

Vertebral Fragility Fractures

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Bone and Joint Decade, 2000 - 2010

- ☐ Extremity trauma
- ☐ Joint diseases
- ☐ Spinal disorders and LBP
- ☐ Osteoporosis

Lars Lidgren, 2000, Lund, Sweden
WHO

Objectives

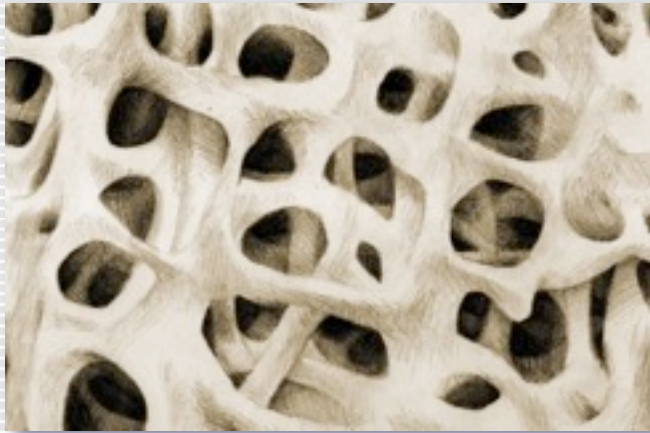
- ☐ Definition
- ☐ Epidemiology/mortality
- ☐ Incidence and diagnosis
- ☐ Treatment

Osteoporosis

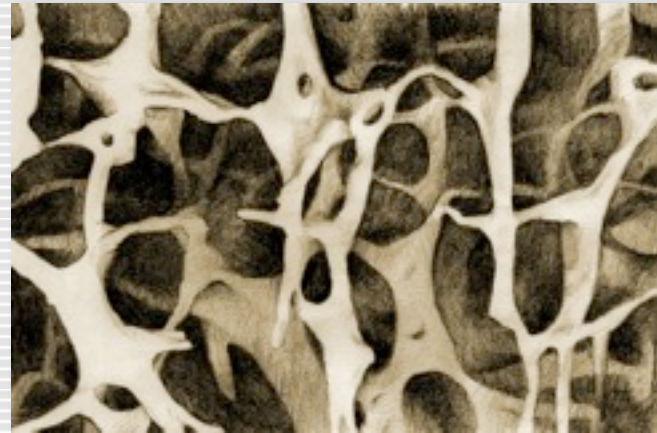
Osteoporosis is a systemic disease characterised by low bone mass and microarchitectural deterioration of bone tissue, leading to enhanced fragility and a consequent increase in fracture risk

Osteoporosis

Normal bone



Osteoporotic bone



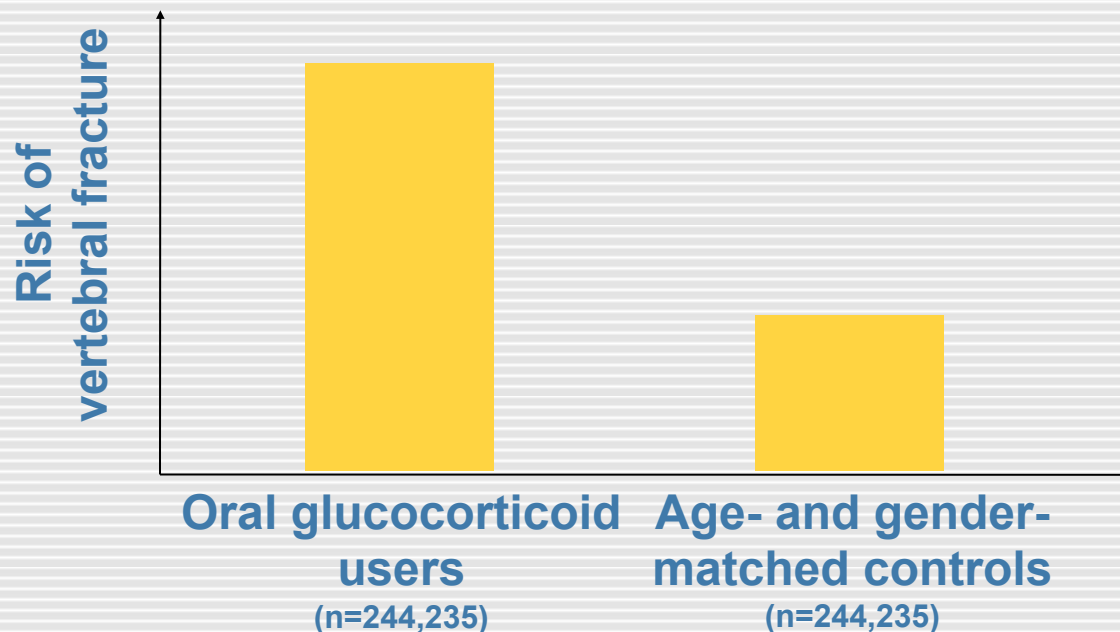
Risk Factors for osteoporosis

□

- Postmenopausal
- Low testosterone
- Age
- Family history of osteoporosis
- Race
- Systemic diseases (RA)
- Low body weight
- Low calcium intake
- Inactive lifestyle
- Cigarette smoking
- Alcohol/ caffeine
- Steroids

Steroids

- Users of oral glucocorticoids have a 2.6-fold increase risk of fracture



van Staa TP et al. *J Bone Miner Res.* 2000;15:993–1000.

Epidemiology of osteoporosis

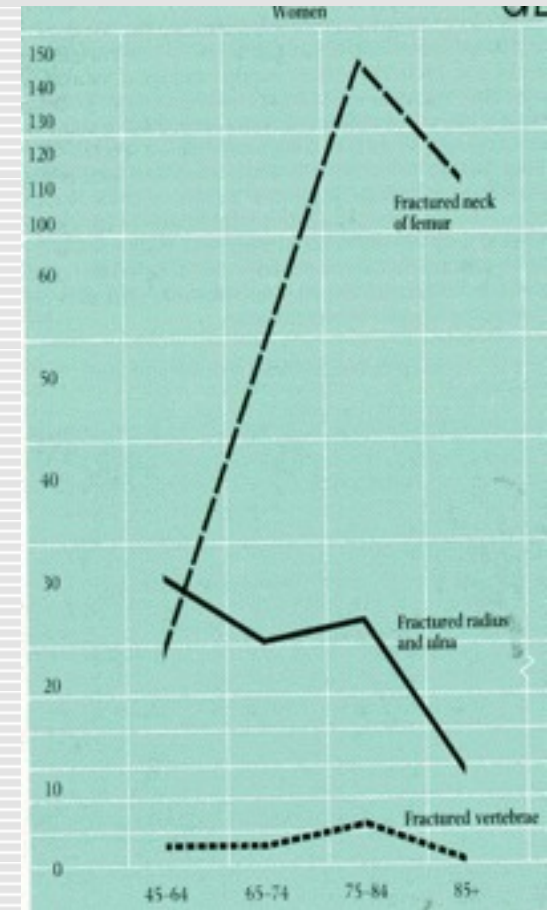
- low bone mass or fragility fractures
- Likelihood of # increases after first fracture
- Increase with age
 - Male:female ratio = 1:3

1. Cooper C et al. *J Bone Min Res.* 1992;7:221–227.
2. The European Prospective Osteoporosis Study (EPOS) Group. *J Bone Miner Res.* 2002;17:2214–2221.

Epidemiology

- Lifetime risk of a major osteoporotic fracture 50% in women and 25% in men.¹
- Most common osteoporotic fracture = Vertebral Compression Fracture (VCF)
- Lifetime risk of a caucasian women at 50 to have an osteoporotic fracture during her remaining lifetime is 40%.²

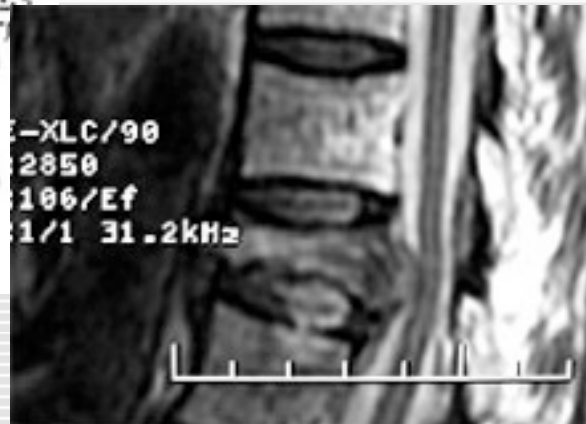
¹ Kanis et al, 2000 ² EU report on Osteoporosis



