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FAST FACTS AND CONCEPTS #202

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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 and mobility. 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 are appropriate for interventional consideration, although outcomes are slightly better in the acute setting. BKP is substantially more expensive than VP, and has not demonstrated superiority to VP in any trial. 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 There are no completed trials comparing VP and BKP. Case series and uncontrolled trials have generally shown both procedures to have similar efficacy with regard to acute pain relief, leading to greater mobilization. Pain reduction occurs in 70-90% of cases with VP and in 67-100% in BKP; often more than a 5 point drop (on a 0-10 scale) in the immediate postoperative period is observed in responders, 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, however studies in cancer patients have shown an approximately 50-60% reduction in pain following intervention. 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 lead to partial vertebral height restoration in selected patients.

Summary VP and KP are effective analgesic interventions for painful VCFs in many patients, and can be

particularly helpful for patients who poorly tolerate opioids and other analgesics. Although the precise indications and contraindications are still evolving, these minimally invasive procedures should be considered as a part of a multidisciplinary approach to patients with painful VCFs. Patients taking opioids should be evaluated carefully after VP or BKP, as they may need dose reductions.

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