

PET-Scanner 18F-PSMA in prostate cancer follow-up : a prospective study about 8 cases

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INTRODUCTION

Prostate cancer is the most common cancer in men [1]. The imaging assessment and treatment of prostate cancer has improved and the introduction of Positron Emission Tomography Scanner (PET-Scanner) 18F-Prostate-specific membrane antigen (PSMA) has allowed the detection of loco-regional and metastatic disease [1]. The main purpose of this work is to analyse the PET-Scanner 18F-PSMA outcomes in prostate cancer follow-up, and to perform a review of the literature.

MATERIELS AND METHODS

It is a prospective and descriptive study covering a period of 4 months, from July to October 2023. It concerned nuclear findings in PET-Scanner 18F-PSMA of 8 patients who came for a follow-up of a prostatic cancer. This study was conducted in Nuclear Medicine department in Cheikh Khalifa University Hospital, Casablanca, Morocco.

RESULTS

A total of 8 patients presenting a prostatic adenocarcinoma were identified.

The indications for PET-Scanner 18F-PSMA were mainly the follow up of prostate cancer for patients whom presented a PSA at 1.83 ng/ml (average level), (Figure 1).

Our patients presented an average age of 73.25 years and received an average injected dose intravenously of 237.99 MBq of fluoro-PSMA.

PET-Scanner 18F-PSMA was performed for patients following the PSMA protocol with late sequences (105 min after intravenous injection) with images focused on the pelvis at 125 min.

The images’ analysis revealed mainly (Figure 2) :

- Hypermetabolic lymph node involvement found in 7 cases (Figure 3),
- Hypermetabolic bone damage found in 4 cases (Figure 4),
- Hypermetabolic prostatic disease found in 3 patients,
- Lung nodules hypermetabolic involvement found in 2 patients.

