Percutaneous Ablation and Cementoplasty

Invaluable tools in the management of painful metastatic bone disease.

BY KEVIN A. PENNYCOOKE, MRCS, FFR (RCSI), EBIR; TYLER M. COUPAL, MD; AND PETER L. MUNK, MDCM, FRCPC, FSIR

The aim of palliative care is to preserve the activities of daily living for as long as possible, treat pain, and improve quality of life. A significant proportion of patients with end-stage metastatic cancer greatly benefit from palliative care treatment.[1] Increasingly, imaging-guided procedures are being recognized as playing an invaluable role in achieving these goals.[1-3]

The musculoskeletal interventional radiologist should be considered an integral member of the multidisciplinary team involved in the management of these patients. Our role is to review images, offer an expert opinion on whether the pathology is suitable for interventional treatment, and, in conjunction with other team members, determine if such procedures could benefit the patient while being consistent with the overall goal of improving quality of life. In multidisciplinary team meetings, specialists come together to discuss each patient's case, with a focus on the site of maximal pain and its correlation with imaging findings. Based on clinical and radiologic assessment, a management plan is formulated. Oncologists and palliative care physicians are often not fully aware of the breadth of different interventions we can offer. Therefore, one of our roles is to act as an educator in this regard.

CASE SELECTION

Interventional options for this patient group include spinal injections, percutaneous thermal ablative techniques, and cementoplasty. These injections include nerve root blocks, epidural injections, and facet injections. Percutaneous thermal ablation techniques destroy tumor cells using a variety of technologies such as radiofrequency ablation, microwave ablation, high-intensity focused ultrasound ablation, cryoablation, and plasma-mediated ablation.[4-6] Our institution mostly uses radiofrequency ablation, microwave ablation, and cryoablation techniques. Cementoplasty involves percutaneous image-guided injection of bone cement into the skeletal system. This can both stabilize pathological fractures and treat pain. Cementoplasty includes procedures such as vertebroplasty, sacroplasty, and acetabuloplasty.[3,7]

Factors that must be assessed in selecting suitable treatment include the type of tumor, extent of disease, any comorbidities, the patient's overall prognosis, extent of bone and soft tissue involvement, route of percutaneous access to the lesion site, the patient's baseline level of daily activities, perceived benefit of the intervention relative to the patient's pain scores, and the patient's goals and life expectancy.[3,8]

CASE 1

A 62-year-old man with metastatic small cell carcinoma presented with a large osteolytic lesion involving the right iliac bone and the right superior acetabulum (Figure 1). Upon weight bearing and gentle mobilization, the patient experienced severe pain that was

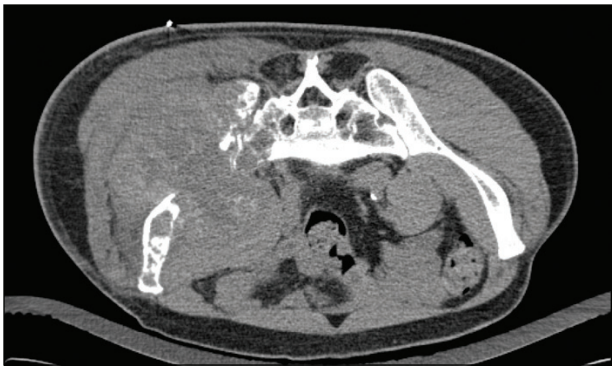

Figure 1. A preprocedural noncontrast CT scan of the pelvis shows a large osteolytic lesion in the right iliac bone.

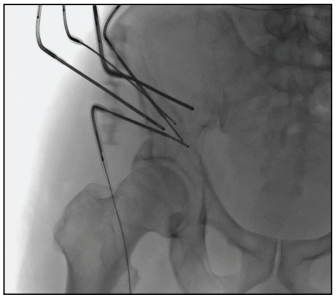

Figure 2. Intraprocedural fluoroscopic image showing five cryoprobes placed into the osteolytic lesion in the right iliac bone during cryotherapy.

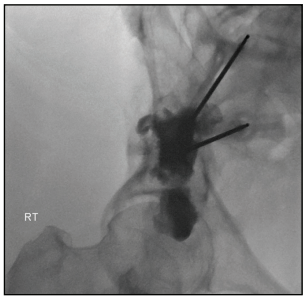

Figure 3. Intraprocedural fluoroscopic image showing two bone access needles placed into the right iliac bone during cement injection.

