# **Pathological spine fracture**

- Adhesive Capsulitis of the Shoulder
- Outcomes after total en bloc spondylectomy at a mean follow-up of 11 years
- Sacral fracture risk after stereotactic spinal radiosurgery: a multi-institution, retrospective analysis
- Generalizable model to predict new or progressing compression fractures in tumor-infiltrated thoracolumbar vertebrae in an all-comer population
- Forensic medical evaluation of uncomplicated compression fractures of bodies of the thoracic and lumbar parts of the spine in children
- Epithelioid angiosarcoma of the cervical spine: A case report
- Patterns of Bone Density Change in L4-L5 Spondylolisthesis
- AO Spine Clinical Practice Recommendations: Reducing the Surgical Footprint of Surgery for Spinal Metastases

# Etiology

This type of spine fracture is often associated with conditions such as:

Osteoporosis: Osteoporotic spine fracture

Spinal metastases

Primary Spinal Tumor

Paget's Disease

Infections: spinal infections (osteomyelitis).

# **Clinical features**

Symptoms of a pathological spine fracture can include sudden back pain, worsening pain with movement, and sometimes neurological symptoms like numbness or weakness if the fracture affects the spinal cord or nerves.

# Diagnosis

Diagnosing a pathological spine fracture involves several steps to confirm the presence of the fracture, assess its characteristics, and identify the underlying condition that led to it. The diagnostic process typically includes the following:

# **1. Clinical Evaluation**

#### • Patient History:

- Detailed history of symptoms, including pain characteristics, onset, and any related medical conditions or risk factors.
- $\circ\,$  Inquiry about any recent trauma, falls, or activities that could have contributed to the fracture.

#### • Physical Examination:

- Assessment of spine tenderness, range of motion, and neurological signs.
- Evaluation for any signs of instability or deformity.

# 2. Imaging Studies

- X-rays:
  - Initial imaging often includes X-rays to identify fractures, assess alignment, and evaluate for signs of osteoporosis or other bone abnormalities.
- Computed Tomography (CT) Scan:
  - Provides detailed images of bone structure, helping to identify the exact location and extent of the fracture.
  - Useful in evaluating complex fractures or when X-rays are inconclusive.

#### • Magnetic Resonance Imaging (MRI):

- $\circ\,$  Offers detailed images of soft tissues, including the spinal cord and nerve roots.
- Helps in assessing the impact of the fracture on surrounding structures and identifying any associated tumors or infections.

#### • Bone Scintigraphy (Bone Scan):

 $\circ\,$  May be used to detect bone lesions or metabolic activity related to conditions like cancer or infections.

# 3. Laboratory Tests

- Blood Tests:
  - Can help identify underlying conditions such as infections, inflammatory markers, or metabolic abnormalities.
  - $\circ\,$  Includes tests for calcium, vitamin D, and other markers relevant to bone health.

# 4. Biopsy (if needed)

#### • Bone Biopsy:

- $\circ\,$  May be performed if there is suspicion of malignancy or infection.
- Helps in obtaining a definitive diagnosis of tumors or infectious agents affecting the spine.

# 5. Assessing the Underlying Condition

#### • Bone Density Test:

- For patients with suspected osteoporosis, a DEXA scan (dual-energy X-ray absorptiometry) is used to assess bone mineral density.
- Oncological Assessment:

• For patients with suspected metastatic cancer, additional imaging or evaluations may be needed to determine the primary cancer site and extent of spread.

Each diagnostic step helps build a comprehensive picture of the fracture and its underlying causes, guiding appropriate treatment and management strategies.

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# Pathological Spine Fracture Management

Managing a pathological spine fracture involves addressing both the fracture itself and the underlying condition that led to it. The approach can vary based on the severity of the fracture, the overall health of the patient, and the specific underlying condition. Below is a general outline of management strategies:

# 1. Pain Management

- **Medications**: Nonsteroidal anti-inflammatory drugs (NSAIDs) or analgesics can help manage pain. In some cases, stronger pain medications or muscle relaxants might be prescribed.
- Topical Treatments: Heat or cold packs may provide additional relief.

