamin D, 700 to 800 IU/d, was associated with a 26% reduction in risk of hip fracture and a 23% reduction of nonvertebral fracture compared with calcium or placebo.<sup>37</sup> Strong evidence shows that alcohol consumption in excess of 2 drinks per day is a major risk factor for osteoporosis. Cigarette smokers undergo earlier menopause, have increased catabolism of endogenous estrogen, and experience more hip fractures than do nonsmokers.<sup>17</sup>

**Patient education and counseling.** Since compliance with an exercise program or pharmacologic regimen declines as early as 1 year,<sup>36</sup> especially in those who believe their BMD test did not indicate osteoporosis,<sup>38</sup> patient education is essential. Referral to a clinical social worker may be useful to identify premorbid anxiety and depression.

**Physical therapy.** A physical therapy program helps prevent deformity by strengthening antigravity muscles and promotes postural retraining. Breathing exercises to encourage thoracic expansion and improve pulmonary function reduce the risk of pulmonary compromise.

**Braces.** To allow early physical therapy and control pain, use of a limited contact brace may be warranted. However, long-term bracing is discouraged. Compliance with bracing is low, especially with the rigid body jackets or the Knight-Taylor orthoses. Lightweight thoracolumbar braces (easier to put on and take off) may improve compliance. For lumbar fractures, a chairback brace is recommended, while cruciform anterior spinal hyperextension (CASH) or Jewett braces are appropriate for thoracic fractures. Lumbar corsets are not recommended as they place additional stress on fractures at the thoracolumbar junction.<sup>39</sup> Standard braces can be obtained at some rehabilitation facilities or orthopedic and physical therapy clinics. Braces may need to be adjusted for individual patients by an orthotist or therapist; customized braces also can be ordered from orthotic

facilities. An increasingly popular brace is the lightweight moldable Spinomed® (Medi-Bayreuth, Germany). Weighing approximately 1 pound, the brace runs from the shoulders to the pelvis and is worn like a backpack. It has been shown to improve trunk strength, decrease kyphosis, decrease postural sway, improve forced expiratory volume, and reduce pain.<sup>40</sup>

### Pharmacologic therapy

Pharmacologic therapy is an important component of care for patients with a VCF. Other than the acute management of pain, the role of pharmacologic therapy is to maintain or increase BMD and reduce the risk of future fractures.<sup>41-43</sup> Available agents include estrogen, selective estrogen receptor modulators, calcitonin, and bisphosphonates.<sup>29</sup> The choice of a specific drug may be dependent on the patient's fracture risk, tolerance, and the drug side effects, but all should always be used in combination with calcium and vitamin D.

### ■ SURGICAL MANAGEMENT OF VERTEBRAL FRACTURES

Kyphoplasty and vertebroplasty, 2 minimally invasive procedures, stabilize a VCF, reduce pain, increase spinal function, and restore normal daily function.<sup>1,29,44</sup> Open surgical treatment can address deformity but is reserved for cases of neurologic deficit. In many cases, poor bone strength precludes the use of orthopedic screws or other open surgical treatment. Although kyphoplasty and vertebroplasty are performed by orthopedic spine surgeons, neurosurgical spine surgeons, and interventional radiologists, PCPs should consider referral for these procedures, as appropriate. (See [www.spine-health.com](http://www.spine-health.com) and [www.spineuniverse.com](http://www.spineuniverse.com) for a list of spine specialists.) Both procedures involve an incision site less than 1 cm and can be performed on an inpatient or outpatient basis under local or general anesthesia. Kyphoplasty restores spinal alignment, theoretically reducing the risk of subsequent fractures.

Insurance coverage for kyphoplasty and vertebroplasty varies from state to state. Payment for kyphoplasty is sometimes limited to 2 vertebral levels.

Following either procedure, it is important that calcium, vitamin D, and other pharmacologic and nonpharmacologic measures be implemented to prevent a secondary VCF.