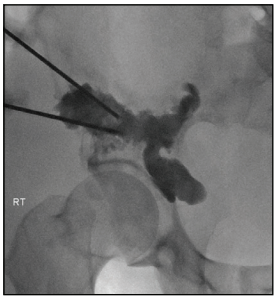

Figure 4. Intraprocedural fluoroscopic image showing two bone access needles placed into the right superior acetabulum during cement injection.

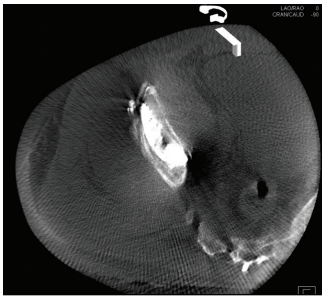

Figure 5. Postprocedural cone-beam CT scan showing cement distribution in the right superior acetabulum.

rated as 10/10 on the visual analog scale (VAS). Despite aggressive analgesic treatment, these symptoms precluded his ability to mobilize. The decision was made to perform cryoablation with cementoplasty of the pathological fracture in the right superior acetabulum (Figures 2–5). One week after the procedure was completed, the patient reported reduced analgesia use to less than half of the preprocedural dose and was able to sufficiently mobilize in order to perform his normal activities of daily living.

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CASE 2

A 47-year-old woman with a history of metastatic breast carcinoma presented with a painful right pathological fracture upon weight bearing and mobilization (VAS, 9–10/10) of the superior acetabulum and the superior pubic ramus. Large doses of opioid analgesia were insufficient in providing adequate pain relief. She underwent cementoplasty through the right superior acetabulum and the right superior pubic ramus to stabilize the fracture and provide mechanical support (Figures 6–8). The superior pubic ramus was included, given the distribution of the pain. One week post-treatment, her pain score had significantly decreased (VAS, 2/10), and she no longer required opioids.

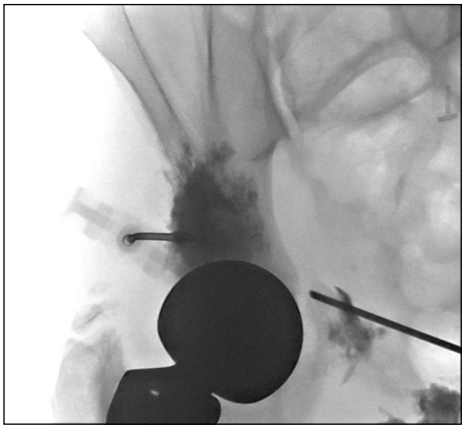

Figure 6. Intraprocedural fluoroscopic image showing two bone access needles in the right superior acetabulum and right superior pubic ramus during cement administration.

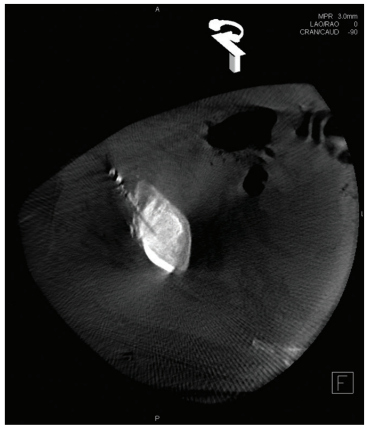

Figure 7. A postprocedural cone-beam CT scan showing cement placement in the right superior acetabulum.

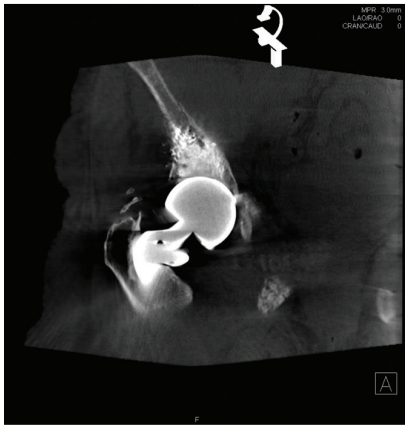

Figure 8. A postprocedural cone-beam CT coronal reconstruction showing cement placement in the right superior acetabulum.

