



Multidisciplinary Approaches to Cancer Symposium

Tumor Board: Management of High risk/Symptomatic Bone Metastases

Panelists:

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John A. deVries, MD, MS
Jonathan Kessler, MD
Amanda Schwer, MD

Panel & Disclosures

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City of Hope Medical Center

- *No relevant financial relationships*

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- *Consultant for Stryker*

This presentation and/or comments will be free of any bias toward or promotion of the above referenced company or their product(s) and/or other business interests.

This presentation and/or comments will provide a balanced, non-promotional, and evidence-based approach to all diagnostic, therapeutic and/or research related content.

This presentation has been peer-reviewed and no conflicts were noted.



Panel & Disclosures

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- *Consultant for Boston Scientific and Varian*
- *No relevant financial relationships*

This presentation and/or comments will be free of any bias toward or promotion of the above referenced company or their product(s) and/or other business interests.

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Cultural Linguistic Competency (CLC) & Implicit Bias (IB)

STATE LAW:

The California legislature has passed Assembly Bill (AB) 1195, which states that as of July 1, 2006, all Category 1 CME activities that relate to patient care must include a cultural diversity/linguistics component. It has also passed AB 241, which states that as of January 1, 2022, all continuing education courses for a physician and surgeon **must** contain curriculum that includes specified instruction in the understanding of implicit bias in medical treatment.

The cultural and linguistic competency (CLC) and implicit bias (IB) definitions reiterate how patients' diverse backgrounds may impact their access to care.

EXEMPTION:

Business and Professions Code 2190.1 exempts activities which are dedicated solely to research or other issues that do not contain a direct patient care component.

This presentation is dedicated solely to research or other issues that do not contain a direct patient care component.



Case 1

41-year-old woman with
metastatic right breast carcinoma
and de novo diffuse bone
metastases

Case 1 · History

41-year-old woman with metastatic carcinoma of the right breast and de novo diffuse bone metastases. Presenting complaint: right hip and lower back pain.

Clinical course

Noticed a right breast mass; deferred medical care.

~1 year later: difficulty walking; family noted right eye swelling.

Presented to an outside hospital with left lower back and hip pain after stepping down from her garage and hearing a “crack.”

Admitted for surgery and workup; found to have diffuse metastatic disease throughout the spine and the axial and appendicular skeleton and left femoral fracture.

Underwent left total hip arthroplasty with biopsy.

Case 1 · Imaging

Imaging at the referring hospital established widespread visceral and osseous metastatic disease with a pathologic femoral neck fracture.

CT chest / abdomen / pelvis

Large, irregular, centrally necrotic right breast mass
Bulky right axillary lymph node consistent with metastatic involvement
Right lower lobe pulmonary nodule suspicious for metastasis
Extensive scattered lytic osseous lesions
Mildly displaced, comminuted pathologic fracture of the left femoral neck

MRI brain

2.5 cm heterogeneously enhancing expansile osseous lesion of the right superior orbital wall
Corresponds to the right eye swelling noted by family

Case 1 · Current Exam

Worsening right hip and lower back pain limiting weight bearing and ambulation.

Presents to COH

Symptoms and examination

Right hip pain 9/10; lower back pain 5/10

Focal tenderness at L4–L5 on palpation

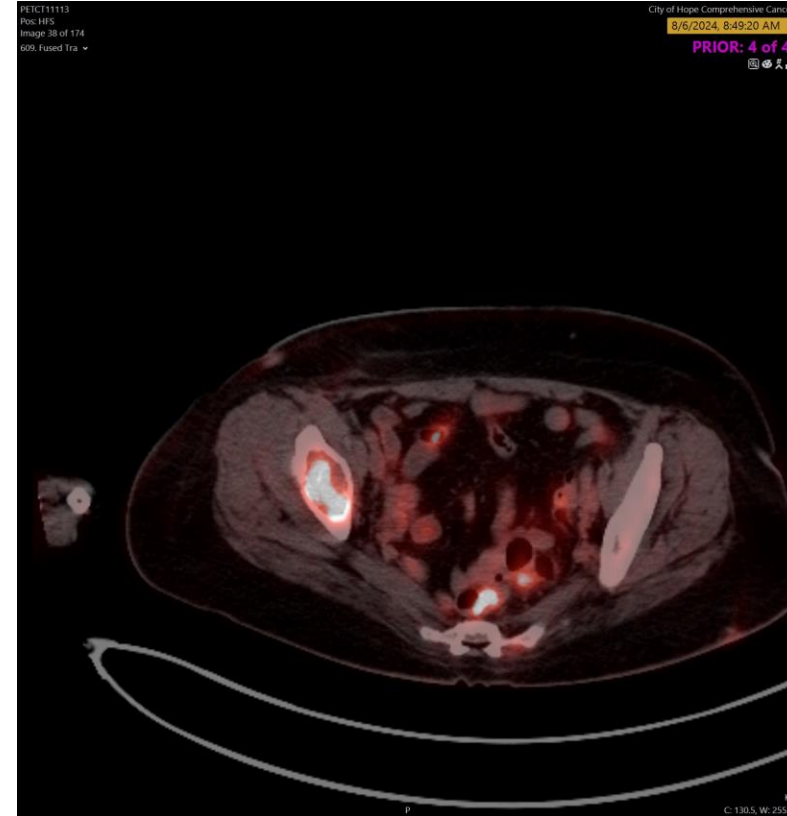
No bowel or bladder dysfunction; no lower extremity numbness or tingling

Unable to bear weight; ambulates only a few steps before pain is unbearable

Case 1 · Baseline Imaging



MRI spine



PET — right hip

What would be your approach for next steps?

Interventional Pain

Manisha Trivedi, MD

Intrathecal Drug Delivery system – IDDS

Indications

Contraindications

Procedure

Complications

Management



Patient Selection

- Anatomical consideration and site of catheter placement
 - Somatic Nociceptive pain from bone metastases
 - Neuropathic pain
 - Visceral pain
-
- Decision is made in collaboration with the oncologists rather than an absolute lab value.
 - RT- no limitation- battery drain, electric pause or failure can occur if pump is within the radiation field

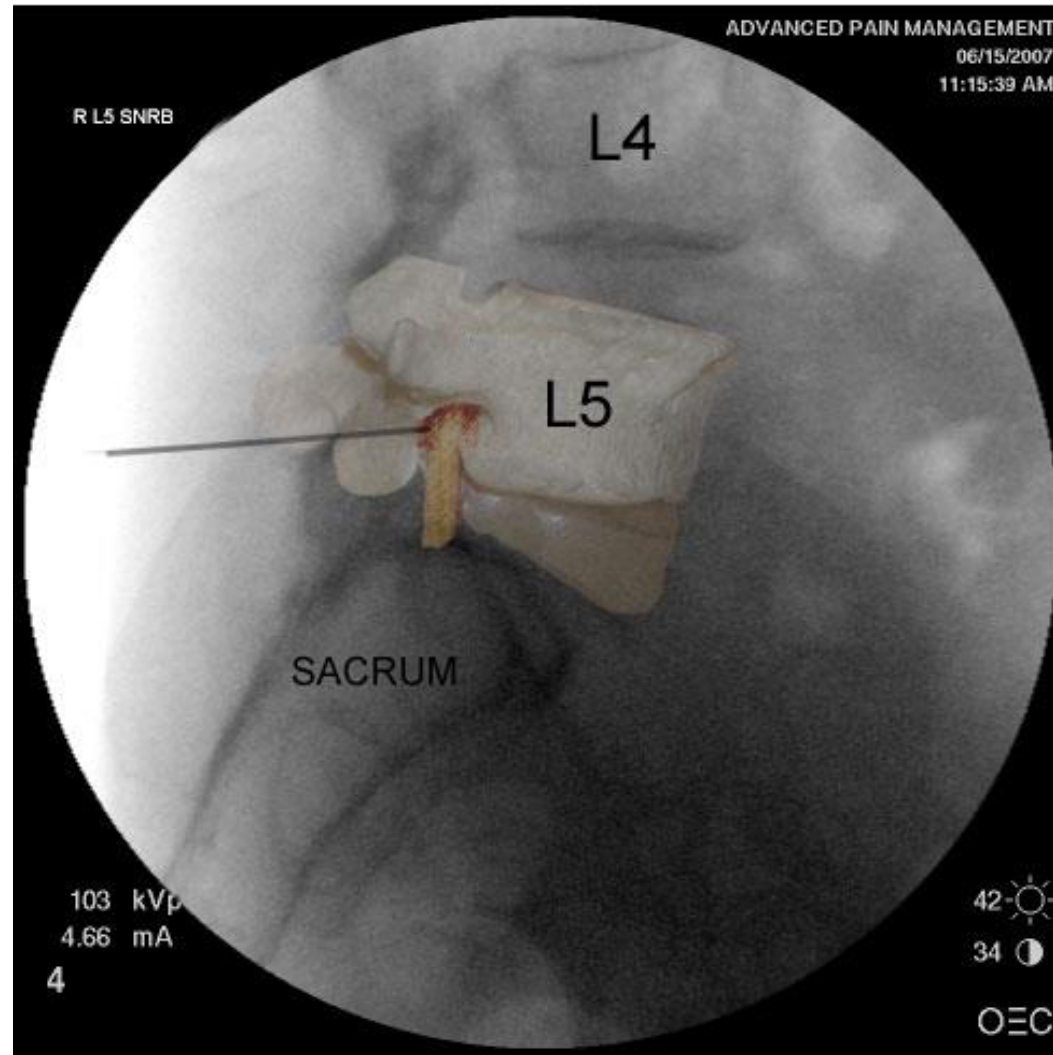
- Metastatic Disease in the spine-technical factors
- Infection
- Coagulopathy
- Comorbidities

Conclusion

- With careful consideration of comorbidities and communication with the oncologists IT therapy can effectively optimize cancer pain
- Often overlooked, evidence based effective treatment for cancer pain
- Integrate without interruption of oncologic treatment
- Comorbidities do not rule out IT therapy, collaboration and communication PRIOR to the downward spiral of symptoms and illness trajectory should be considered to avoid suffering

Epidural Steroid injection

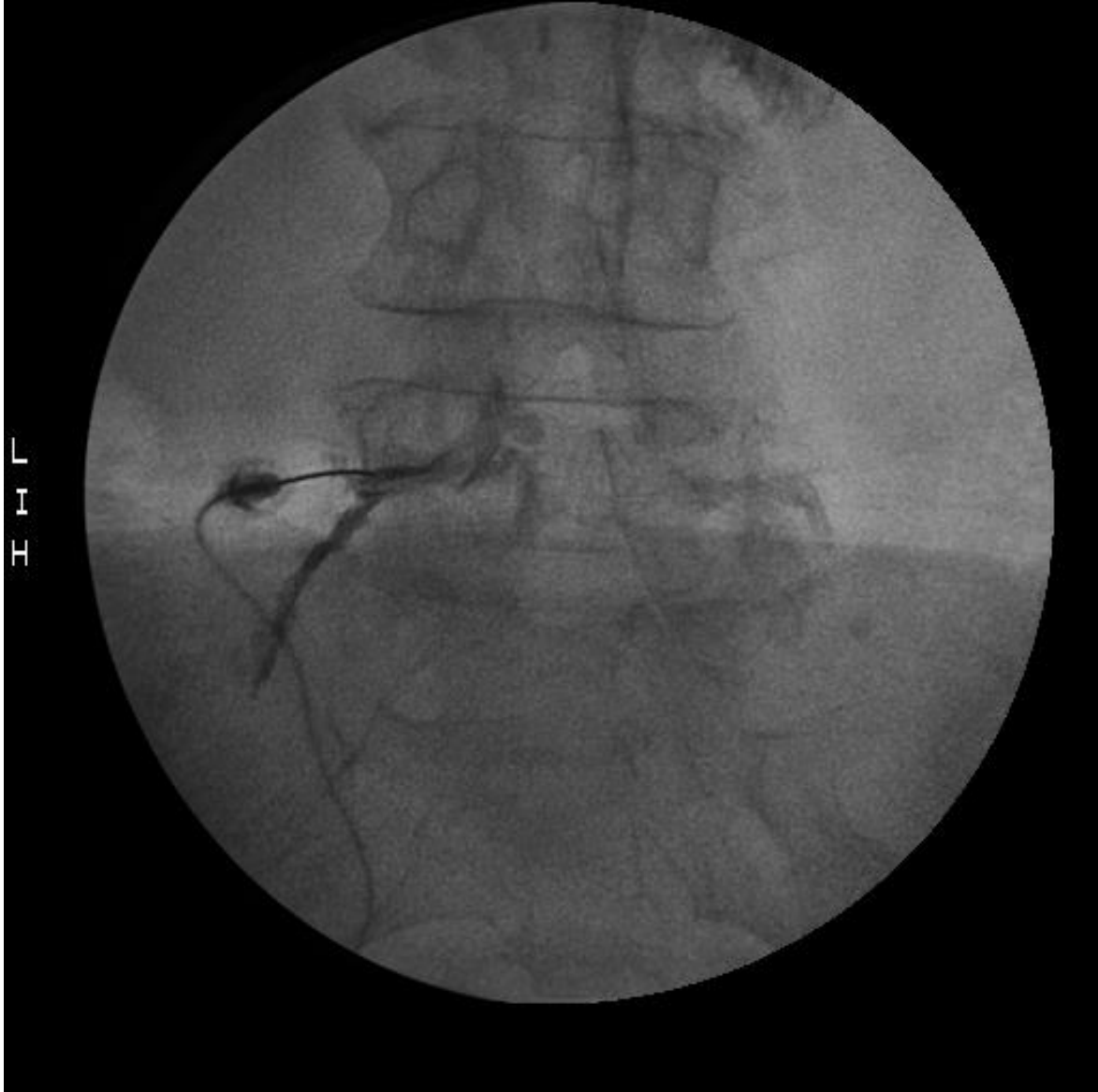
- Radiculopathy/Radicular pain
- Transforaminal Approach
- Selective option