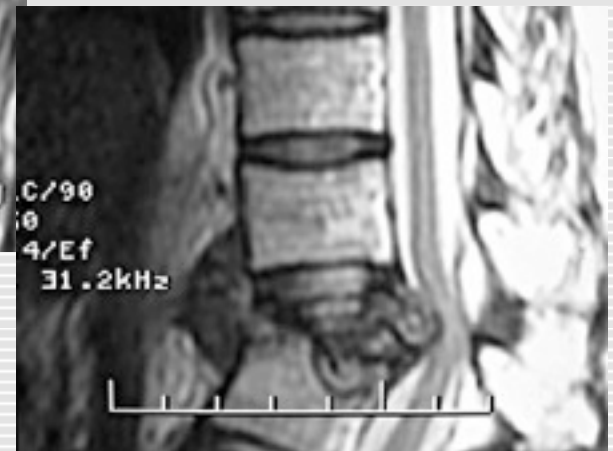
Natural history



January 2003



February 2003

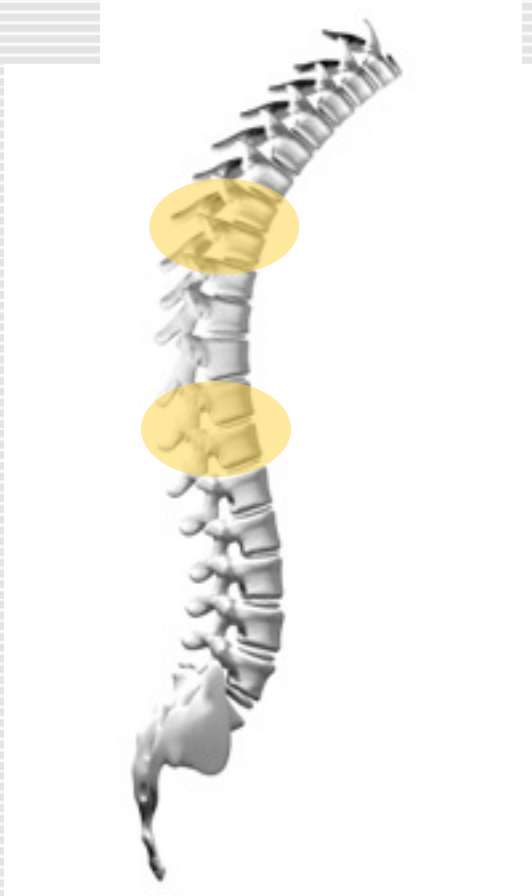


T-12 VCF

May 2003

Courtesy of M Hisey, MD
Texas Back Institute

Location of vertebral fractures



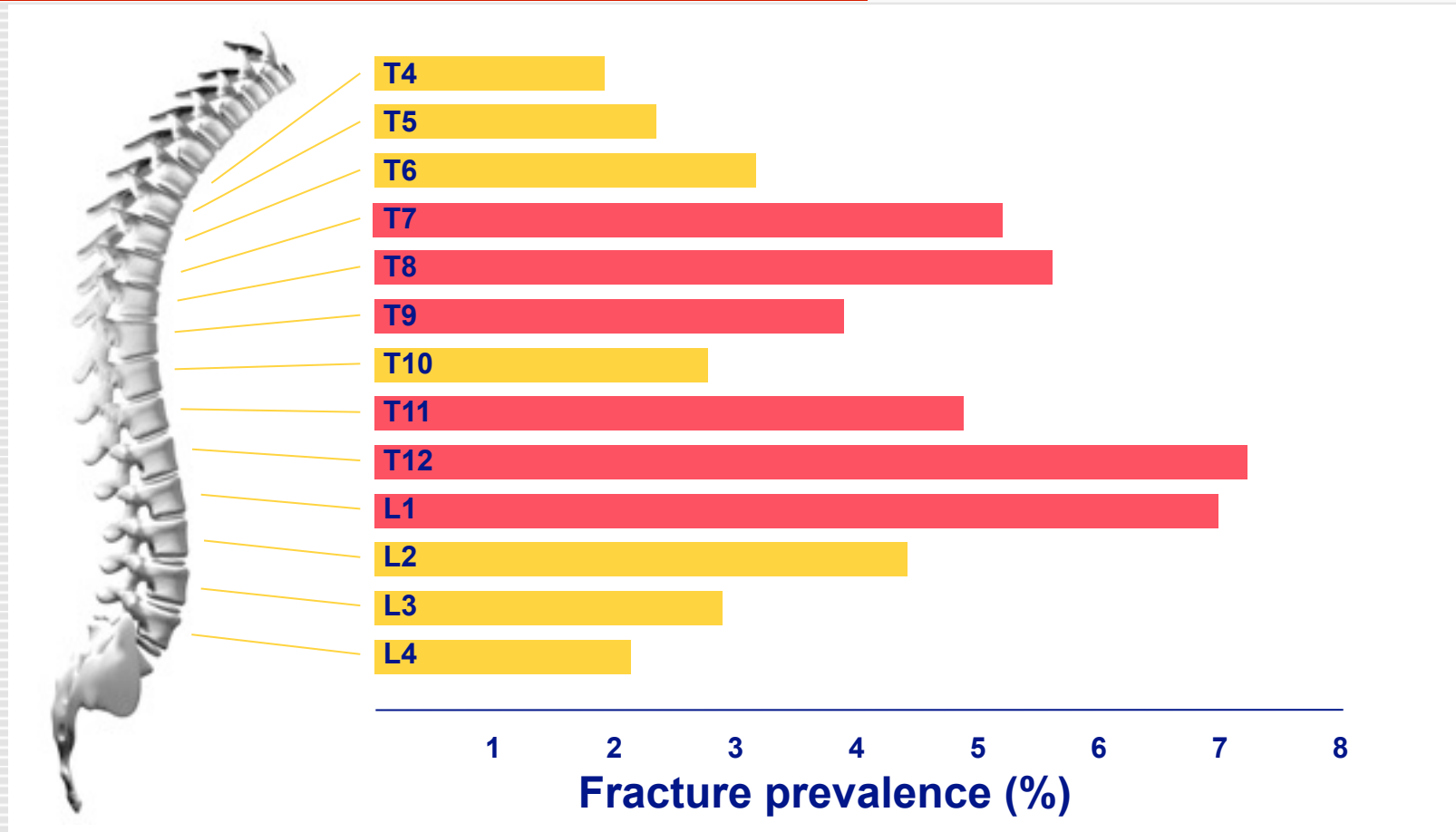
- Midthoracic region (T7–T8)
- Thoracolumbar junction (T12–L1)¹

Results:

