Thermal Ablation: How I do it

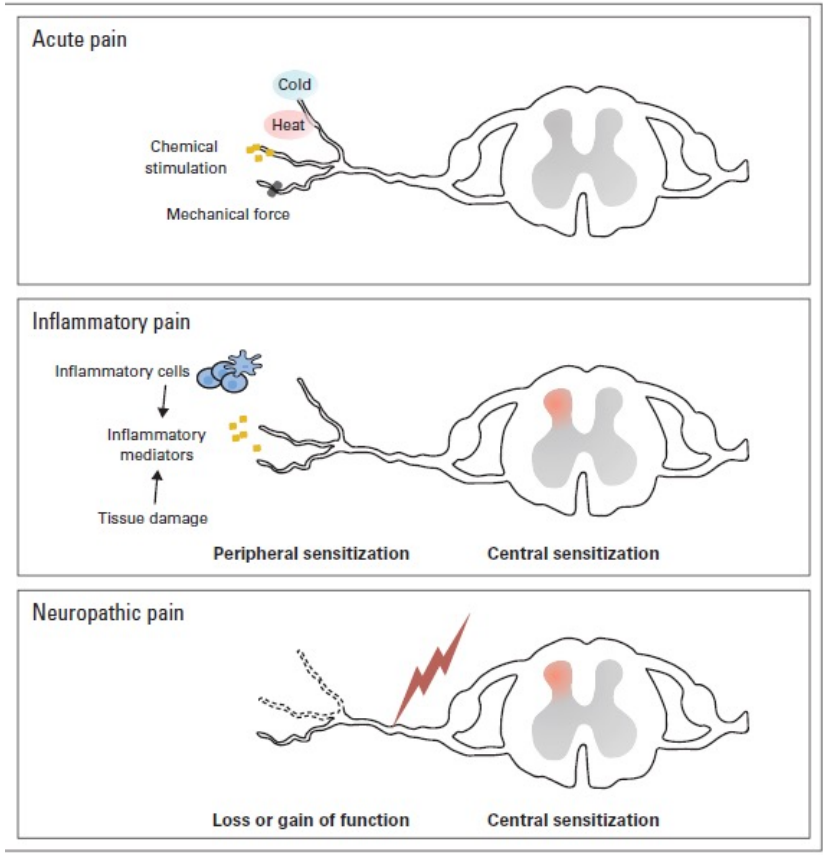
Dr. Ernesto Santos Martin
Memorial Sloan Kettering Cancer Center
New York City, NY

Disclosures

NOTHING TO DISCLOSE

Bone Ablation: How I do it

Main mechanisms of cancer-induced bone pain



- Background pain, a dull continuous pain, increases in intensity as the diseases progresses: treated normally with traditional analgesics (Biological pain)
  - RT and Image guided ablation. Embolization

- Spontaneous and incident pain, often referred as breakthrough pain, are episodes of extreme pain breaking through the therapeutic regimen administrated to control background pain (Mechanical/Incident pain)
  - RT/Image guided ablation
  - Cementoplasty: Axial load/weight bearing
  - Percutaneous fixation: Rotational or sheer forces

Falk S. Pain and nociception: Mechanisms of cancer-induced bone pain. J Clin Oncol 2014; 32:1647

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Bone Ablation: Procedure and Devices

- Adequate pre-procedural imaging. CT: Anatomical location, Fx and quality of the bone. MRI: neural structures. PET: treatment of residual tumor after RT or systemic therapy.

- Devices. Thermal ablation: RFA, Cryoablation, MWA, MRgFUS
  - Heat (RFA/MWA): Faster ablation but cannot be monitored accurately without thermocouples or MR thermometry. Bipolar RF in spine: treatment algorithm allows the ablation zone to conform the vertebral body shape.
  - CA and MWA: Better delivery of the energy through intact and sclerotic bone (CA)
  - CA: large ablation volume, ice ball visible (CT, US, MRI) for monitoring. Less post ablation pain and lower analgesic requirement than RFA.
  - 1 cm away form critical structures

Kurup, AN. Ablation of MSK metastases. AJR 2017
Auloge P. Complications of perc bone tumor cryoablation: A 10-year experience. Radiology 2019

Bone Ablation: Minimizing complications

- Organ displacement, monitoring techniques, CT navigation
  - Critical structures can be displaced using fluid, gas or balloons.
  - Safety margin >1 cm but difficult to accomplish in the spine and patients with no fat.
  - Monitoring of the ablation zone: imaging, thermocouples and neurophysiologic techniques.
  - CA: Imaging monitoring (CT, MRI or US) every 3-5 min.
  - Superficial tumors. Skin protection: hydro-dissection of the skin and warm pads. US monitoring.
  - Neurophysiologic monitoring with somatosensory or motor evoked potentials or direct nerve stimulation is helpful (patients should be under GA and responses may be dampened by inhaled anesthetics)
  - Combined techniques in pats with mechanical pain (cementoplasty/perc fixation)
  - CT navigation: accuracy and multiple probe placement