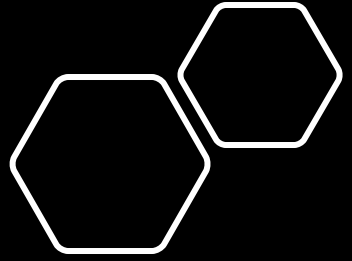
L5 SPINAL NERVE ROOT BLOCK

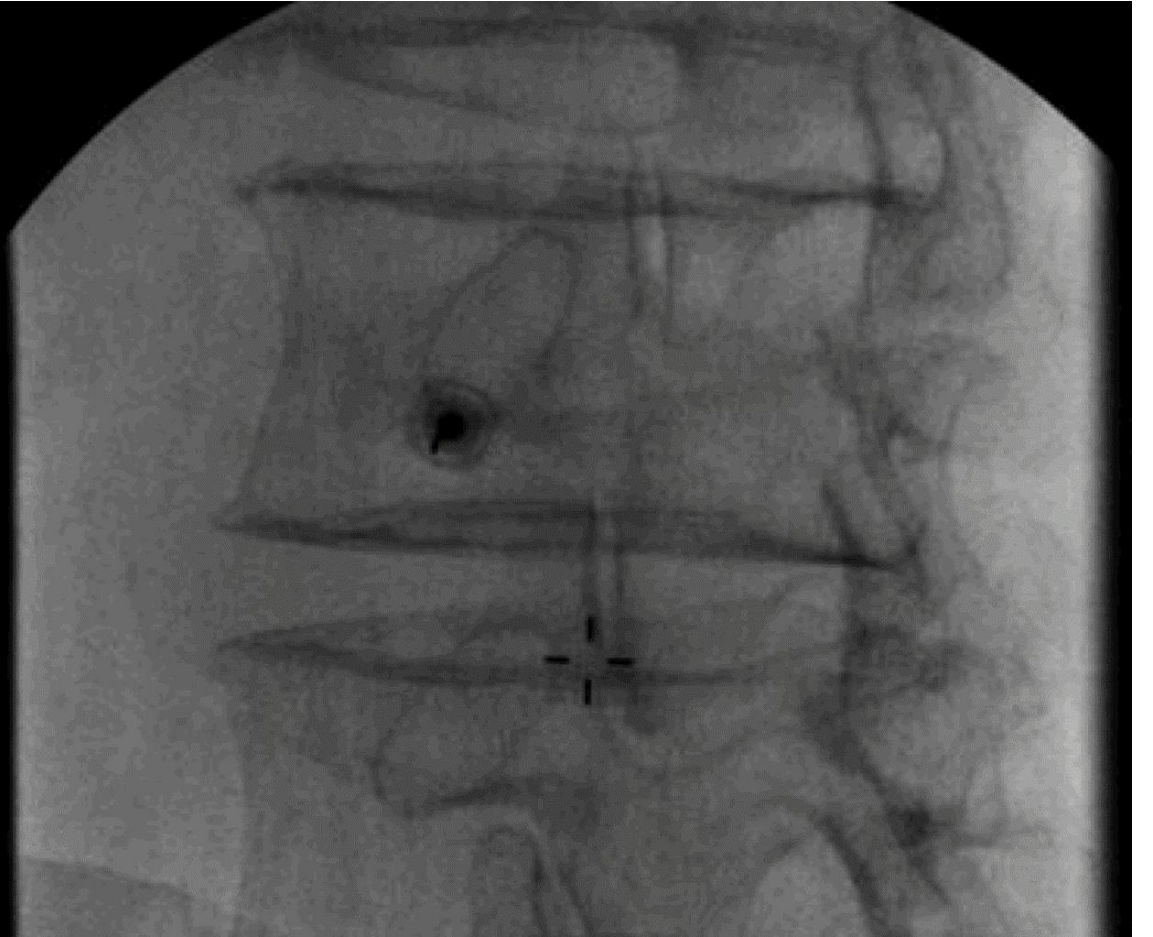
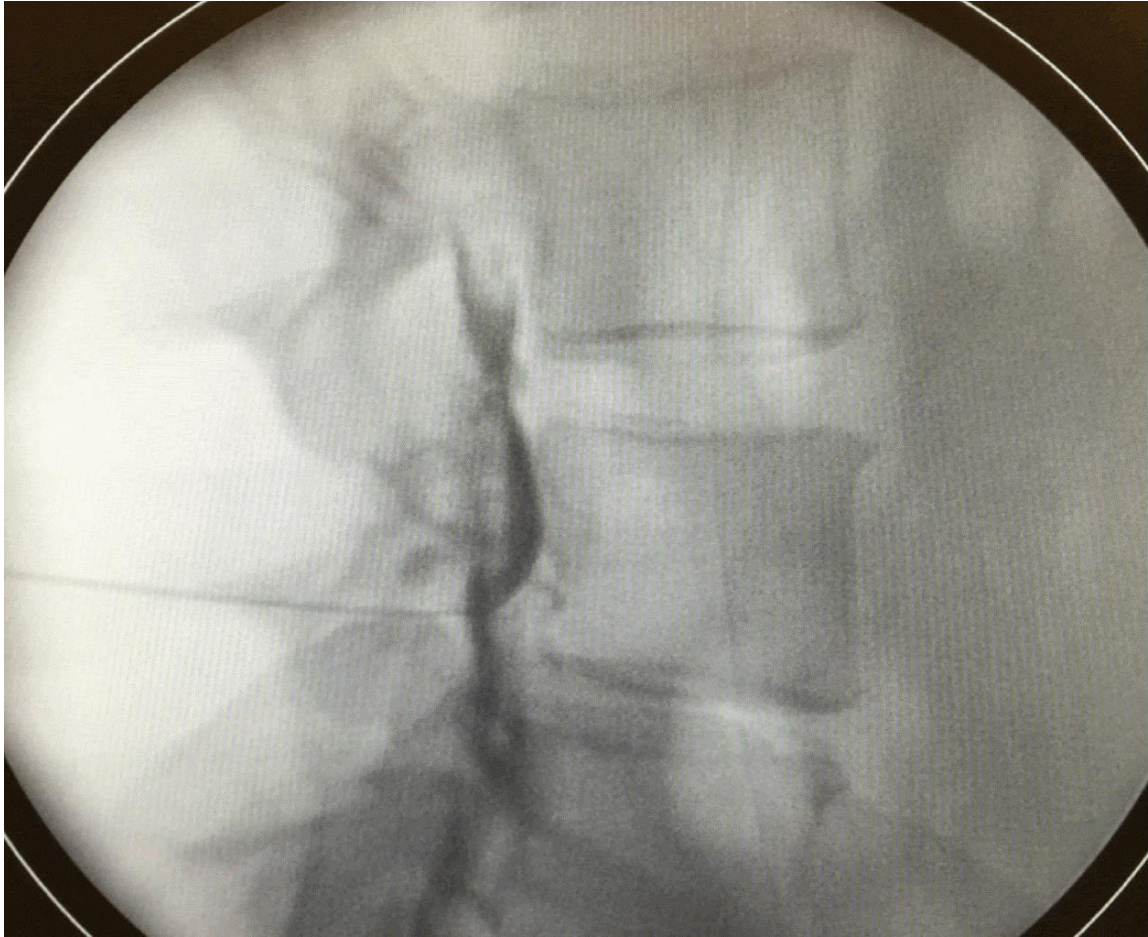
contrast
spread





HH





Radiation Oncology

Amanda Schwer, MD



MANAGEMENT STRATEGIES FOR SPECIFIC CANCER PAIN SYNDROMES

Moderate to severe cancer pain is treated with opioids as indicated ([PAIN-4](#) and [PAIN-5](#)); these interventions are meant to complement opioid management. Adjuvant analgesics are used depending on the pain diagnosis, comorbidities, and potential for drug interactions. Non-pharmacologic interventions should also be optimized ([PAIN-D](#)).

- Painful lesions that are likely to respond to antineoplastic therapies:
 - ▶ **Consider trial of RT**, hormones, or chemotherapy.
- Disease-specific pain: **Refer to tumor-specific guidelines for details on palliative RT as applicable.**
- Pain from PO mucositis:
 - ▶ Gabapentin PO or in liquid preparation
 - ▶ Local anesthetic formulations/PO care protocols
 - ▶ For more information on the prevention and treatment of mucositis, see
 - ◊ <https://www.ons.org/pep/mucositis>
 - ◊ [MASCC Guidelines](#)
 - ◊ [ESMO Guidelines](#)
- Nerve pain
 - ▶ Nerve compression or inflammation:
 - ◊ Trial of corticosteroids^a
 - ◊ **Optimize local disease control as appropriate; consider RT or other treatments**
 - ▶ Neuropathic pain:
 - ◊ Trial of antidepressant (SNRI or TCA) ([PAIN-F](#)) and/or
 - ◊ Trial of anticonvulsant ([PAIN-F](#)) and/or
 - ◊ Consider trial of topical agent ([PAIN-F](#))
 - ◊ For refractory pain, consider referral to a pain specialist and/or the use of interventional strategies ([Interventional Strategies \[PAIN-M\]](#))
- Bone pain without oncologic emergency:
 - ▶ NSAIDs, acetaminophen, or steroids^a;
See [Non-Opioid Analgesic \(Nonsteroidal Anti-Inflammatory Drugs \[NSAIDs\] and Acetaminophen\) Prescribing \(PAIN-E\)](#).
 - ▶ Consider bone-modifying agents to prevent additional fractures (eg, bisphosphonates, denosumab^b).
 - ▶ Diffuse bone pain: Consider hormonal therapy or chemotherapy, corticosteroids,^a and/or systemic administration of radioisotopes.
 - ▶ Local bone pain:
 - ◊ **Consider local RT**, nerve block (eg, rib pain), vertebral augmentation, or percutaneous ablation techniques.
 - ◊ Assess for impending fracture with plain radiographs.
 - ▶ Consider physical medicine evaluation.
See [Specialty Consultations for Improved Pain Management \(PAIN-L\)](#).
 - ▶ Consider orthopedic consultation for stabilization, if feasible.
Consider referral to a pain specialist or interventional therapist for interventional pain therapies including percutaneous ablation techniques for bone lesions. See [Interventional Strategies \(PAIN-M\)](#).
- For severe refractory pain in the imminently dying, consider palliative sedation ([NCCN Guidelines for Palliative Care](#)).
- Immunotherapy-related polyarthralgias ([NCCN Guidelines for Management of Immune Checkpoint Inhibitor-Related Toxicities](#))

Radiation Therapy for Bone Mets

Radiation therapy is a proven, effective palliative treatment used to relieve pain, reduce tumor size, and lower the risk of fractures in patients with bone metastases

