

STATEMENT OF PURPOSE

While proceeding with a series of conservative therapy modalities a 39 year old female who had minimal smoking history presented with ankle pain and through a series of follow up MRI, CT and PET scans, a diagnosis of NSCLA with metastases to the brain, spine, hip and foot was made. This case study is aimed at providing insight into a rare occurrence of non-small cell lung adenocarcinoma (NSCLA) metastasizing to the talus.

CASE STUDY

A 39-year-old female that had a minimal smoking history presented to the clinic with chronic, progressive ankle pain following activities underwent multiple modalities of conservative therapy including immobilization, rest and injections with no relief. There were no significant findings on radiographic appearance as seen below (figure 1). The patient also brought an MRI performed by her primary care physician to the appointment that showed bone marrow edema and can be seen to the right (figure 2).

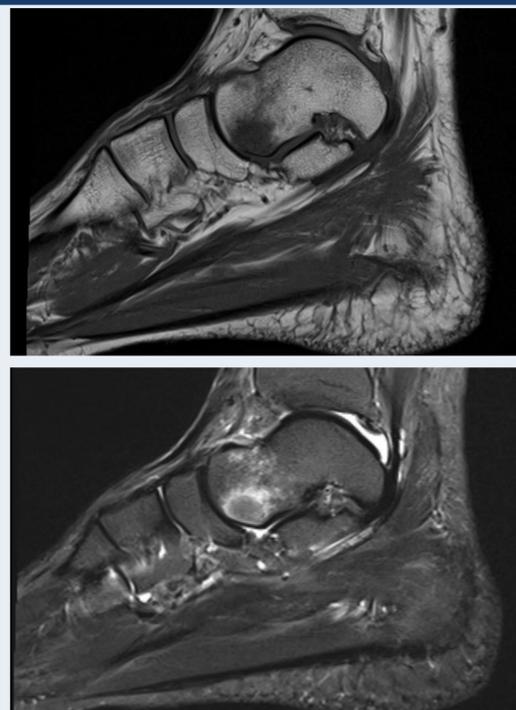
Figure 1. Radiographic evaluation at first visit



Radiographs showing no likely causality of ankle pain.

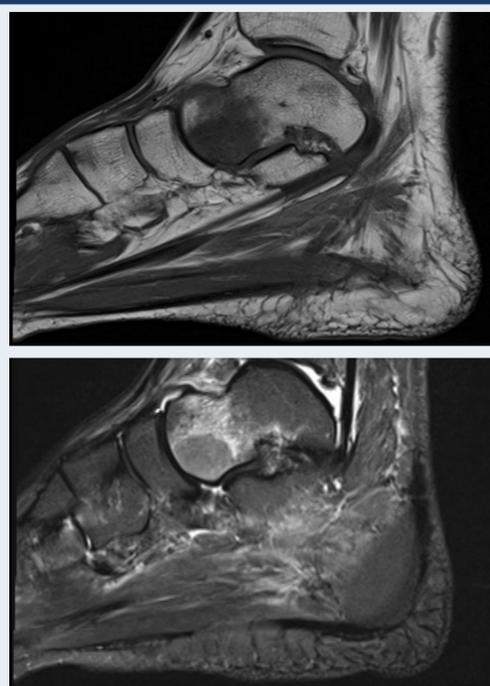
The patient presented back to the clinic after a series of failed conservative treatment modalities including a CAM boot, casting, bone stimulator and non weight bearing. A follow up MRI was ordered at this visit and can be seen to the right (figure 3). She was then sent to pain management as the pain worsened to include symptoms consistent with nerve pain. After multiple months of failed conservative treatment surgery was planned for a diagnostic ankle arthroscopy with subchondroplasty of the talus. However, after a second opinion she decided to proceed with physical therapy and was placed on Lyrica and Baclofen for CRPS. As the pain continued to worsen a CT guided tissue biopsy was performed and the results were inconclusive. A follow up MRI (figure 4) was then performed showing worsening marrow edema and surgery for a diagnostic ankle arthroscopy and subchondroplasty was scheduled once again. However, the day before the surgery the patient suffered a seizure overnight and a CT of the brain showed multiple tumors, and a PET scan was performed with the results seen to the right (figure 5).

Figure 2. MRI at 1 month



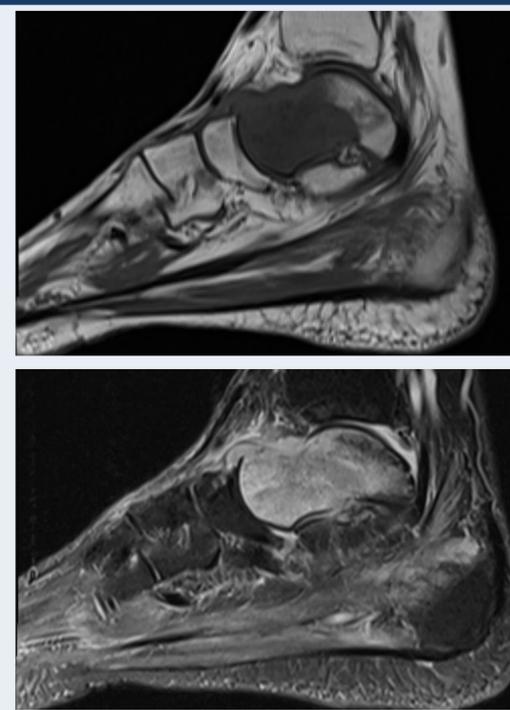
First MRI showing bone marrow edema in the head of the Talus on both T1 and T2 imaging.

