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

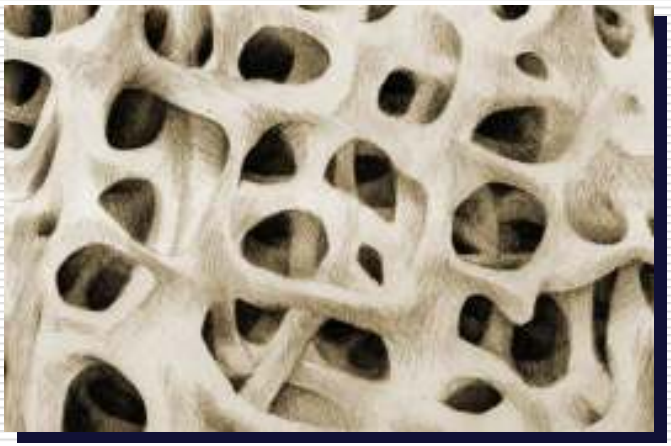
- Definition
- Epidemiology/mortality
- Incidence and diagnosis
- Treatment

Osteoporosis

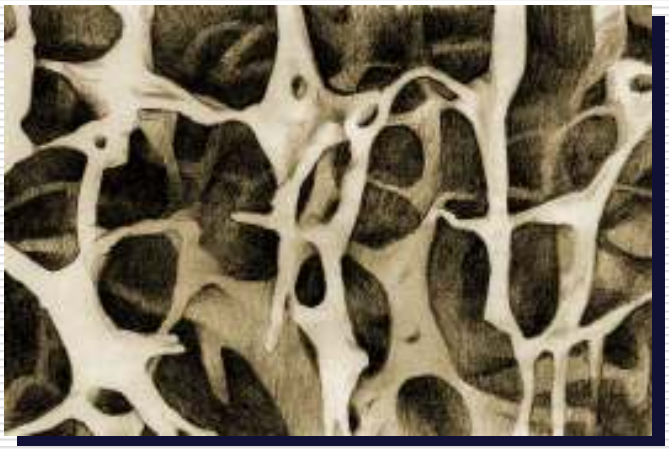
Osteoporosis is a systemic disease characterised by low bone mass and microarchitectural deterioration of bone tissue, leading to enhanced fragility and a consequent increase in fracture risk

Osteoporosis

Normal bone



Osteoporotic bone

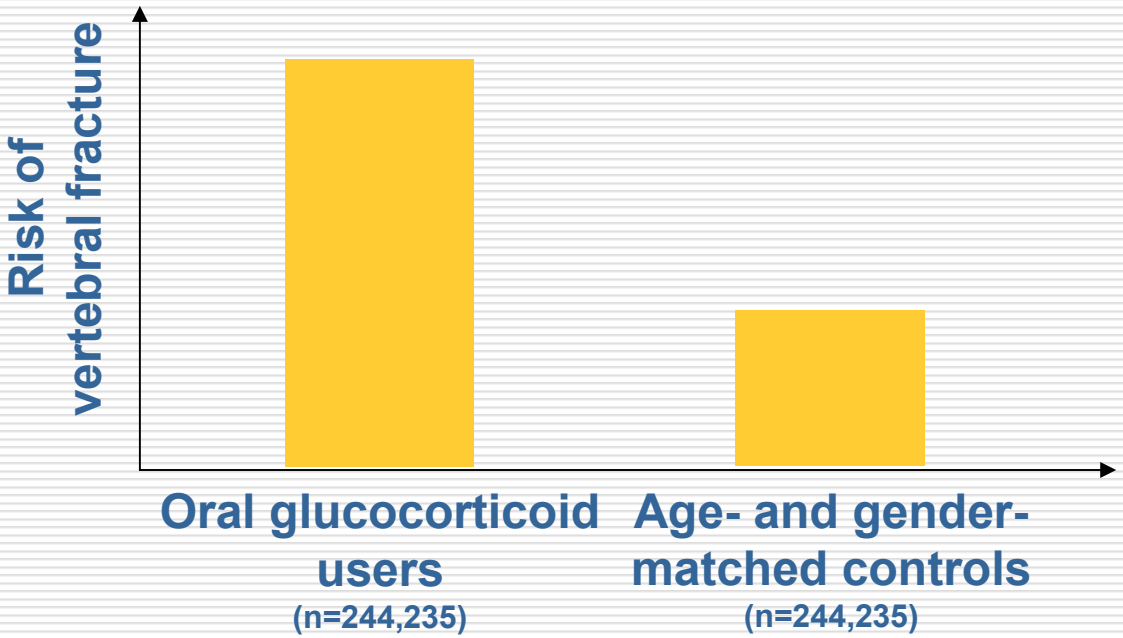


Risk Factors for osteoporosis

- 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.

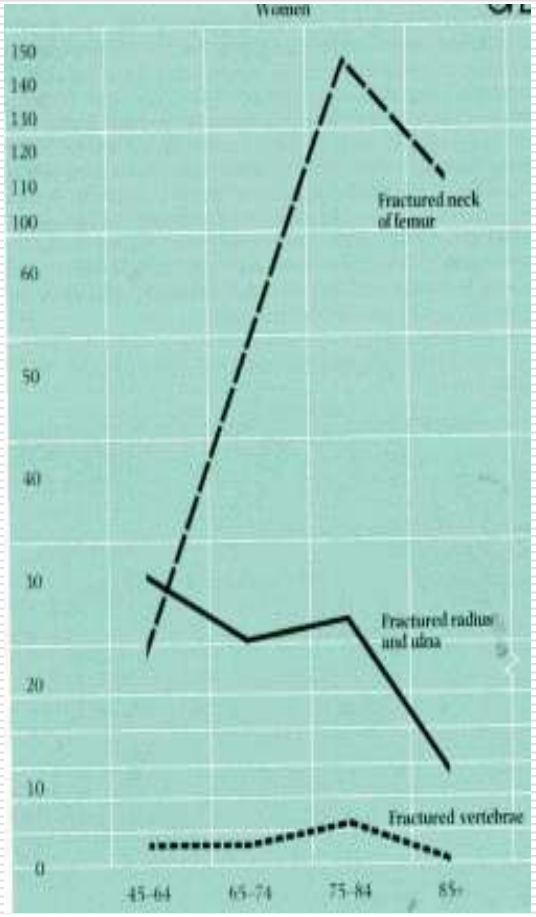
Epidemiology of osteoporosis

- 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]