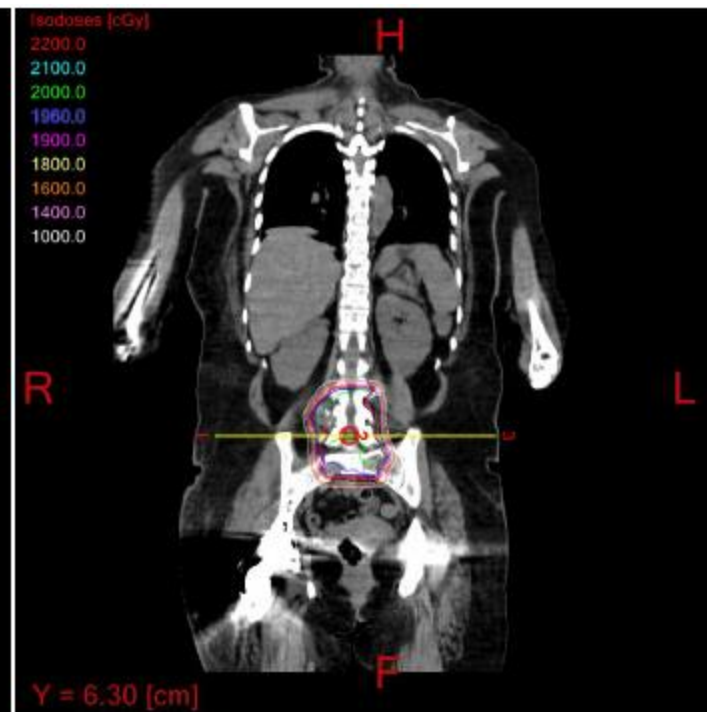
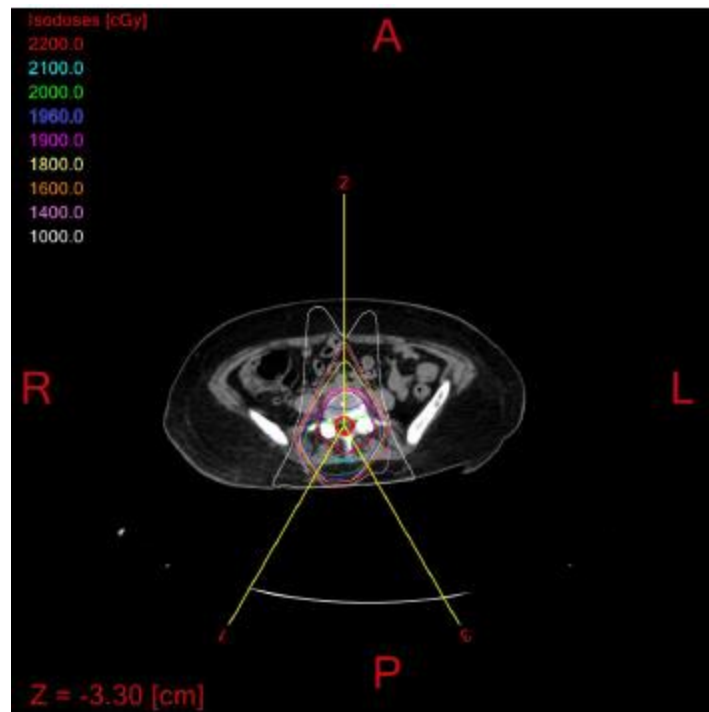
It is a highly effective treatment for bone metastases, providing significant pain relief in roughly 60% to 80% of patients and complete pain relief in 20-35%



Radiation Therapy for Bone Mets

Standard Fractionation Schedules

- **Single Fraction:** 8 Gy in 1 fraction (800 cGy) offers maximum patient convenience and equal pain relief compared to multi-fraction courses, though it carries a higher risk of requiring retreatment to the same site.
- **Short-Course Fractionation:** 20 Gy in 5 fractions (400 cGy/fx) provides a balanced approach with lower acute toxicity than protracted schedules.
- **Intermediate Fractionation:** 24 Gy in 6 fractions (400 cGy/fx) is an alternative regimen supported by consensus guidelines. [1, 2]
- **Protracted Fractionation:** 30 Gy in 10 fractions (300 cGy/fx) delivers a traditional longer course, sometimes preferred for certain re-treatments or structural stability concerns, though equivalent in initial pain response. [1, 2]



Ongoing Pain

The patient has ongoing pain. What is the next step?

Options

- A. Wait to start chemotherapy
- B. Wait for radiation to take full effect
- C. Increase narcotics
- D. Other

Interventional Radiology

Jonathan Kessler, MD



NCCN Guidelines Version 2.2026

Adult Cancer Pain

MANAGEMENT STRATEGIES FOR SPECIFIC CANCER PAIN SYNDROMES

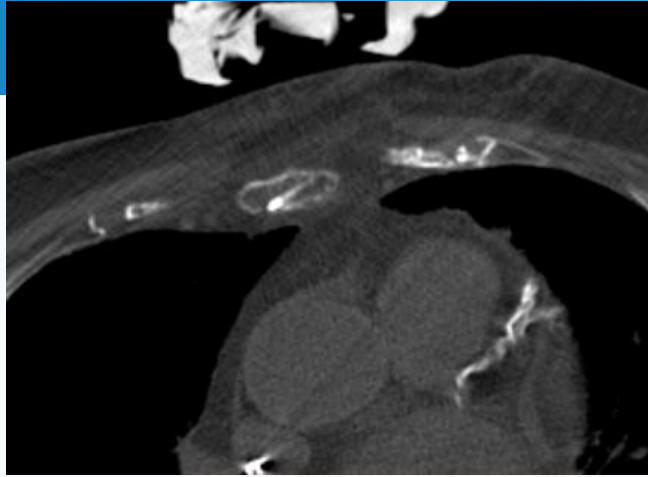
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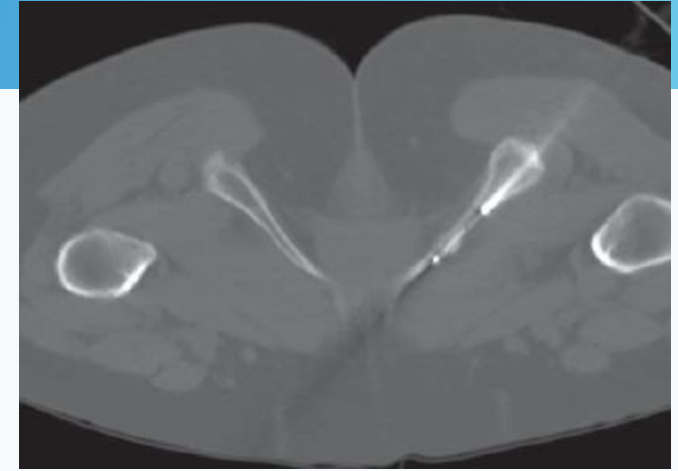
Ablation: areas and techniques



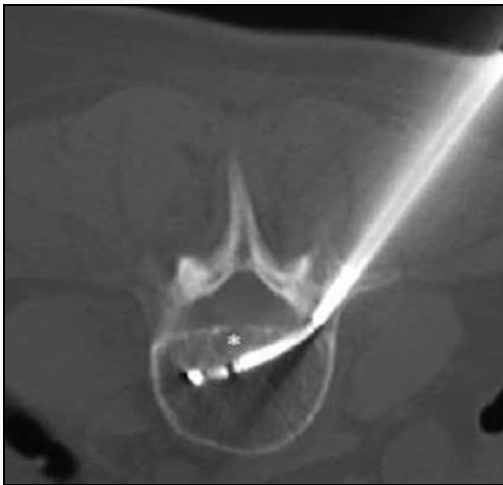
RFA diffuse spine metastasis



Cryoablation of sternal tumor



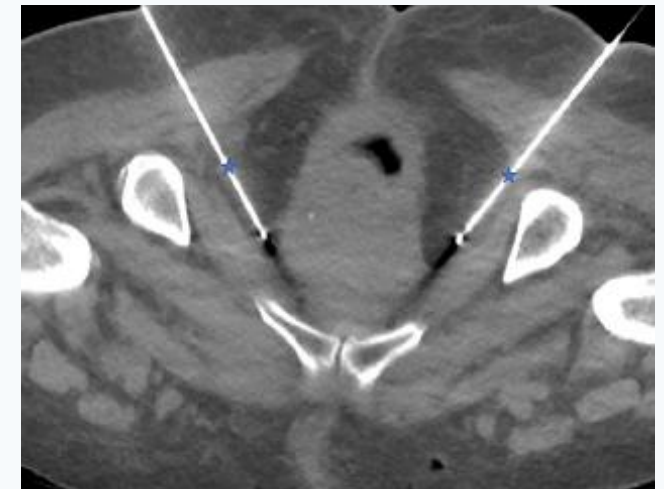
RFA pelvic bone metastasis



RFA focal spine metastasis



Cryoablation of intercostal neuralgia



Pudendal cryoneurolysis for cervical cancer

Cryoablation and RFA both palliate pain

Choose the energy that safely covers the target

CRYOABLATION

Visualized ice ball • conformal multi-probe coverage • intrinsic analgesic effect

Best fit

Large or irregular lesions
Need for real-time CT margin assessment
Pain-sensitive periosteal targets

Trade-offs

Longer procedure / multiple probes
Bleeding risk may be slightly higher
Protect skin and adjacent nerves

RADIOFREQUENCY ABLATION

Predictable heat zone • rapid treatment • navigational bipolar systems for vertebral lesions

Best fit

Small to moderate targets
Vertebral body access with curved devices
Planned cement augmentation

Trade-offs

Ablation margin is not directly visible
Heat propagation near neural structures
Impedance can limit larger zones

MOTION | Cryo

-2.61 points

Jennings et al. Radiology 2021;3(2);e200101

OPuS One | RFA

8.2 → 2.5

Levy et al JVIR 2020; 31:1745

TRIBUTE moves the field from “either/or” to combined care

Prospective real-world evaluation of percutaneous ablation plus palliative radiation for symptomatic, high-risk bone metastases.

120 adults

One painful, high-risk metastatic bone lesion



Ablation + RT

Standard-of-care sequencing in real-world practice



12-month follow-up

Pain, function, SREs, health care utilization,

PRIMARY ENDPOINT

**CR + PR pain response
at 3 months**

BPI worst pain + oral morphine equivalent dose
using international consensus definitions

HYPOTHESIS

≥65%

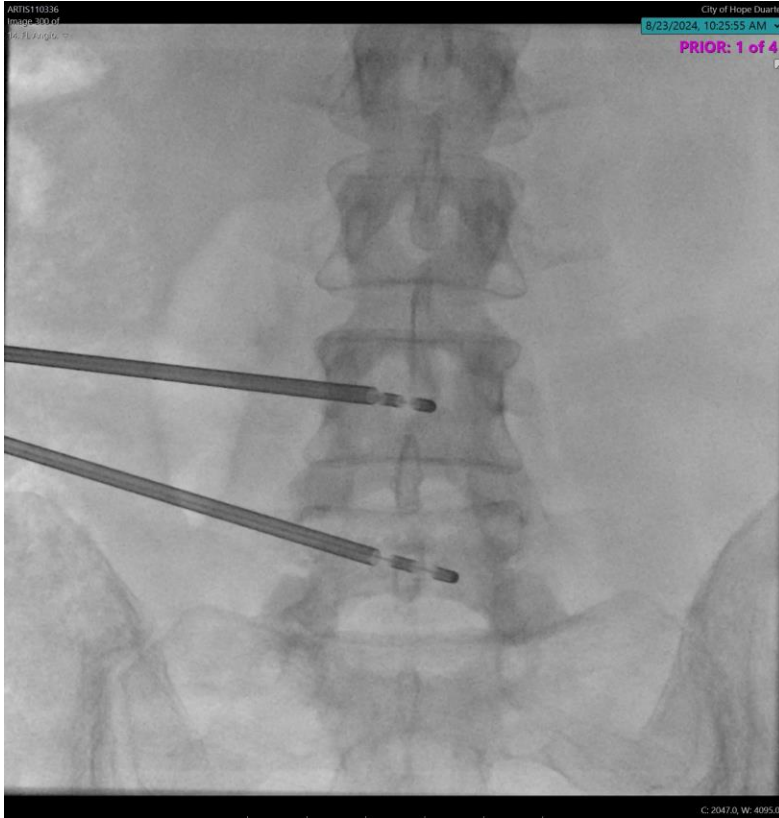
combined complete / partial pain
response

