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Treatment Considerations for Vertebroplasty in Men

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BACKGROUND AND PURPOSE: **Vertebroplasty is now a widely accepted image-guided intervention in patients with compression fracture. The purpose of this report is to look specifically at the male population undergoing vertebroplasty and identfy the management considerations distinct to men.**

METHODS: **The hospital medical records and radiographic studies of 24 men treated with vertebroplasty between February 1999 and November 2000 were retrospectively reviewed.**

RESULTS: **Five patients presented with idiopathic or secondary osteoporosis. In two of these five men, malignancies were discovered by core biopsies taken at the time of vertebroplasty. Thirteen patients (54%) had secondary osteoporosis. Of this group, 10 patients (42%) were steroid dependent and three (13%) were hypogonadal. Five patients (21%) had traumatic events leading to fracture. One presented with known metastases.**

CONCLUSION: **Primary osteoporosis in men is unusual. In male patients without a definable cause of osteoporosis, known metastatic disease, or a significant history of trauma, the routine performance of a vertebral biopsy through the vertebroplasty needle before the injection of bone cement is indicated to identify unexpected neoplasm.**

Percutaneous vertebroplasty was first performed in France in 1984 by Galibert and Deramond and has gained popularity in the United States over the past 5 years (1, 2). It has been shown to provide dramatic pain relief for vertebral body fractures associated with underlying osteoporosis or malignancy and has been successfully applied in cases where conservative management had failed and surgery was undesirable (3–5). Because of a higher incidence of osteoporosis, most patients referred for this procedure are women; however, men with vertebral body fractures from osteoporosis also present for treatment. Many of the characteristics of the male population with osteoporotic vertebral body fractures have recently been described (6–9). Like those in women, they are associated with significant morbidity and restriction of activities of daily living (10). The economic impact of osteoporotic fractures was estimated at nearly $2.7 billion in 1995 for men alone (11), making this a substantial health care problem from the standpoint of both cost and morbidity.

The purpose of this report is to define the demographics, diseases, and treatment requirements of men referred for vertebroplasty at our institution so that vertebroplasty management considerations unique to men can be determined.

Methods

The charts and radiographic studies of 29 consecutive male patients who underwent percutaneous vertebroplasty between February 1999 and November 2000 were retrospectively reviewed. Five patients were omitted from the study because of inadequate medical records. Documentation from outside hospitals was included when available. Records were studied to determine the mechanism of fracture and onset of pain and significant past medical and surgical history, including secondary causes of osteoporosis and malignancy. All radiographic studies (conventional radiographs and CT and MR images) were reviewed.

Results

The average age at presentation was 72 years, ranging from 53 to 97 years. Only three patients were less than 60 years of age. Vertebral levels treated ranged from T6 to L5, with one treatment at C2.

Bone densitometry data were available for six patients. Five of these patients had T scores greater than 2.5 SDs below the mean for peak bone mass at all measured locations.

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From the Division of Interventional Neuroradiology (A.H., P.G., D.A.N., M.W., K.J.M.), Department of Radiology and Radiologic Sciences, and Department of Orthopedic Surgery (L.H.R.), The Johns Hopkins Medical Institutions, Baltimore, MD.

Address correspondence to Kieran J Murphy, MD, Division of Interventional Neuroradiology, The Johns Hopkins Medical Institutions, 600 North Wolfe Street, Baltimore, MD 21287.

Five patients (21%) had an obvious traumatic event preceding the onset of severe pain. Most patients had an acute onset of back pain at the level of the fracture without a clear precipitating event or following activities such as sneezing, coughing, opening windows, or bending at the waist. In one case, a compression fracture occurred while the patient was admitted for treatment of acute kidney transplant rejection.

Five patients (21%) had no clear predisposition for vertebral fractures at presentation and were considered to have idiopathic or primary osteoporosis. Two of these patients (8%) had previously unknown metastatic disease to the spine, diagnosed by core biopsy taken at the time of vertebroplasty (nonsecretory multiple myeloma and plasma cell dyscrasia).