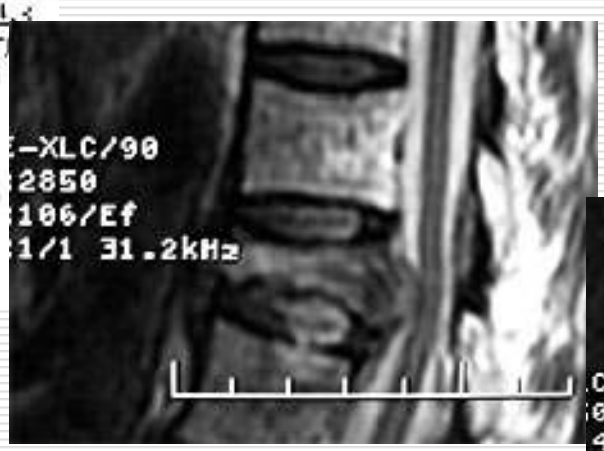


[1] Kanis et al, 2000 [2] EU report on Osteoporosis

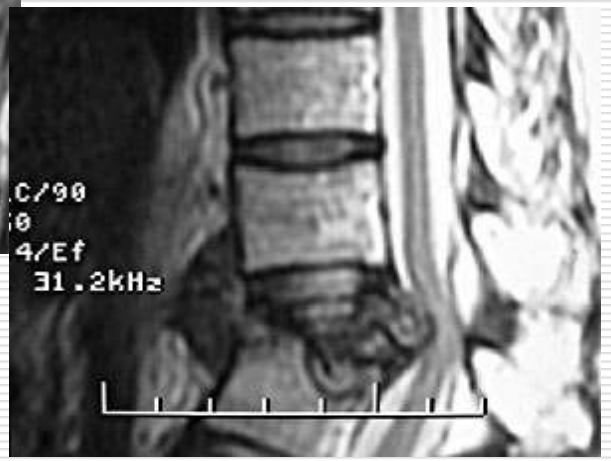
Natural history

T-12 VCF

January 2003



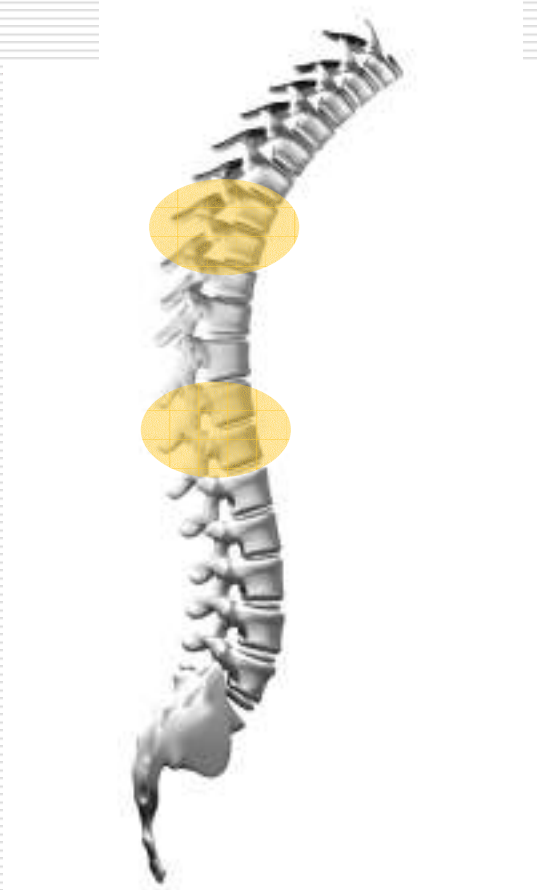
February 2003



May 2003

Courtesy of M Hisey, MD
Texas Back Institute

Location of vertebral fractures



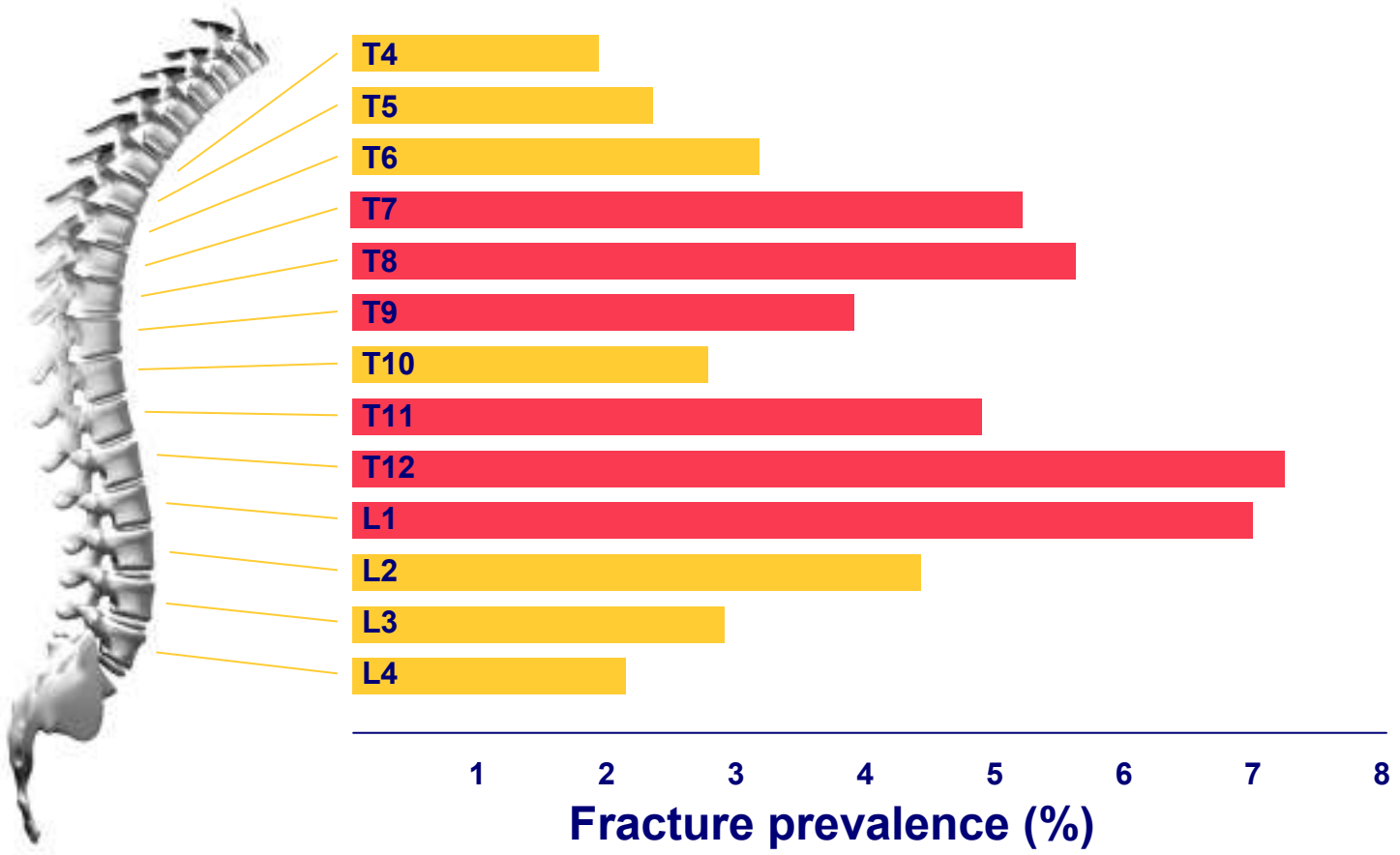
- Midthoracic region (T7–T8)
- Thoracolumbar junction (T12–L1)[1]

Results:

- mechanical compromise
- Increase in vertebral loading during flexion

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

Incidence of vertebral fractures[1]



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

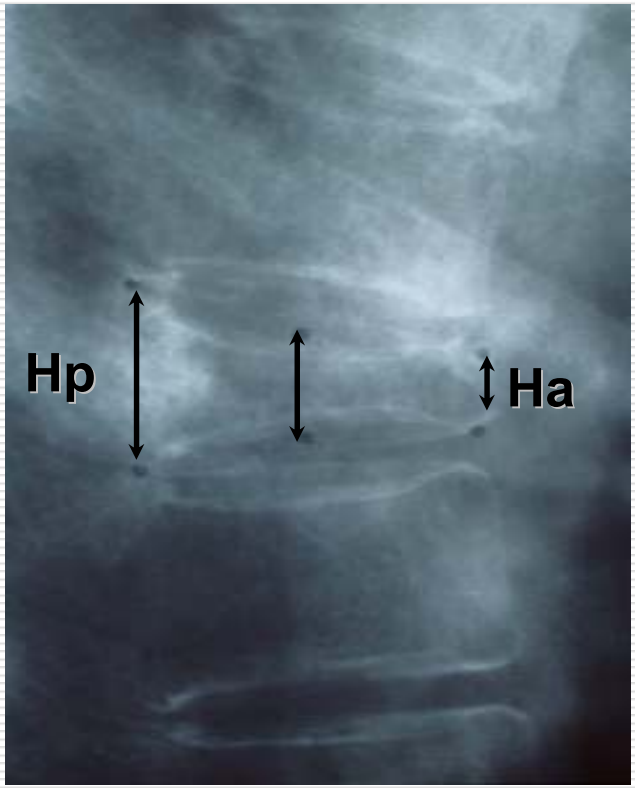
- Chronic manifestation
  - Loss of height
  - Spinal deformity
  - Protuberant abdomen

