

Treatment of Osteoporotic Compression Fractures

C. Lan Fotopoulos, MD
Interventional Physiatric Spine and Sports
Kansas City Orthopaedic Alliance

1

Osteoporosis

- 54 million men and women have osteoporosis
- 2,000,000 men have osteoporosis
- 34,000,000 have osteopenia
- 1 in 2 white women and 1 in 4 men will experience an osteoporotic fracture in her lifetime.

2

Osteoporosis

- Osteoporotic fractures cost \$18 billion annually
- Projected to cost \$50 billion by 2040
- Projected costs exceed the cost of stroke, breast CA, DM, or chronic lung disease

3

Definitions

- Osteoporosis-Characterized by low bone mass leading to an increased fracture risk
 - WHO defines a bone mineral density (BMD) 2.5 standard deviations below the mean for healthy young women measured by dual energy x-ray absorptiometry (DEXA).
- Osteopenia-defined as BMD between 1-2.5 standard deviations below the mean.

4

Primary Osteoporosis

- Primary Osteoporosis – bone loss related to the decline of gonadal function associated with aging.
 - Increasing age
 - Low body weight
 - White or Asian
 - Excessive alcohol and caffeine
 - Low calcium and/or vitamin D intake

5

Secondary Osteoporosis

- Low bone mass resulting from chronic disease, exposures, or nutritional deficiencies.
 - Amyloidosis
 - Ankylosing Spondylitis
 - HIV
 - IBD
 - Severe Liver Disease
 - Renal Failure
 - Rheumatoid Arthritis
 - SLE

6

Endocrine and Metabolic disorders

- Athletic amenorrhea
 - Disordered Eating, Amenorrhea, Osteoporosis
- Cushing Syndrome
- DM type 1
- Hemochromatosis
- Hyperadrenocorticism
- Primary hyperparathyroidism
- Hyperthyroidism
- Hypogonadism
- Hypophosphatasia

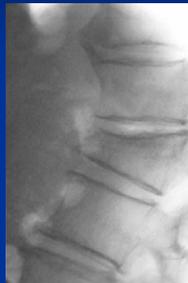
7

Medications

- Anticonvulsants
- Drugs causing hypogonadism
 - Progesterone, methotrexate, GRHA
- Glucocorticoids
- Heparin
- Immunosuppressants
 - Cyclosporine, tacrolimus
- Lithium
- Thyroid Hormone Excess

8

Osteoporotic Fractures



9

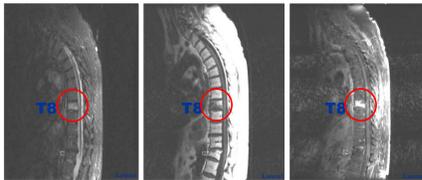
Imaging

- X-rays – Allows for quick screening and identification of fractures
- CT – Allows for best imaging of bony anatomy
- MRI – Optimal imaging for judging fracture age, as it shows bony edema for an acute fracture
- Bone scan – Less commonly used imaging, but will show increased uptake in a fracture and may be done in conjunction with a DEXA scan

13

Imaging

MRI with short T1-T2 inversion recovery (STIR)¹⁰



14

Imaging

Bone scan³
Allows for quick fracture evaluation from T4 to L4



CT scan³
Demonstrates fracture through posterior wall of vertebra



15

Number Needed to Treat with Vertebral Augmentation to Save a Life

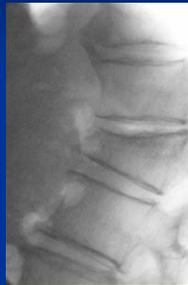
American Journal of Neuroradiology January 2020, 41 (1) 178-182; DOI: <https://doi.org/10.3174/ajnr.A6367>

- Why Treat: Number Needed to Treat with Vertebral Augmentation to Save a Life
- The purpose of this study was to calculate the number needed to treat (NNT) to save 1 life at 1 year and up to 5 years after vertebral augmentation.
- Pooled data from 10-year sample of US Medicare patients with vertebral compression fractures (VCFs) treated with nonsurgical management, balloon kyphoplasty, and vertebroplasty.
- Adjusted number needed to save 1 life saved for nonsurgical management versus kyphoplasty 14.8 at 1 year, 11.9 at 5 years; non-surgical management versus vertebroplasty ranged from 22.8 at 1 year, to 23.8 at 5 years.
- This large dataset analysis (>2 million patients) reveals that vertebral augmentation provides a significant mortality benefit over non-surgical management.