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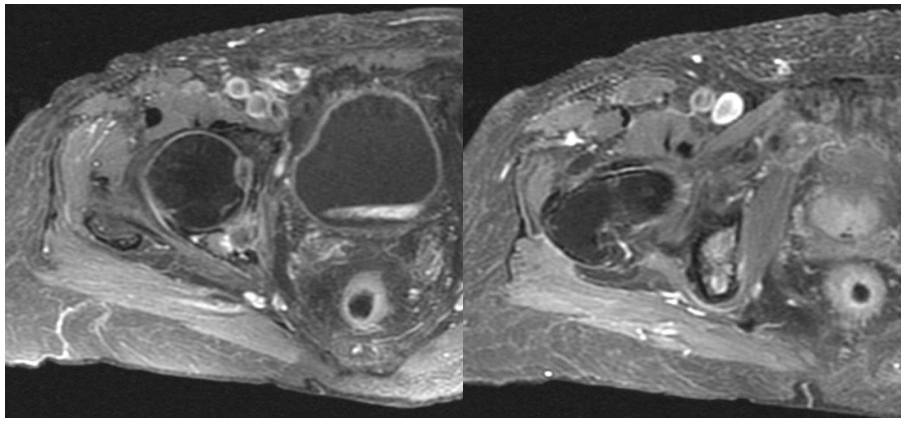
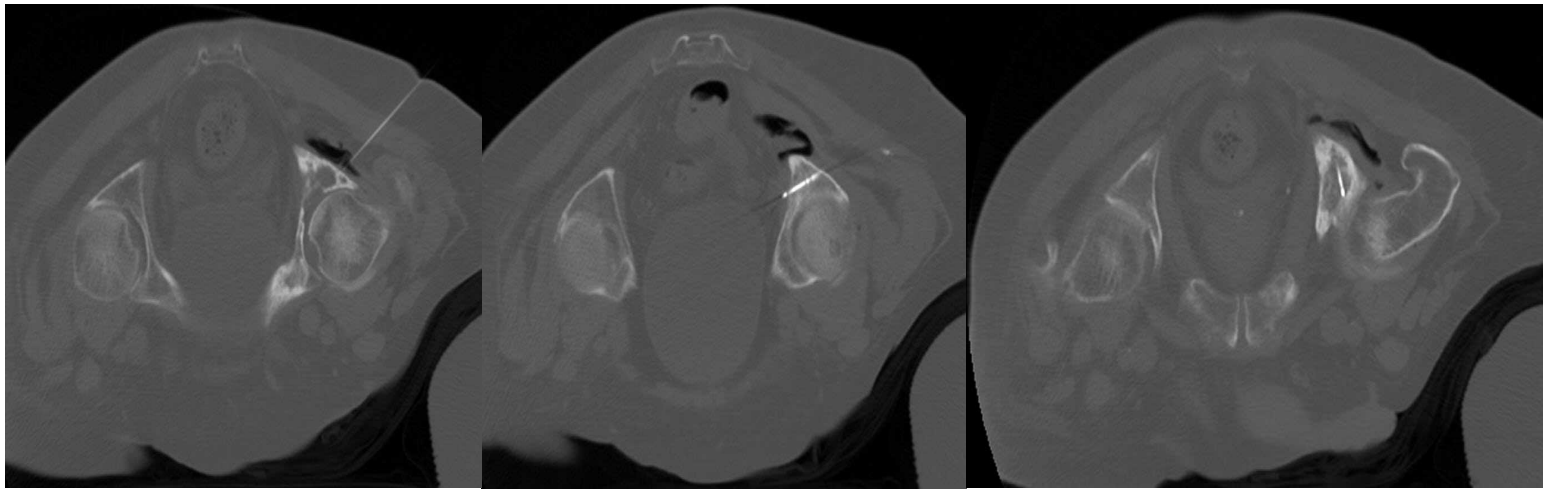
Bone Ablation: How I do it

62 yo male bone metastases from pancreatic neuroendocrine tumor. Multiple bone metastases with R hip/buttock pain. Biological pain uncontrolled with opioids. **VAS pre 9**

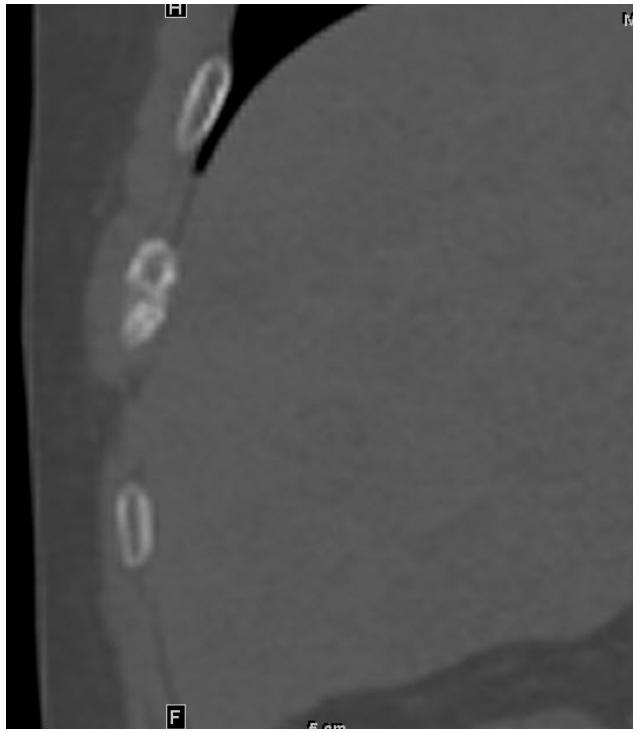


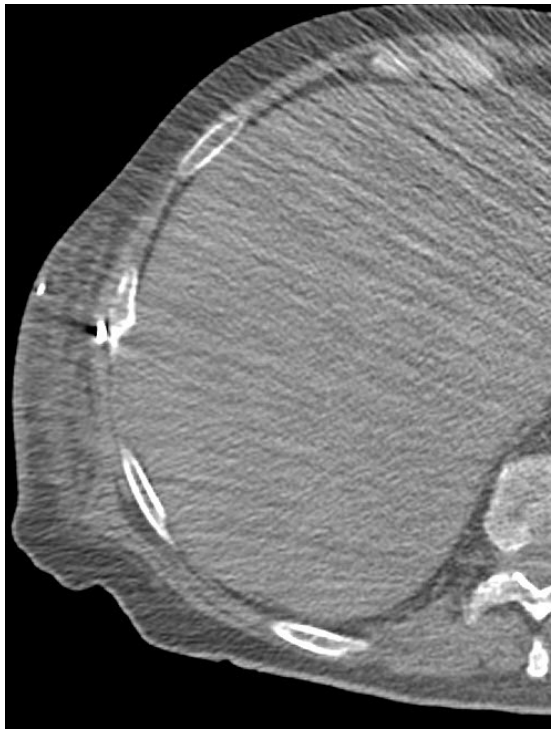


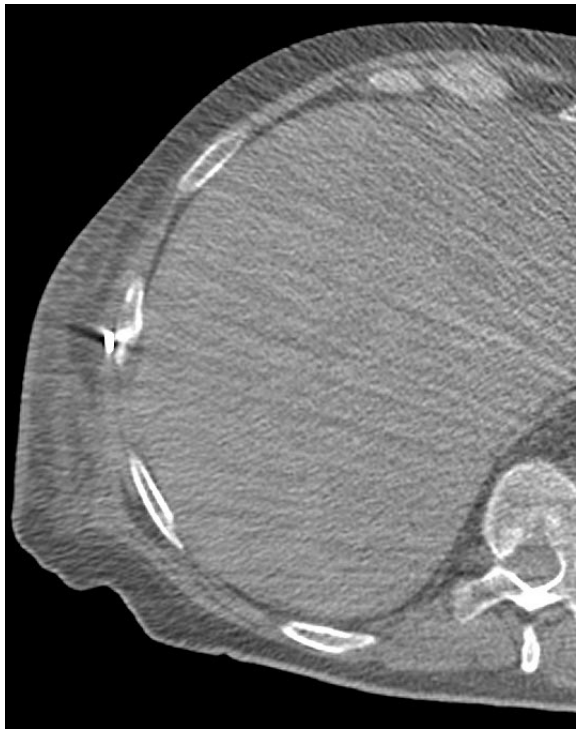
June 2020: Cryoablation + IONM+ Air dissection/nerve insulation