Age 50

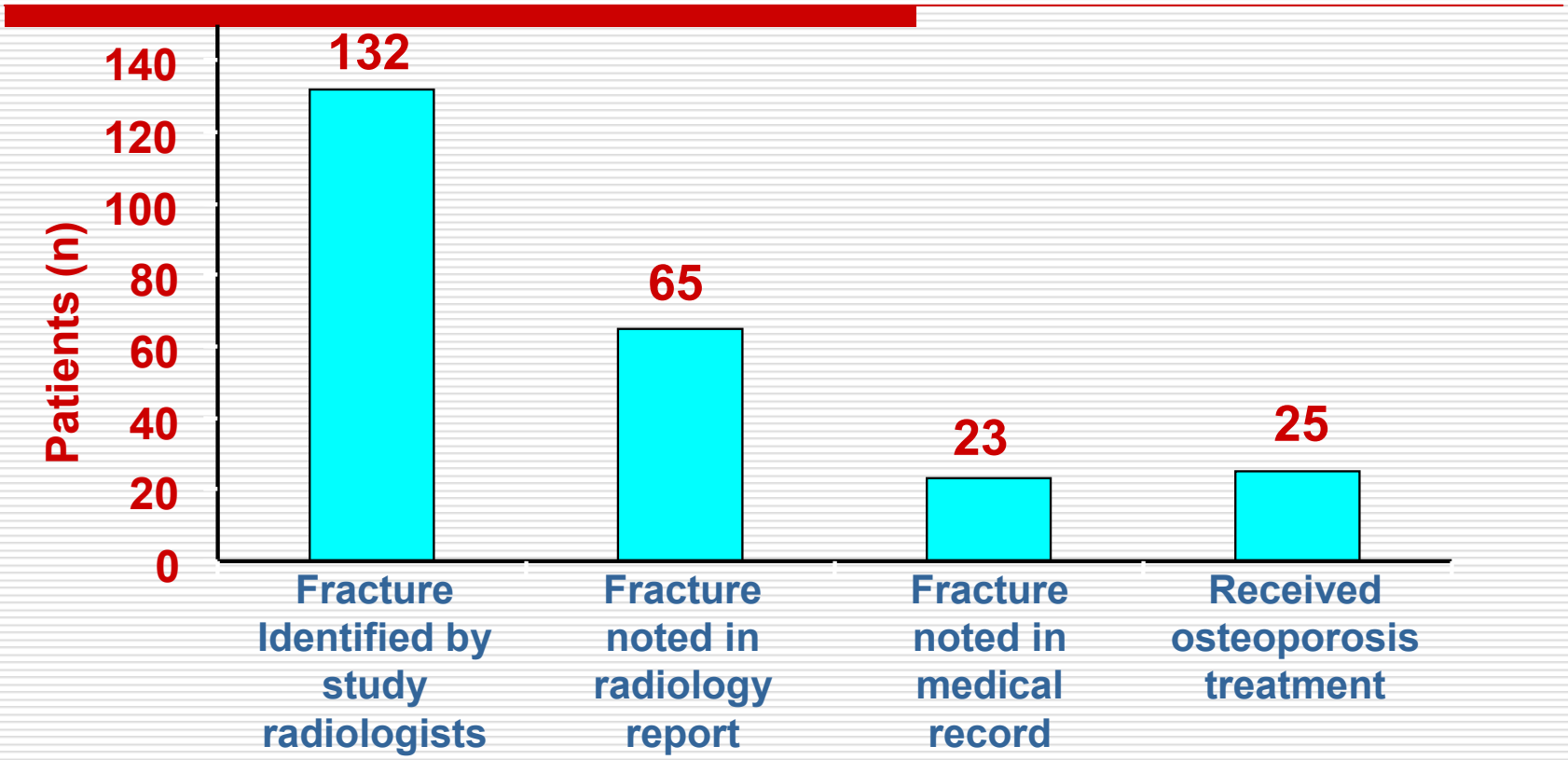
Age 75

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

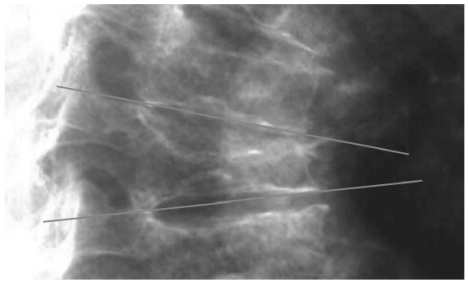
Diagnosis of osteoporosis

Glucocorticoid therapy (≥7.5 mg prednisolone)

