Post-kyphoplasty vertebral re-fracture in metastatic disease- the Wailing Wall effect

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Epidemiology

• 1.2 million new cancer per year in USA

• 40% of all patients will develop metastatic spinal disease
  – 10-20% of these patients will develop spinal cord compression

• Spinal metastasis is the initial presentation of malignancy in 20% of patients

Significance

• The spine is the most common site for skeletal metastases

• Metastatic lesions are the most common tumors of the spine (95-98%)

• Vertebral body affected first

• Approximately 70% of patients who die of cancer have evidence of vertebral metastases on autopsy

Future

• Population ages
• Better adjuvant therapy

• Patients surviving longer
• More patients developing metastatic disease
Primary Sites
MD Anderson 1984-1994 (n=11,884)

- Breast (30.2%)
- Lung (20.3%)
- Blood (10.2%)
- Prostate (9.6%)
- Urinary tract (4%)
- Skin (3.1%)
- Unknown 1° (2.9%)
- Colon (1.6%)
- Other (18.1%)

Level of Metastases

- Thoracic 70%
- Lumbar 20%
- Cervical 10%
Clinical Presentation

- **Pain (85%)**
  - **Biologic:** local release of cytokines, periosteal irritation, stimulation of intraosseous nerves, increased pressure or mass effect from tumor tissue in the bone
  - **Mechanical:** nerve compression, pathologic fractures, instability

- **Weakness (34%)**
  - Spinal cord compression in 20%
  - Early: edema, venous congestion, and demyelination
  - Late: secondary vascular injury and spinal infarction

- **Mass (13%)**

- **Constitutional Symptoms**
Spine Surgeon’s Role

• 20% of patients, the first presentation of a malignancy is a spinal problem

To achieve the goal:

- Provide pain relief
- Improve or maintain neurologic function
- Restore or maintain the structural integrity of the spinal column
Treatment Options

- Supportive: Orthotic, Steroids, Bisphosphonates
- Chemotherapy & Hormonal Therapy
- Radiotherapy
- Surgery
- Combination

Multi-disciplinary approach
Vertebroplasty / Kyphoplasty
What is it?

Vertebroplasty

Kyphoplasty

[Images of medical procedures]
How does it work?

- Structural support – but no good correlation with amount of cement injected
- Thermal properties
- Decompression
- Placebo
How is it done?

- Usually performed under general anaesthetic
- Can be performed under local
- Day case procedure
- Minimal invasive
How is it done?
How is it done?

Vertebroplasty  Kyphoplasty
How is it done?
Results

Vertebroplasty

- Significant better pain and functional improvement than conservative treatment at 3 months.
- No difference at twelve months.
- Vertebroplasty patients had significantly more pain than the conservative group.

Kyphoplasty

- FREE trial.
- 300 patients randomised.
- Assessed at one year
- SF 36 PCS 0-100.
- Kyphoplasty 26 ➞ 33.4
- Conservative 25.5 ➞ 27.4
  p<0.0001

Wardlaw D et al Lancet
2009;21:1016-24
Kyphoplasty for Metastases


Conclusions

• significant reduction in pain
• Minimal procedure-related morbidity.
• Aid mobility
• Increase in response to physiotherapy
• Improvement in quality of life
however

• The studies looked at short term effect (months).
• Clinical finding that a subset of patients suffers a relapse of pain a few months after surgery.
Case

- 58 YO male
- Dentist
- Pack pain for 4 months
- Never smoked
- Lung ca- met to L5
CT in kyphoplasty
Two months after kyphoplasty
MRI pre op
Post surgery
Patients

- 92 metastatic patients underwent kyphoplasty Jan- Sep 2010
- Solid tumor metastasis
- 97 vertebrae
- Age -66.
- Follow up was 3.5 months.
Results

• VAS- Pre-kyphoplasty pain was 8.45, decreasing to 2.45 after the procedure
• Restoration of vertebral height in most cases.
• 34 re-fractures
• Decrease of 4.4 mm of vertebra height
• 19 cases - retropulsion of tissue to the canal
• A decrease in canal area by 29 mm2.
Results

• Pain levels increased to 7.22 (vs 3 without fracture) (P<0.0001).

• Average balloon pressure 114.8 in the fracture group versus 165.6 in the non-fracture group (P=0.00013).

• In cases were 6 cc of cement were injected only 2 fractures were noted (out of 18 patients).
results

• No difference was noted between groups in vertebra height pre or post kyphoplasty or average amount of cement injected.

• 13 adjacent level fractures were documented.
Conclusion

• Re-fractures are associated with lower balloon pressure, suggesting a more lithic injury or end plate penetration.

• Cause increased pain

• In such cases a larger amount of cement should be injected or an additional support procedure should be considered.
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