6 month follow up**: VAS post 4**

62 yo male bone metastases from pancreatic neuroendocrine tumor. Multiple bone metastases with R 7th rib painful met. **VAS pre 8**

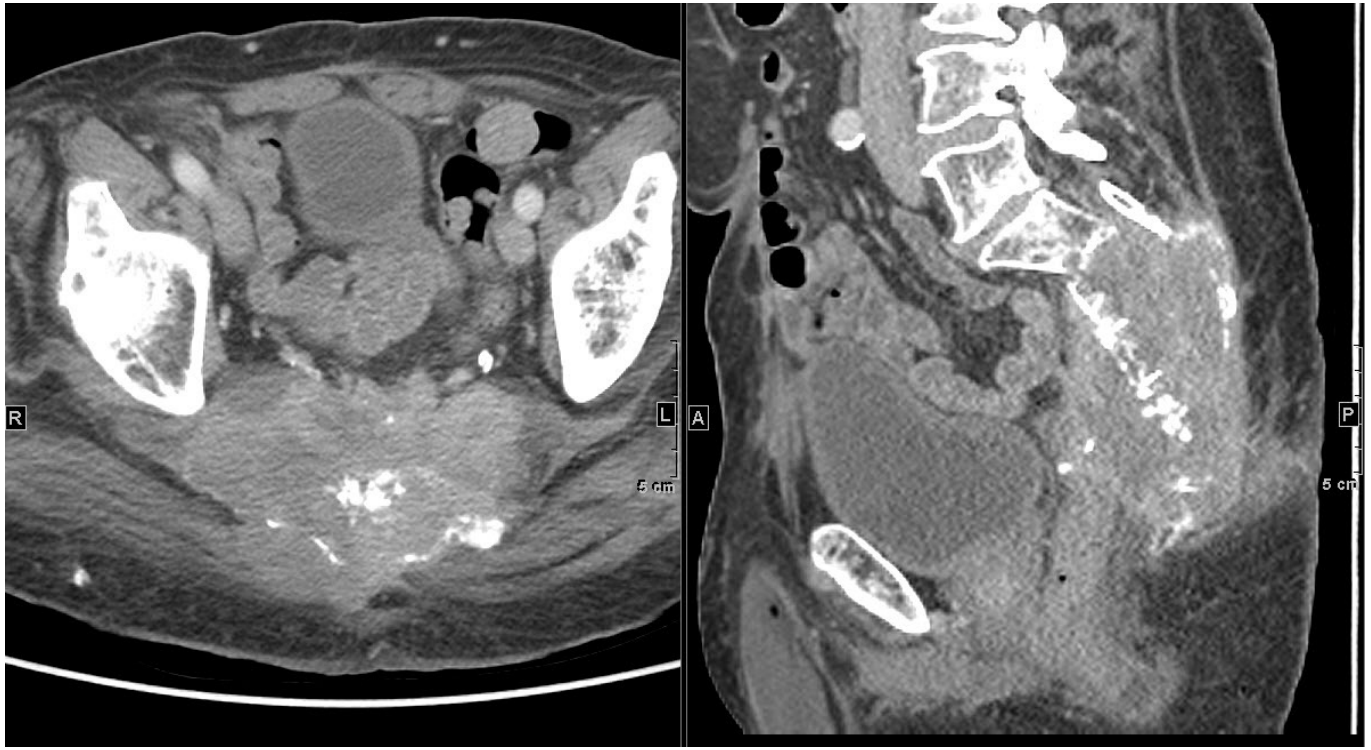






VAS post (3 month follow up) 4

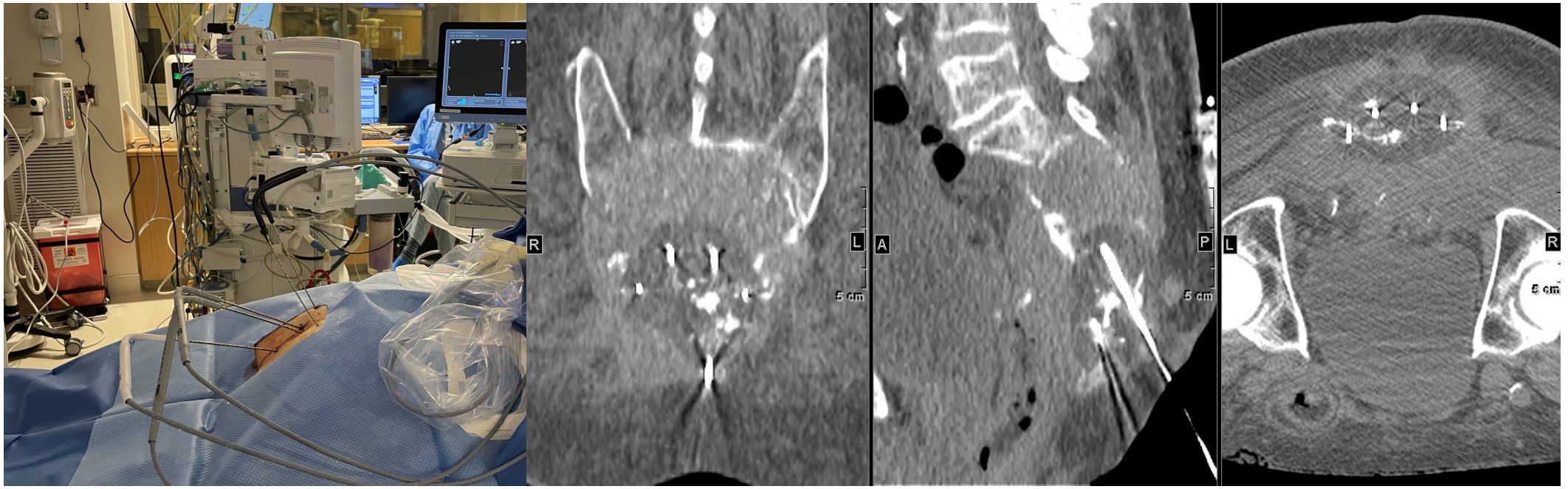
Bone Ablation: How I do it

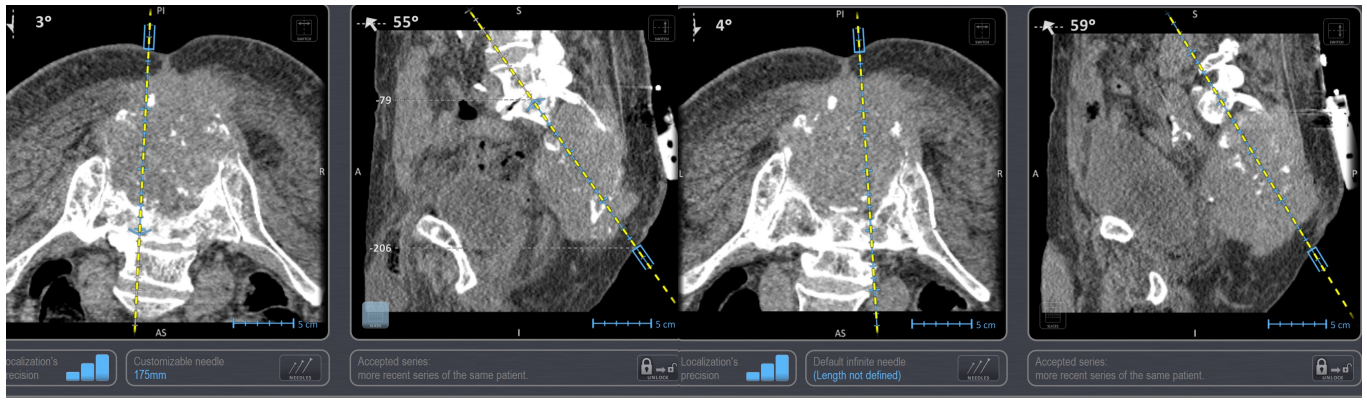


Goal of the treatment: QoL improvement. Patient wants to sit for longer period of time to write his book

77 yo male (author and playwright) with a Hx of synchronous rectal and sigmoid ca diagnosed in 2016 s/p local excision of rectal ca on Dec 2016, and LAR in Jan 2017, with presacral recurrence and pulmonary mets. Pat received10 fractions but he elected to stop radiation due to adverse effects