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

Classification

Wedge

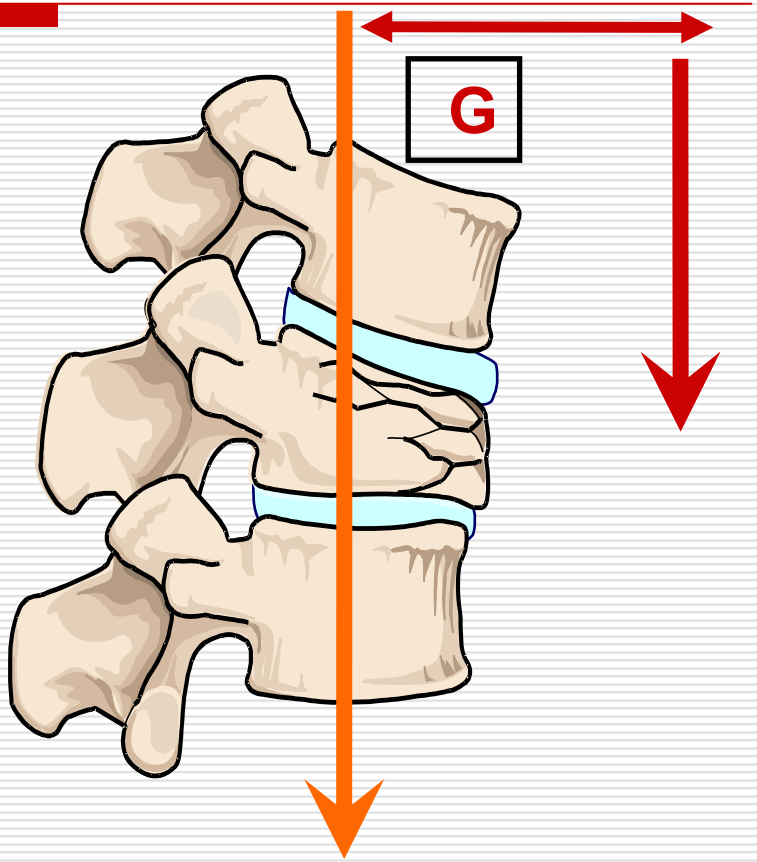


Biconcave

Crush

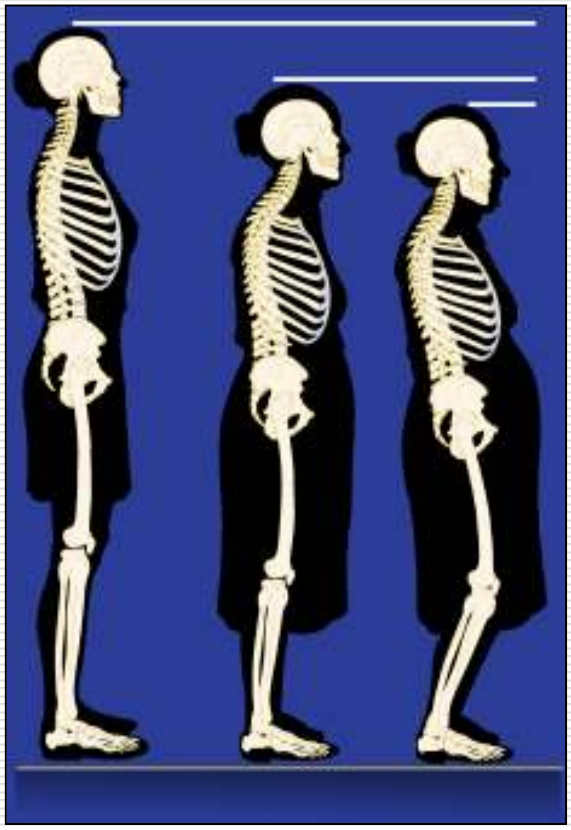
Biomechanics of VCF

- 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



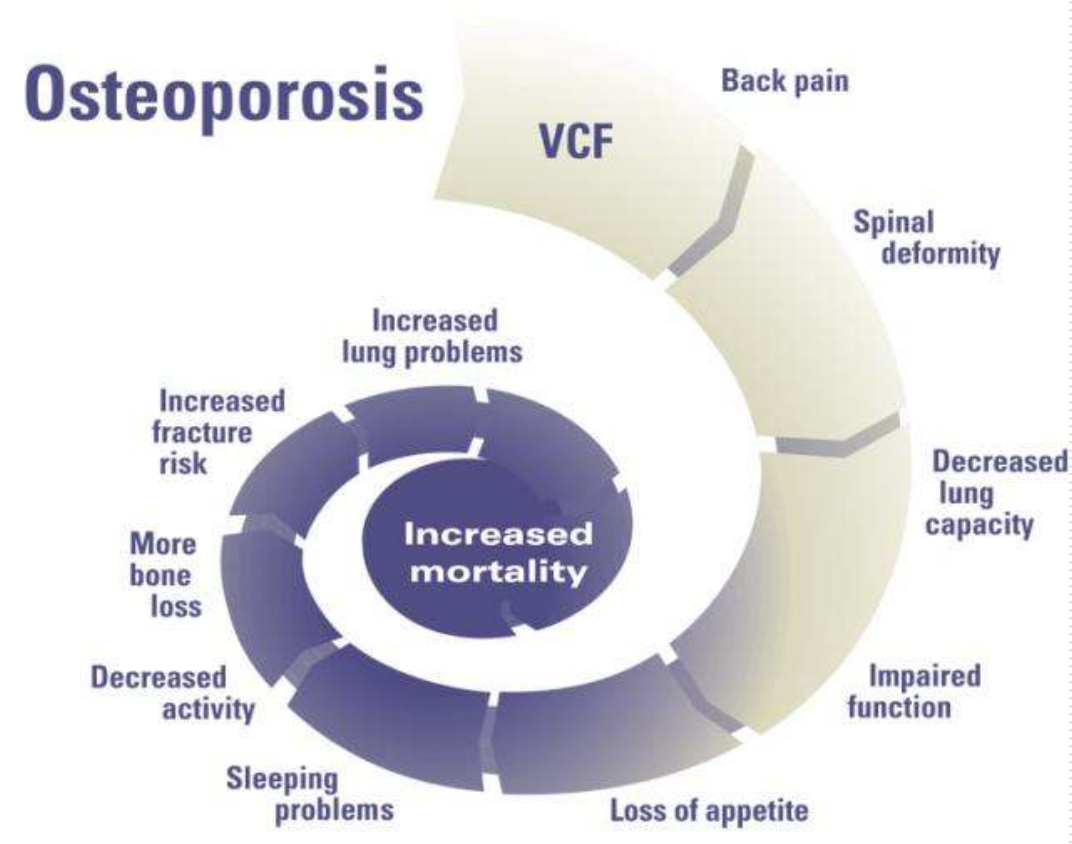
Biomechanics of VCF

- Decrease in gait velocity[1]
- Change in balance[1]
- Increased muscle fatigue[1]
- Increased risk of falls and additional fractures[1]



[1]Gold et al, Osteoporosis 1989

Consequences of VCF



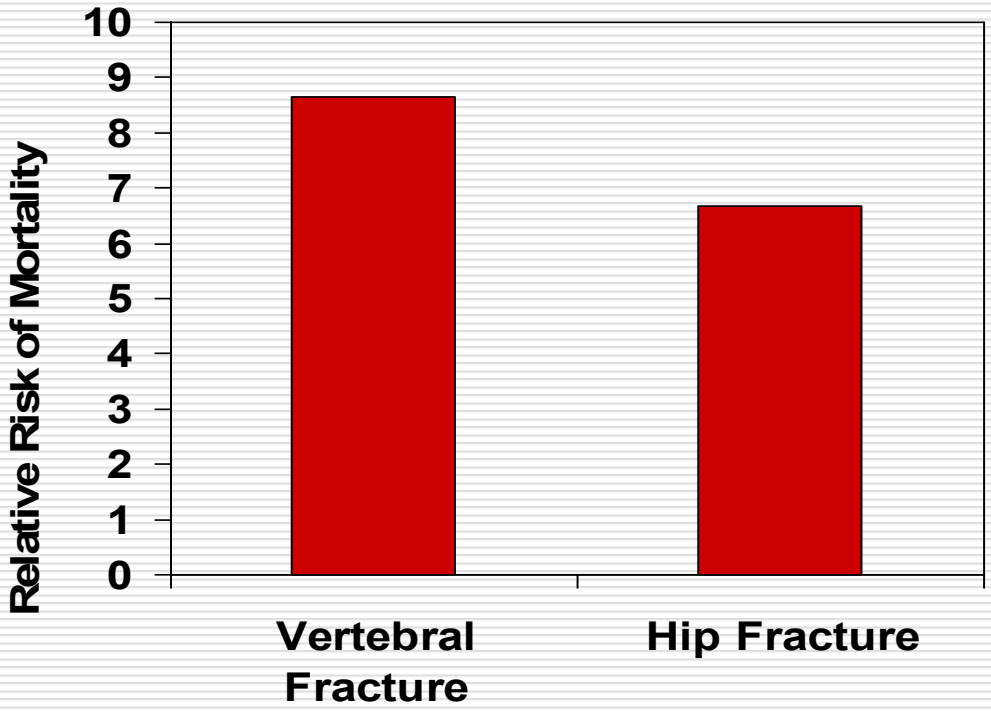
Pulmonary Function

- VCF reduces Pulmonary Function[1]
  - 1 thoracic VCF causes 9% loss of forced vital capacity[2]
  - Lung function (FVC, FEV1) is significantly reduced in patients with thoracic and lumbar fracture[1]