- mechanical compromise
- Increase in vertebral loading during flexion

1. Nevitt MC et al. *Bone*. 1999;**25**:613–619.

Incidence of vertebral fractures¹



1. Nevitt MC et al. *Bone*. 1999;**25**:613–619.

Diagnosis of VCF

☐ Acute event

Sudden onset of back pain with little or no trauma

☐ Chronic manifestation

- Loss of height
- Spinal deformity
- Protuberant abdomen



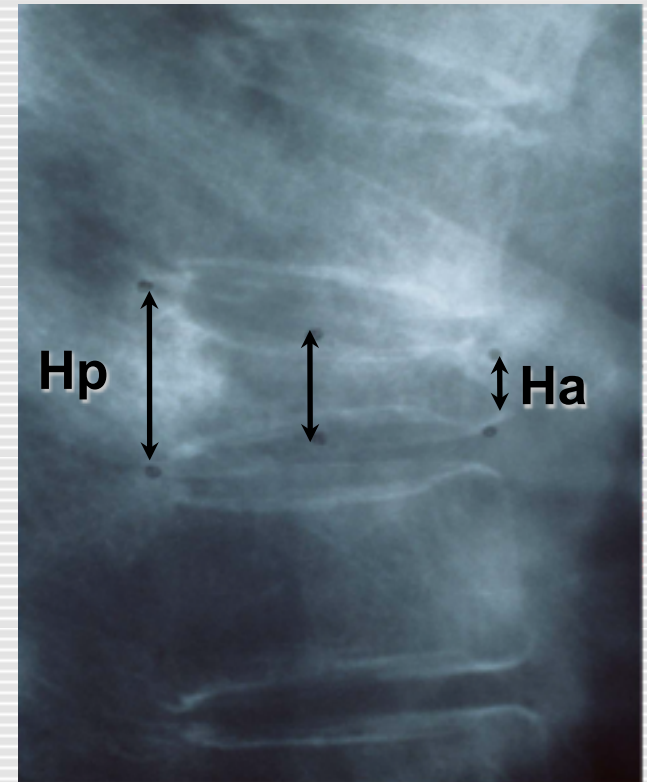
Age 50



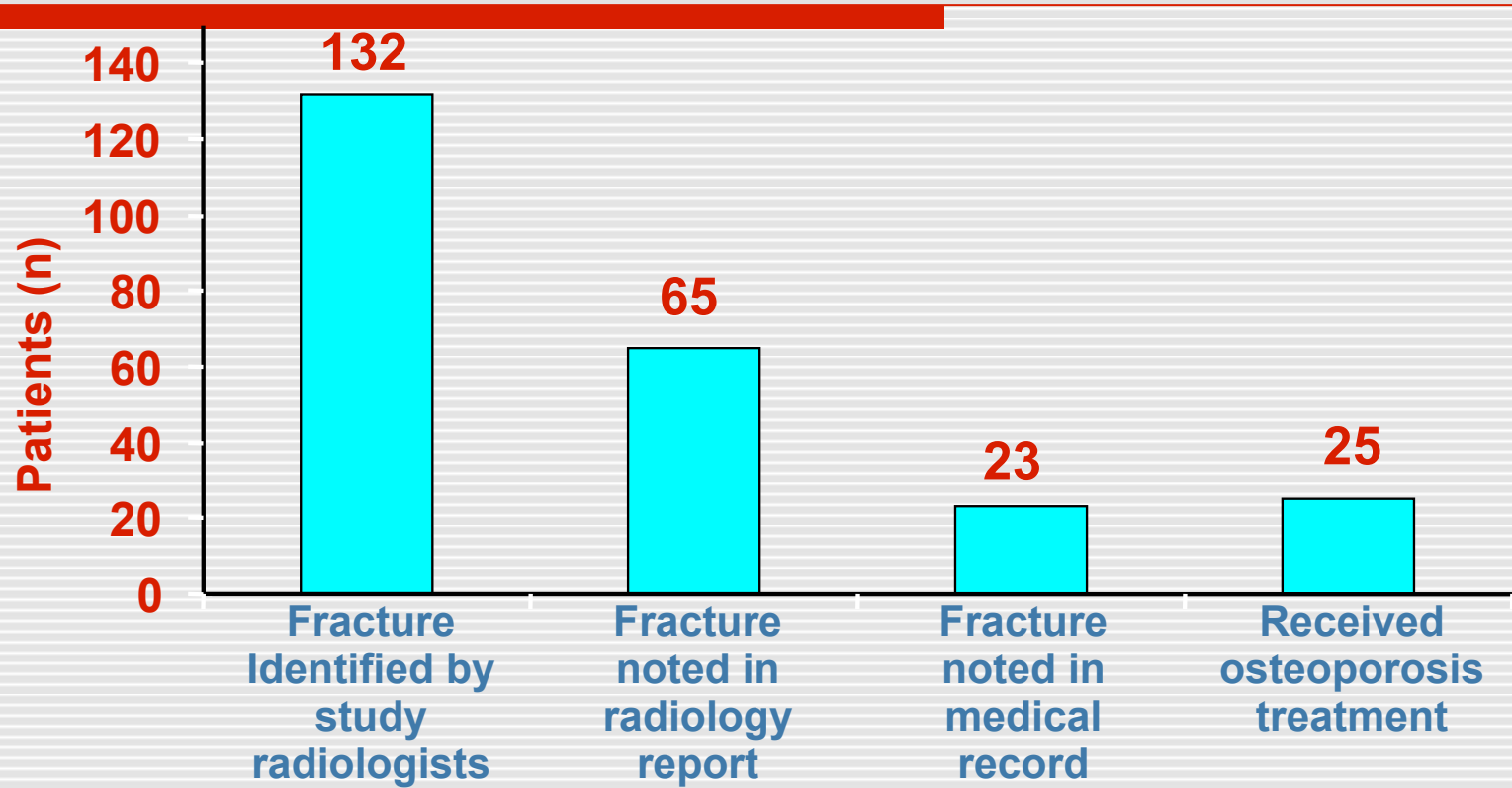
Age 75

Diagnosis

- ❑ Often asymptomatic
- ❑ Pain ranges from mild to severe and chronic.
- ❑ Often self limiting
- ❑ Index of suspicion!



Osteoporotic fractures are often unrecognized



N= 934 women older than 60 years

Gehlbach et al, Ost Int 2000; 11 557-582

Vertebral fracture: detection

Postmenopausal
women over the
age of 55

Prominent thoracic
kyphosis

Low bone mass
evaluations suggest
vertebral fracture

Loss of 2 or more
inches in height

Diagnosis of
osteoporosis

Glucocorticoid therapy
(≥ 7.5 mg prednisolone)

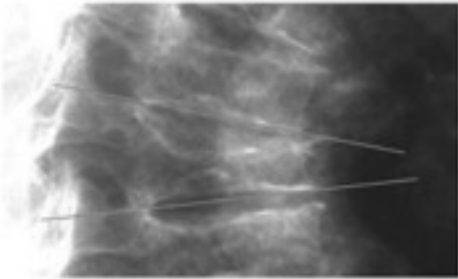


1. Ismail AA et al. *Osteoporos Int.* 1999;9:206–213.

Classification

Wedge

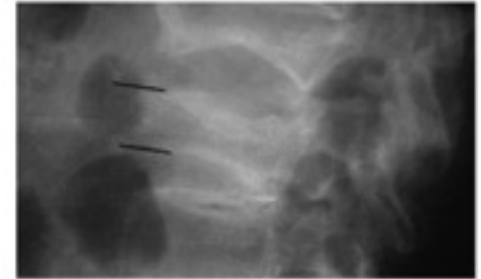
Wedge



Biconcave

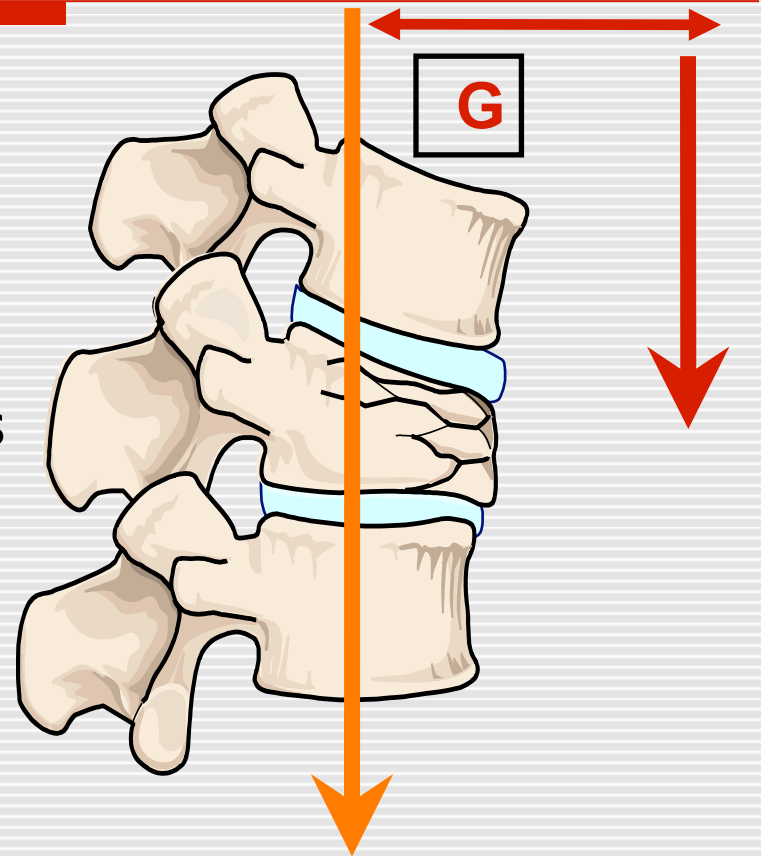


Crush



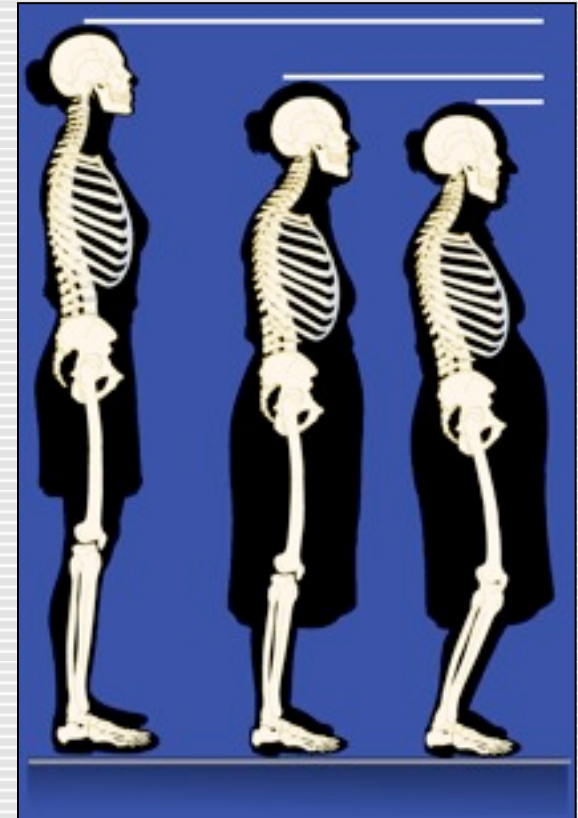
Biomechanics of VCF

- ❑ The centre of gravity (G) moves forward
- ❑ Large bending moment created
- ❑ Posterior muscles and ligaments must counterbalance increased bending
- ❑ Osteoporotic anterior spine must resist larger compressive stresses