#### Kyphoplasty: an overview

Kyphoplasty involves the stabilization of the fracture using bone cement (polymethylmethacrylate [PMMA]). The procedure is initiated by inserting a balloon tamp into the vertebral body under fluoroscopic guidance. The balloon is inflated, restoring vertebral height and moving the weight-bearing axis posteriorly to reduce spinal deformity (FIGURE 2). The size of the void created by the balloon is determined, the bal-

**TABLE 3**

### Rehabilitation of chronic back pain in patients with VCFs

- Improve any faults in posture
- If beyond correction, consider a back support to decrease ligament stretch
- Avoid activities that increase vertebral compression forces
- Prescribe a sound, ongoing, therapeutic exercise program:
  - Strengthening exercises for the trunk, pelvis, thighs, and lower extremities.
  - Emphasis should be on trunk extension and avoidance of trunk flexion and rotation.
  - Tai Chi activities have been shown to be beneficial at increasing strength, balance, and posture.
  - Gentle aerobic activity, including walking, even with the use of a wheeled walker with hand brakes, may improve mobility.
  - Exercises should be done for a minimum of 30 minutes at least 3 times weekly.
- Start appropriate medications, as indicated
- Use acupuncture, biofeedback, relaxation therapy, and guided visualization as appropriate
- Evaluate and treat psychologic and social consequences
- Consider support groups and self-management skill training

Adapted with permission from *Health Professional's Guide to Rehabilitation of the Patient with Osteoporosis*. 2003. National Osteoporosis Foundation, Washington, DC 20037.<sup>29</sup>

loon is removed, and the void is filled with a precise amount of cement at low pressure to minimize extravasation.<sup>31</sup> Pain reduction occurs in 60% to 97% of patients with rapid improvement in daily activity levels and QOL; benefits are sustained for at least 2 years.<sup>45-48</sup> Physical functioning shows significant improvement with a change from 12 to 47 in the physical functioning subscale score of the Short-Form 36 (SF-36),<sup>48</sup> a survey assessing health status in 8 different areas such as physical functioning, bodily pain, and general mental health.

The extent of fracture deformity correction has been expressed variously in studies as the angular correction (ie, Cobb angle), the amount of correction, or the degree to which the vertebral body returns to the expected height. Overall, a mean 50% of the lost height is restored. Acute or "readily reducible" fractures are typically corrected to 90% of their pre-fracture height.<sup>45,48-52</sup> Early referral of appropriate patients is important since the likelihood of height restoration decreases with time after the injury. However, the age of the fracture is irrelevant if the fracture is painful and STIR sequence MRI reveals edema at the culprit vertebrae. Procedure-related complication rates range from 0.2% to 0.7% and include extravasation, embolism, and nerve root injury.

#### Vertebroplasty: an overview

Initially used to treat symptomatic hemangiomas of the vertebral body, vertebroplasty now is used more frequently in

**TABLE 4**
**Medical management of a VCF**

<b>Who to screen</b>			
Patient type	Women > 65 years with no other risk Adult women with a previous history of fracture Women and men on corticosteroids > 3 months		
<b>What to look for</b>			
BMD finding	Within 1 SD of the mean* Dx: Normal	Between -1 and -2.5 SD below the mean* Dx: Osteopenia	At least -2.5 SD below the mean* Dx: Osteoporosis
	<ul style="list-style-type: none"> <li>The risk of fracture increases with age and with each SD below the mean</li> <li>A minimum of 2 years may be needed to reliably measure a change in BMD, but a longer interval may be adequate for repeated screening to identify new cases of osteoporosis</li> </ul>		
Other prominent risk factors (see also Table 2)	<ul style="list-style-type: none"> <li>Previous fracture</li> <li>Low body weight</li> <li>Persistent back pain</li> </ul>		
<b>What to do</b>			
All patients	<ul style="list-style-type: none"> <li>Advocate 1500 mg calcium with 800 IU vitamin D daily and weight-bearing exercise</li> <li>Educate on importance of good exercise and calcium intake</li> <li>Prescribe and encourage compliance with a medication that increases BMD</li> <li>Refer to physical therapy if help is needed to promote an osteoporosis exercise program</li> <li>Identify any coexisting medical conditions that cause or contribute to bone loss (Cushing's syndrome, diabetes mellitus, inflammatory bowel syndrome, multiple myeloma, end-stage renal disease, chronic metabolic acidosis), by ordering initial lab workup that includes:                             <ul style="list-style-type: none"> <li>Complete blood count</li> <li>Spinal films</li> <li>Chem profile: calcium, total protein, albumin, LFTs, creatinine, electrolytes</li> <li>24-hour urine calcium</li> <li>Vitamin D levels (25-hydroxy vitamin D, dihydroxy vitamin D-25 levels)</li> <li>Thyroid stimulating hormone</li> <li>Erythrocyte sedimentation rate</li> <li>Alkaline phosphatase</li> <li>Phosphorus</li> </ul> </li> </ul>		
Acute treatment	<ul style="list-style-type: none"> <li>Bed rest (prolonged bed rest can lead to further bone loss)</li> <li>Analgesics (NSAIDs may inhibit repair of the bone fracture, while opioids may cause constipation)</li> <li>Braces</li> <li>Pharmacologic treatment of osteoporosis</li> <li>For patients with persistent back pain, refer to a spine specialist for workup for vertebroplasty or kyphoplasty</li> </ul>		
Long-term management	<ul style="list-style-type: none"> <li>Patient may require home care for an assessment of risk of falls at home</li> <li>Be aware that VCF may cause loss of physical functioning and depression in our patients. Be prepared for a consultation to assess social and physical functioning</li> </ul>		
Prevention strategies	<b>Physical therapy</b> <ul style="list-style-type: none"> <li>Gait and back strengthening</li> <li>Education on proper lifting, etc.</li> <li>Appropriate use of walker or cane</li> </ul>	<b>Patient education</b> <ul style="list-style-type: none"> <li>Smoking cessation</li> <li>Take calcium, vitamin D</li> <li>Take medications</li> <li>Importance of BMD results</li> <li>Exercise</li> </ul>	<b>Environmental assessment</b> <ul style="list-style-type: none"> <li>Lighting</li> <li>Carpeting</li> <li>Living on 1 floor vs multilevel</li> </ul>