1Schlaich,Osteop Int, 1998, 8:261-67
2Leech,Am Rev Respir Dis 1990; 141: 68-71

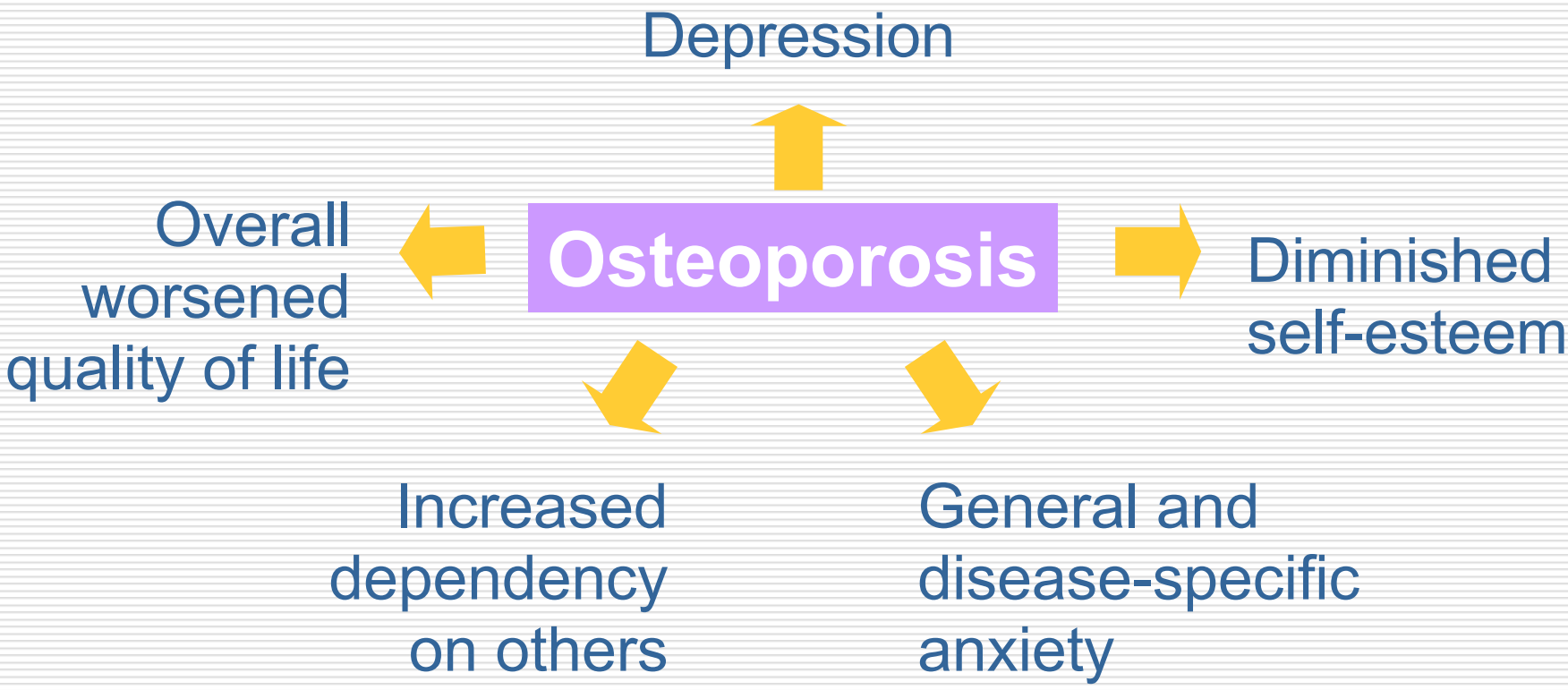
Mortality

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



[1]Kado; 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

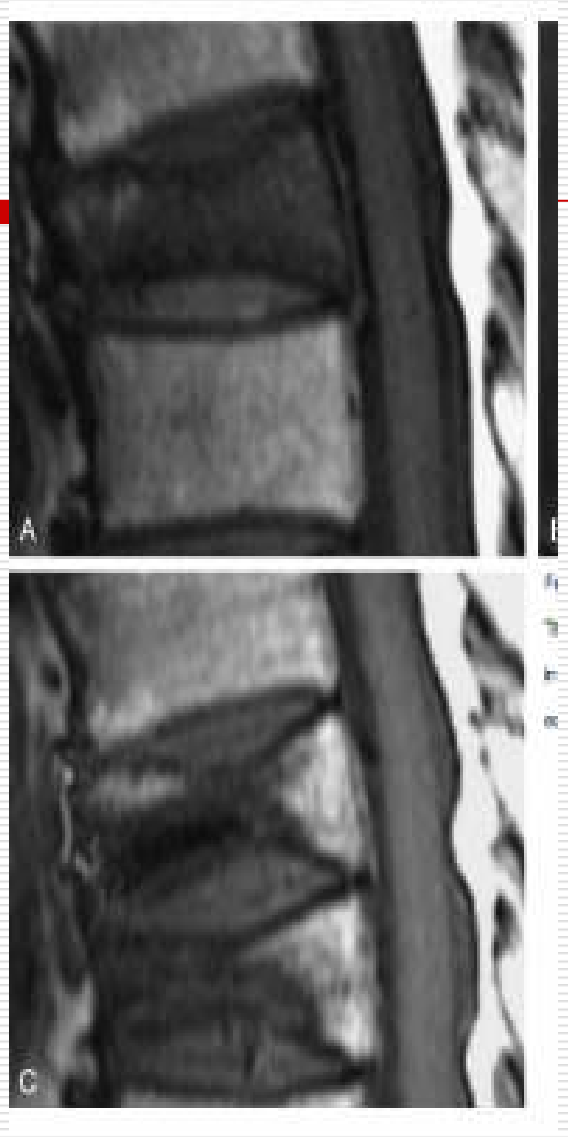
- Contra-indications
  - Healed fractures
  - Canal compression
  - Fractures > one year
  - Neurology

