REVIEW OF PERCUTANEOUS ABLATION OF SPINAL TUMORS

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INTRODUCTION

- Percutaneous spinal tumor ablation is an image guided intervention for pain palliation and local tumor control. It can be used with curative intent for patients with bone tumors such as osteoid osteoma, osteoblastoma, aneurysmal bone cysts and giant cell tumors and as palliation of painful spinal metastases by reducing extraspinal cord compression.

- A multidisciplinary team is recommended to evaluate patients and selection is determined based on a combination of factors including pain, performance status, life expectancy, status of spinal stability, presence of metastatic epidural spinal cord compression, and extent of visceral metastases [2]

COMPLICATIONS

- Neural damage (common, but often transient)

- Damage to the great anterior radiculomedullary artery can cause irreversible anterior spinal cord ischemia, resulting in paraplegia
    - Risk of this serious complication may be reduced by avoiding the paravertebral approach

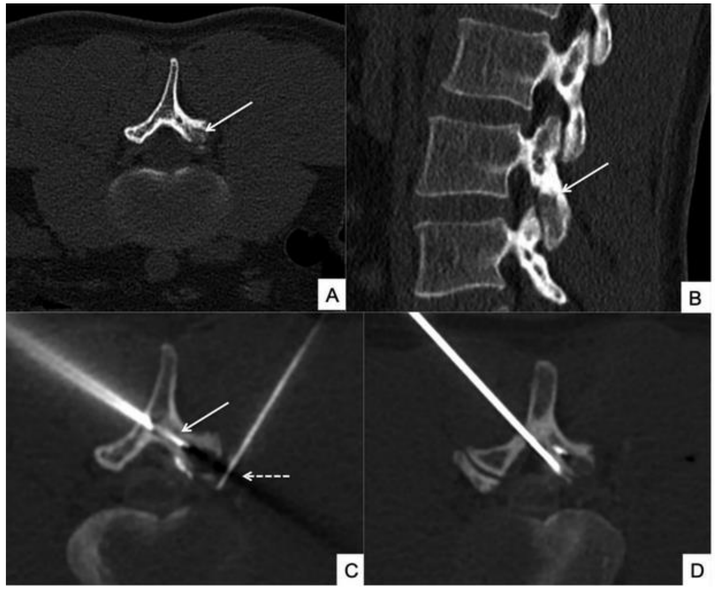

Figure 1: Axial (A) and sagittal (B) CT images demonstrating a patient with an osteoid osteoma (arrows indicate nidus) treated using laser ablation under a trans-osseous approach (C,D) Originally by Cazzato et al. [1]

Absolute Contraindications
Spinal instability
Presence of focal neurologic symptoms
Life-threatening irreversible coagulopathies
Relative Contraindications
Metastatic epidural involvement
Life expectancy <3 months
Poor performance status
Visceral metastatic involvement

Table 1 (above):
Contraindications of percutaneous ablation of spinal tumors.
Adapted from Tomasian et al. [2]

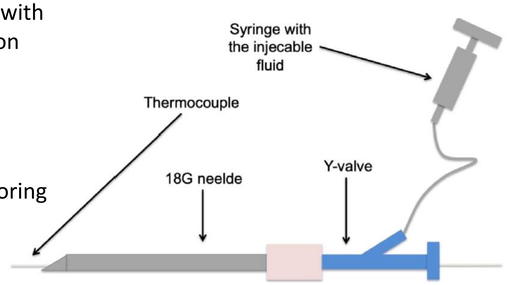

Figure 2 (right): Coaxial 18-guage system used for simultaneous hydro-dissection and thermal monitoring used in direct proximity to ablation area.
Adopted from Cazzato et al. [1]

Table 2 Common Protective Measures Used During Spine Ablation

	Hydro-Dissection (HD)Carbo-Dissection (CD)	Thermocouples	Electro-Stimulation(ES) Evoked Potentials (EP)
Main function	Physical displacement of the at-risk structure Temperature mitigation around the at-risk structure (HD only)	Thermal monitoring at the interface between the expected ablation area and the at-risk structure	Monitoring of the nervous function through visualization of muscle contraction (ES) or EP amplitude

Table 1: Protective measures used during spine ablation employed to protect adjacent tissue.
Adopted from Cazzato et al. [1]

TECHNIQUE

- Preprocedural CT is used to evaluate for interval tumor changes and variant vessel anatomy
- A trans-osseous approach avoids variable origins of the great anterior radiculomedullary artery
- Access the anterior epidural space gained through a trans-foraminal approach avoids foraminal neurovascular structures
- Ablation is performed with careful consideration of potential iatrogenic lesions to neural structures including the spinal cord and the nerve roots exiting the neuroforamina[2]
- Following ablation, PMMA cement is injected once the temperature within the vertebral body is physiologic

DISCUSSION

With proper patient selection, evaluation, and technique, data has shown that ablation of bone tumors provides high local control and significantly reduces pain in patients with painful spinal metastases.

REFERENCES

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2. Tomasian A, Jennings JW. Percutaneous Minimally Invasive Thermal Ablation of Osseous Metastases: Evidence-Based Practice Guidelines. *AJR Am J Roentgenol.* 2020;215(2):502-510. doi:10.2214/AJR.19.2252