SAR Prostate DFP Case of the Week

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History

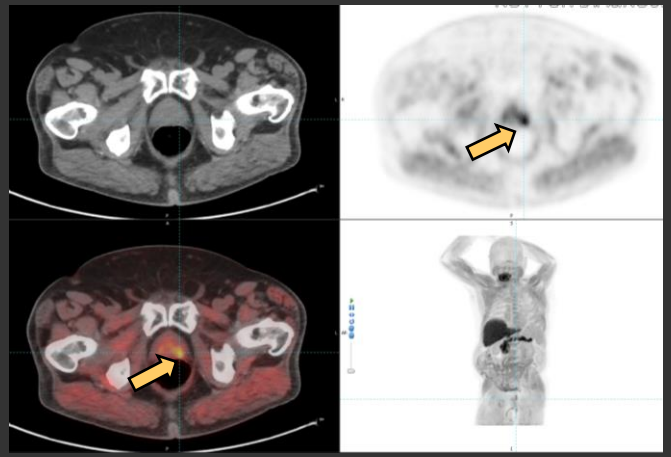
- 71 year old male with history of rising PSA (2.79 -> 7.88 ng/ml)
- Biopsy demonstrated low volume disease
  - Left: Gleason 3 + 4 = 7
  - Right: Gleason 3 + 3 = 6
- Patient elected active surveillance

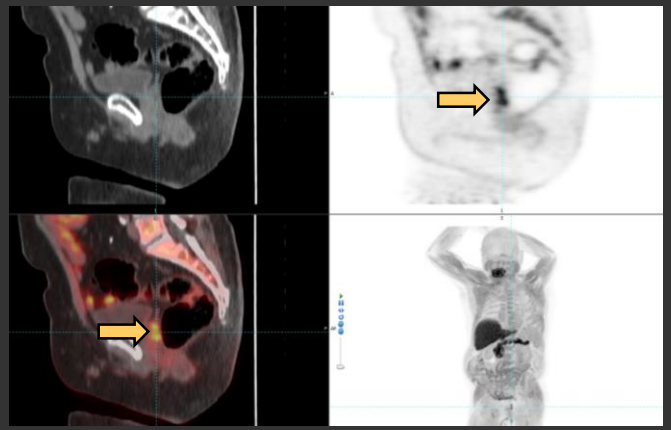
- PSA reached 9.32, patient decided to treat with radiation
  - External Beam Radiation: 70 Gy in 28 fractions

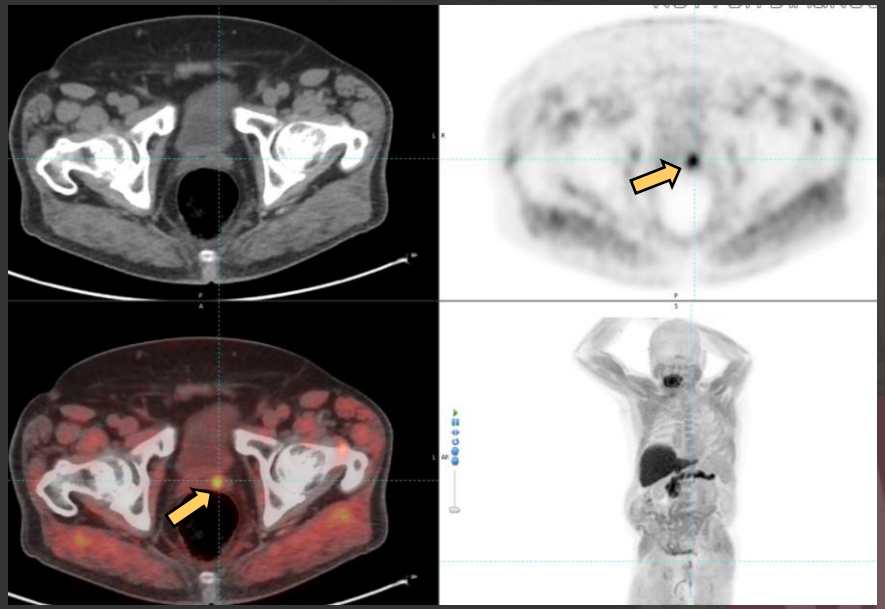
- Post Treatment PSA decreased to a nadir of 1.56 ng/ml and gradually increased to 2.45 ng/ml over the course of two years.

- Imaging to investigate for disease recurrence

Fluciclovine (^{18}F, Axumin) PET/CT



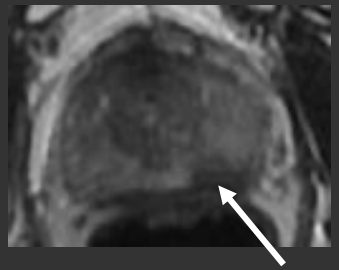


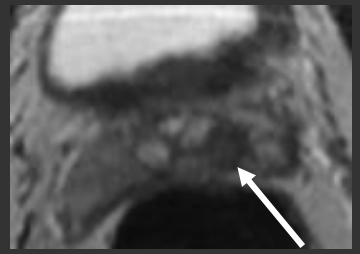


Isolated uptake in the proximal/base of the left prostate with extension into the seminal vesicle. No evidence of local regional lymphadenopathy or distant metastasis.