Number of patients	PSA level (ng/ml)
4	< 0.5
0	0.5 – 1
1	1 – 2
3	> 2

Fig. 1 : PSA levels of our patients

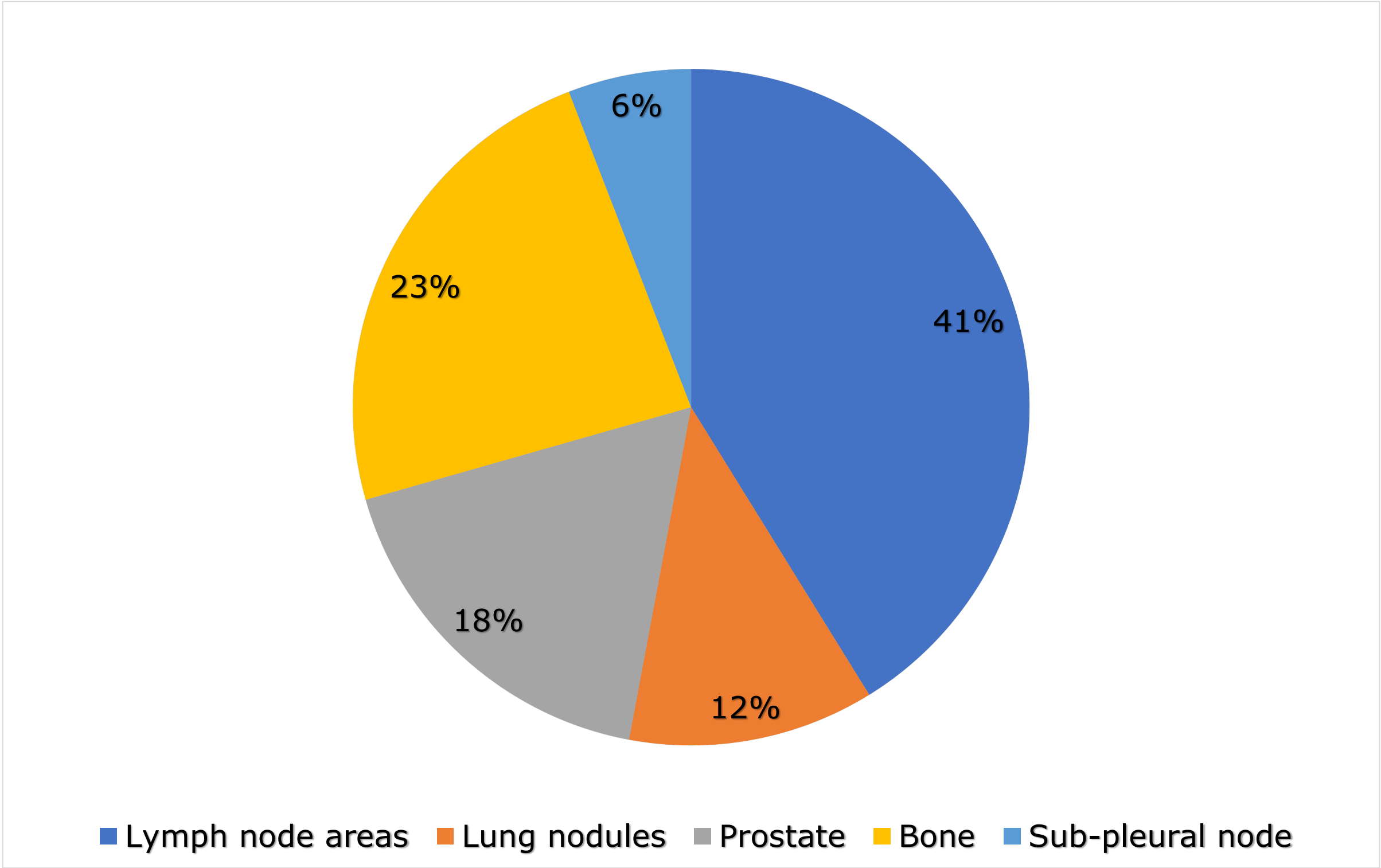


Fig. 2 : Different secondary locations detected in our study

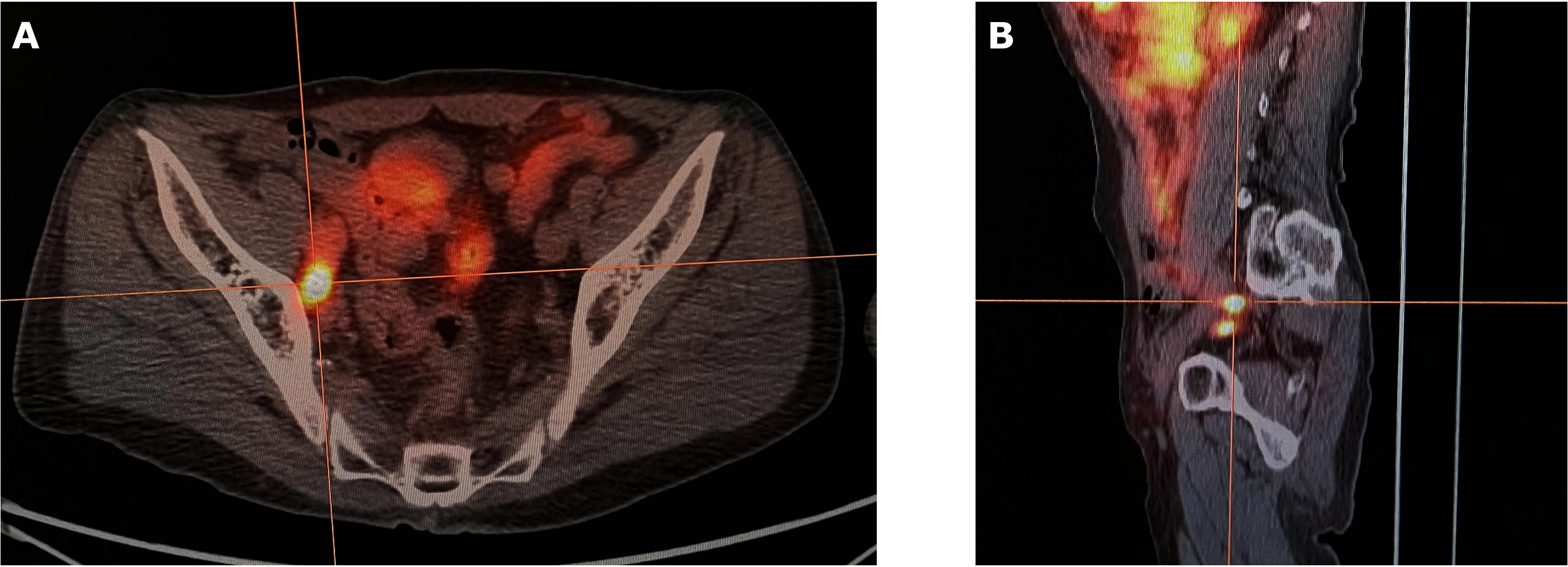


Fig. 3 : Axial (A) and sagittal (B) Pet-Scanner 18F-PSMA sections showing hypermetabolic involvement of the internal iliac lymph nodes