Ongoing sacral pain particularly when sitting (VAS 9/10). Sacral pain in bed and walking (VAS 6-7/10) Ambulation: cane and walker with unsteady gait. Urinary incontinence



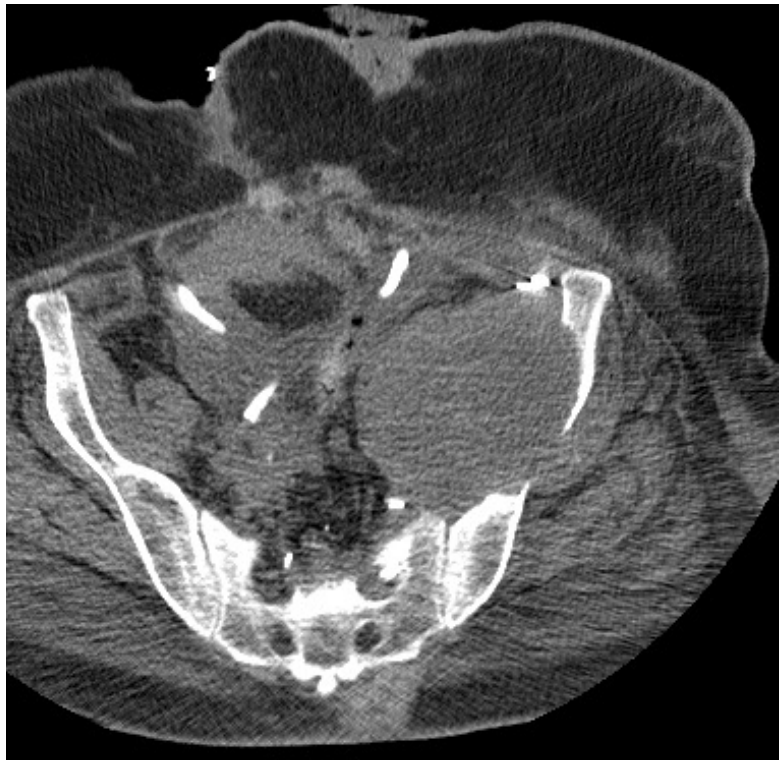


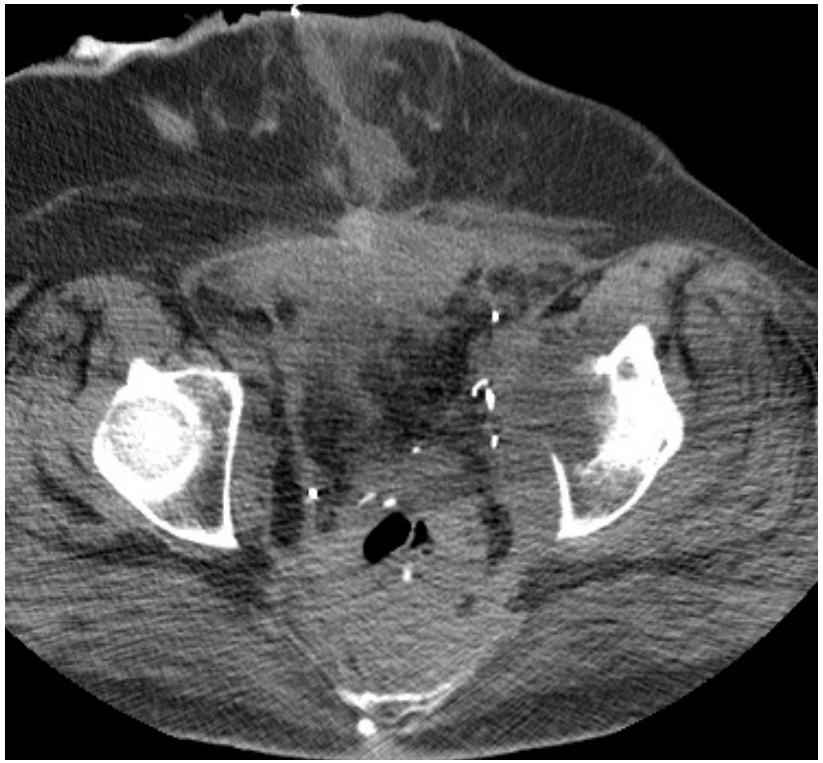
CT Navigation

Image guided cryoablation of the sacrum (S3-S5) and coccyx covering the interphase between the tumor and bone fragments.
1 month follow up: Pain post ablation: (sitting) VAS 5 , (bed/walking) VAS 4.

Bone Ablation: How I do it

53 yo female bone metastases from endometrial Ca. Patient s/p pelvic exenteration and radiation therapy. Large lytic lesion of the left iliac bone with extension to the left acetabular roof (Dec 2012). Pain uncontrolled with opioids. Decreased mobility and increasing difficulty in ambulation (crutches).