WHY THIS MATTERS

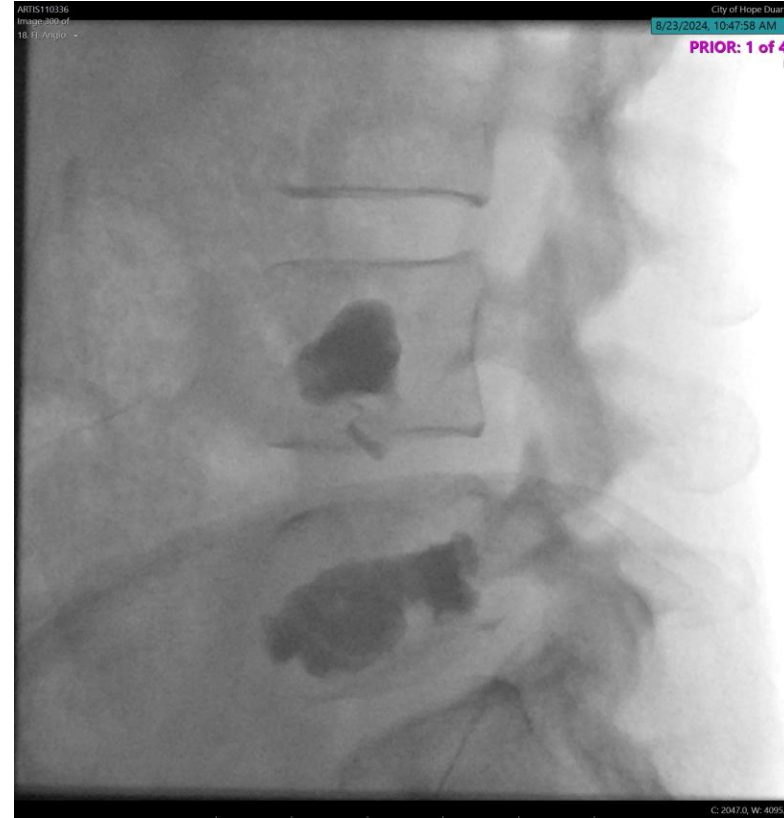
Tests the multidisciplinary strategy already used in
practice
May define which high-risk lesions benefit from
planned combination therapy

IR perspective: involve us before RT when the lesion is structurally high-risk, radioresistant, previously irradiated, or likely to need ablation plus stabilization.

Ablation and Kyphoplasty



Ablation of the spinal lesion



Cement augmentation (kyphoplasty)

What about the right hip
pain?

Orthopaedic Surgery

John DeVries, MD

Bone Pain in Metastatic Disease

Mirels Criteria

Score	1	2	3
Site	Upper Extremity	Lower Extremity	Peritrochanteric
Pain	Mild	Moderate	Functional
X-Ray Appearance	Blastic	Mixed	Lytic
Size	<1/3 diameter	1/3-2/3	>2/3

Mirels, et al.

<7 points, no surgery – 4% fracture risk

8 points, borderline – 15% fracture risk

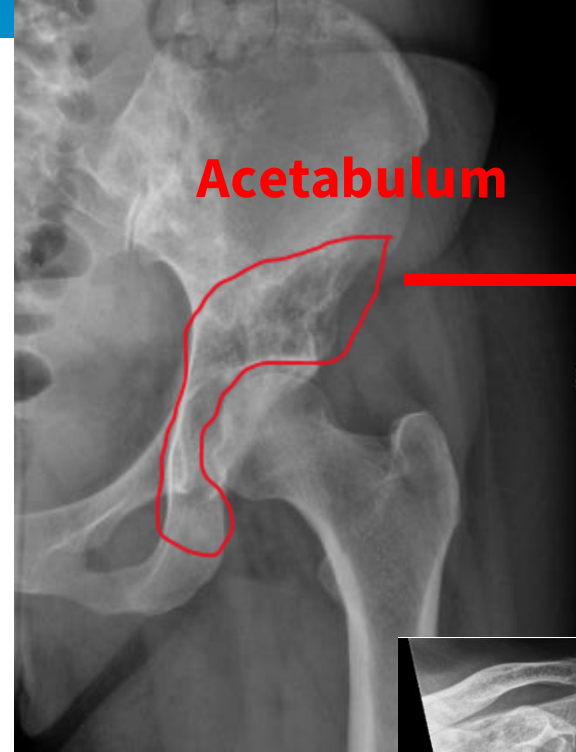
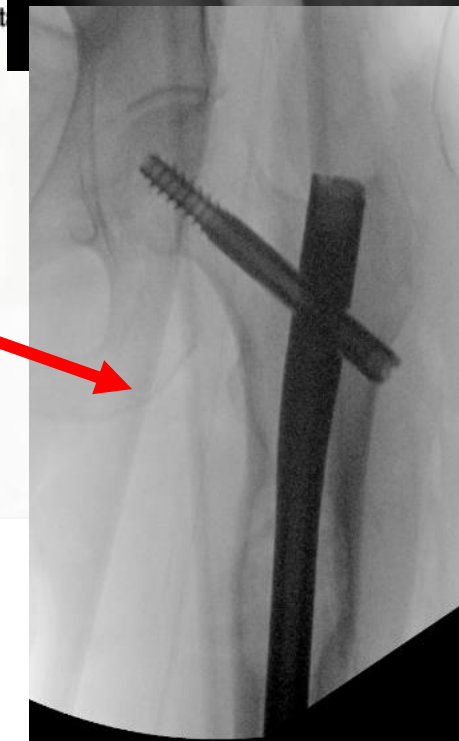
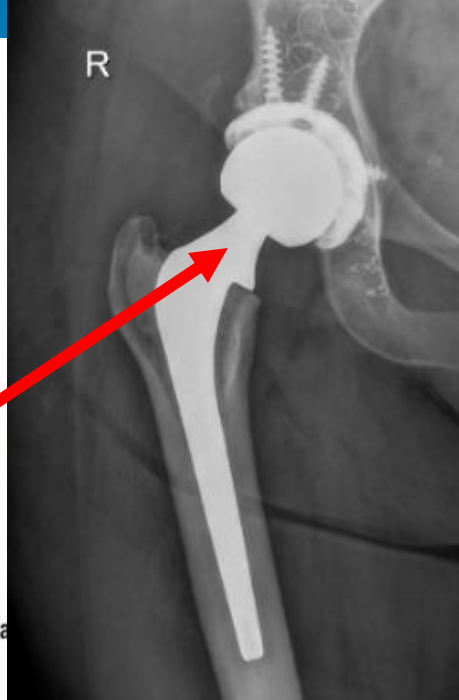
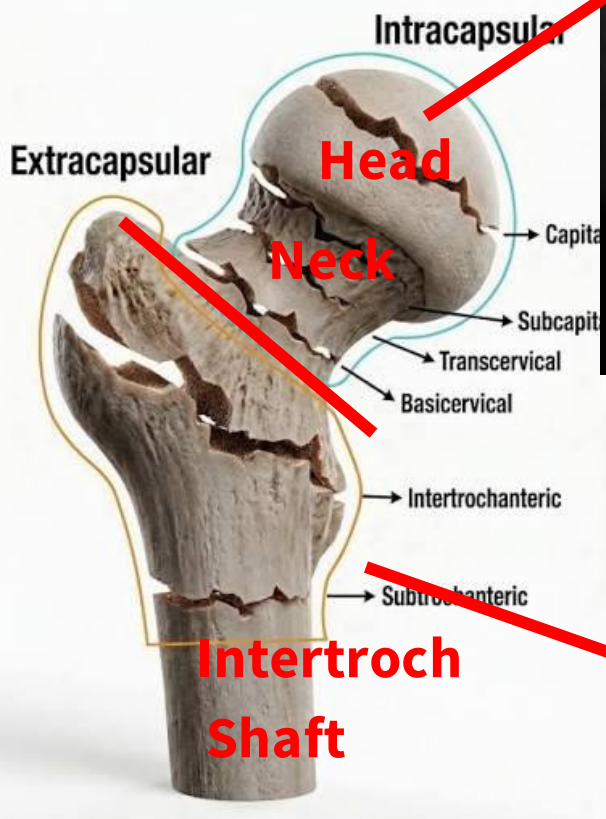
>9 points, recommend prophylactic fixation – 33% fracture risk

Significance

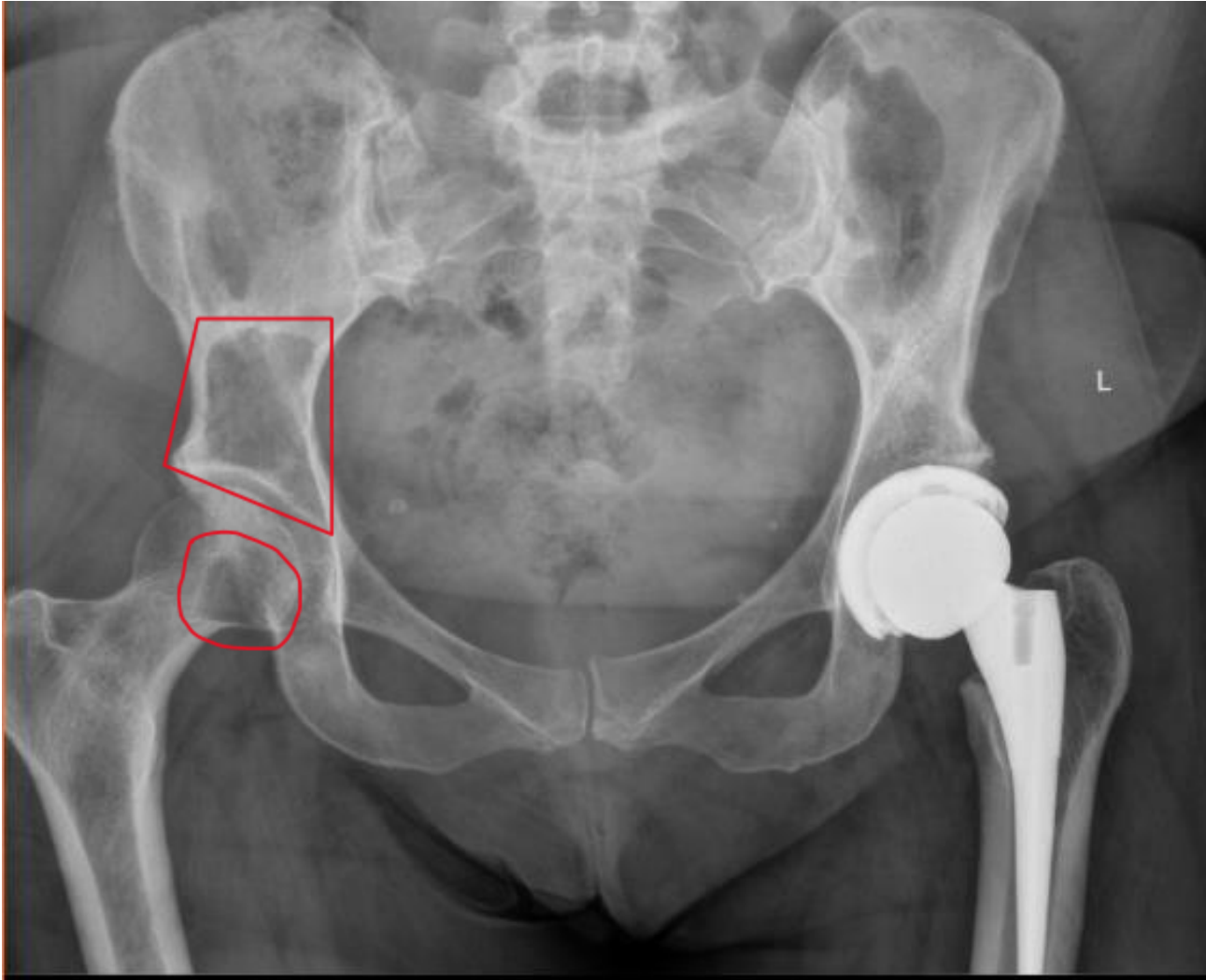
- Nearly 1/5 total cost of oncology care is from metastatic bone disease (MBD)
- Patients with MBD more than double their yearly treatment cost
- A skeletal related event can significantly increase costs and burden (up to 20x)
- Prophylactic surgery has been shown to decrease overall costs, decrease LOS, and increase functionality, and life expectancy vs. surgery after fracture.