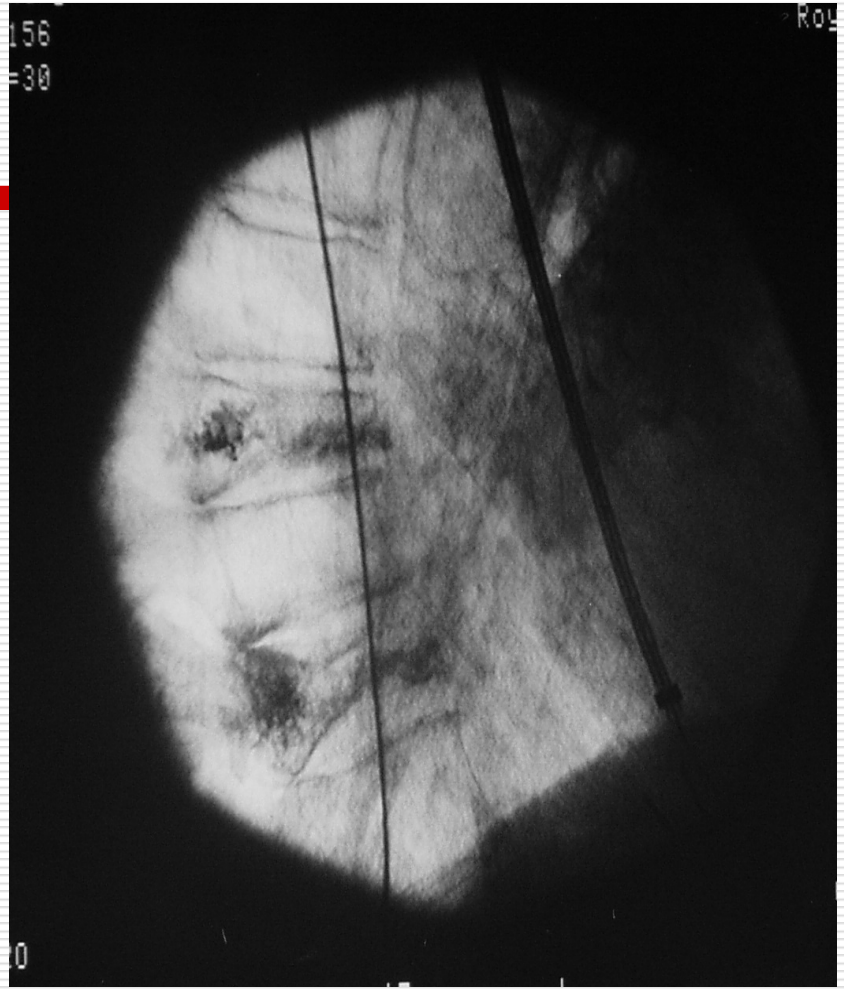

1.2kHz
.0sp
4 NEX
B/ED

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

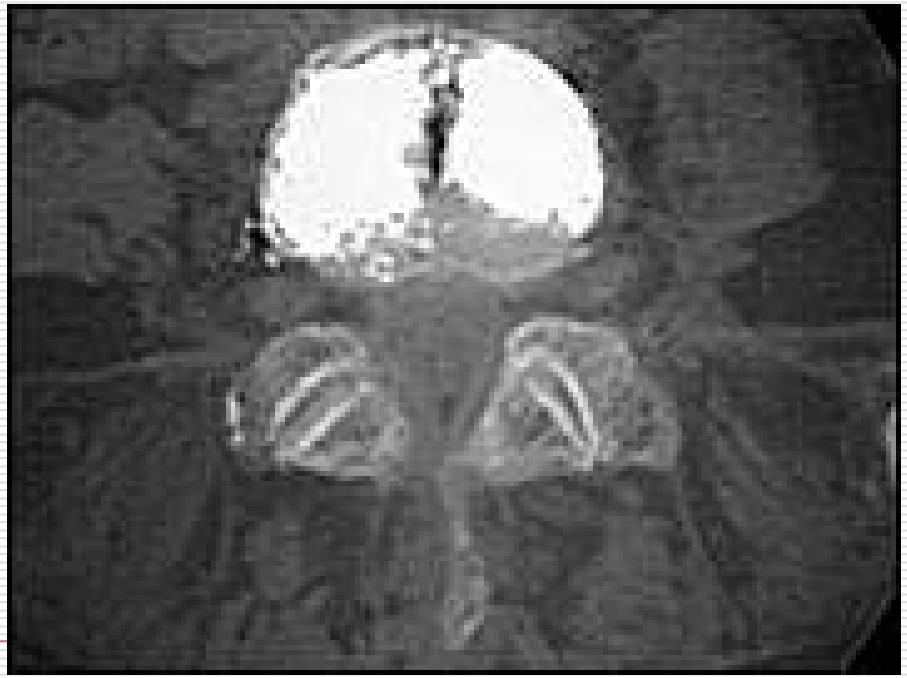
MRI protocols





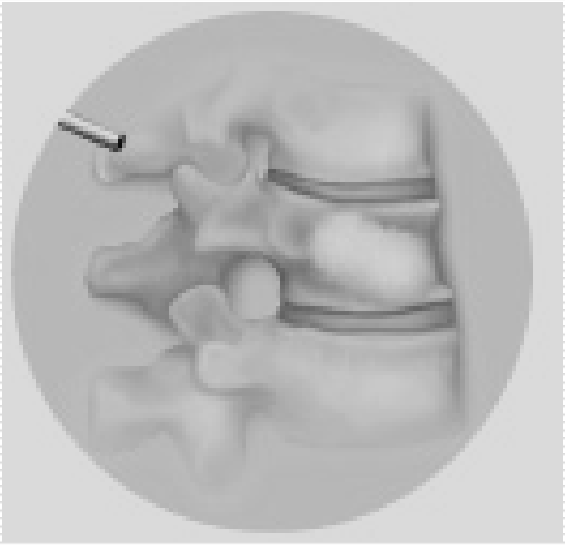
Results

- Pain relief
  - 65% good to excellent
  - 30% moderate
- Complications
  - Leakage
  - Radicular pain
  - Paraparesis

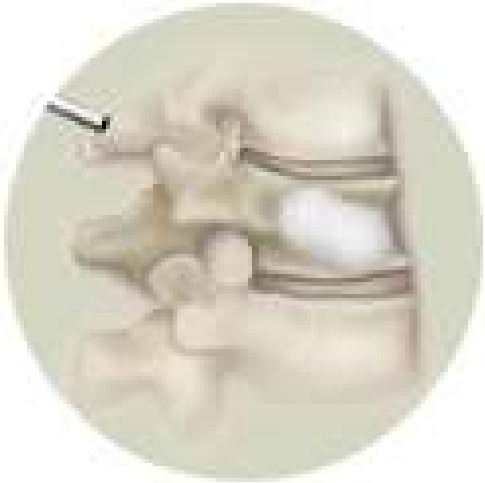


Balloon/Stent Kyphoplasty

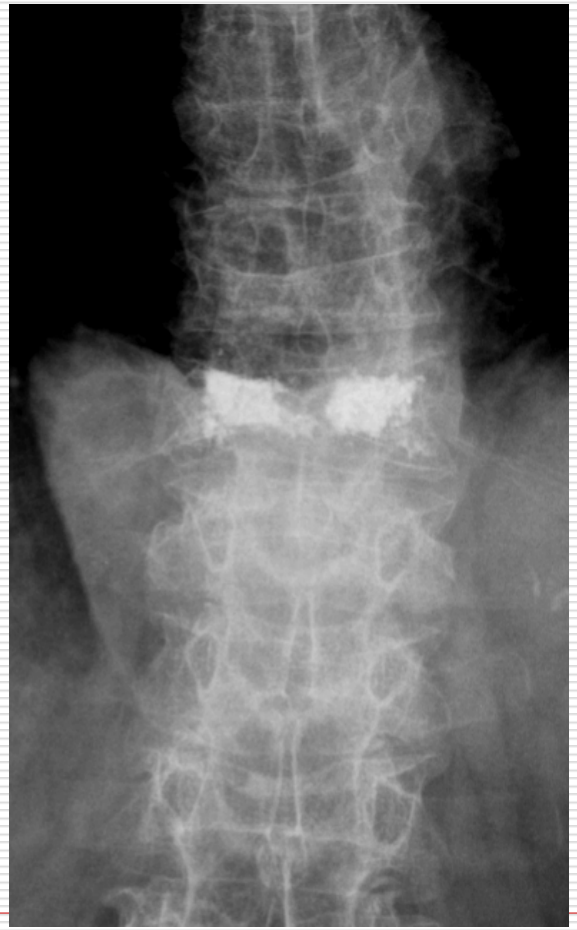
- Correction of deformity
- Reduction of risk of further #s
- Pain relief
- Shape morphology