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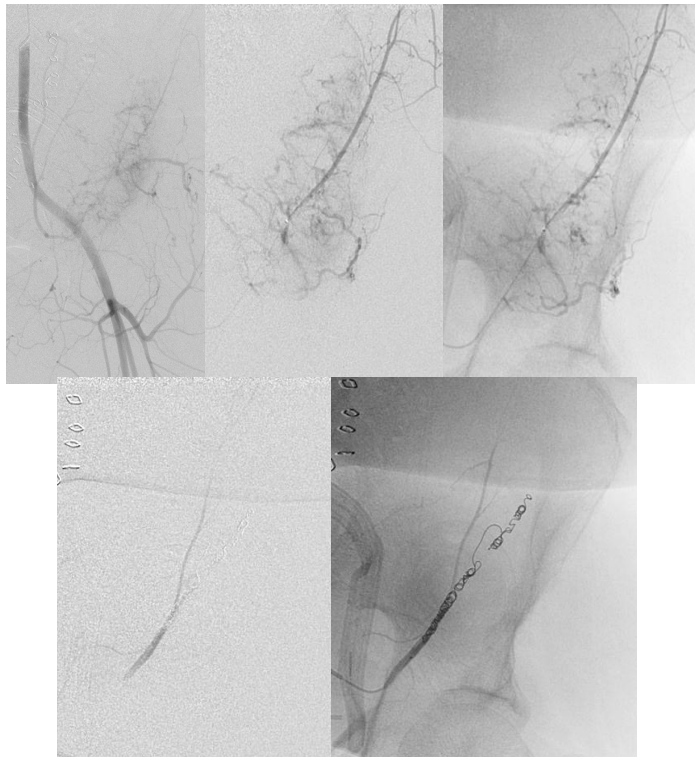

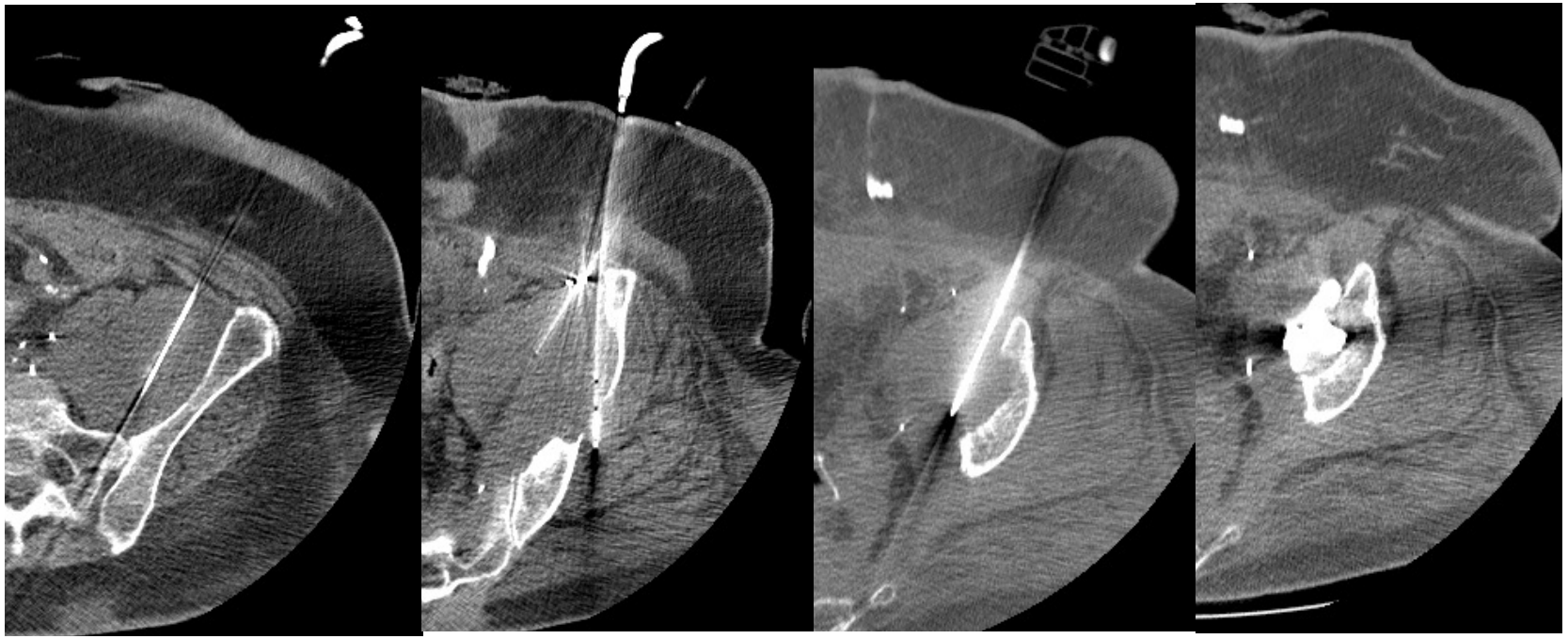

CT guided cryoablation of left iliac bone lytic met. Cementoplasty of left acetabular roof. IONM