16

Vertebral Compression Fracture

- Osteoporosis
- Neoplasm
- Hemangioma
- Myeloma
- Metastasis



17

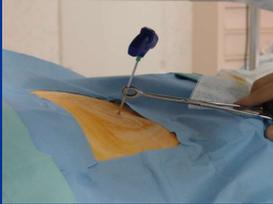
Osteoplasty

- A procedure for treatment of compression fractures.
- Promotes quicker return to activity.
- Originally not intended for treatment of traumatic fractures.
- Originally not intended for treatment in those less than 55 years of age.

Kyphoplasty and Vertebroplasty

18

Vertebroplasty



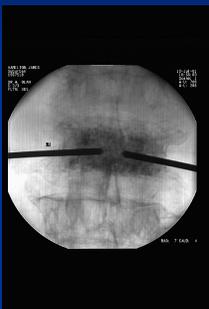
19

Vertebroplasty

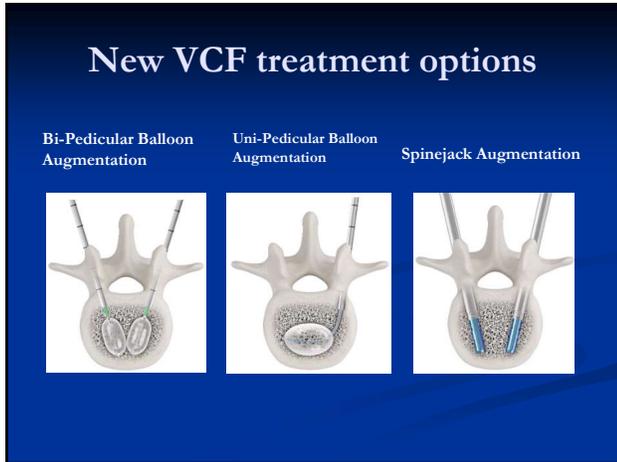


20

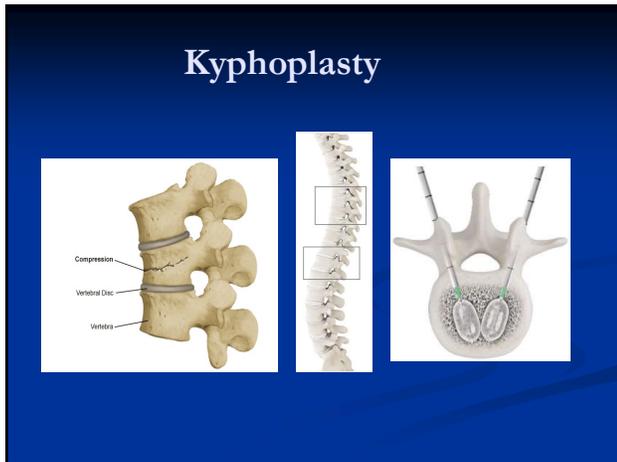
Vertebroplasty



21



22

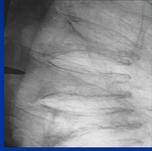


23

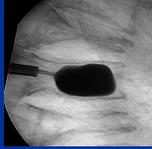


24

The Procedure



Pre-kyphoplasty



IBT Inflation

- Minimally invasive (only 0.5 cm incision)
- General or local anesthesia
- Typically 15-20 minutes per treated fracture
- Adverse event risk due to bone cement leak very low (< 0.3% per patient)