# 2. Management of the Underlying Condition

- Osteoporosis:
  - Medications such as bisphosphonates, hormone replacement therapy, or other bonestrengthening drugs may be used.
  - $\circ\,$  Dietary changes and supplements (e.g., calcium and vitamin D) might also be recommended.
- Cancer:
  - Treatment may involve chemotherapy, radiation therapy, or targeted therapies to address metastatic or primary tumors affecting the spine.
- Paget's Disease:
  - $\circ\,$  Medications like bisphosphonates can help control bone remodeling and prevent further damage.
- Infections:
  - Antibiotics or antifungal medications are prescribed based on the infection type, along with addressing the infection's source.

# **3. Surgical Interventions**

- Vertebroplasty/Kyphoplasty:
  - Minimally invasive procedures where bone cement is injected into the fractured vertebra to stabilize it and alleviate pain.
- Spinal Fusion:
  - Surgery that joins two or more vertebrae together to stabilize the spine if the fracture or underlying condition causes significant instability.
- Decompression:
  - $\circ$  If the fracture has affected spinal nerves or the spinal cord, surgical decompression may

be necessary to relieve pressure.

# 4. Rehabilitation and Physical Therapy

- Physical Therapy:
  - A tailored program to strengthen the muscles supporting the spine, improve flexibility, and promote safe movement. This can help prevent future fractures and improve overall function.
- Exercise:
  - Low-impact activities like swimming or walking may be recommended to improve overall bone health and physical function.

### 5. Lifestyle and Supportive Measures

- Fall Prevention:
  - Modifying the home environment to reduce fall risk, using assistive devices if necessary.
- Nutritional Support:
  - $\circ\,$  Ensuring adequate nutrition to support bone health and recovery.
- Monitoring:
  - $\circ\,$  Regular follow-up with healthcare providers to monitor the progress of the fracture and the underlying condition.

### 6. Education and Self-Management

- Patient Education:
  - Providing information on managing pain, understanding the condition, and making lifestyle changes to support recovery and prevent future fractures.

Each patient's situation is unique, so management plans should be personalized based on the specific fracture characteristics and underlying condition. Regular follow-up with a healthcare provider is essential to adjust the treatment plan as needed and address any new or ongoing issues.

# Treatment

Percutaneous fixation with cement-augmented pedicle screws in patients with pathological spine fractures provides an improvement in mechanical back pain, with a low incidence of failure, and in some patients, spontaneous facet fusion was observed. Further research is necessary with regard to both short-term benefits and long-term outcomes <sup>1)</sup>.

# **Case series**

# 2021

Survival of cancer patients continues to improve with systemic treatment advancements, leading to an increase in cancer-related complications such as pathological spinal fractures. In a study,

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Meleis et al. from the MD Anderson Cancer Center Houston and Baylor College of Medicine aimed to evaluate the outcome of percutaneous stabilization with cement augmentation of the pedicle screws in the management of patients with metastatic cancer to the spine.

They reviewed a retrospective case series of 74 patients with symptomatic pathological spine fractures treated with cement-augmented pedicle screws implanted with a percutaneous technique. The mean imaging follow-up was 11.3 months. Data on demographics, clinical outcomes, and complications were collected. Cement extravasation, spinal hardware integrity, and fusion rates were assessed on CT scans.

Among 50 patients with follow-up imaging, 23 patients (46%) showed facet joint fusion. The length of segmental stabilization was not a significant predictor of the occurrence of fusion. Pre- or postoperative radiation therapy, postoperative chemotherapy, and the location of spinal lesions did not have a statistically significant effect on the occurrence of fusion. Patients older than 60 years of age were more likely to have fusion across facet joints compared with younger patients. There was a significant difference in the mean visual analog scale pain score, with 6.28 preoperatively and 3.41 postoperatively, regardless of fusion status (p < 0.001). Cement extravasation was seen in 51% of the cohort, but in all instances, patients remained asymptomatic. Most importantly, the incidence of hardware failure was low (4%).

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#### 1) 2)

Meleis A, Larkin MB, Bastos DCA, Muir MT, Rao G, Rhines LD, Cowles CE, Tatsui CE. Single-center outcomes for percutaneous pedicle screw fixation in metastatic spinal lesions: can spontaneous facet fusion occur? Neurosurg Focus. 2021 May;50(5):E9. doi: 10.3171/2021.1.FOCUS20671. PMID: 33932939.

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