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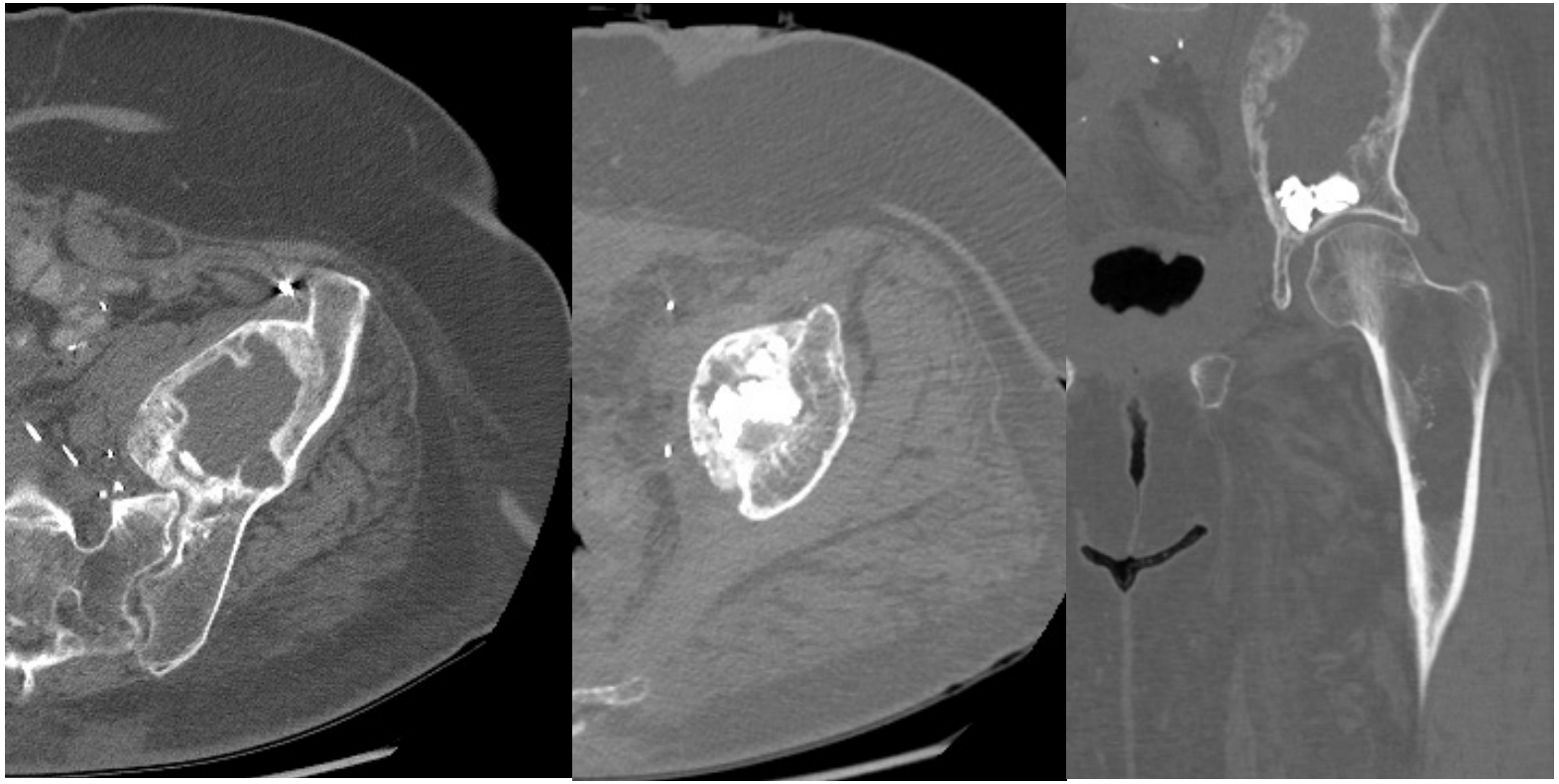
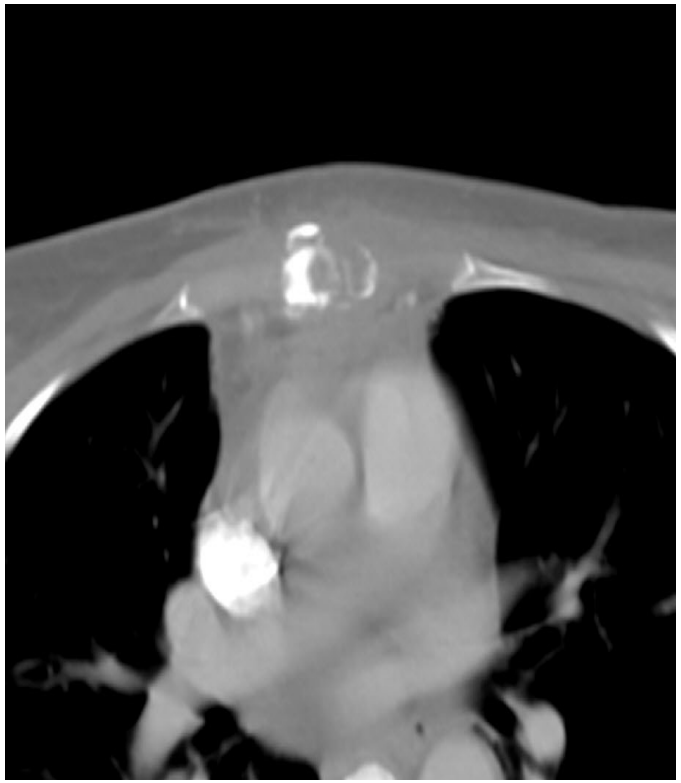


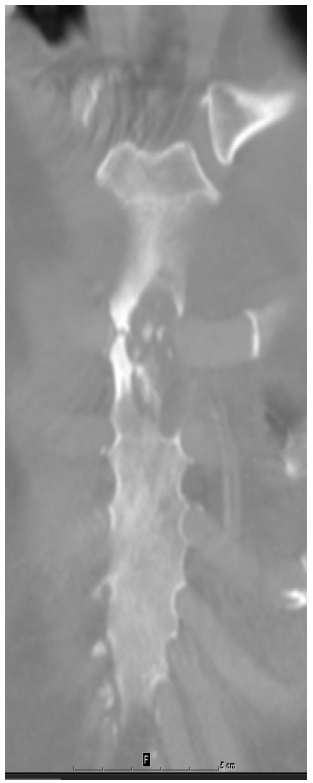
28 months after the initial treatment.
QOL intact with no pain

VAS Pre 8 → VAS Post: 1

Bone Ablation: How I do it

Sternal metastases: 50 yo male with metastatic anaplastic thyroid carcinoma. Main source of pain: left arm and large lytic sternal lesion. RT to sternum: 27 Gy July 2018 and 25 Gy Feb 2019
Sternal pain: VAS PRE Average 5, worst score 8. IR treatment: MWA ablation and cementoplasty on 11/1/2019