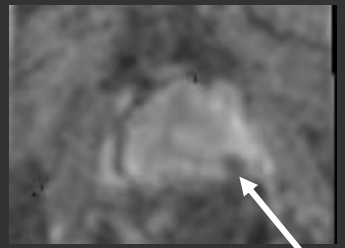
Prostate mpMRI

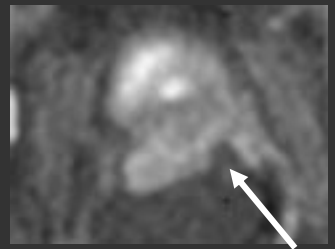
T2



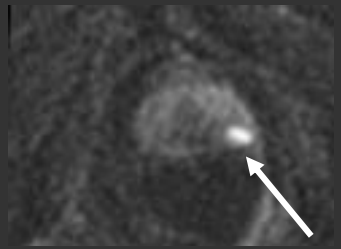


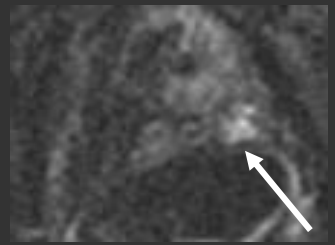
ADC





DWI





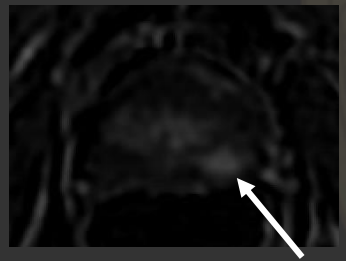
T2: focal low signal in the left peripheral zone and seminal vesicle in the background of diffuse low signal

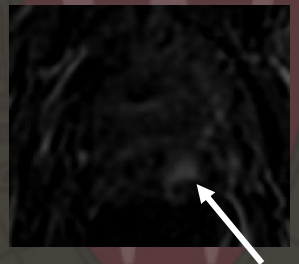
DWI/ADC: lesions restrict diffusion

DCE: early and persistent enhancement

Both lesions given PI-RADS 4 score

DCE





Pathology Report

Prostate, Left Base: Needle Core Biopsy.
Prostatic adenocarcinoma. Gleason Pattern: 3+4=7/10.
Perineural invasion: Present.

Prostate, Left Seminal Vesicle: Needle Core Biopsy.
Prostatic adenocarcinoma. Gleason Pattern: 4+3=7/10.
Perineural invasion: Present.

MR Imaging Recurrence After Radiation Therapy

Pearls

- Decreased size and decreased signal on T2 weighted sequences
- Recurrent tumor usually is nodular, has lower T2 signal than the adjacent prostate and is locally recurrent.
- Restricted DWI and rapid contrast uptake and washout favor recurrence

Pitfalls

- Focal areas of hypointensity on T2 weighted sequences may represent treated tumor and not definitely recurrence
- Recurrent tumor may not be apparent on T2 weighted sequences
- RT-induced capsular irregularity may confound evaluation for extracapsular extension.

[2,3]

PET/CT Fluciclovine (^{18}F)

- FDA approved Fluciclovine (^{18}F, Axumin) in 2016 for imaging suspected prostate cancer recurrence based on elevated PSA
- Multiple studies have demonstrated that Axumin PET/CT studies have high sensitivity at the expense of low specificity.
- For example one such study shows the following for regional detection [1]
  - Axumin sensitivity 100.0% and specificity 11.1%
  - mpMR sensitivity 15.4-38.5% and specificity 55.6-77.8%
- ^{18}F PET high sensitivity and MRI moderate specificity might be used together (PET/MR) to optimally localize disease recurrence and guide biopsy.

References:

1. Akin-Akintayo, O., Tade, F., Mittal, P., Moreno, C., Nieh, P., Rossi, P., . . . Schuster, D. (n.d.). Prospective evaluation of fluciclovine (18F) PET-CT and MRI in detection of recurrent prostate cancer in non-prostatectomy patients. *European Journal of Radiology.*2018 May; *102*, 1-8.
2. Vargas, H., Wassberg, C., Akin, O., & Hricak, H. (n.d.). MR imaging of treated prostate cancer. *Radiology.* 2012 Jan*, 262*(1), 26-42.
3. Patel, P., Mathew, M., Trilisky, I., & Oto, A. (n.d.). Multiparametric MR Imaging of the Prostate after Treatment of Prostate Cancer. *Radiographics.* 2018*, 38*(2), 437-449.

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