Kyphoplasty with intraspinal brachytherapy for metastatic spine tumors

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Among patients with metastatic cancer, an estimated 10% develop malignant lesions to the spine annually in the US, leading to over 120,000 new patients with spinal metastases. Each year, approximately 10–15% of these patients develop symptoms significant enough to require intervention; these symptoms are usually in the form of pain, progressive myelopathy, or pathological vertebral compression fractures. Recent advancements in the diagnosis and treatment of systemic cancers have prolonged life and improved the quality of life for cancer patients, but the prolongation of life has been accompanied by an increase in the incidence of spinal metastases. While radiotherapy remained the mainstay of treatment for many years, there is now increasing evidence that surgical intervention in addition to radiation offers superior outcome. Vertebroplasty and kyphoplasty have also been well documented to be effective in improving pain from pathological compression fractures in a safe and durable way. More recently, the combination of kyphoplasty with radiosurgery has been shown to be effective in treating pathological fracture in patients with spinal metastasis.

A multimodal treatment approach utilizing systemic chemotherapy, radiation, and surgery has been shown to be beneficial in prolonging survival and offering better local control in patients with intracranial glial tumors. Furthermore, multimodal treatment with local chemotherapy, radiation, and surgical excision in a rat spinal metastasis model at our institution validated this approach in the experimental setting.

In this issue, Cardoso and colleagues present a retrospective case series involving 19 patients with vertebral metastases who underwent percutaneous curettage followed by kyphoplasty with injection of $^{153}$Sm-EDTMP mixed with polymethylmethacrylate. This procedure allows for tumor debulking, vertebral augmentation, and interstitial radiolabeled particle delivery. These procedures were performed in a minimally invasive manner under local anesthesia with sedation. The authors found that there was no significant myelotoxicity and there was an elevated level of radiolabeled $^{153}$Sm at the treated vertebra compared to the systemic level of $^{153}$Sm. The patients were found to have improved pain scores—from 8.5 to 2.6 points on a visual analog scale.

This is an interesting study of the use of intraspinal brachytherapy with $^{153}$Sm-EDTMP. This particle has been used for the treatment of bone metastasis and is effective for pain relief administered by intravenous injection. Although the concept of local delivery of $^{153}$Sm is interesting and appealing, it is unclear that there has been any additional benefit of this procedure compared to traditional kyphoplasty.

Nevertheless, this is an interesting application of $^{153}$Sm locally as a brachytherapy agent in conjunction with curettage and kyphoplasty as a form of multimodal treatment. The authors should be recognized for their novel contribution to the therapeutic options available to patients with metastatic spine tumors. Long-term studies aimed at identifying specific benefits derived from the use of local radiation with $^{153}$Sm-EDTMP are needed.

References


### Response

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We thank Drs. Gokaslan and McGirt for their comments. This technique as observed has a potential to become part of the armamentarium for treating patients with vertebral metastases. The combination of pain control due to kyphoplasty and the antineoplastic activity of intraspinal samarium is appealing for expanding the indications and benefits of kyphoplasty.

The lack of significant adverse effects is another helpful feature. Local administration of samarium would still deliver the needed function without the potential adverse effects of parenteral administration. We look forward to wider use in other centers and hopefully expansion of technique for use in extraspinal bone metastases.

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