PALLIATIVE CARE NETWORK OF WISCONSIN

FAST FACTS AND CONCEPTS #202
VERTEBROPLASTY AND KYPHOPLASTY FOR VERTEBRAL COMPRESSION FRACTURES

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Background Vertebral compression fractures (VCFs) occur in up to 20% of patients above the age of 50, mostly due to osteoporosis. Malignant VCFs are the result of osteolytic lesions from multiple myeloma or metastatic carcinoma and occur in up to 30% of patients with bone metastases. VCFs can cause significant acute and long-term pain, can compromise pulmonary function, and impair activities of daily living. Vertebroplasty (VP) and balloon Kyphoplasty (BKP) are minimally invasive surgical techniques used for treatment of both osteoporotic and malignant VCFs.

Technique VP involves percutaneous injection of cement (polymethylmethacrylate - PMMA) into a fractured vertebral body. BKP involves inserting an inflatable balloon in the vertebral body first – to attempt to elevate the vertebral end plates – with subsequent insertion of PMMA. Both are outpatient procedures, done under conscious sedation and local anesthesia, with fluoroscopic guidance. Some clinicians will augment multiple levels at once.

Patient Selection Careful correlation of a patient's symptoms with the level of the fracture is important, as not all fractures are painful, and alternative causes of pain need to be considered. Patients with painful acute or chronic VCFs (only after neurological compromise has been ruled out) are appropriate for interventional consideration, although outcomes are slightly better in the acute setting. BKP is substantially more expensive than VP. Some practitioners empirically favor BKP in case of significant kyphosis (deformity more than 20°) or when VP is difficult due to posterior vertebral cortex involvement, which makes cement extravasation more likely. VP, on the other hand, is favored when insertion of balloon device is technically difficult due to severe vertebral collapse (> 65% reduction in vertebral height) or if the fracture is more than 3 months old, in which case elevation of the endplate is unlikely.

Relative contraindications include the presence of any neurologic damage related to the fracture, fractures with a burst component (where bone fragments extend into the spinal canal), systemic or local infection, uncorrected hypercoagulable state, and severe cardiopulmonary disease.

Complications

- Cement Extravasation is more common in VP (up to 40%, depending on the series) than in BKP (up to 13%). Cement leaks are rarely symptomatic.
- Pulmonary or neurologic emboli can occur from displaced bone marrow in <1% of cases.
- Infectious complications such as pyogenic spondylitis and osteomyelitis are very rare.

Outcomes Multiple randomized, unblinded, controlled trials have shown VP/BKP to provide better analgesia than medical management alone. RCTs have shown efficacy in pain and functional improvement for both BP and BKP vs non-surgical management in patients with osteoporotic (10, 11) and cancer-induced VCFs (12). In some of these studies the improvements lasted up to 12 months. **However**, two blinded, randomized, sham-procedure controlled trials showed the efficacy of VP to be similar to controls who received a sham procedure for osteoporotic VCFs (8,9). The injection of a local anaesthetic into the periosteum may explain this finding. Of note, these studies were criticized for patient selection, low pain scores, insufficient amount of cement used and other methodological issues. **Pain reduction** occurs in 67-100% of cases with VP and in BKP; often more than a 5 point drop (on a 0-10 scale) in the immediate postoperative period, along with significant decrease in analgesic use at 1 month. Pain relief seems to be better in patients with osteoporotic VCFs as compared to those with malignant fractures. BKP is reported to contribute to better long-term pain control (more than 2 years) than VP (73% vs. 41%, respectively); however, these data are not from a head-to-head comparison. Both BKP and VP may lead to partial vertebral height restoration in selected patients, along with reductions in depression, anxiety, drowsiness, and fatigue (13).

Summary VP and BKP are effective analgesic interventions for painful VCFs in many patients, including cancer patients, and can be particularly helpful for patients who poorly tolerate opioids and other analgesics. Although understanding of the precise mechanism of action and precise indications are still evolving, these minimally invasive procedures should be considered as a part of a multidisciplinary approach to patients with painful VCFs. The choice of the vertebral augmentation procedure for a patient with either benign or malignant VCF is still largely guided by the experience of the practitioner performing the procedure. Patients taking opioids should be evaluated carefully after VP or BKP, as they may need dose reductions.

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