Thirteen patients (54%) had secondary causes of osteoporosis. Ten of these patients (42%) were receiving chronic steroids. Three patients (13%) were hypogonadal (primary endocrine failure, prolactinoma, and orchiectomy). One patient had secondary osteoporosis due to AIDS and antiretroviral drug therapy. Seven (29%) patients had a history of cigarette use.

Three patients (13%) had biopsy-proved metastatic disease to the spine. These include the two undiagnosed malignancies described above and a nonsmall cell adenocarcinoma from an unknown primary. Biopsy was taken at the time of vertebroplasty by using a biopsy gun introduced through the vertebroplasty canula. One patient presented with a pathologic fracture of an aneurismal bone cyst of the C2 vertebral body diagnosed by MR imaging.

Discussion

The epidemiology of osteoporosis in men is limited. According to a European-based population study, the prevalence of vertebral body deformity, a surrogate measure for vertebral body fracture, is greater in men than women below the age of 60 years. With further aging this is reversed, presumably because the incidence of osteoporosis increases more rapidly in women than in men (12, 13). The prevalence of osteoporosis in men in the United States has been estimated at between 3% and 7% (14, 15), and male osteoporosis accounts for up to 20% of all cases of osteoporosis (14). This prevalence, however, is increasing. Longer life spans and the aging of the population are bringing both greater numbers and greater percentages of the male population into the osteoporotic range.

The advanced age of men referred for vertebroplasty in this study is consistent with the increase incidence of both osteoporosis and malignancy with age. Smoking is also known to be associated with osteoporosis (16) and is reflected in the high incidence of patients with a smoking history (seven of 24 patients). Decreased bone attenuation is also expected in a male population with vertebral compression fractures (6). This was evident in all six cases, where densitometry data were available. These findings suggest that bone densitometry measurements with subsequent treatment if indicated would be beneficial for men referred for vertebroplasty.

Ten patients were receiving chronic steroids, six of them because of cigarette-induced lung disease. The side effect of osteopenia with glucocorticoid therapy has been clearly established. Its mechanism of action is complex, resulting in both increased bone resorption and inhibition of formation (17–19), which contribute to rapid bone loss (19).

Hypogonadism was present in three of the 13 men with secondary osteoporosis. Hypogonadism is known to frequently occur among those with vertebral body compression fractures (20, 21). Androgens are needed in young males to achieve peak bone mass, but the role of androgens in the elderly to maintain adequate mass is less clear. Androgens in the elderly may be needed as a substrate for the formation of estradiol, which correlates more closely with bone mineral attenuation in some studies (22).

Conclusion

Most men treated with vertebroplasty in our study had significant risk factors for osteoporosis or a history of metastatic disease or trauma. Two patients, however, had compression fractures that were wrongly attributed to idiopathic osteoporosis. Though most series indicate that 50% of cases of male osteoporosis may indeed be idiopathic (23), these patients were discovered, by core biopsy taken at the time of vertebroplasty, to have multiple myeloma and plasma cell dyscrasia. The discovery of two patients (8%) with previously occult malignancies suggests that core biopsy of male patients undergoing vertebroplasty is indicated in cases of presumed idiopathic osteoporosis.

References

1. Galibert P, Deramond H, Rosat P, et al. **Preliminary note on the treatment of vertebral angioma by percutaneous acrylic vertebroplasty.** *Neurosurg Q* 1987;33:166–168
2. Murphy KJ, Lin D, Gailloud P. **Vertebroplasty in benign and malignant disease.** *Neurosurg Q* 2001;11:290–301
3. Deramond H, Depriester C, Galibert P, et al. **Percutaneous vertebroplasty with polymethylmethacrylate: technique, indications, and results.** *Radiol Clin North Am* 1998;36:533–546
4. Grados F, Depriester C, Cayrolle G, et al. **Long-term observations of vertebral osteoporotic fractures treated by percutaneous vertebroplasty.** *Rheumatology* 2000;39:1410–1414
5. Murphy KJ, Deramond H. **Percutaneous vertebroplasty in benign and malignant disease.** *Neuroimaging Clin North Am* 2000;10:535–545
6. Evans S, Davie M. **Vertebral fractures and bone mineral density in idiopathic, secondary and corticosteriod associated osteoporosis in men.** *Ann Rheum Dis* 2000;50:269–275
7. Legrand E, Chappard D, Pascaretti C, et al. **Bone mineral density and vertebral fractures in men.** *Osteoporos Int* 1999;10:265–270
8. Melton L, Atkinson E, O'Connor M, et al. **Bone density and fracture risk in men.** *J Bone Miner Res* 1998;13:1915–1923
9. Nguyen T, Eisman J, Kelly P, Sambrook P. **Risk factors for osteoporotic fractures in elderly men.** *Am J Epidemiol* 1996;144:255–263
10. Burger H, Van Daele PL, Grashuis K, et al. **Vertebral deformities and functional impairment in men and women.** *J Bone Miner Res* 1997;12:152–157
11. Ray NF, Chan JK, Thamer M, Melton LJ 3rd. **Medical expenditures for the treatment of osteoporotic fractures in the United States in 1995: report from the National Osteoporosis Foundation.** *J Bone Miner Res* 1997;12:24–35