Figure 3. Follow up MRI



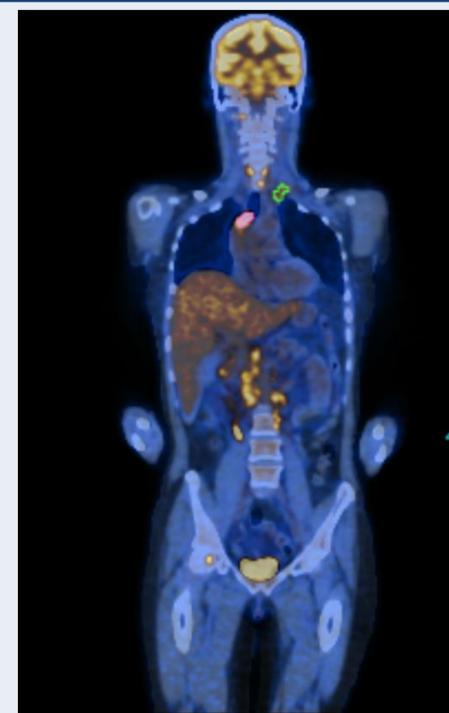
MRI showing bone marrow edema extending further into the neck compared to previous MRI evaluation.

Figure 4. Final MRI



Final MRI showing bone marrow edema extending into the talar body

Figure 5. PET Scan



PET scan showing multiple metastatic sites including the pelvis, spine, ribs, liver and brain.

DISCUSSION

The patient was diagnosed with non-small cell lung adenocarcinoma (NSCLA) with multiple metastatic sites. Surgical intervention of the ankle was cancelled and the patient was given a prognosis of 6 months to live secondary to the significant metastases to multiple organs. The patient eventually succumbed within the year after palliative treatment.

Ankle pain is one of the most commonly diagnosed pathologies in musculoskeletal management. This case demonstrates that initially benign ankle pain can progress rapidly to a much larger issue. There are multiple reports of lung cancer that had metastasized to the calcaneus, however there were no reports found by the authors of primary lung cancer metastasizing to the Talus bone. At least 80% of bone metastases stemming from lung cancer occur in the axial skeleton in the spine, ribs and pelvis. However, the appendicular skeleton can also be the site of metastases. A case report in 2013 by Dai et al. showed a patient who had never smoked presented with lung cancer that had metastasized to the calcaneus in a patient who presented with chronic heel pain for 6 months. Another case study performed in 2015 (Singh) a 63 year old female with a history of 3 months heel pain underwent an MRI that showed a cystic change that led to a diagnosis of lung cancer after open biopsy of the lesion.

This case demonstrates the need for a thorough evaluation of the patient that is refractory to typical conservative modalities. When advanced imaging is deemed appropriate for continued musculoskeletal pain, MRI is typically the choice. When MRI demonstrates an area of avascular necrosis with concomitant cystic change in a patient with a history of tobacco use, we believe PET-MRI or PET-CT may be a better choice. As continued improvements are made in advanced imaging, we will be more capable of diagnosing rare ailments with symptoms showing in the foot and ankle at an earlier time point.

Had we been able to obtain tissue biopsy results with the correct testing this case would have been much more definitive; however we were advised against subjecting the patient to further testing due to the patient's staging. Metastases to the foot and ankle are a late occurrence in cancerous findings, and advanced imaging modalities pursued in the foot and ankle may not change the prognosis.

REFERENCES

1. American Cancer Society. Cancer Facts and Figures 2018. American Cancer Society, Atlanta, GA 2018.
2. Kohler BA, Wand E, McCarthy BJ et al. Annual report to the nation on the status of cancer, 1975-2007, featuring tumors of the brain and other nervous system. *J Natl Cancer Inst* 103:714-736, 2011.
3. Coleman RE. Metastatic bone disease: clinical features, pathophysiology and treatment strategies. *Cancer Treat Rev* 27:165-176, 2001.
4. Coleman RE. Skeletal complications of malignancy. *Cancer* 80:1588-1594, 1997.
5. Hirsh V. Skeletal disease contributes substantially to morbidity and mortality in patients with lung cancer. *Clin Lung Cancer* 10(4):223-229, 2009.
6. Sathikumar N, Delzell E, Morrissey MA et al. Mortality following bone metastasis and skeletal-related events among patients 65 years and above with lung cancer: a population-based analysis of U.S Medicare beneficiaries, 1999-2006. *Lung Ind* 30(1):20-26, 2013.
7. Kosteva J and Langer C. The changing landscape of the medical management of skeletal metastases in nonsmall cell lung cancer. *Current Opinions Oncology* 20: 155-161, 2008.
8. Dai H, Qiang M, Chen Y, Zhai W and Zhang K. Lung Cancer Presenting as Heel Pain: A Case Report. *Oncology Letters* 8: 736-738, 2014.
9. Singh C, Gupta M, Singh J, and Ali A. Isolated Calcaneal Metastasis; An Unusual Presentation of Lung Carcinoma as Heel Pain. *Clinical Nuclear Medicine* 41 (3): 214-216, 2016.
10. Telles da Silva G., Bergmann A, Santos Thuler LC. Skeletal related events in patients with bone metastasis arising from non-small cell lung cancer. *Support Care Cancer* 24:731-736, 2015.
11. Tsuya A, Kurata T, Tamura K and Fukuoka M. Skeletal Metastases in Non-Small Cell Lung Cancer: a Retrospective Study. *Lung Cancer* 57: 229-232, 2007.
12. Ehman EC, et al. PET/MRI: Where might it replace Pet/CT? *Journal of Magnetic Resonance Imaging* 46(5): 1247-1262, 2017.