25

Spine Jack



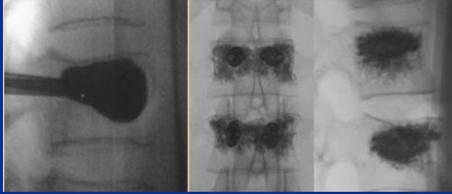
26

Spine Jack in action



27

Spinejack Difference



28

Osteoporotic fracture

■ Pre-operative situation:

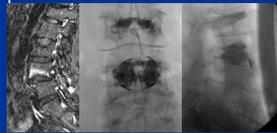
- Patient: 62, Female
- Fracture type: Inferior Endplate

Level: L4

- Pre-op VAS: 10/10

■ Post-operative situation:

- 5.8mm Spinejack
- Cement amount: 4-6 cc
- Post-op VAS: 1/10



29

Osteoporotic fracture

■ Pre-operative situation:

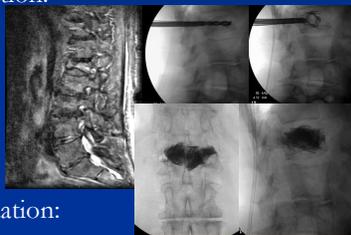
- Patient: 68 male
- Fracture type:
- 70% Compression

Level: L1

- Pre-op VAS: 9/10

■ Post-operative situation:

- 5.0mm Spinejack
- Cement amount: 7-8 cc
- Post-op VAS: 2/10



30

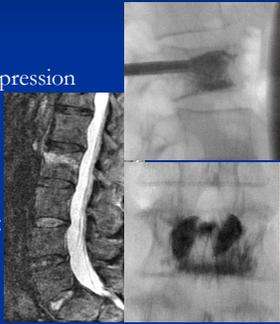
Osteoporotic fracture

- Pre-operative situation:
 - Patient: 61 male
 - Fracture type: 10% Compression
 - Focus on less cement

Level: L2

- Pre-op VAS: 10/10

- Post-operative situation:
 - 5.0mm Spinejack
 - Cement amount: 3-4 cc
 - Post-op VAS: 2/10



31

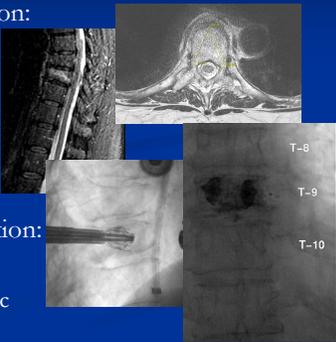
Osteoporotic fracture

- Pre-operative situation:
 - Patient: 73 female
 - Fracture type: 40% Compression
 - Compression

Level: T9

- Pre-op VAS: 10/10

- Post-operative situation:
 - 4.2mm Spinejack
 - Cement amount: 5 cc
 - Post-op VAS: 3/10



32

Osteoporotic fracture

- Pre-operative situation:
 - Patient: 66 Female

Levels: T10 & T11

- Pre-op VAS: 9/10

- Post-operative situation:
 - 4.2mm Spinejack T10 & T11
 - Cement amount: 10cc Total
 - Post-op VAS: 2/10



33

Spine Jack

- Correction of endplate deformity may help reduce the risk of adjacent level fractures
- In a study conducted by Edidin et al within a U.S. Medicare population from 2005-2009, VCF patients who received VA therapies experienced lower mortality and overall morbidity than VCF patients who received conservative management
- Significant pain relief
- Functional improvements
- Restoration of sagittal alignment

34

Spinejack Additional Benefits

- • Greater midline VB height restoration
- • Significantly fewer adjacent level fractures than kyphoplasty
- • Results maintained over time in three-year follow-up
- • Fast and sustainable improvement in quality of life
- • Fracture reduction with ligamentotaxis leads to indirect central canal decompression