CASE 3

An 81-year-old man presented with a history of metastatic prostatic carcinoma with central back pain (VAS, 10/10) associated with multilevel vertebral compression fractures, one of which was a vertebral plana at the site of the most intense pain. The decision was made to perform vertebroplasty at the level of the plana (Figures 9–12). Two weeks later, the patient reported that he was on a regimen to discontinue all opioid analgesia with significant improvement in his pain score (VAS, 2/10).

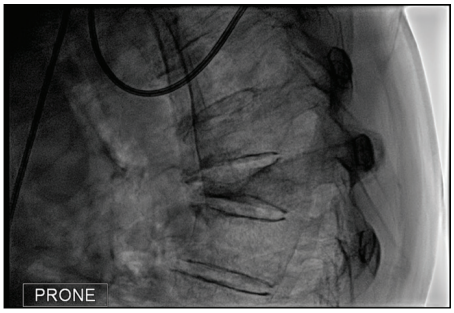

Figure 9. Intraprocedural fluoroscopic image showing vertebral plana of the T10 vertebral body.

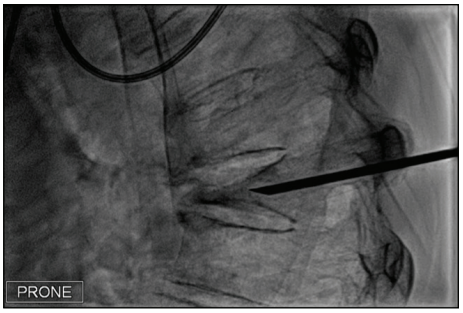

Figure 10. Intraprocedural fluoroscopic image showing vertebral plana of the T10 vertebral body with left unipedicular access.

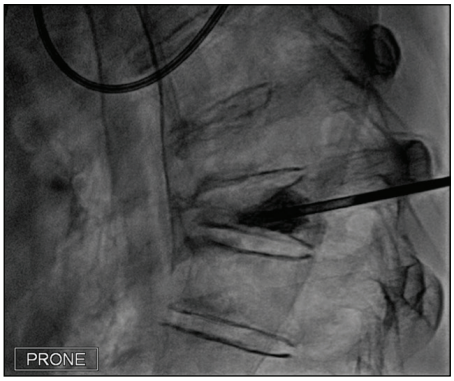

Figure 11. Intraprocedural fluoroscopic image showing vertebral plana of the T10 vertebral body with left unipedicular access after cement insertion.

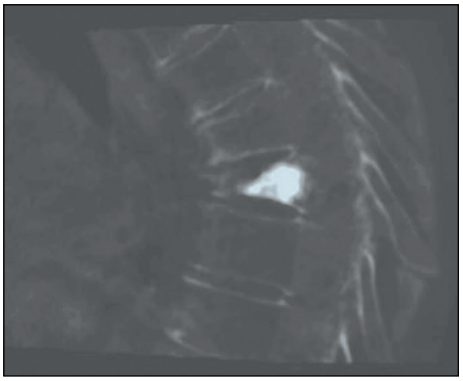

Figure 12. Postprocedure cone-beam CT sagittal reformat image showing adequate cement placement in the T10 vertebral body.

CONCLUSION

Over the past 5 years, we have consulted on several hundred patients, and our experiences show that significant improvement in pain scores after these percutaneous procedures can be expected. We have found that we have frequently been able to keep patients out of the hospital, improve their quality of life, reduce their dependence on opiates, and assist their ability to maintain their daily activities. Interventional radiologists have a crucial role in treating this group of patients, which is currently not completely recognized both by referring clinicians and ourselves. This branch of oncology treatment represents a frontier of interventional radiology that can certainly be further explored. ■

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Kevin A. Pennycooke, MRCS, FFR (RCSI), EBIR
University of British Columbia
Vancouver General Hospital
Vancouver, British Columbia, Canada
kevin.pennycooke@vch.ca
Disclosures: None.

Tyler M. Coupal, MD
University of British Columbia
Vancouver General Hospital
Vancouver, British Columbia, Canada
Disclosures: None.

Peter L. Munk, MDCM, FRCPC, FSIR
University of British Columbia
Vancouver General Hospital
Vancouver, British Columbia, Canada
peter.munk@vch.ca
Disclosures: None.