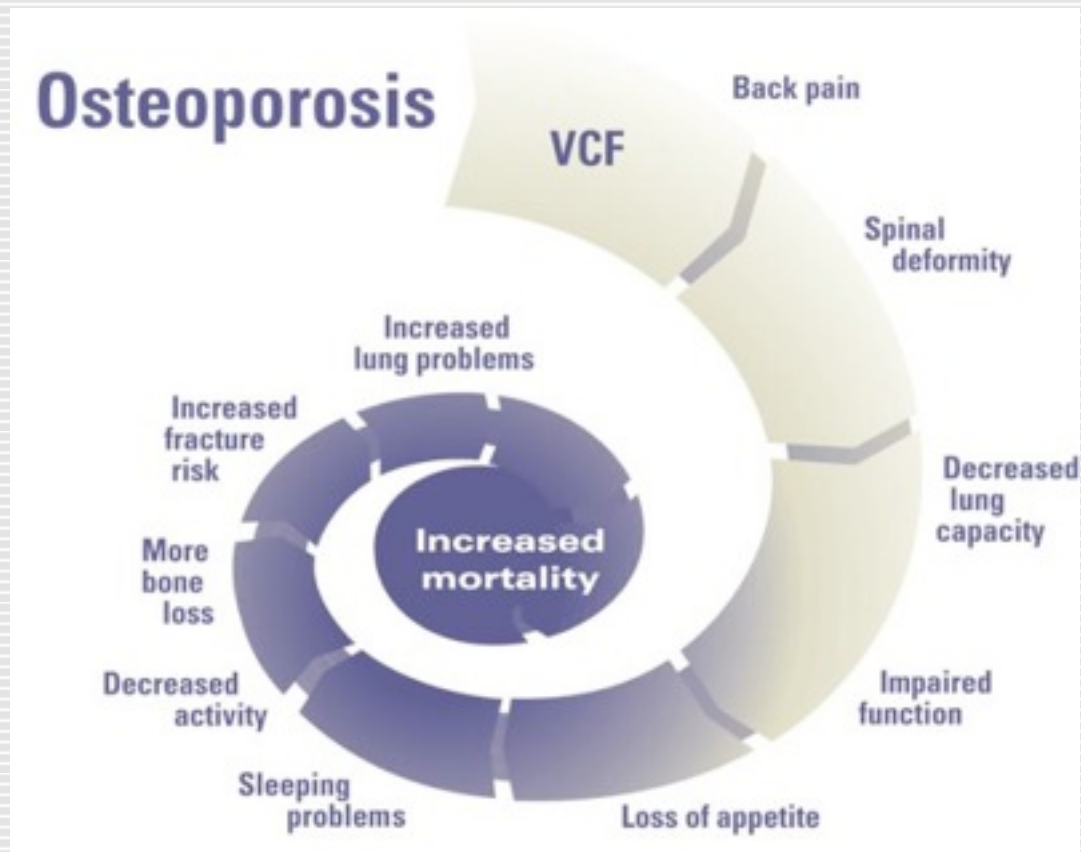


Biomechanics of VCF

- ❑ Decrease in gait velocity¹
- ❑ Change in balance¹
- ❑ Increased muscle fatigue¹
- ❑ Increased risk of falls and additional fractures¹



Consequences of VCF



Pulmonary Function

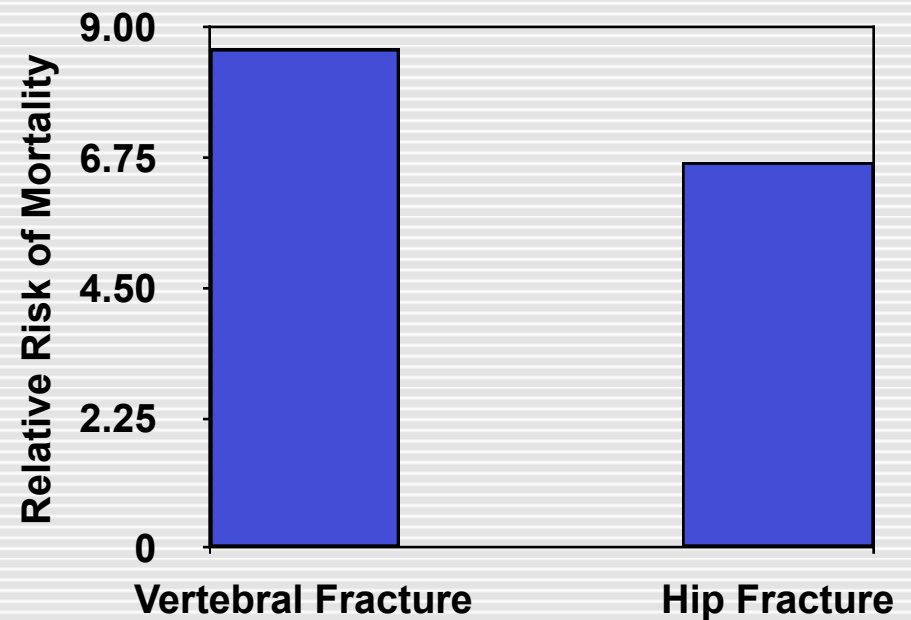
- VCF reduces Pulmonary Function¹
 - 1 thoracic VCF causes 9% loss of forced vital capacity²
 - Lung function (FVC, FEV1) is significantly reduced in patients with thoracic and lumbar fracture¹

¹Schlaich, Osteop Int, 1998, 8:261-67

²Leech, Am Rev Respir Dis 1990; 141: 68-71

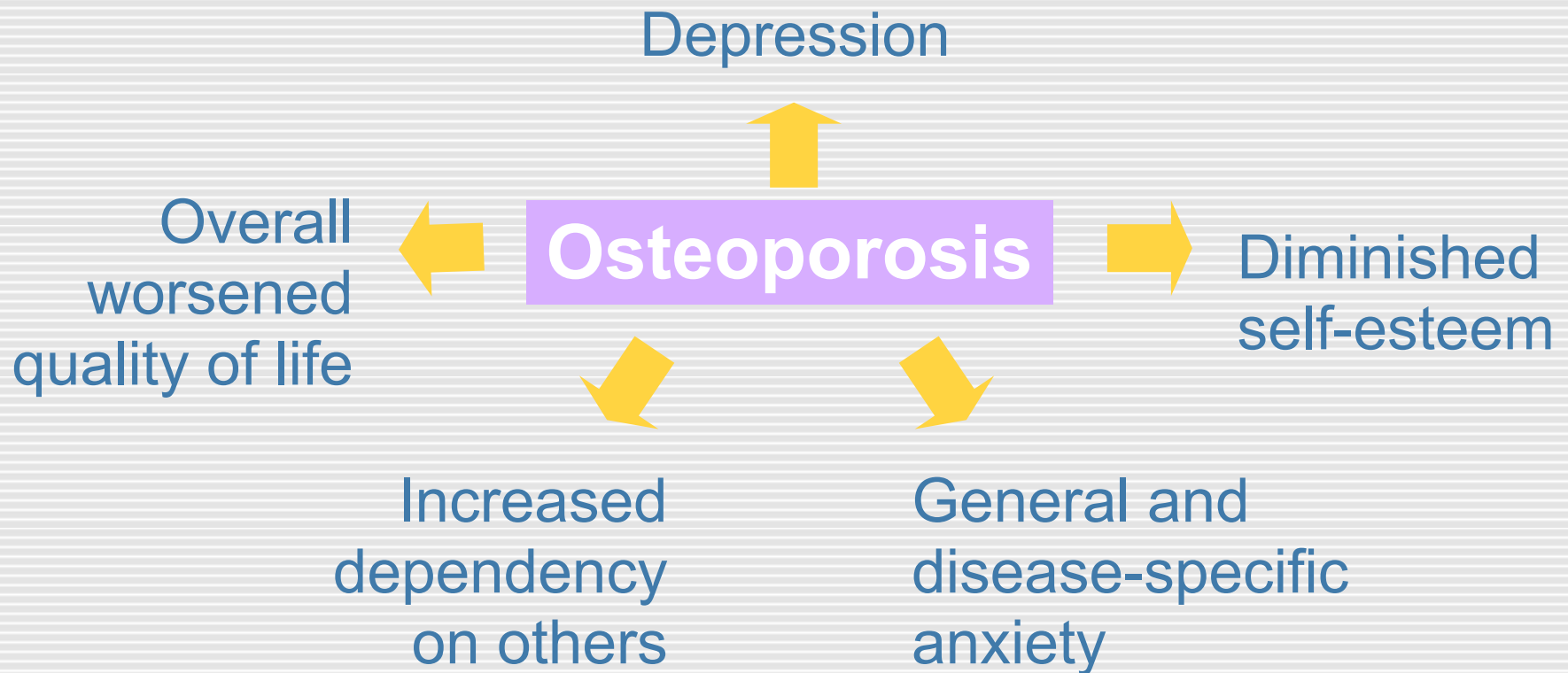
Mortality

- VCF patients have a 23-34% increased mortality risk.¹
- Both hip and a vertebral fracture increase mortality risk 7 to 9 fold.²



¹Kado; Arch Int Med 1999; ² Cauley ; Ost Int 2000; 11(7) 556-61

Psychological consequences of osteoporosis



Options for treatment

- ☐ Prevention
 - ☐ Pain relief
 - ☐ Bracing
 - ☐ Surgical vertebroplasty
 - ☐ Surgical kyphoplasty
 - ☐ Open reconstruction
-

Vertebroplasty & Kyphoplasty

- ☐ Definition
- ☐ Indications
- ☐ Technique
- ☐ Results



Vertebroplasty

- Injection of bone cement into recently collapsed vertebra.
 - Osteoporosis
 - Haemangioma
 - Malignancy
 - fractures