35

SAKOS Clinical Study

Mechanical vertebral augmentation SAKOS clinical study¹³

5 countries | 13 sites | 15 investigators

- Prospective, multicenter, randomized, comparative study
- N=141 (Spinejack system n=68; KyphX Xpander BKP n=73)
- Non-inferiority study
- 12-month follow up



Superior mid-vertebral height restoration

- Significantly greater midline VB height restoration with SJ system at 6 and 12 months
- 6 mo. p= 0.0246
- 12 mo. p= 0.0035

Significantly fewer adjacent level fractures

- Reduction in clinically significant AEs
 - BKP compared to SJ system had more than double the rate of ALFs
- 12.9% v. 27.3%
- p= 0.043
- Fewer hospital and physician visits
- Decrease in future interventions

Greater pain score reduction

- Less pain medication usage including opioid analgesics at 5 days after surgery (SJ group 7.4% vs. BKP group 21.9%)
- Decreased pain intensity vs. baseline more pronounced in the SJ group at 1 and 6 months
- 1 mo. p= 0.029
- 6 mo. p= 0.021

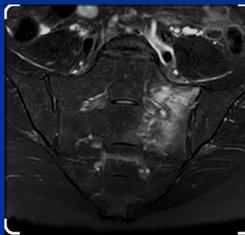
36

Sacroplasty

- Sacral Insufficiency Fractures
- Known complication of Osteoporosis
- Until recently went untreated or poorly treated
- Newer treatment options have been developed
- Requires very high index of suspicion
- Sacroplasty

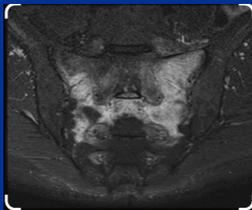
40

Sacral Fracture



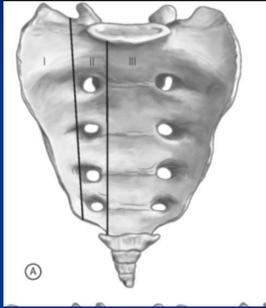
41

Honda Sign



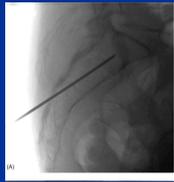
42

Zones



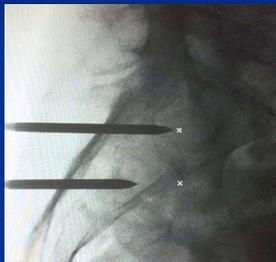
43

Long Axis



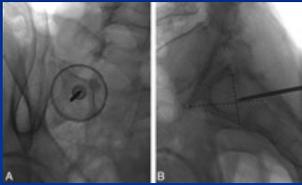
44

Short Axis



45

Sacroplasty



46

Sacroplasty

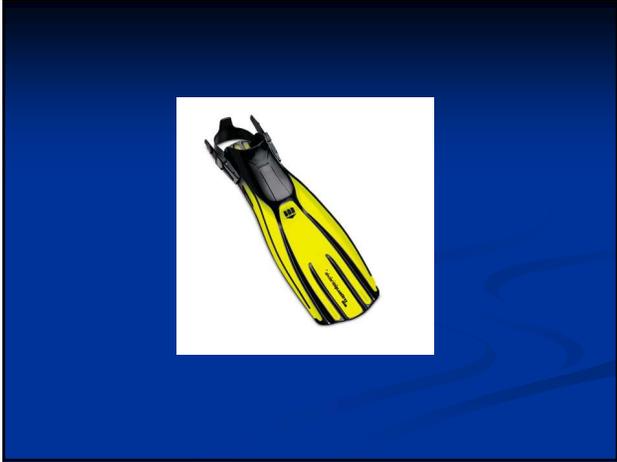


47

Conclusion

- Osteoporosis is a significant disease entity
- Diagnosis requires intervention and high level of suspicion
- Treatment is best done through prevention
- IF fracture suspected, rec Imaging and referral for Vertebral Augmentation.

48



49