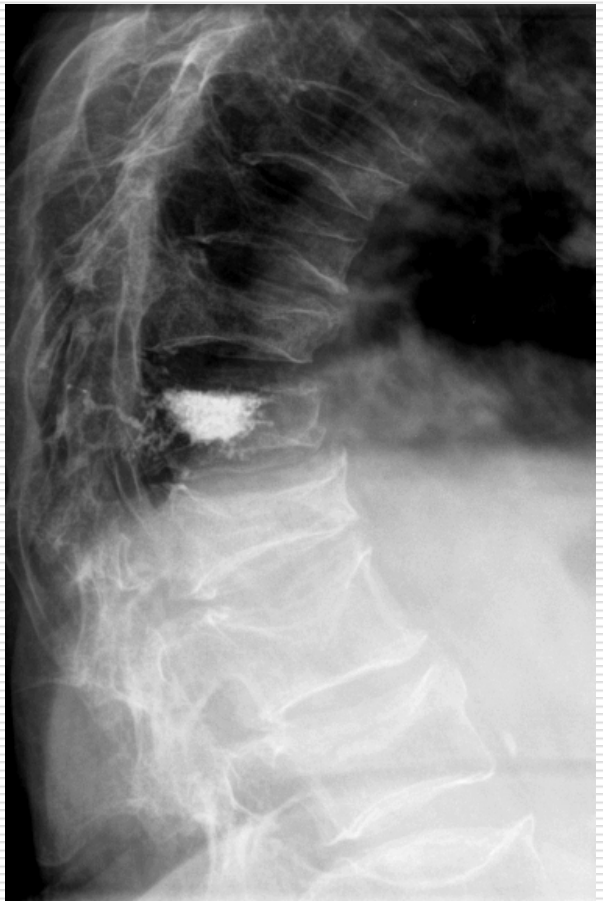


Balloon Kyphoplasty

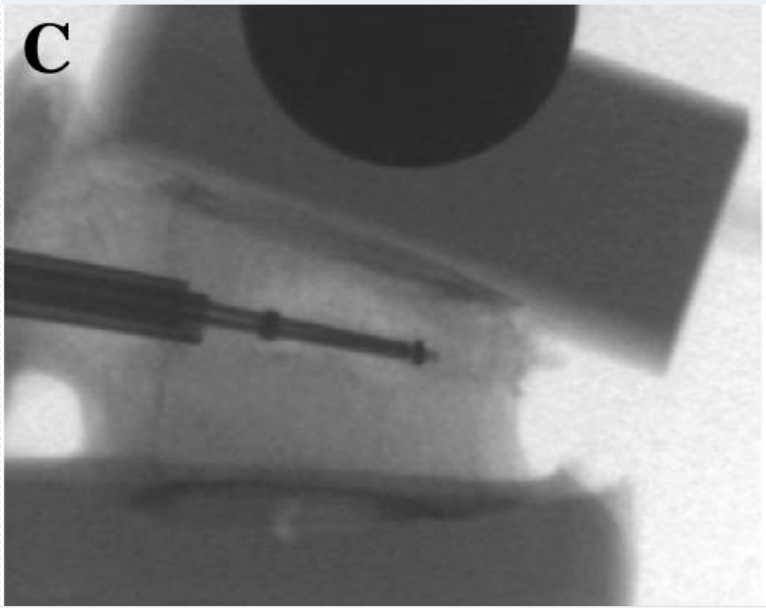


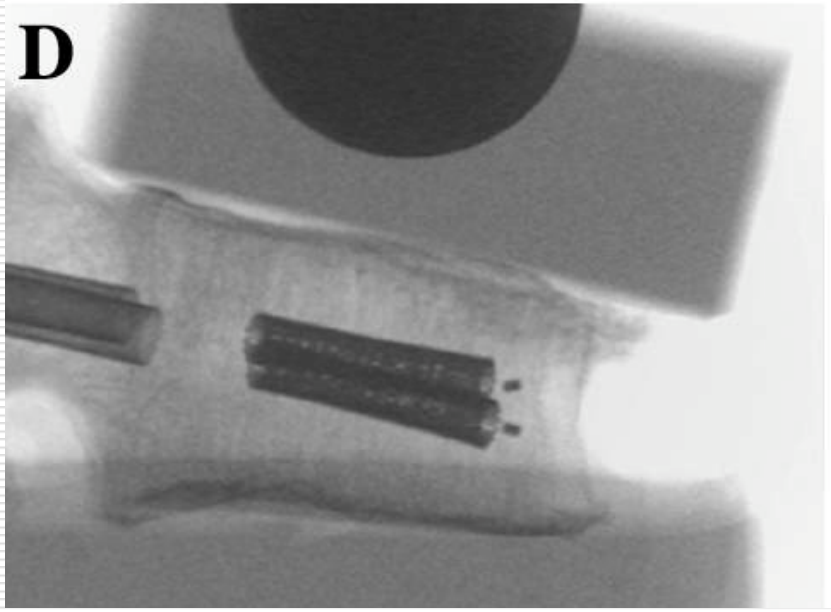
JH 72



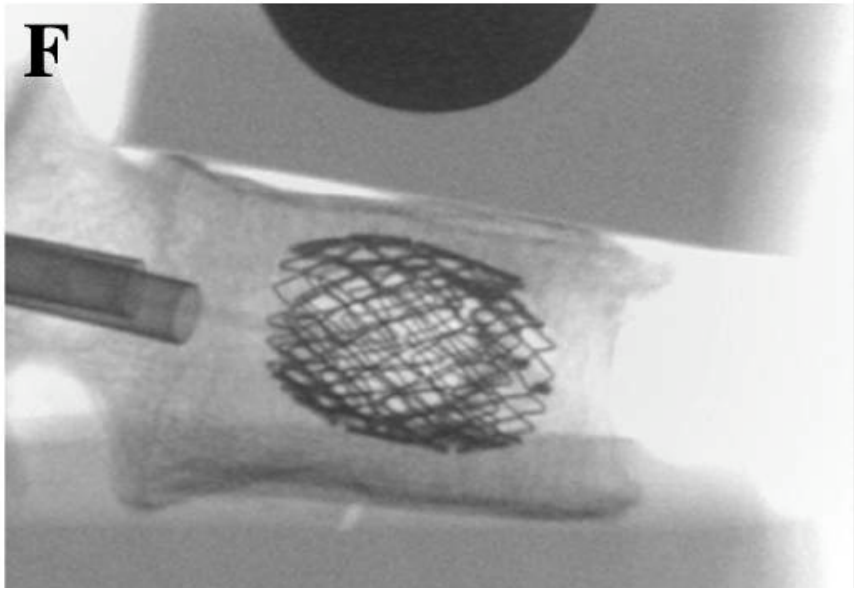


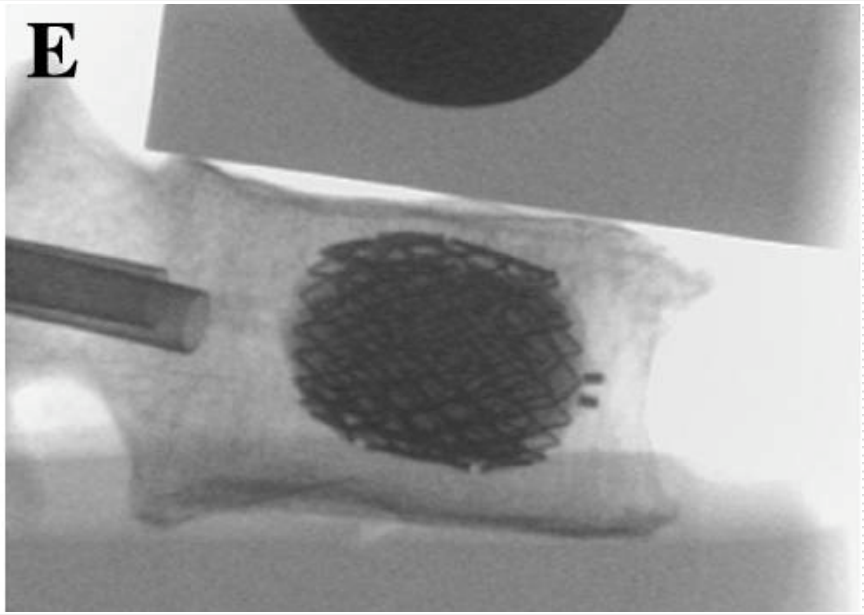
Stent Kyphoplasty





Stent Kyphoplasty

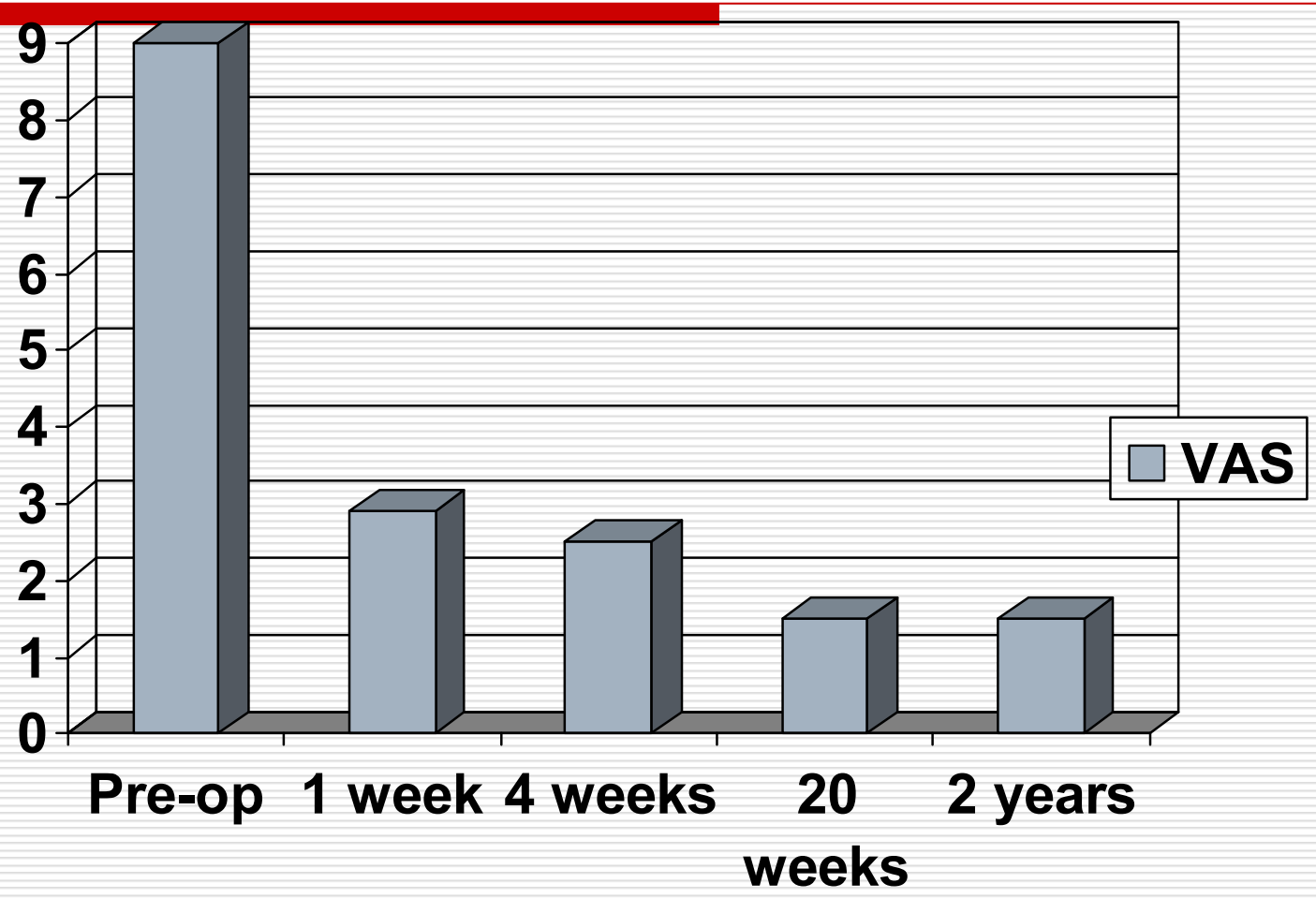




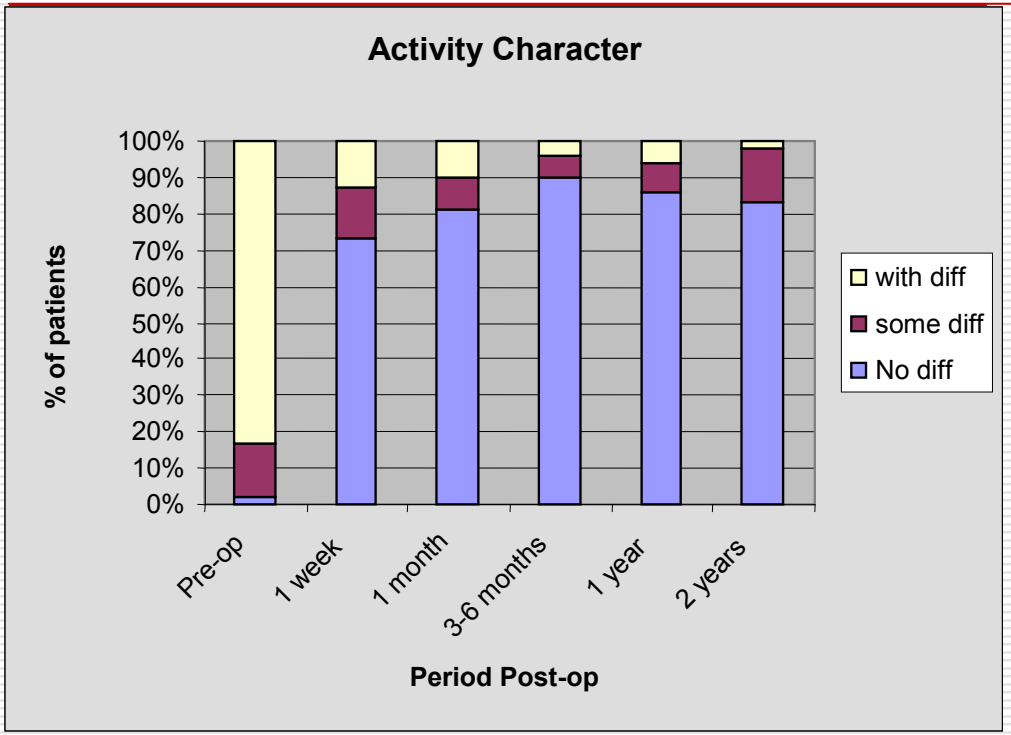
Results

- 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.