\* Young adult mean.

VCF = vertebral compression fracture; BMD = bone mineral density; SD = standard deviation; Dx = diagnosis; LFT = liver function tests; NSAIDs = nonsteroidal anti-inflammatory drugs

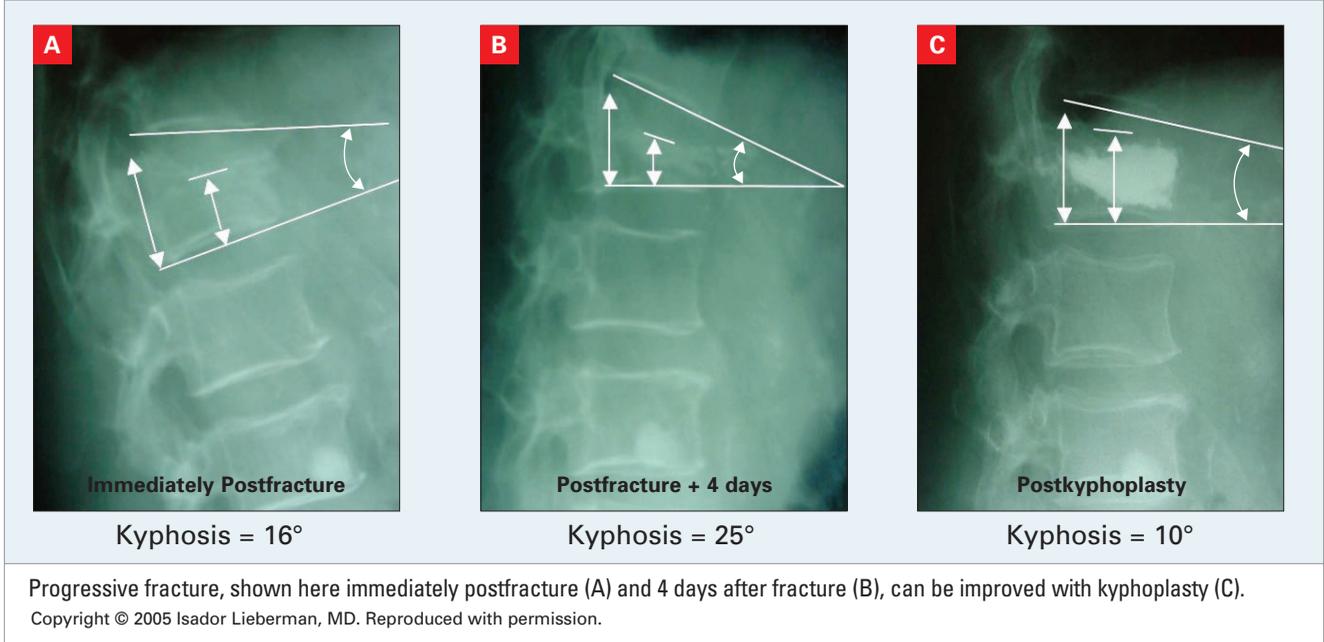
Old JL, Calvert M. *Am Fam Physician*. 2004;69:111-116;<sup>9</sup> Hodgson SF, et al. *Endocr Pract*. 2001;7:293-312;<sup>17</sup> National Osteoporosis Foundation. Available at: [www.nof.org/prevention/index.htm](http://www.nof.org/prevention/index.htm). Accessed April 26, 2005;<sup>18</sup> Papaioannou A, et al. *Osteoporos Int*. 2001;12:870-874;<sup>23</sup> American College of Rheumatology Ad Hoc Committee on Glucocorticoid-Induced Osteoporosis. *Arthritis Rheum*. 2001;44:1496-1503;<sup>24</sup> Woolf AD, Akesson K. *BMJ*. 2003;327:89-95;<sup>22</sup> South-Paul JE. *Am Fam Physician*. 2001;63:1121-1128.<sup>33</sup>

