Detection of Unusual Etiologies for Vertebral Compression Fractures with Intraoperative Biopsy During Kyphoplasty

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ABSTRACT

INTRODUCTION:
Kyphoplasty is a percutaneous procedure used to treat compression fractures of the vertebral body in which polymethylmethacrylate (PMMA) cement is used to stabilize the collapsed vertebrae. Vertebral compression fractures are the most common fracture associated with osteoporosis, a disease that affects 10 million people in the United States. The prevalence of underlying disease in these patients is also common practice to biopsy and aspirate marrow from the iliac crest for the same reason.

While the vast majority of vertebral compression fractures (VCFs) result from osteoporotic disease, a small percentage of patients suffer VCFs as a result of a solid organ metastatic lesion, myeloma, lymphoma or other primary bone disease. Some of these patients are already aware of their disease, but for others, this injury serves as the initial presentation of their pathology. In order to screen for this subset of patients, biopsy specimens are routinely taken from the vertebral body and sent for histopathologic analysis. At our institution, it is also common practice to biopsy and aspirate marrow from the iliac crest for the same purpose, in the case that occult disease exists but is not seen in the vertebral body biopsy. This additional screening is undertaken in order to avoid the consequences associated with missing a treatable, but previously undiagnosed, underlying disease process. This study describes the experience at our institution in discovering relatively rare underlying causes for VCFs using intraoperative biopsy from both the fracture site and from the iliac crest.

METHODS:
Following approval by the institutional review board, we performed a retrospective review of the medical records of patients undergoing kyphoplasty at Hospital for Special Surgery from January 2006 to the present. This data was generated using a prospectively maintained registry of all patients receiving kyphoplasty at our institution. We studied the histological results of vertebral body biopsies and concurrent iliac crest aspirates in specimens from 134 patients with 208 vertebral body fractures. The presence of underlying, unknown disease on histopathology of vertebral body specimens was analyzed for concordance with that of the iliac crest biopsy and aspirate in each case and the overall prevalence of occult disease in the series was calculated. Patients with known malignancy were excluded.

RESULTS:
All biopsy specimens from the vertebral bodies in this series showed evidence of fracture, hematoma and callus formation. Demographic data on the patients studied appears in Table 1. Of the 134 patients screened, specimens from two patients revealed new underlying pathology. Histopathological examination from these two patients revealed one case of lysosomal storage disease (Gaucher’s disease) and one case of myeloma. In the latter case, iliac crest aspiration yielded information that the vertebral biopsy did not.

In the patient diagnosed with Gaucher’s disease, the iliac crest aspirate showed large macrophages with single or double nuclei and wrinkled coarse eosinophilic cytoplasm (Figure 1A, arrow). Biopsy of the vertebral body revealed no diagnostic abnormalities. In the patient diagnosed with myeloma, both iliac crest and vertebral body specimens demonstrated excessive plasma cells in clusters with occasional atypical and binucleate forms (Figure 1B, arrow).

DISCUSSION:
Occult malignancy and lysosomal storage diseases are much less common causes of vertebral compression fractures than osteoporosis. However, the potential cost of a missed opportunity to diagnose a patient with these types of pathology is great. In this series, thorough screening of patients with VCFs using intraoperative biopsy allowed for the diagnosis of two patients with unusual, but treatable causes for fracture. This prevented delay in diagnosis that could otherwise lead to a poor outcome. Furthermore, additional information gained from screening with an iliac crest aspirate led to the diagnosis of Gaucher’s disease. On the basis of this initial analysis, we recommend routine biopsy and histopathologic analysis of VCF sites as well as an iliac crest aspirate in every patient undergoing kyphoplasty.

| Table 1. Population Data for Study Patients 2006-Present |
|---------------------------------|---------------|
| Number of Patients              | 134           |
| Number of Vertebrae Treated     | 208           |
| Average Number of Vertebrae Treated Per Patient | 1.4 |
| Age Range of Patients (years)   | 51 – 87       |
| Number (%) of Patients Found to Have New Underlying Pathology | 2 (1.5%) |
| Number (%) of Patients In Which Iliac Crest Biopsy Yielded Additional Information | 1 (0.75%) |

Figure 1.

References

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