Compression Fracture

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Definition

Compression fractures account for 50–70% of all thoracolumbar fractures. The mechanism is a compressive failure of the anterior column under an axial load applied in flexion [1]. These fractures are usually stable as they only involve the anterior column and can be managed conservatively, but in some cases can result in spinal instability if there is severe compression (>50% of vertebral height), significant fracture kyphosis (>30°), a rotational component to injury, or compression fractures at multiple levels [2]. It is important to note that in compression fractures, the anterior height of the vertebral body is diminished, while posterior height remains normal.

Compression fractures can be caused by trauma, can be and atraumatic, such as in women with osteoporosis or can be pathologic, as a result of underlying malignancy.

The etiology and stability of the fracture are the major factors that physicians use to determine appropriate management.

Diagnosis

Patients normally present with back pain as the first sign of a compression fracture; however some patients are asymptomatic; thus, the diagnosis is frequently missed [3]. One should suspect a compression fracture if a patient who is at risk for or already has been diagnosed with osteoporosis or malignancy, presents after trauma.

Diagnosis can usually be confirmed with plain radiography; however, in certain cases CT or MRI is indicated especially if patient has neurologic findings on exam, history of cancer, or multiple fractures on plain radiographs.

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Differential Diagnosis

For back pain in general, the differential diagnosis list is long and should include disk herniation, muscle strain, degenerative disk disease, spinal stenosis, and facet arthropathy, among other diagnoses.

Atraumatic compression fracture:

- Metastatic cancer, multiple myeloma, lymphoma, osteoporosis, osteomalacia, primary benign bone tumor, primary bone sarcoma, Paget's disease, and hyperparathyroidism

Traumatic compression fracture:

- Burst fracture and Chance fracture

Physical Exam

- May have point and/or percussion tenderness over a spinous process.
- Increased pain with flexion of the spine.
- Neurologic symptoms do not often accompany osteoporotic compression fractures because the posterior cortical wall is usually intact.
- In patients with a pathologic vertebral compression fracture, if present, neurologic deficits typically include weakness, numbness, and tingling as a result of tumor compressing the spinal cord, rather than the fracture itself.

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Imaging

Plain frontal and lateral radiographs of the entire spine are the initial studies of choice.

- In 20–30% of cases, multiple fractures are present.
- Reveals diminished anterior height and normal posterior height of vertebral body and focal kyphosis.
- If the amount of anterior compression is greater than 40% when compared to posterior vertebral body height, this may represent a burst fracture [4].
- May give additional information about etiology of fracture. The typical radiographic appearance of a metastasis is a lytic, permeative lesion. Osteoblastic lesions appear sclerotic, sometimes admixed with lytic elements. If osteoporosis is present, one may note diffuse demineralization and osteopenia.

CT Scan

- Is effective in identifying fractures that may have been missed on plain film
- Helps to differentiate a compression fracture versus burst fracture
- May reveal additional pathology associated with the fracture, including spinal canal narrowing

Role of MRI

- Indicated if patient has history of malignancy or if exam shows neurologic compromise and spinal cord compression is suspected [5]

Treatment

For stable fractures:

- Conservative management is the standard of care.
- Pain management
  - In most cases, back pain associated with the fracture continues to resolve as the fracture heals. This may take up to 3 months [6]. If intractable pain persists, may consider referral for kyphoplasty or vertebroplasty.
- Encourage early ambulation. Considerorthosis.
- Physical therapy.

For unstable fractures as defined above [7]:

- Percutaneous vertebroplasty
- Kyphoplasty
- Open surgical intervention (if neurologic involvement)

Post injury, physicians should watch for increasing kyphotic deformity or return of patient's pain. If these are present, the patient should be referred back to their surgeon as they may be a sign of failed fracture healing.

If the fracture is secondary to underlying osteoporosis, pharmacotherapy should be considered in order to reduce the incidence of recurrent fractures. Hormone replacement therapy and bisphosphonates are commonly used in this subset of patients.

Surgical intervention in patients with underlying malignancy is often palliative in nature, and any procedure should involve a multidisciplinary discussion.

Return to Play

- Patients with stable compression fractures who do not require surgical intervention may begin an exercise routine under guidance of physical therapy when pain no longer prohibits them from participating. Studies have shown that physical therapy decreases analgesic use and improves functional outcomes [8, 9].
- Patients with unstable compression fractures that require procedural intervention should be cleared by surgical team first, then progress through a physical therapy program.

When to Refer

- Refer if there is failed conservative treatment, intractable pain, or unstable fracture suspected or there is neurological compromise.
- Refer if there is concern for underlying malignancy.

Referral

- Interventional spine physiatrist or pain medicine specialist
- Spine surgeon (orthopedic surgery or neurosurgery)
- Oncology (if malignancy is suspected)

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