DiCaprio, et al.

Hip Metastasis



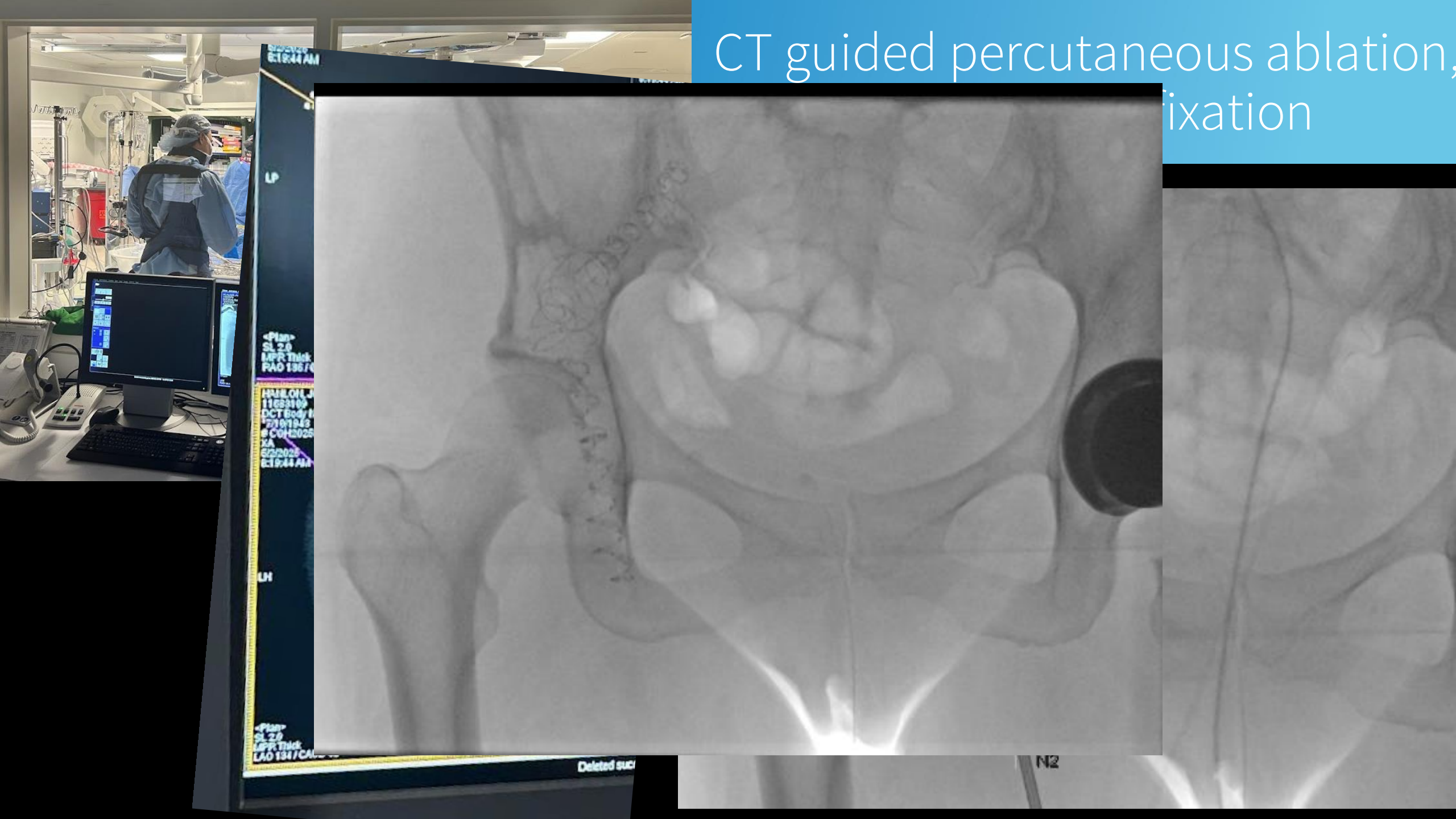
Case #1



Inability to ambulate, pain through right hip with weight bearing, **relieved by rest**

Acetabular and femoral head lesions

CT guided percutaneous ablation, fixation



Minimally Invasive Stabilization with or without Ablation for Metastatic Periacetabular Tumors

D. Ian English, MD, MA, William B. Lea, MD, David M. King, MD, Sean M. Tutton, MD, FSIR, and John C. Neilson, MD

Investigation performed at the Division of Orthopaedic Surgery, Froedtert Hospital, Wauwatosa, and the Division of Interventional Radiology, Medical College of Wisconsin, Milwaukee Wisconsin

TABLE IV MSTS Scores*

	All Patients (N = 38)			Patients without Other Surgical Treatments (N = 29)		
	Preoperative	Postoperative	P Value	Preoperative	Postoperative	P Value
Total	7.8	19.6	<0.001	7.9	19.7	<0.001
Pain	0.9	3.7	<0.001	0.8	3.5	<0.001
Emotional acceptance	1.1	4.2	<0.001	1.0	4.2	<0.001
Use of supports	1.1	2.3	<0.001	1.1	2.2	0.0014
Walking ability	1.8	3.1	<0.001	1.9	3.2	<0.001
Gait	1.5	3.2	<0.001	1.6	3.2	<0.001
Function	1.5	3.2	<0.001	1.4	3.0	<0.001

*Musculoskeletal Tumor Society Scoring system; a score of 0 to 5 is assigned in each of 6 categories, which are then combined for a maximum possible score of 30.

Narcotic use†

Reduced

81% (26 of 32)

87% (20 of 23)

No change

16% (5 of 32)

9% (2 of 23)

Increased

3% (1 of 32)

4% (1 of 23)

Minimally Invasive Image-Guided Ablation, Osteoplasty, Reinforcement, and Internal Fixation (AORIF) for Osteolytic Lesions in the Pelvis and Periarticular Regions of Weight-Bearing Bones

Francis Y. Lee MD, PhD, Igor Latich MD, Courtney Toombs MD, Alana Mungur MD, Devin Conway MD, Kareme Alder BS, Izuchukwu Ibe MD, Dieter Lindskog MD and Gary Friedlaender MD
Journal of Vascular and Interventional Radiology, 2020-04-01, Volume 31, Issue 4, Pages 649-658.e1, Copyright © 2019 SIR

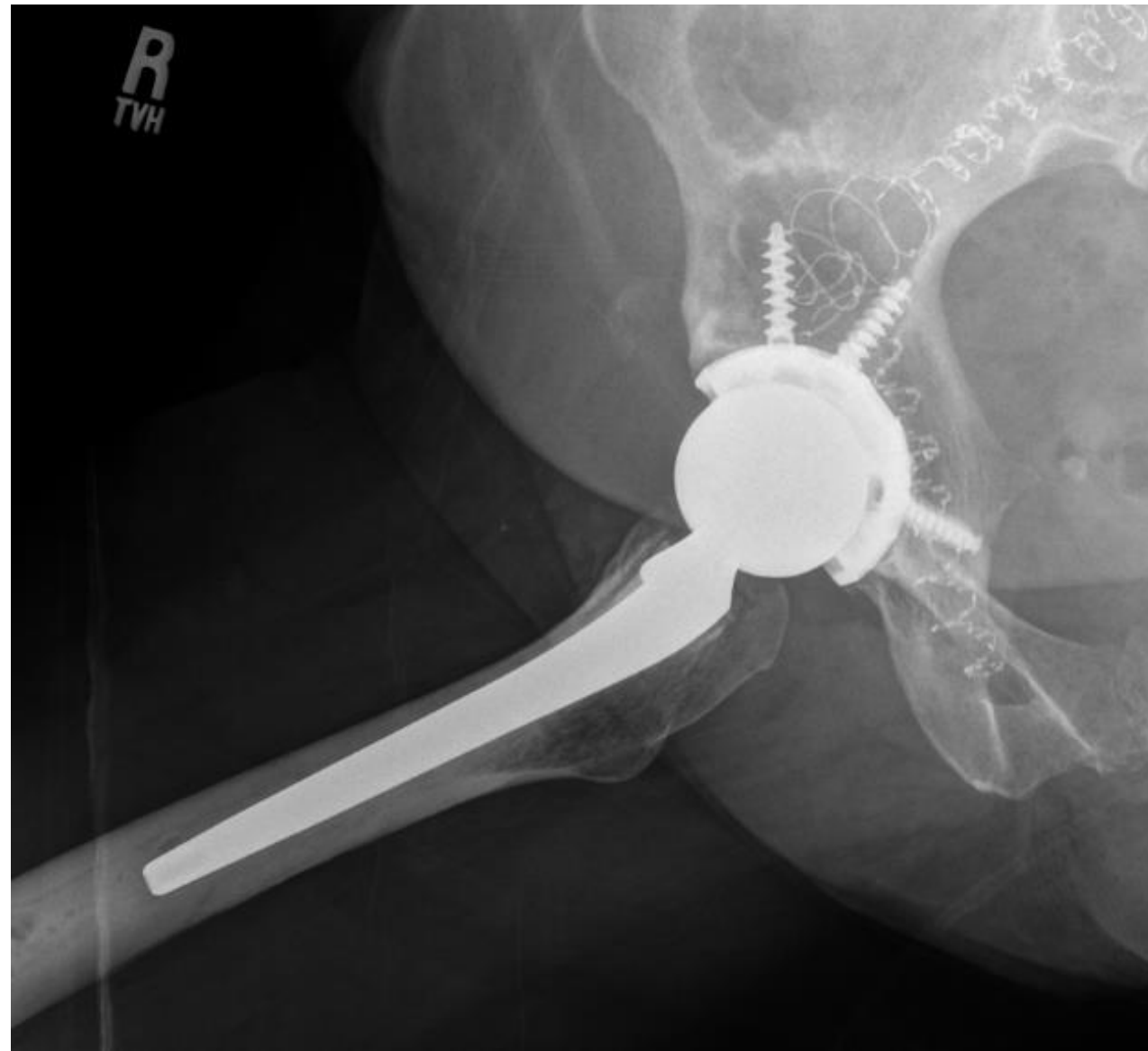
Pain and Function Significantly Improved over multiple studies

Lee et al. – 26 patients, VAS scores 8.32 -> 2.36, statistical improvement of MSTS score

Hirase et al. – Systemic review 579 patients (mostly cement alone) 74.2% significant pain and function improvement

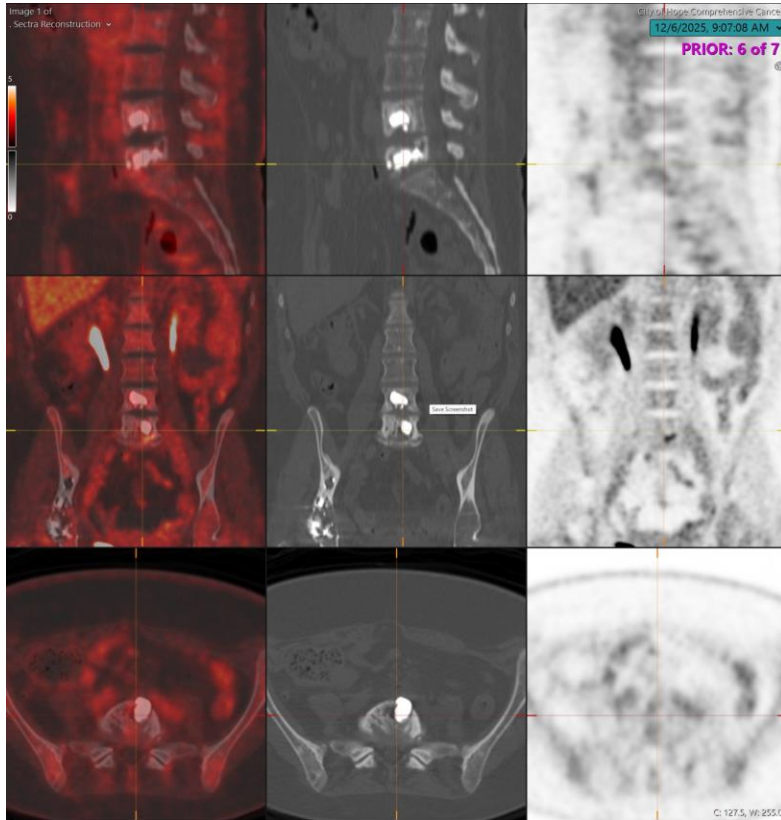
Lozano-Calderon et al. – 39 patients with photodynamic intrapelvic nails VAS 8 -> 0 at 6 weeks.