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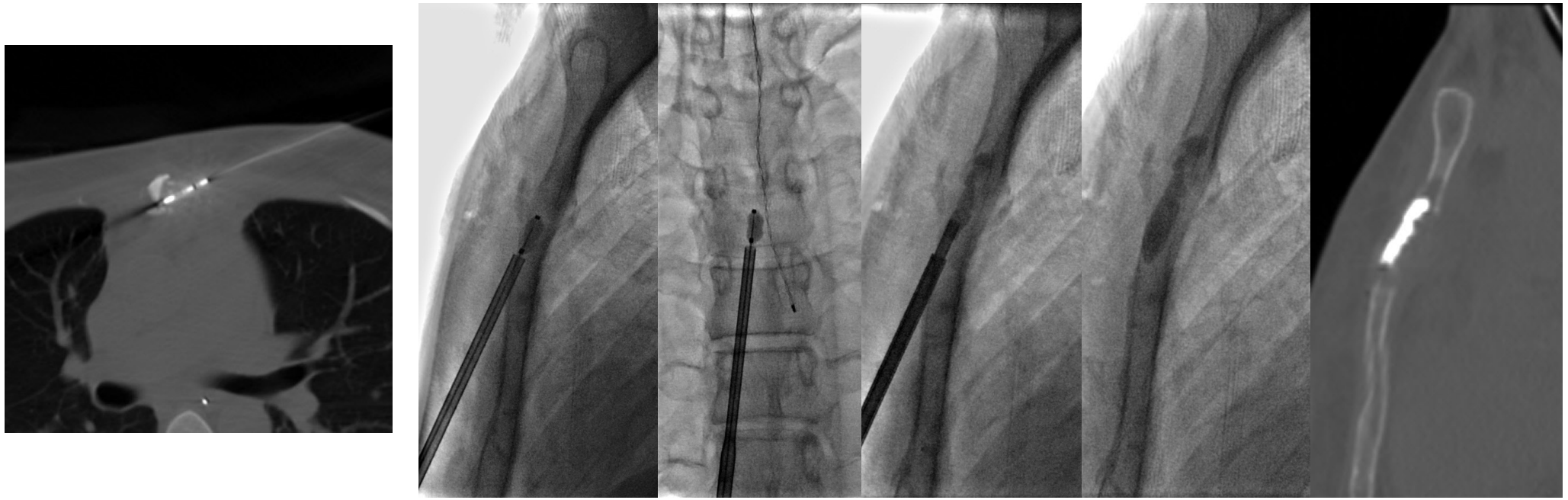
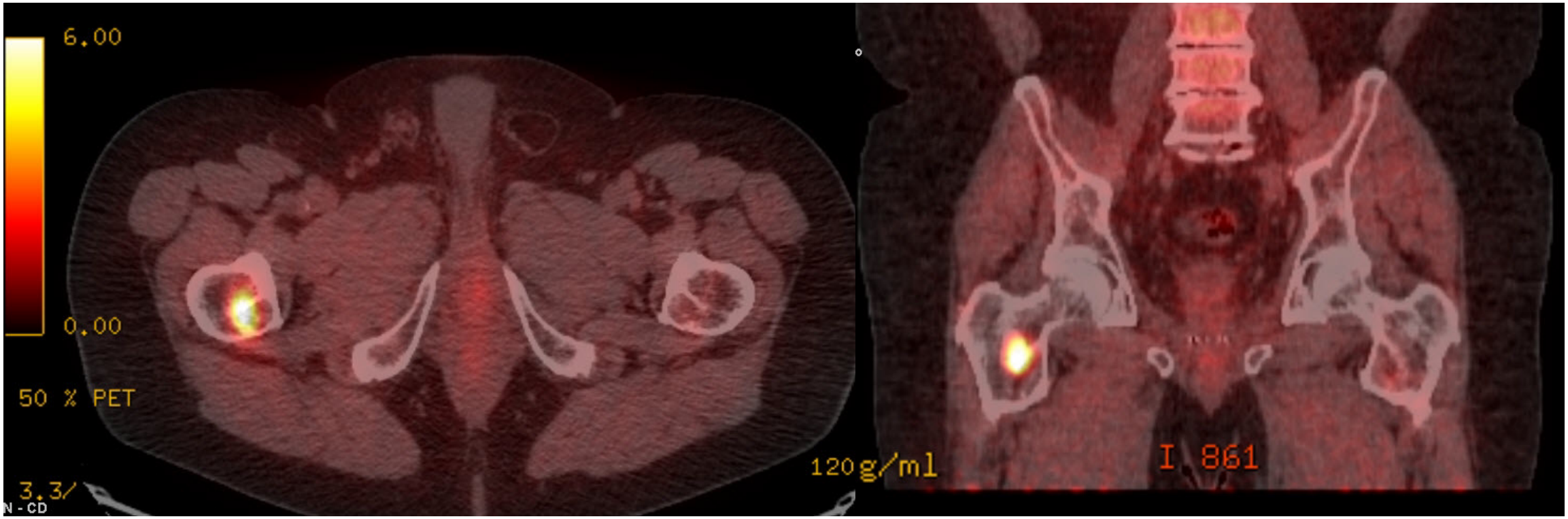


6 month post procedure: VAS 2-3

Bone Ablation: How I do it

75 year old male with Hx of oligometastatic prostate carcinoma status post HIFU in 2016. Pat s/p proton therapy to an intertrochanteric right femur solitary lesion on March 2019. Case discussed in the Bone met Multi-D DMT.