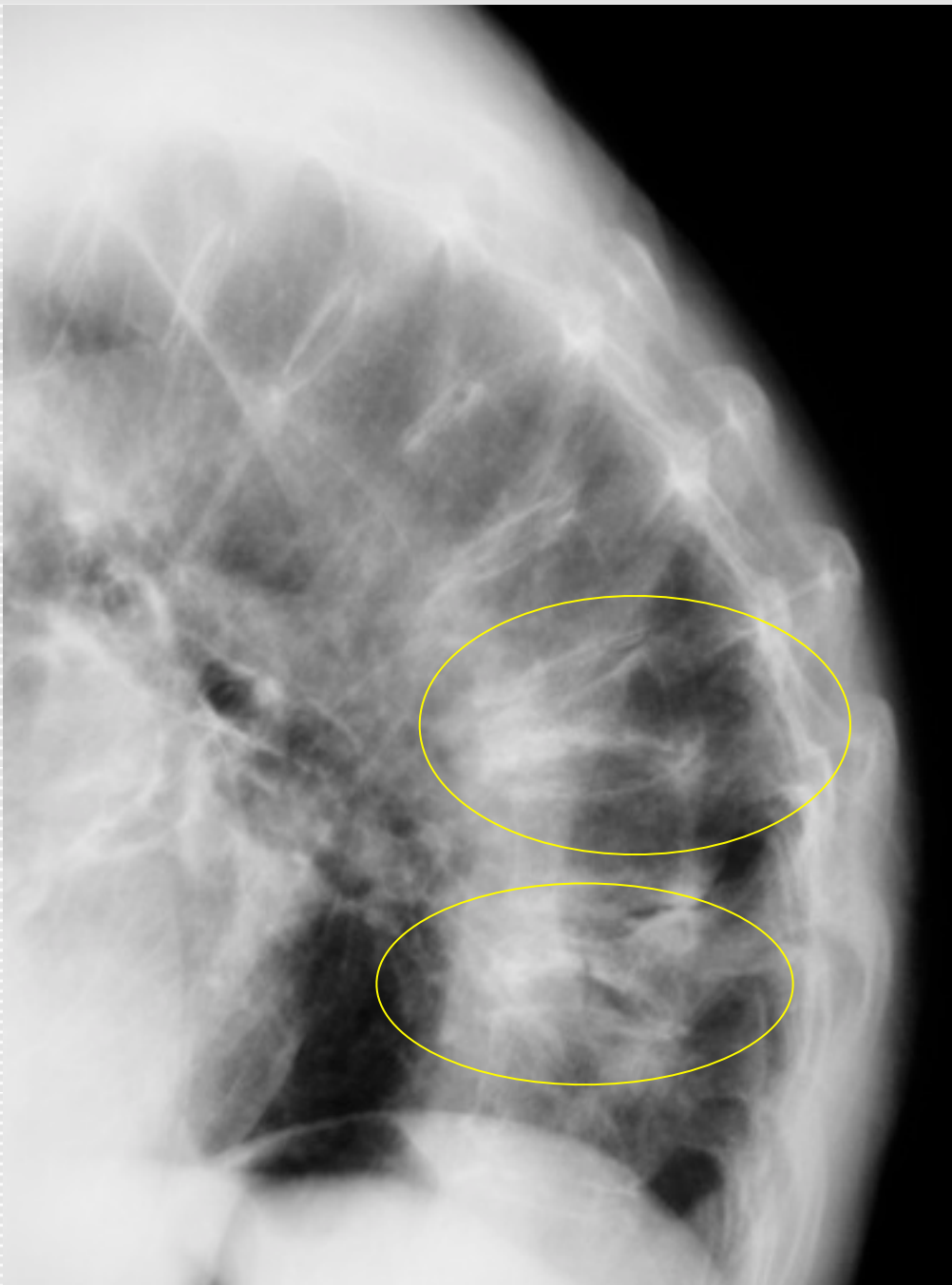
Why and why not!

☐ Indications

- Pain > two weeks
- < 75% vertebral collapse

☐ Contra-indications

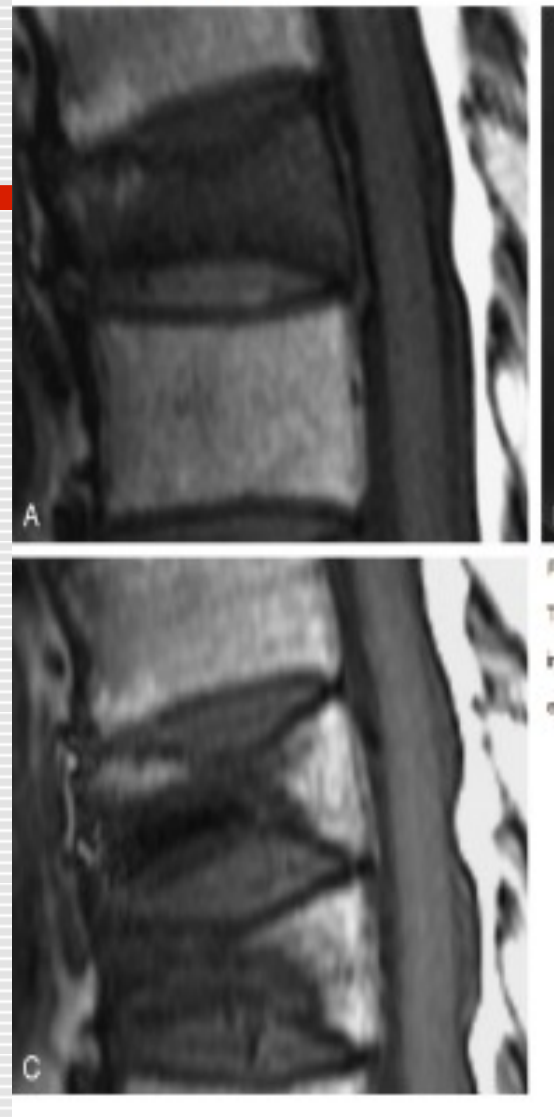
- Healed fractures
 - Canal compression
 - Fractures > one year
 - Neurology
-

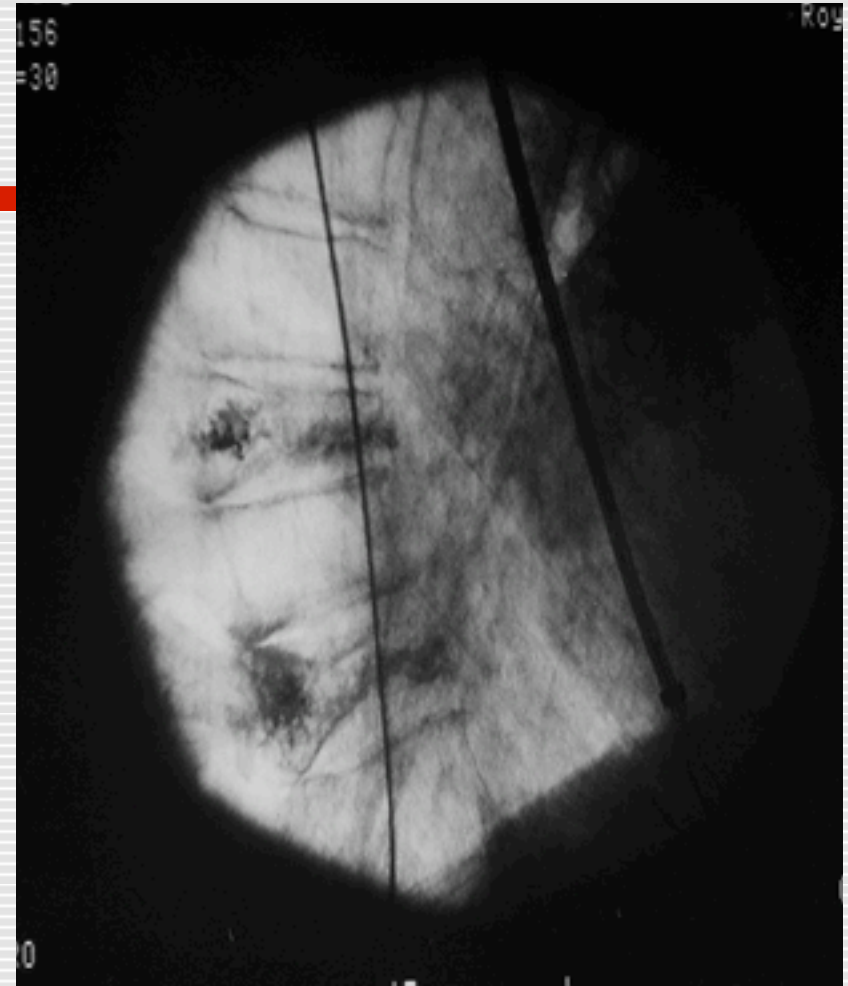
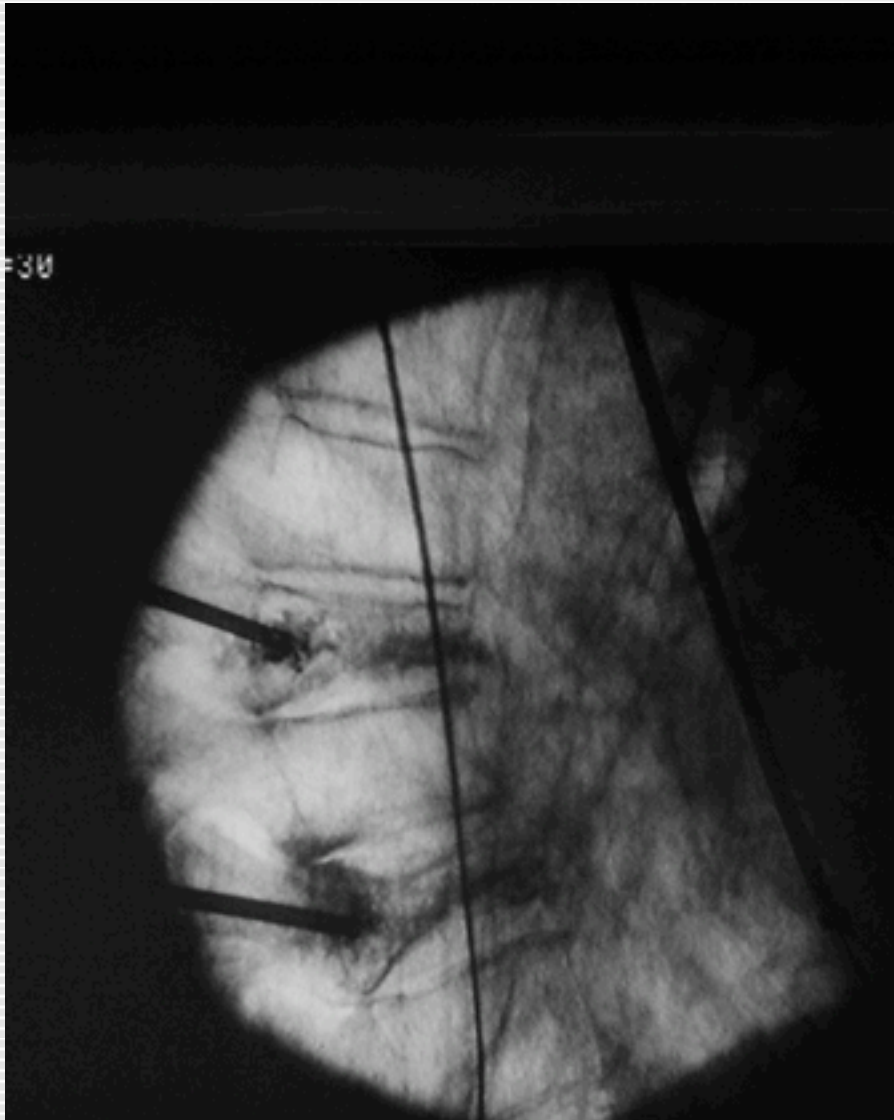