HCRHRAD_DX02

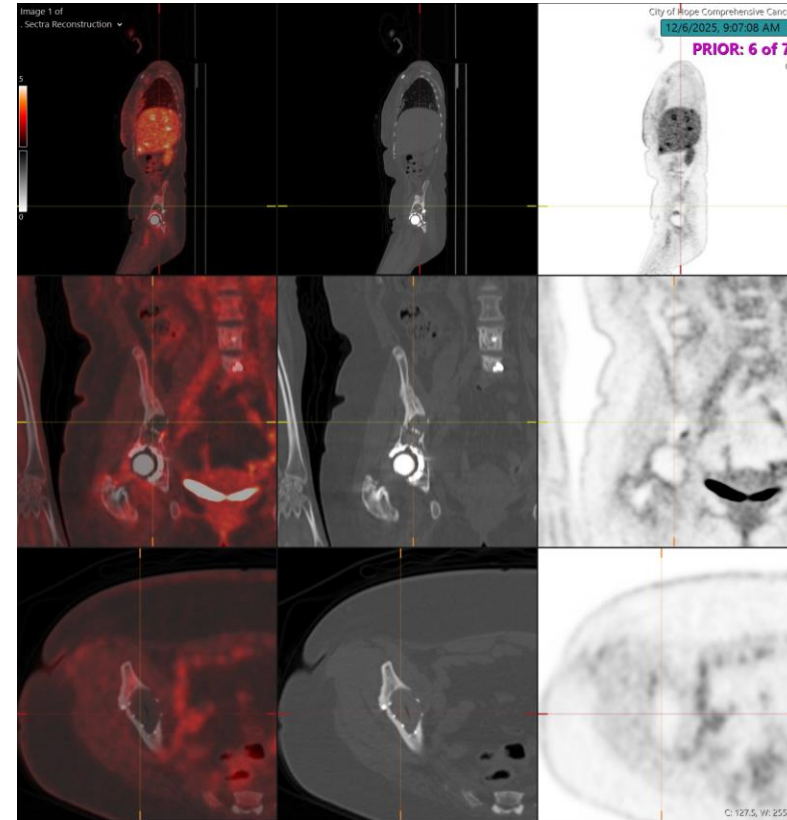


Two years post op with no hip pain, no limp and full strength

PET at 16 Months



Spine



Pelvis

Case 2

78-year-old man with metastatic renal cell carcinoma and a painful iliac bone lesion

Case 2 · History

78-year-old man admitted with severe pain from an iliac bone lesion, on a background of extensive cardiac, renal, and metabolic comorbidity.

Oncologic history

Renal cell carcinoma, status post nephrectomy (2022)

Surveillance imaging 1/2025: iliac bone lesion

Admitted with severe pain

Comorbidities

Atrial fibrillation, congestive heart failure, coronary artery disease

Prior cerebrovascular accident

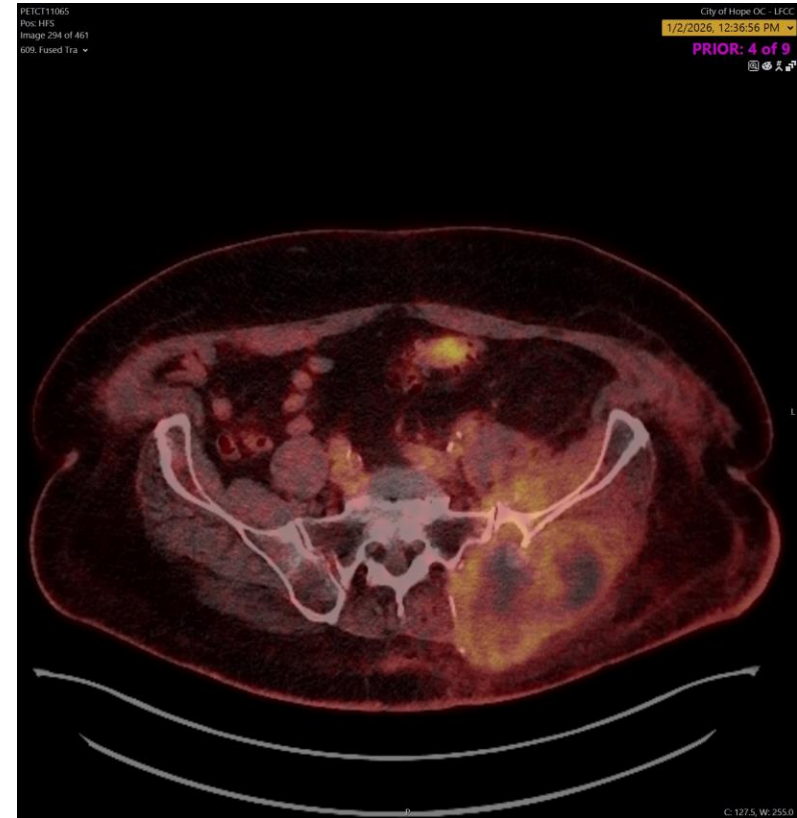
Type 2 diabetes mellitus with neuropathy

Chronic kidney disease

Case 2 · Baseline Imaging



CT — iliac lesion



PET — iliac lesion

Interventional Pain

Sacroilic Joint Injection

- Limited role in cancer related sacral pain
- Mechanical SIJ pain and degenerative pain

Conventional radiation
or SBRT?

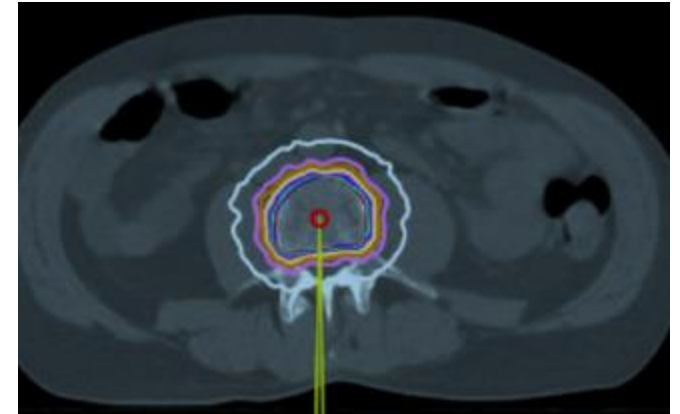
Radiation Oncology

Amanda Schwer, MD

Radiation Therapy for Bone Mets

SBRT vs EBRT

- **SBRT** is preferred for oligometastases (limited number of spots), radioresistant tumors, previously irradiated areas, or spine metastases where long-term local control and high-dose precision near the spinal cord are essential.
- **EBRT** remains the standard, highly effective workhorse for widespread bone metastases, uncomplicated pain, or patients with a more limited life expectancy where shorter or broader palliative coverage is practical.

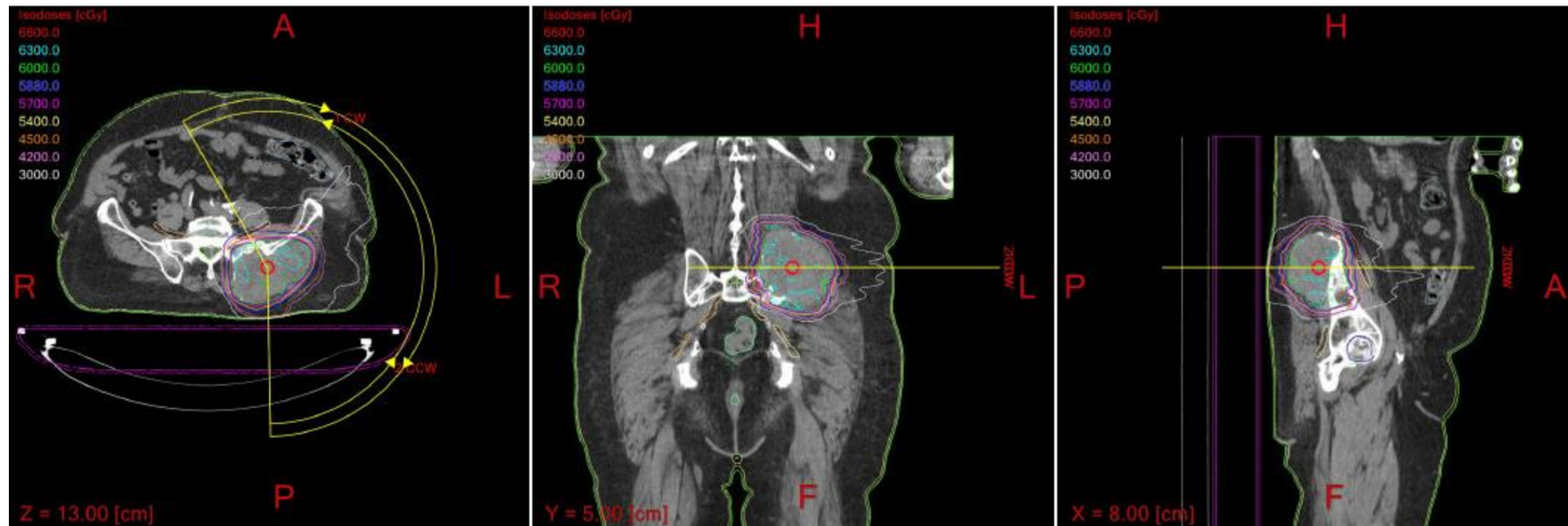


Radiation Therapy for Bone Mets

SBRT vs EBRT

Characteristic	Conventional RT	SBRT
Dose / Fraction	1.8 – 3 Gy	6 – 30 Gy
No. of Fractions	10 – 30	1-5
Target definition	CTV / PTV gross disease + clinical extension: tumor may not have a sharp boundary.	GTV / CTV / ITV/ PTV well-defined tumors: GTV=CTV
Margin	Centimeters	Millimeters