the management of painful osteoporotic VCFs. A balloon tamp is not involved in vertebroplasty, so unlike kyphoplasty, this procedure does not restore height or reduce spinal deformity. Bone cement is injected under fluoroscopic guid-

ance into the vertebral body to stabilize the fracture in its current position. Pain relief is achieved in 63% to 100% of patients; most maintain a benefit for 1 year or more.<sup>53,54</sup> One study showed a reduction in the mean pain rating from

**FIGURE 2**

**Kyphoplasty: Effect on vertebral height and reduction of spinal deformity**



7.7 prior to the procedure to 2.8 one day after the procedure.<sup>55</sup> In another report, 90% were able to return to their normal activities without opioid use.<sup>45</sup> Unfortunately the spinal deformity remains, as the fracture is cemented in place. The failure and complication rates are low; extravasation of the cement leading to local tissue or nerve injury or embolism is possible.

**■ CASE A: KYPHOPLASTY**

A 69-year-old woman experiences excruciating and immediate back pain after slipping on ice. X-ray studies demonstrate marked collapse of the L2 vertebra. Nonoperative management with bracing, nasal miacalcin, opioids, relative rest, and physical therapy fail to control pain. Patient is nonambulatory. MRI STIR sequences demonstrate intense uptake in the L2 vertebral body, while the T1 marrow signal is decreased. Subsequent radiographs demonstrate further collapse of the vertebra. Because of progressive deformity and intense pain, a kyphoplasty is performed, with balloons inserted into the L2 vertebral body under local anesthesia. Serial inflation of the balloons allows restoration of lost vertebral body height; the fracture is stabilized with PMMA. A post-operative computed tomography (CT) reveals excellent restoration of the vertebral morphology without cement leak. Long-term therapy with a bisphosphonate, vitamin D, and calcium also are instituted.

**■ CASE B: VERTEBROPLASTY**

A 74-year-old woman with primary osteoporosis complains of 4 weeks of gradually increasing low back pain after having

picked up a potted plant. Radiographs reveal a mild superior endplate fracture of L3. Initial management (brace, physical therapy, and pain medications) fails to relieve pain. The patient's pacemaker precludes an MRI. A bone scan and CT demonstrate intensely increased uptake suggestive of an acute fracture without evidence of lytic lesion or canal compromise. To relieve intractable pain, a vertebroplasty is performed under local anesthesia. The patient notes immediate relief of her pain. Postoperative plain radiographs and a CT demonstrate an appropriate cement mantle with only mild intravascular leakage. Long-term therapy with a bisphosphonate, vitamin D, and calcium also are instituted.

**■ SUMMARY**

Vertebral compression fractures are a relatively common but often unrecognized consequence of osteoporosis. Back pain is the typical presenting symptom; patients older than 50 years with acute back pain should undergo a clinical workup for a VCF. Primary care clinicians have important roles as educators about bone health and as providers of pharmacologic therapies. Additionally, they are critical in coordinating the multidisciplinary care of a patient with a VCF. Kyphoplasty and vertebroplasty stabilize a VCF, increase spinal function, and restore normal daily function. Both may be performed as an inpatient or outpatient procedure, as determined by medical necessity. They provide rapid pain improvement with a low complication rate. Restoration of the vertebral height is an added benefit of kyphoplasty. ■

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