

# Spine Surgery for Spinal Stabilization and Treatment of Osteomalacia Fractures

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## DESCRIPTION

Osteomalacia is a metabolic bone disorder characterized by softening of the bones due to impaired bone mineralization, often caused by vitamin D deficiency. This condition weakens the skeletal structure, increasing the risk of fractures and spinal deformities. Spine surgeries, though often considered a last resort, can play an important role in managing fractures and ensuring spinal stability in patients with osteomalacia. The spine is particularly vulnerable in osteomalacia due to its weight-bearing function and complex structure. Patients may experience vertebral fractures, deformities like kyphosis, and chronic pain. Untreated vertebral fractures can lead to nerve compression, reduced mobility, and a reduced quality of life.

### Spine surgeries for osteomalacia

When conservative treatments such as physical therapy, medications, and vitamin D supplementation fail to manage symptoms or prevent complications, spine surgery may become necessary. Spine surgery may be considered when conservative treatments no longer provide relief or when the risk of fractures or deformities increases. Surgical options, such as spinal fusion or vertebroplasty, aim to stabilize the spine, alleviate pain, and restore mobility. These procedures are typically reserved for severe cases where bone density loss or spinal deformity significantly impacts daily function. Common surgical procedures for osteomalacia include:

**Vertebral fracture repair:** Vertebral fractures in osteomalacia patients are often caused by minimal trauma or even daily activities. Kyphoplasty or vertebroplasty are minimally invasive procedures that aim to stabilize fractured vertebrae. A special bone cement is injected into the affected vertebra, providing immediate relief from pain and restoring some structural integrity.

**Spinal fusion surgery:** In cases of severe deformities or instability, spinal fusion is performed. This procedure involves joining two or more vertebrae using bone grafts or implants, creating a single, solid structure to support the spine. Posterior Lumbar Interbody Fusion (PLIF) or Transforaminal Lumbar Interbody Fusion (TLIF) are commonly used techniques for

lumbar spine instability. Cervical or thoracic fusion may be required for fractures or deformities in other parts of the spine.

**Decompression surgery:** Osteomalacia can lead to spinal canal narrowing (stenosis) due to bone deformities or fractures compressing nerves. A laminectomy or laminotomy may be performed to relieve pressure on the spinal cord or nerves, alleviating pain and restoring function.

### Surgical outcomes and challenges in spine surgeries for osteomalacia

Surgeons face several challenges when treating osteomalacia-related spinal issues. Bone fragility, soft and brittle bones in osteomalacia increase the risk of surgical complications such as hardware failure or poor healing of bone grafts. Nutritional deficiencies, particularly of vitamin D and calcium, can delay post-operative recovery. Malnourished patients are more prone to infections, which can complicate surgical outcomes. Additionally, the weakened bone structure in osteomalacia can make it difficult to achieve optimal fixation during surgery, requiring specialized techniques or materials to ensure stability. Surgeons must also consider the potential for delayed or incomplete bone healing due to impaired mineralization. Preoperative assessment and correction of vitamin D and calcium deficiencies are essential to improve surgical outcomes. To enhance the success of spine surgeries in osteomalacia, a multidisciplinary approach is essential:

**Preoperative preparation:** Correcting vitamin D and calcium deficiencies is important. Patients may receive high doses of supplements to improve bone quality. Bone density scans and imaging studies help assess the severity of bone disease and guide surgical planning.

**Intraoperative techniques:** Advanced implants and fixation devices designed for osteoporotic or weakened bones can improve stability. Surgeons may use minimally invasive techniques to reduce trauma and promote faster healing.

**Postoperative care:** Continued supplementation of vitamin D and calcium. Physical therapy to strengthen muscles and improve mobility. Regular monitoring to detect complications such as hardware failure or new fractures.

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## CONCLUSION

Spine surgeries for osteomalacia, though complex, can significantly improve the quality of life for patients suffering from fractures and spinal deformities. By stabilizing the spine,

relieving pain, and restoring mobility, these procedures address both the physical and functional challenges posed by this condition. Early diagnosis and a comprehensive treatment plan that includes surgical intervention when necessary are essential for optimal outcomes.