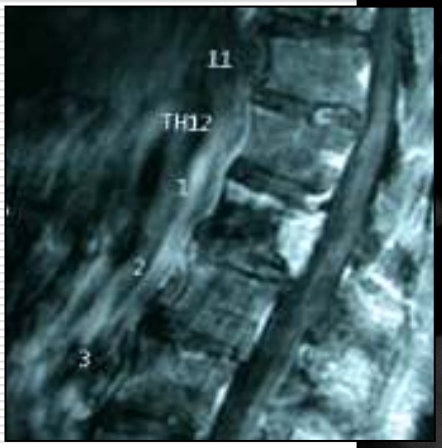
Mean hospital stay was **1.7** days

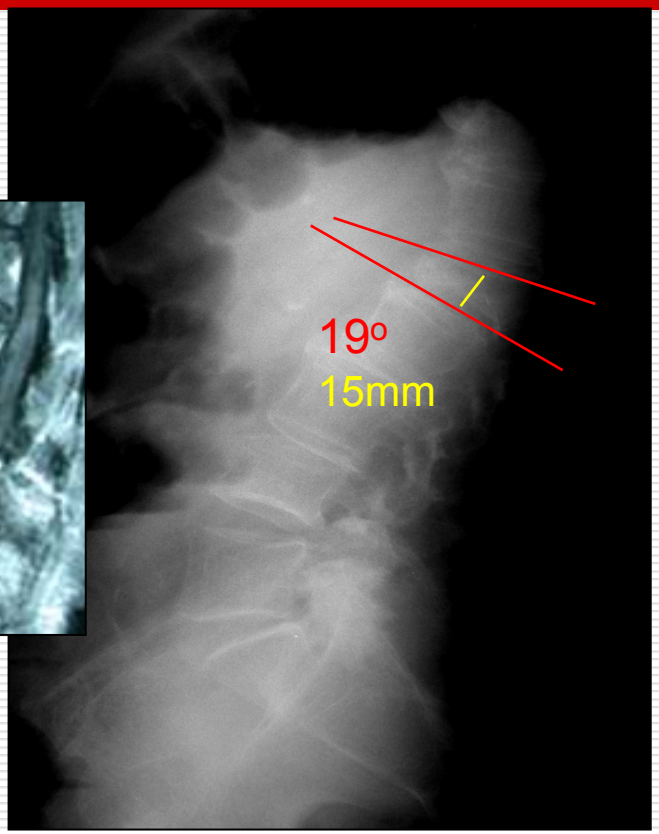
81% of the patients could function without any difficulties at 2 year follow up

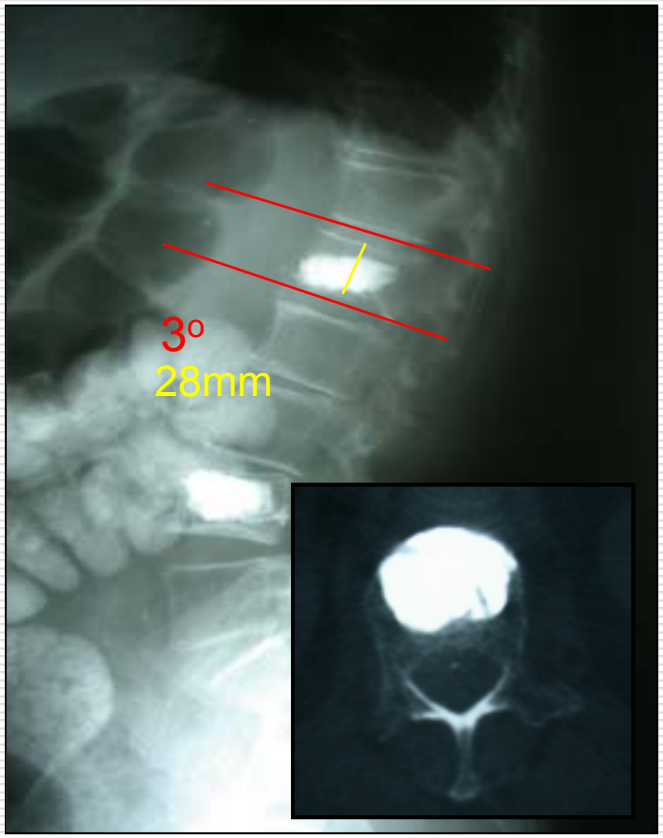
Ledlie et al, Spine Vol 31 N° 1, 2006

Case Study

Patient:	91 YO Female
Diagnosis:	Primary osteoporosis
Fracture Reduced:	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