Pre-op work up

- ☐ Pain management
 - ☐ Serial radiography
 - ☐ Flexion/extension films
 - ☐ MRI scan –
 - STIR sequences for time of #
 - T1/T2 for posterior wall integrity
 - ☐ Anaesthetic assessment
-

MRI protocols





Results

- Pain relief
 - 65% good to excellent
 - 30% moderate

- Complications
 - Leakage
 - Radicular pain
 - Paraparesis



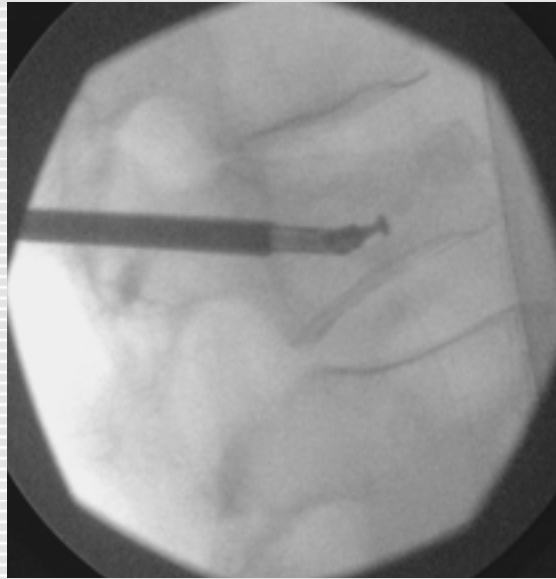
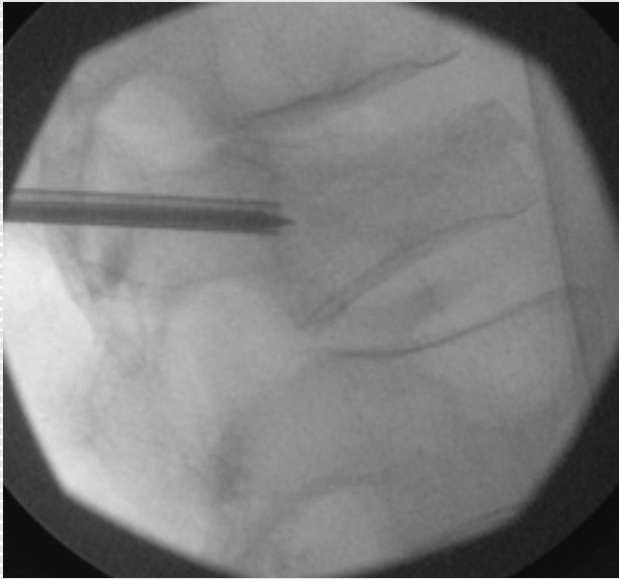
Balloon/Stent Kyphoplasty

- ❑ Correction of deformity
- ❑ Reduction of risk of further #s
- ❑ Pain relief
- ❑ Shape morphology

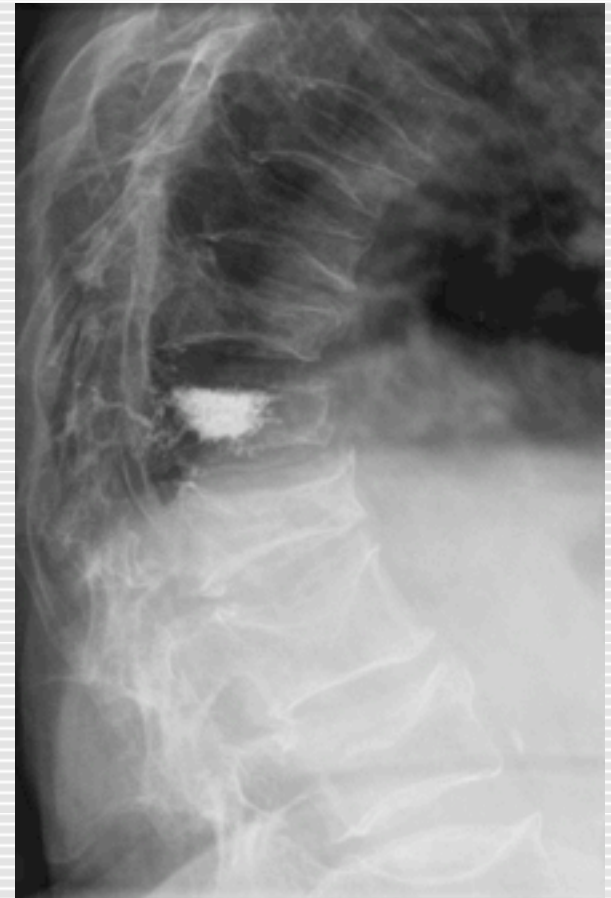
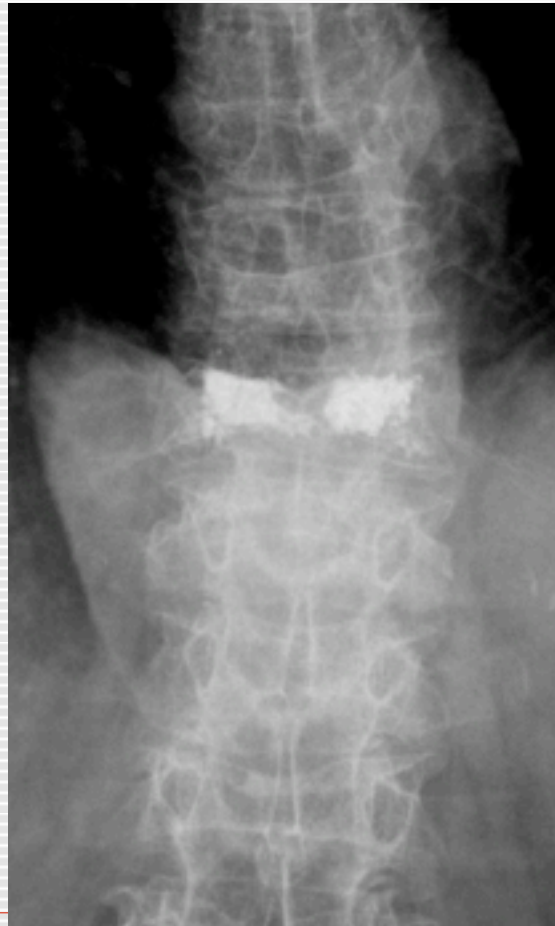
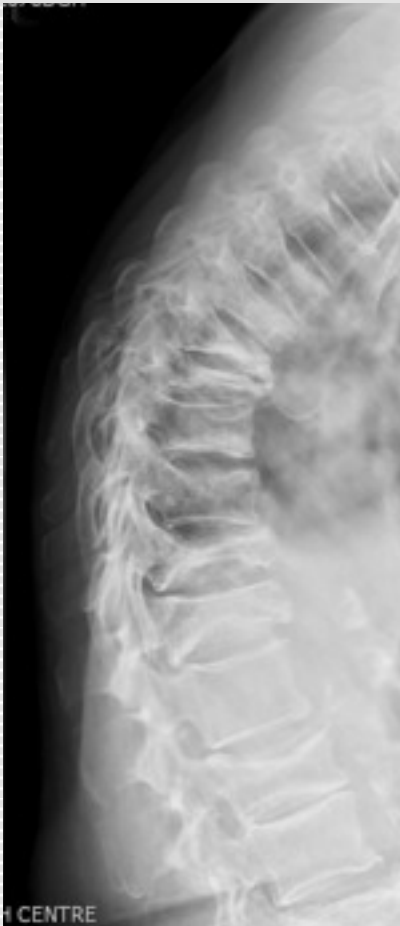