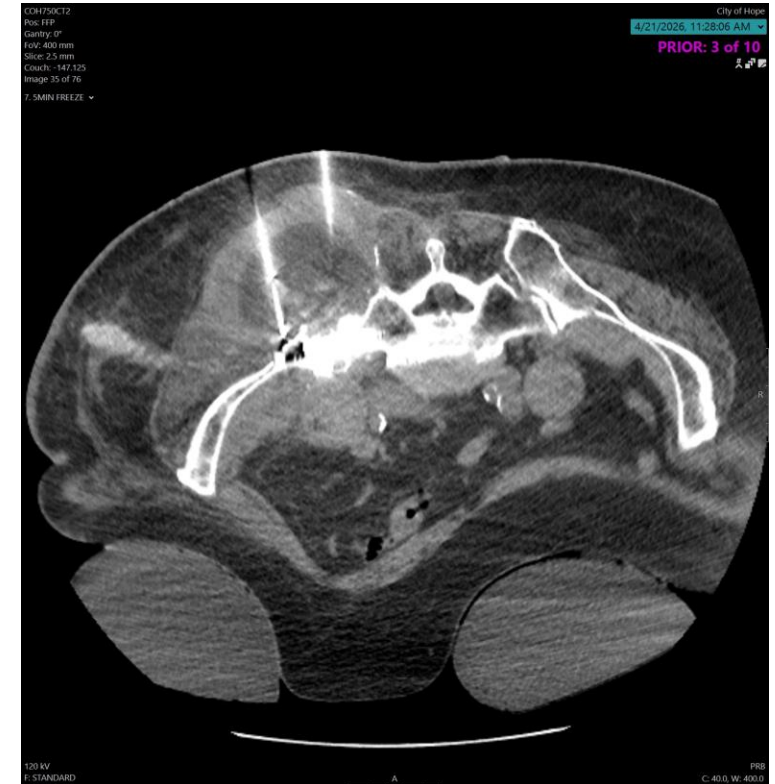
45Gy in 15 fractions



Interventional Radiology

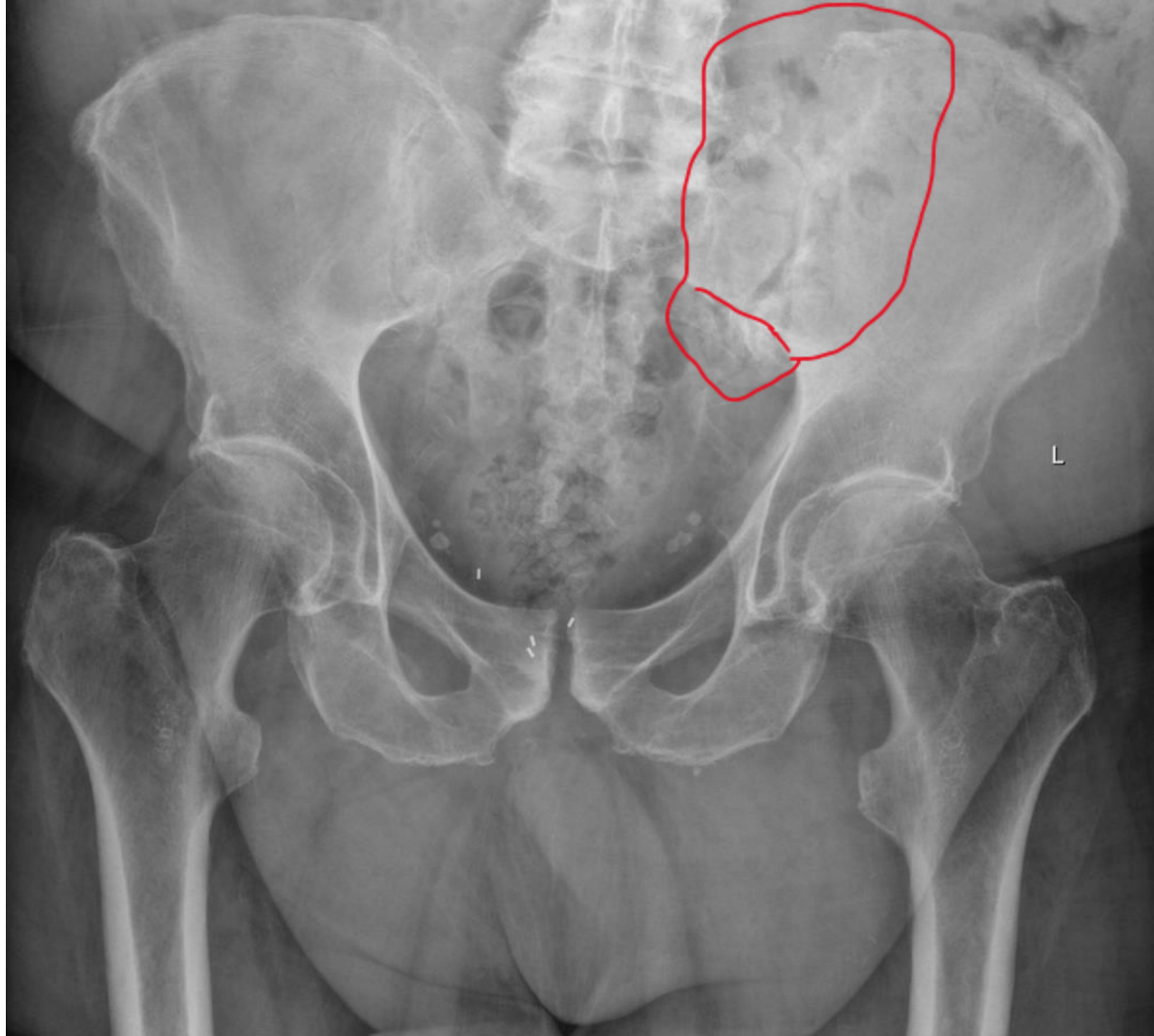
Cryoablation of the Iliac Mass

- **Complete tumor coverage is not required for pain relief.**
- Ablating the bone–tumor interface targets the periosteal and intraosseous nerve fibers that generate pain.
- A large mass can be palliated by treating the symptomatic interface rather than the entire lesion.

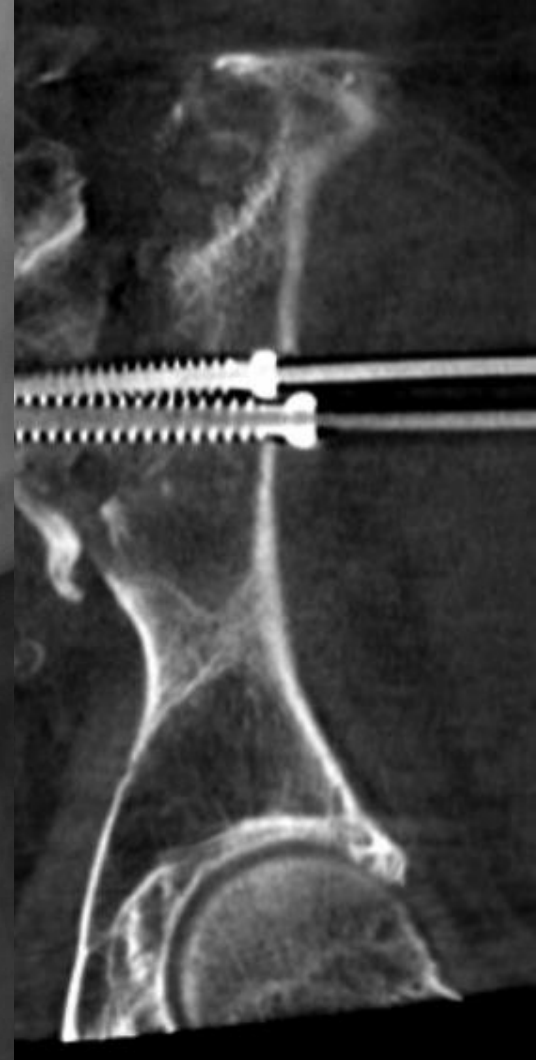


Orthopedic Surgery

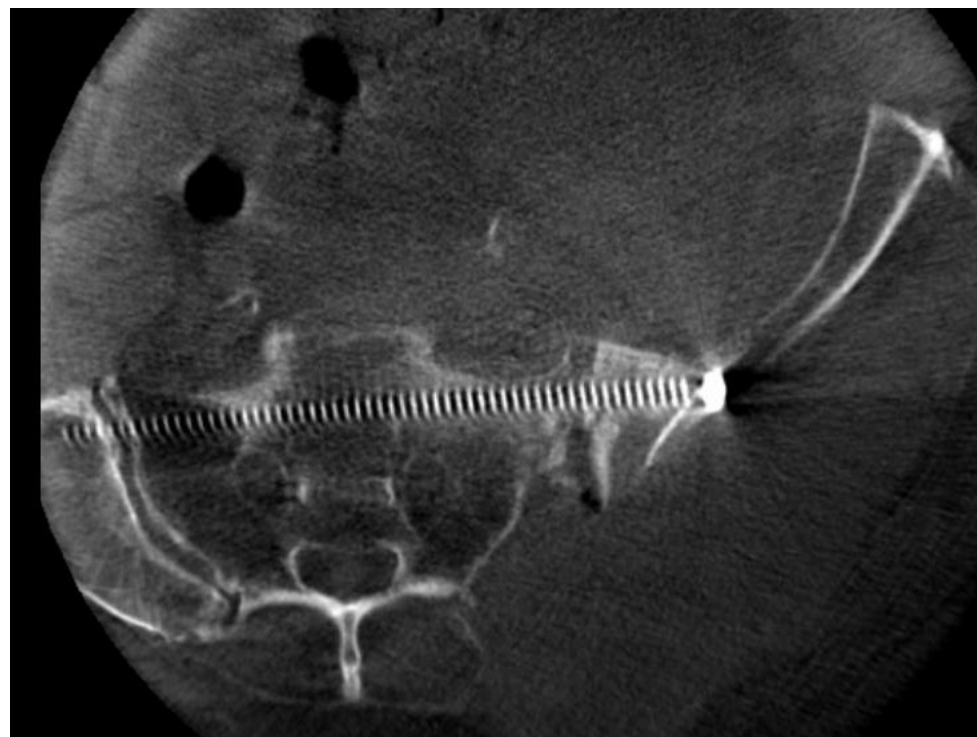
6-week progression, pain with weight bearing, unstable fracture



CT Guided Percutaneous Sacral Fixation



Sacral Fixation

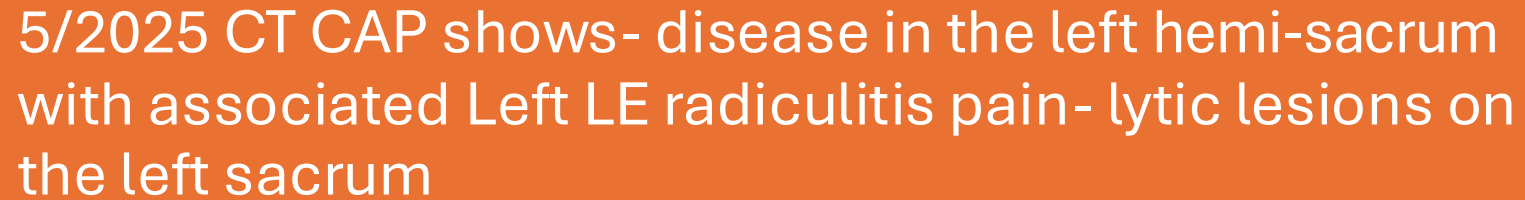


Case 3

69-year-old woman with stage IV cholangiocarcinoma, bone metastases, and recurrent liver metastases (4/2024)

Progressive symptom burden

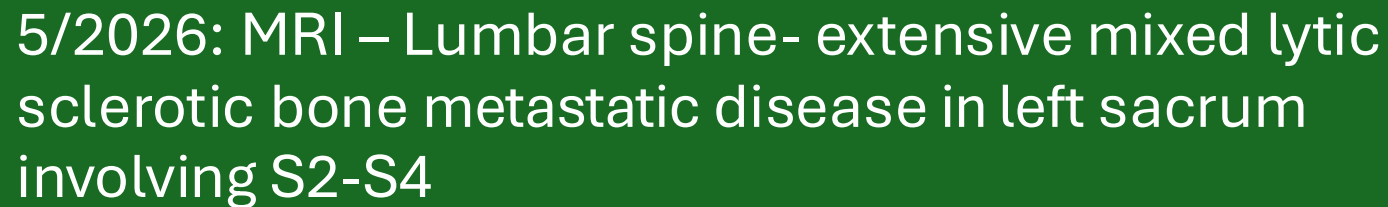
5/2025 CT CAP shows- disease in the left hemi-sacrum with associated Left LE radiculitis pain- lytic lesions on the left sacrum



Radiation therapy to left hemisacrum – completed 6/2025



5/2026: MRI – Lumbar spine- extensive mixed lytic sclerotic bone metastatic disease in left sacrum involving S2-S4



Ortho consultation-
10/22/2025- evalauted by
Orthopedics after
completion of RT to
Discuss indicated
surgical plan