12. Anderson FH, Cooper C. **Hip and vertebral fractures.** In: Orwoll ES, ed. *Osteoporosis in Men: the Effects of Gender on Skeletal Health.* San Diego: Academic Press, 1999;29–49
13. O'Neill TW, Felsenberg D, Varlow J, et al. **The prevalence of vertebral deformity in European men and women: the European vertebral osteoporosis study.** *J Bone Miner Res* 1996;11:1010–1018
14. Gold DT. **Outcomes and the personal impact of osteoporosis.** In: Orwoll ES, ed. *Osteoporosis in Men: the Effects of Gender on Skeletal Health.* San Diego: Academic Press, 1999;51–63
15. Looker AC, Orwoll ES, Johnston CC, et al. **Prevalence of low femoral bone density in older U.S. adults from NHANES III.** *J Bone Miner Res* 1997;12:1761–1768
16. Slemenda CW, Christian JC, Reed T, et al. **Long-term bone loss in men: effects of genetic and environmental factors.** *Ann Intern Med* 1992;117:286–289
17. Lukert B, Raisz L. **Glucocorticoid-induced osteoporosis: pathogenesis and management.** *Ann Intern Med* 1990;112:352–364
18. Manolagas S, Weinstein R. **New developments in the pathogenesis and treatment of steroid-induced osteoporosis.** *J Bone Miner Res* 1999;14:1061–1066
19. Reid I, Heap S. **Determinants of vertebral mineral density in patients receiving long-term glucocorticoid therapy.** *Arch Intern Med* 1990;150:2545–2548
20. Jackson J, Keerekoper M. **Osteoporosis in men: diagnosis, pathophysiology, and prevention.** *Medicine* 1990;69:137–148
21. Kelepouris N, Harper K, Gannon F, et al. **Severe osteoporosis in men.** *Ann Intern Med* 1995;123:452–460
22. Amin S, Zhang D, Sawin C, et al. **Association of hypogonadism and estradiol levels with bone mineral density in elderly men from the Framingham study.** *Ann Intern Med* 2000;133:951–963
23. Bilezikian JP, Kurland ES, Rosen CJ. **Idiopathic osteoporosis in men.** In: Orwoll ES, ed. *Osteoporosis in Men: the Effects of Gender on Skeletal Health.* San Diego: Academic Press, 1999;395–416

Errata

Due to an author oversight, Amit Malhotra, BS, was omitted from the published list of authors. The correct citation should be Hammond, A, Riley III, LH, Gailloud, P, Nussbaum, DA, Watkins, M, Malhotra, A and Murphy, KJ. **Treatment Considerations for Vertebroplasty in Men**. *AJNR Am J Neuroradiol* 2004; 25:639–641.

Due to an author oversight, D. Cressler Heasley, was misspelled in the published list of authors in the April 2004 issue. The correct citation should be Mohamed M, Heasley DC, Yagmurlu B and Yousem DM. **Fluid-Attenuated Inversion Recovery MR Imaging and Subarachnoid Hemorrhage: Not a Panacea**. *AJNR Am J Neuroradiol* 2004; 25:545–550.