



Introduction

Pathologic compression fractures in cancer patients are a significant source of pain and disability. Determining the best treatment of this manifestation of metastatic disease presents many challenges to physicians. Not only do spinal metastases decrease the patient quality of life near the end of life, spinal metastases can also result in multiple procedures due to loss of spinal stability. Treatment can range from medical management of pain to open surgical decompression and fixation. One minimally invasive technique that has gained in popularity over the years is Kyphoplasty. Kyphoplasty has been shown to alleviate the pain of pathological fractures secondary to metastatic spinal metastasis, however these procedures can fail. Delayed kyphoplasty failure with retropulsed cement and neural element compression is known but has not been well categorized or reported. This catastrophic failure which requires open surgical decompression and stabilization is problematic when present. The presence of cement makes this surgery more difficult in an already compromised patient. In this study we sought to examine the prevalence of “catastrophic” delayed failure, identify predictors of failure by looking at patient and disease characteristics in a series of cement augmentations performed for pathologic compression fractures with the goal of reducing failure and preventing excessive surgical procedures at the end of life.

Methods

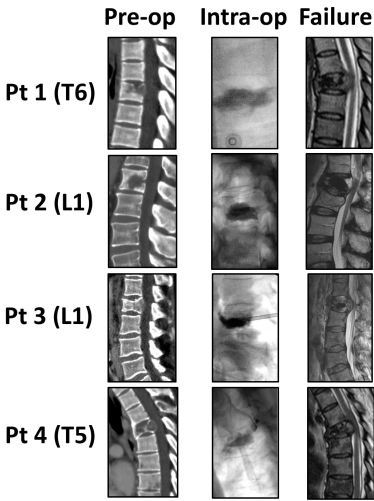
We retrospectively reviewed all metastatic cancer patients from 2010-2013 who underwent a procedure for cement augmentation of a pathologic compression fracture. We examined patient, disease and radiographic fracture characteristics.

Variable	Failure	Non-failure
Spinal level		
Thoracic, n (%)	2	39
Lumbar, n (%)	2	32
Post-op Pain		
Same, n (%)	1	6 (17)
Better, n (%)	3	29 (81)
Worse, n (%)	0	1 (3)
Vertebral body collapse, mean (sd)	16.5 (7.7)	33.1 (2.5)
Spinal alignment		
Normal alignment, n (%)	1 (25)	8 (19.5)
De novo deformity, n (%)	1 (25)	5 (12.2)
Sublux/translation deformity, n (%)	1 (25)	0
Fractures in three or more cortical walls, n (%)	4 (100)	19 (26.4)
Cement extravasation		
No, n (%)	3 (75)	36 (80)
Yes, n (%)	1(25)	9 (20)
SINS Score, mean (sd)	10.75 (0.85)	10.0 (0.25)
SINS Class		
Stable , n (%)	0	2 (2.8)
Potentially unstable, n (%)	3 (75)	58 (81.7)
Unstable, n (%)	1 (25)	11 (15.5)

Results

Thirty-seven patients underwent cement augmentation of seventy-five levels. Four patients had a “catastrophic” failure requiring surgical decompression and fusion. The mean time to failure was 2.88 +/- 1.24 months. The mean percent loss of body height in the patients that failed was 16% compared to 32% in non-failure patients. There was no posterior cement extravasation in any of our patients. The mean SINS score was 10.75 in the patients that failed and 10.14 in the patients that did not fail. In the failure group 100% of levels had fractures in three or more cortical walls pre-treatment. In the non-failure group only 25% of patients had three or more walls breached. 50% of failures occurred at junctional spinal levels.

Kyphoplasty Failure Patients



Pre operative, intraoperative and imaging at time of failure for the four patients with delayed failure. Note multiple cortical defects present in the vertebral bodies.

Conclusions

Although rare, delayed failures of cement augmentation occur and can lead to further procedures adding to patient morbidity. Possible predictive indices of failure may include wall integrity of the vertebral body and vertebral level. Larger studies will be needed to confirm these results.

Learning Objectives

The reader should be able to identify risk factors for delayed kyphoplasty failure in cancer patients.