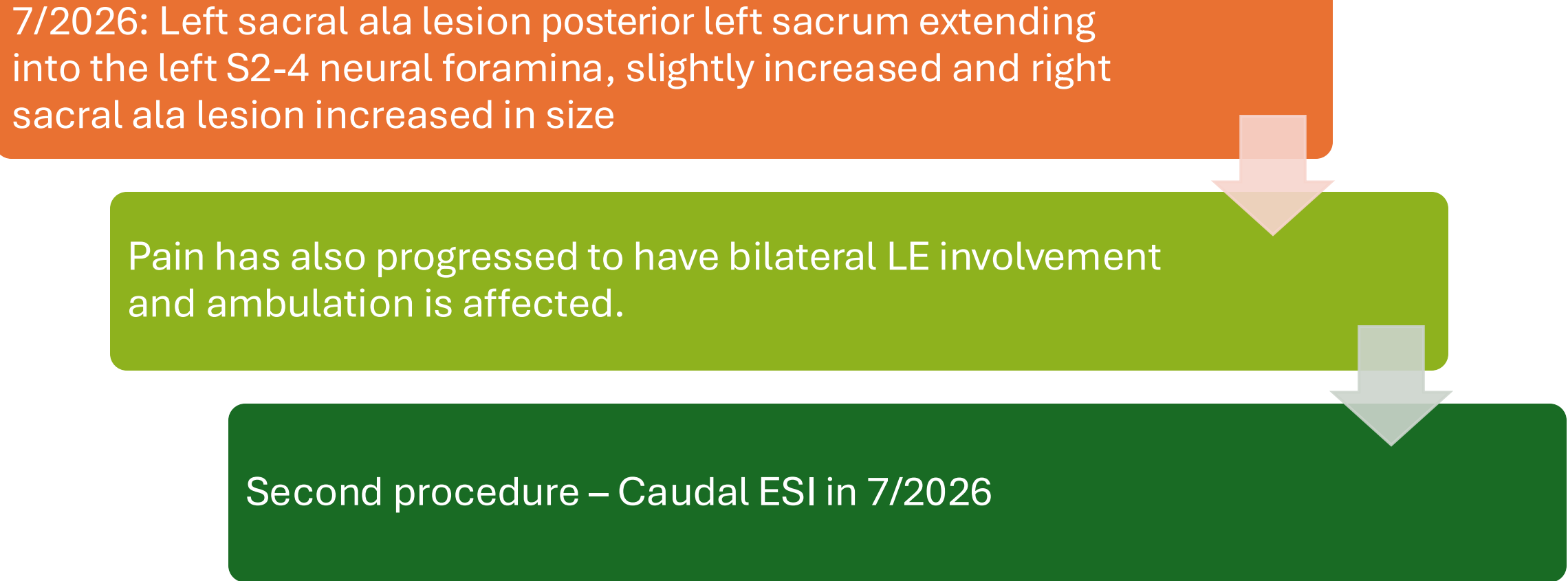
No indication for fixation,
not a candidate for tumor
ablation and has already
completed RT

Interventional pain
consultation –
11/6/2025

Left sided S1
Transforaminal Epidural
steroid injection



7/2026: Left sacral ala lesion posterior left sacrum extending into the left S2-4 neural foramina, slightly increased and right sacral ala lesion increased in size



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graph TD; A[7/2026: Left sacral ala lesion posterior left sacrum extending into the left S2-4 neural foramina, slightly increased and right sacral ala lesion increased in size] --> B[Pain has also progressed to have bilateral LE involvement and ambulation is affected.]; B --> C[Second procedure – Caudal ESI in 7/2026];
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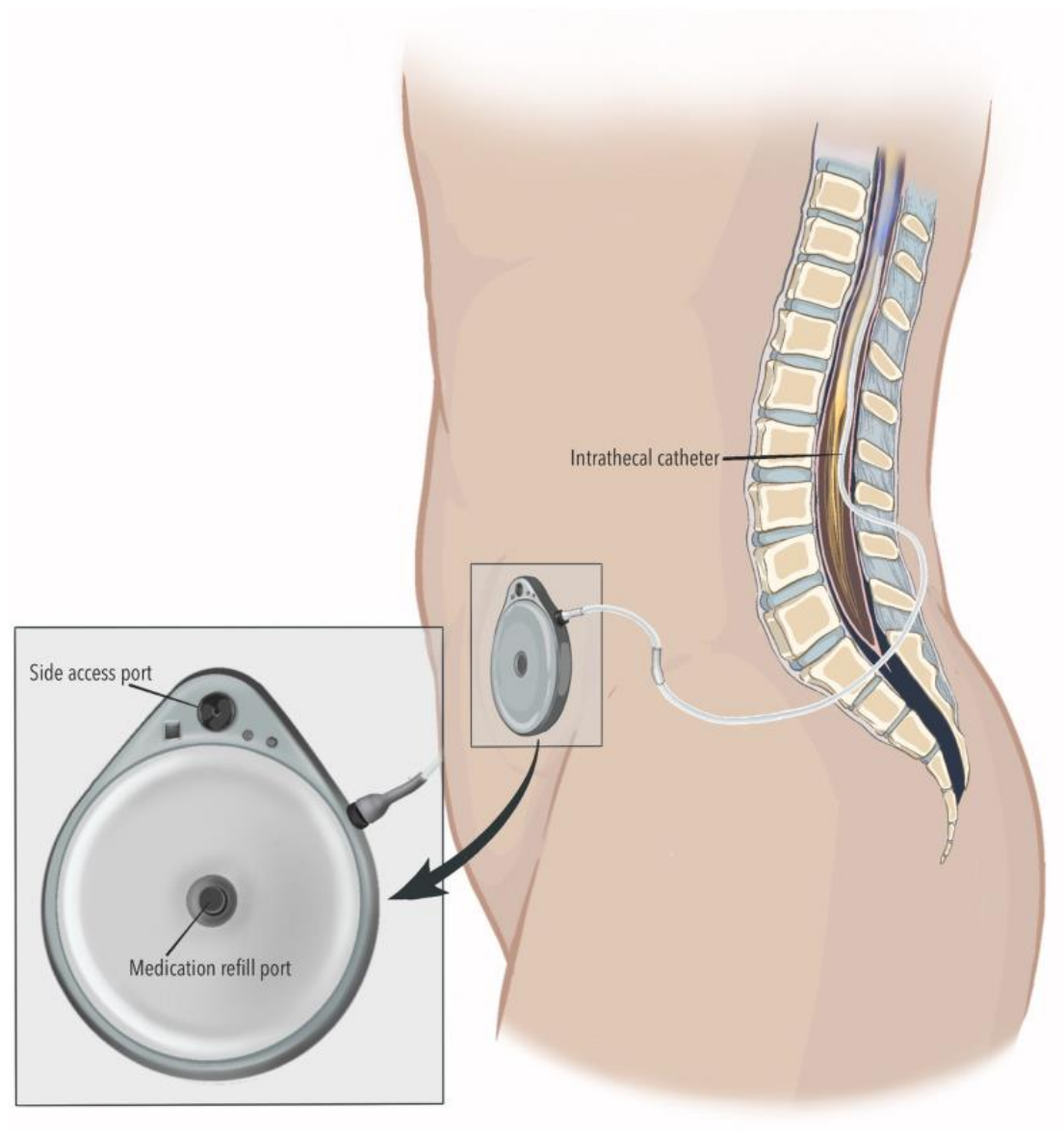
Pain has also progressed to have bilateral LE involvement and ambulation is affected.

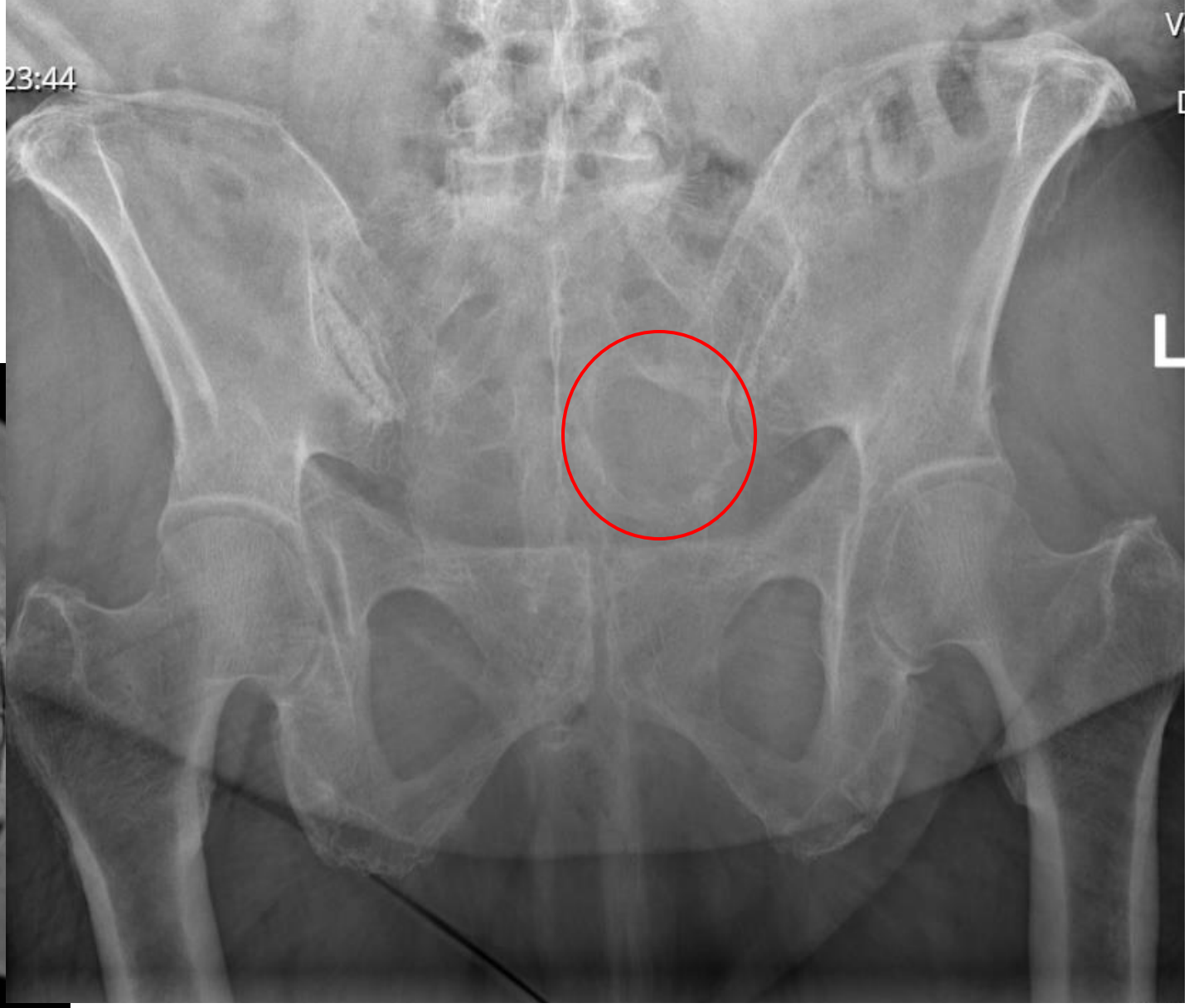
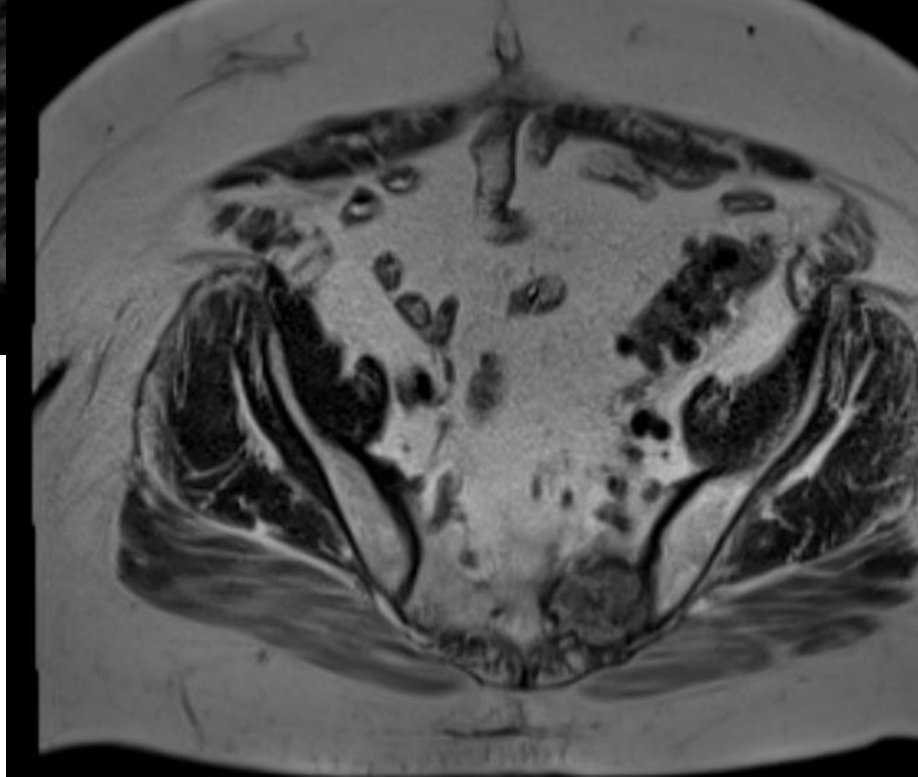
Second procedure – Caudal ESI in 7/2026



Intrathecal Pump – when is the right time???







- Left Sacral Lesion, no impending fracture, no activity related pain (not relieved by rest), significant nerve related pain, proximity to nerve roots.

Thank You

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