Balloon Kyphoplasty

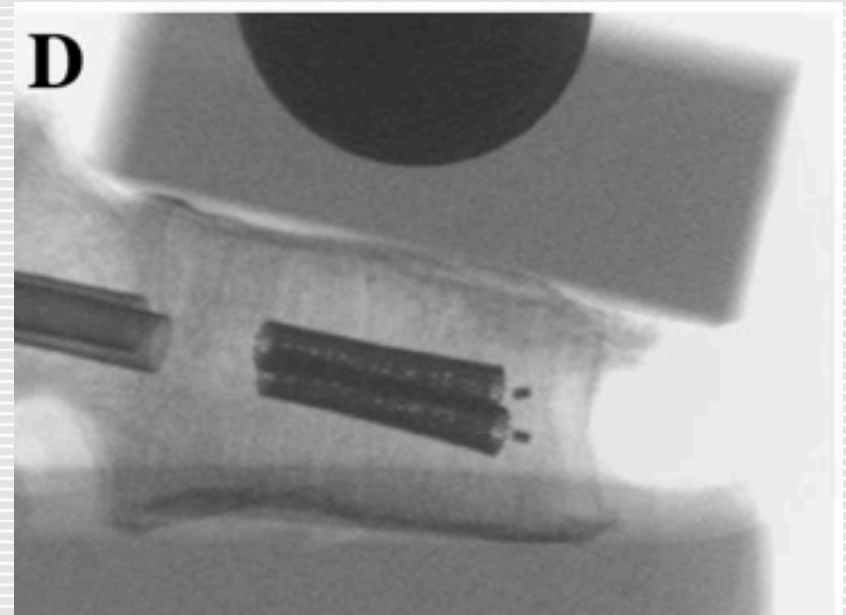
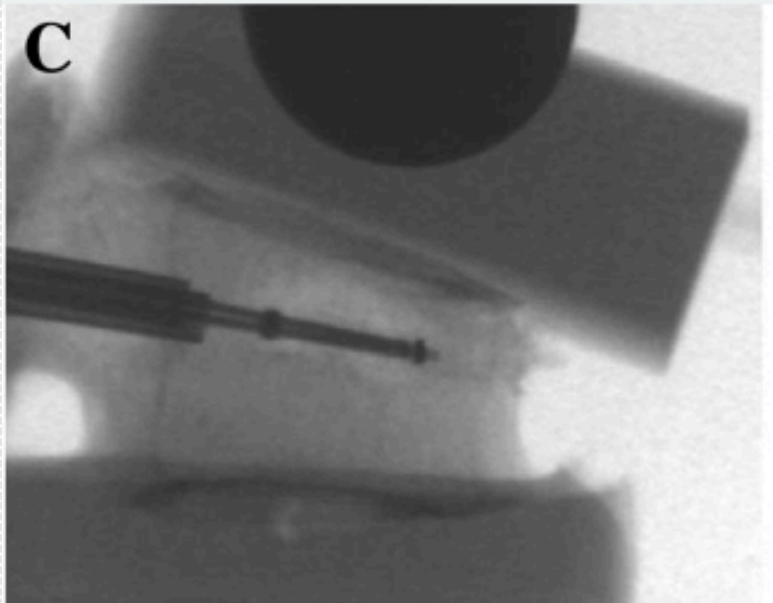




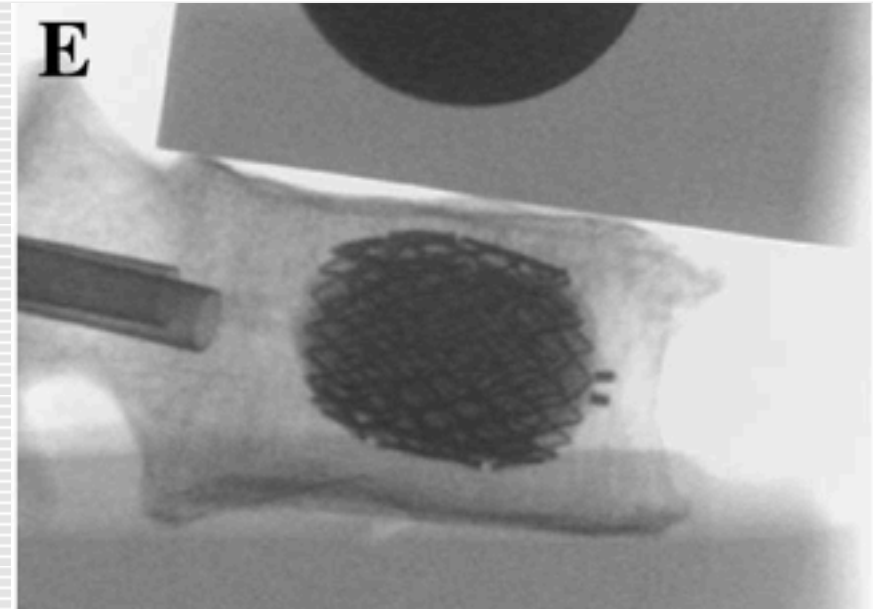
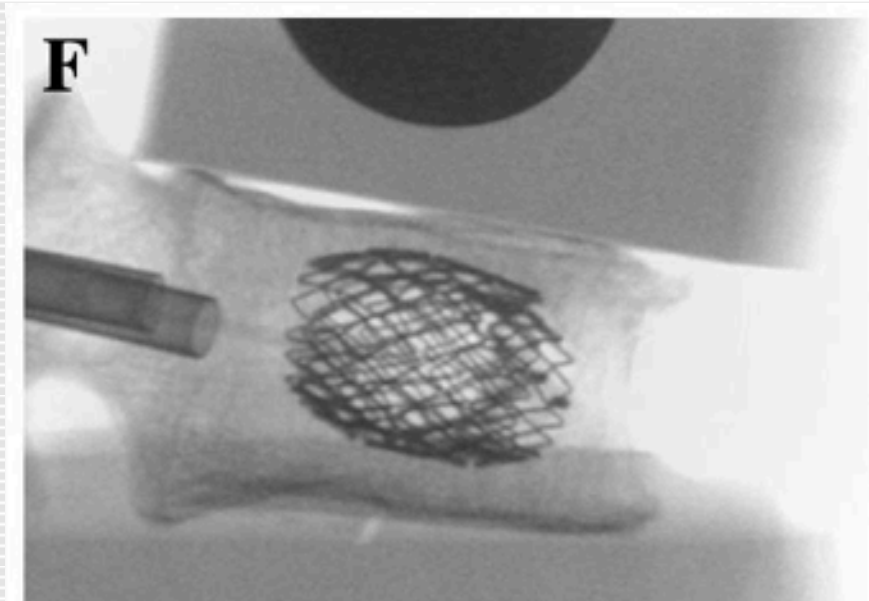
JH 72