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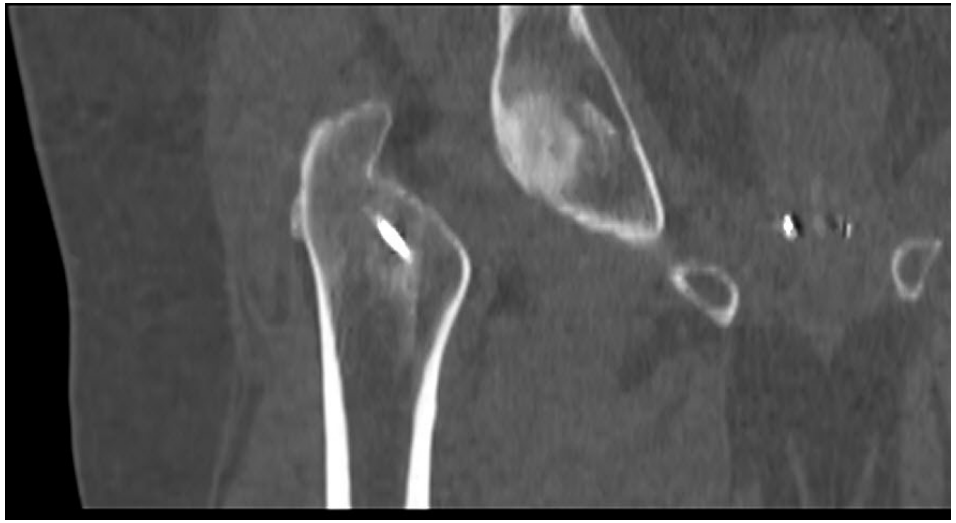
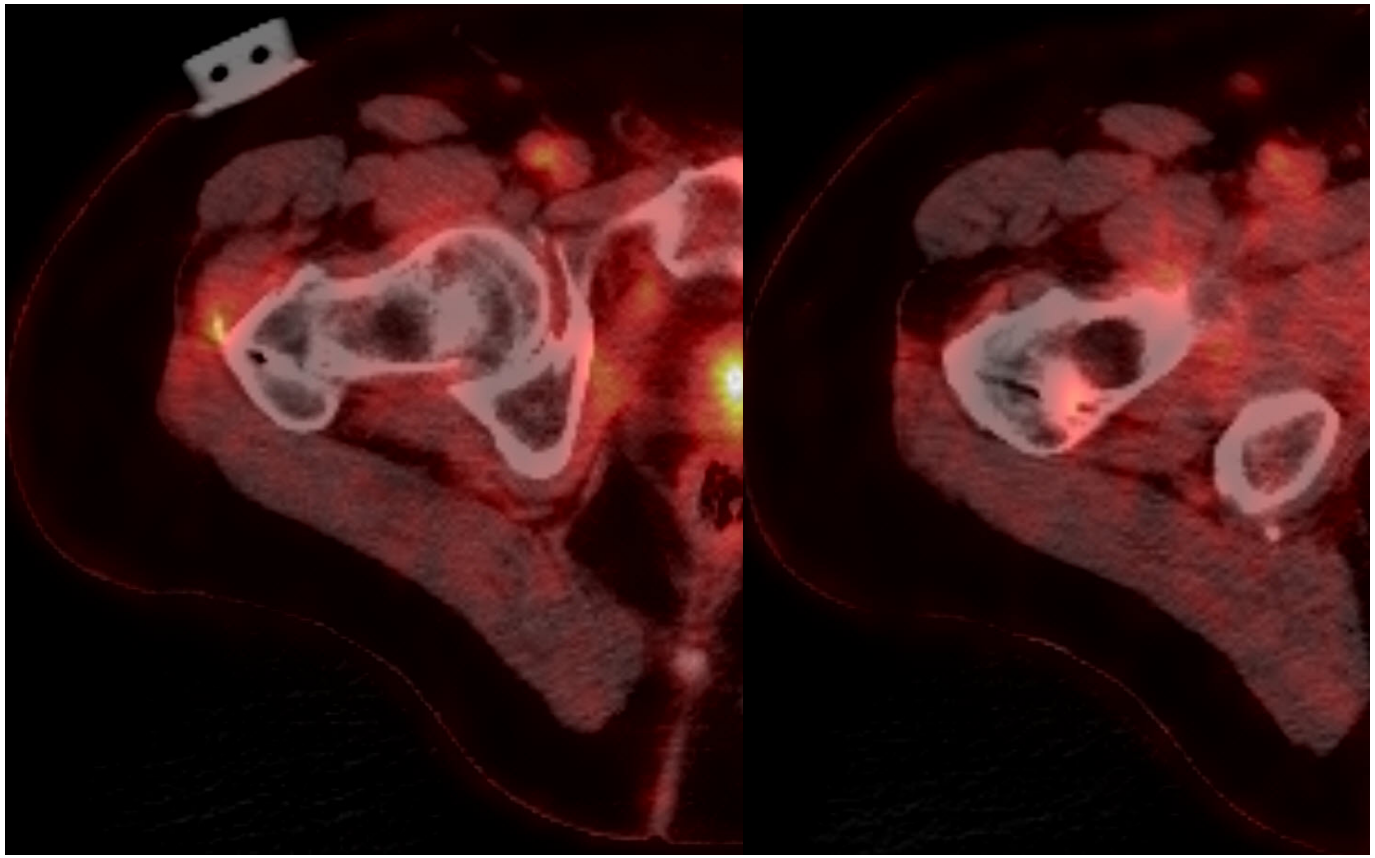


CT Navigation



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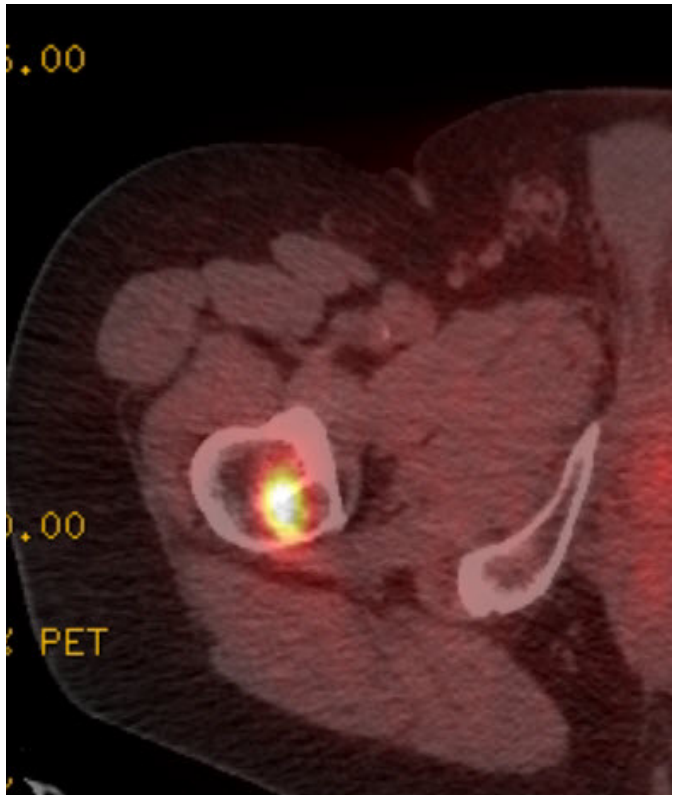
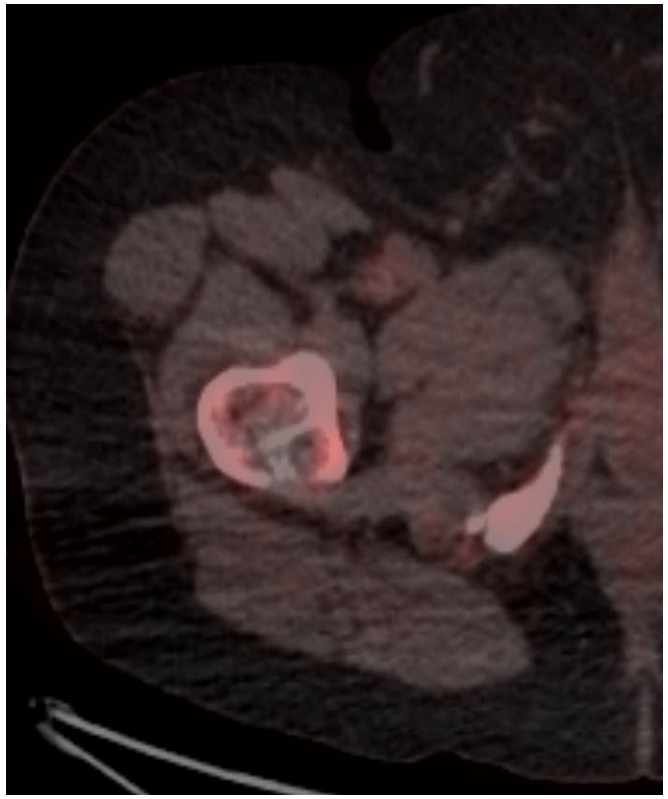


PET pre ablation



PET post ablation: 9 month follow up