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Combination kyphoplasty and spinal radiosurgery: a new treatment paradigm for pathological fractures.

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OBJECT: Patients with symptomatic pathological compression fractures require a stabilization procedure for mechanical control of back pain as well as radiation therapy for the underlying malignant process. In this study the authors evaluated a treatment paradigm of closed fracture reduction and fixation in which kyphoplasty was used, followed by single-fraction spinal radiosurgery performed with the CyberKnife.

METHODS: Twenty-six patients (six men and 20 women, mean age 72 years) with histologically confirmed pathological compression fractures (16 thoracic, 10 lumbar) were prospectively evaluated. For inclusion in the study, the patients' presenting symptoms were limited to pain without neurological deficits. Histological findings included 11 lung, nine breast, and four renal carcinomas, one cholangiocarcinoma, and one ocular melanoma. All patients underwent kyphoplasty of the affected vertebral body, for which a percutaneous transpedicular procedure was used. Fiducial markers that allow image guidance for CyberKnife radiosurgery were placed into the pedicles at the adjacent levels at the time of the kyphoplasty procedure. Patients then underwent single-fraction radiosurgery (at a mean of 12 days after kyphoplasty) in an outpatient setting. The tumor dose was maintained at 16 to 20 Gy to the 80% isodose line (mean 18 Gy). Treated tumor volume ranged from 12.7 to 37.1 cm³. Axial pain improved in 24 (92%) of 26 patients during the follow-up period of 7 to 20 months.

CONCLUSIONS: A combined kyphoplasty and spinal radiosurgery treatment paradigm was found to be safe and clinically effective for patients with pathological fractures without significant spinal canal compromise. This technique combines two minimally invasive surgical procedures, thereby avoiding the morbidity associated with open surgery while providing immediate fracture fixation as well as a single-fraction tumoricidal radiation dose.

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