Stent Kyphoplasty



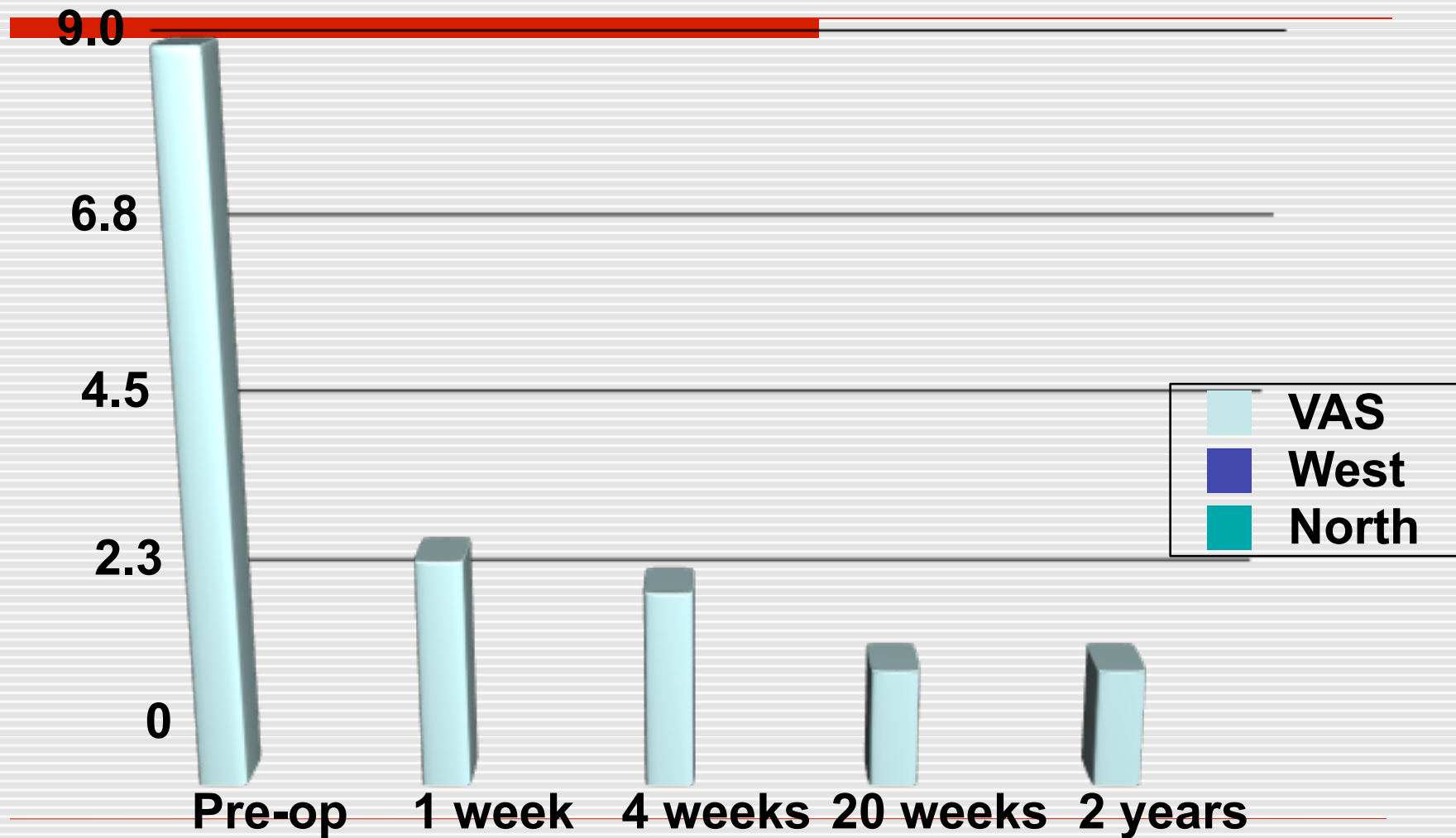
Stent Kyphoplasty



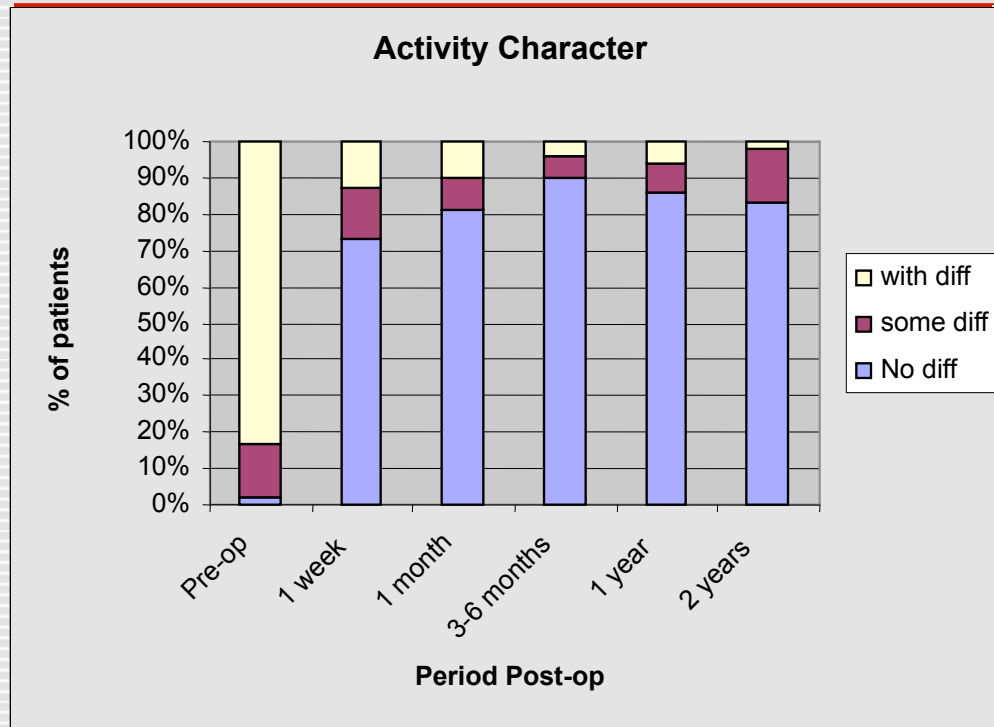
Results

- 20% improvement in angular deformity in 70% of patients
- 11.5% asymptomatic cement extravasation.
- Additional #s 4.5% per year

Pain relief



Mobility - Activity



88% of the patients returned to a fully ambulatory status at 2 year follow-up.

Mean hospital stay was **1.7** days

81% of the patients could function without any difficulties at 2 year follow up

Ledlie et al, Spine Vol 31 N°1, 2006

Case Study

Patient:

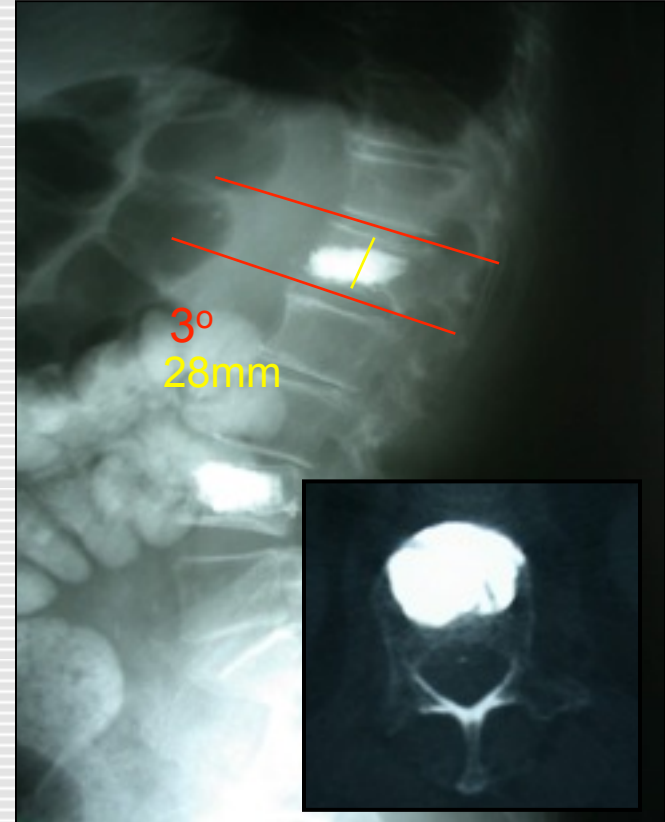
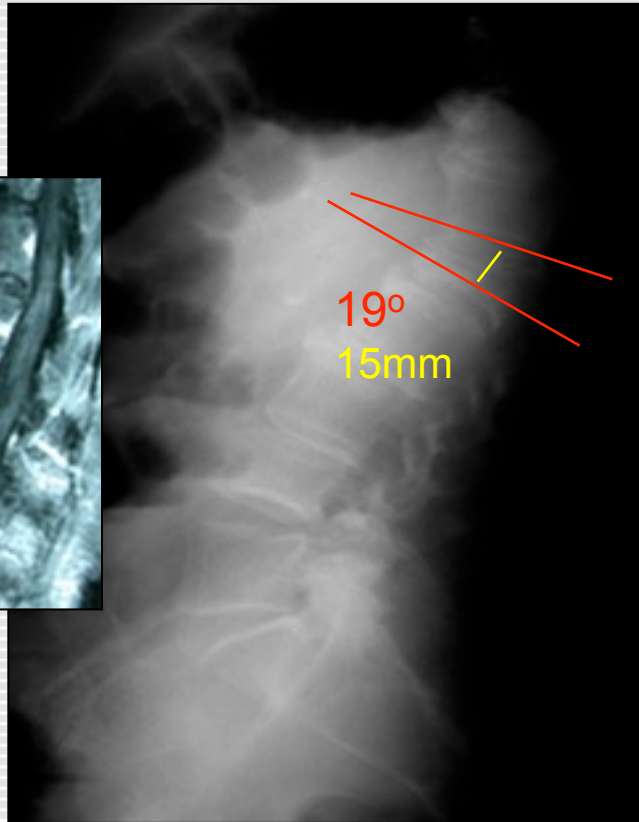
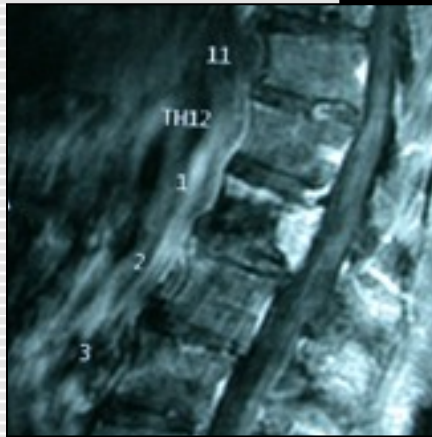
Diagnosis:

Fracture Reduced:

91 YO Female

Primary osteoporosis

L-1, 4 months old



Courtesy of Alexander Hadjipavlou, M.D., Crete, Greece

Summary – Vertebroplasty/ kyphoplasty

- ☐ Additional treatment modality
 - ☐ Pain relief
 - ☐ Possibility of restoring morphology
 - ☐ Safe
-

Summary

- ❑ Commonest fracture in post-menopausal women
- ❑ Recognition
- ❑ Mechanics and morbidity
- ❑ Social dependency