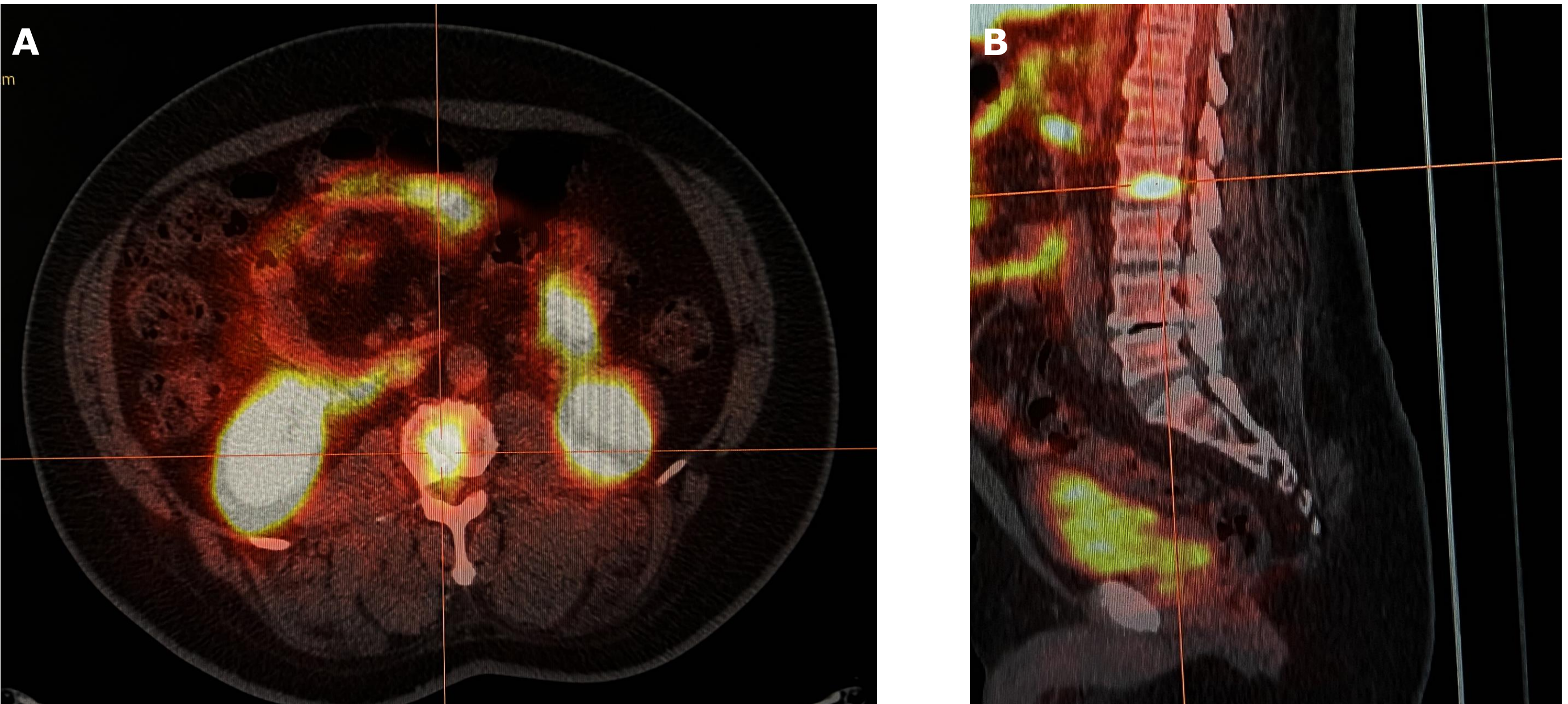


Fig. 4 : Axial (A) and sagittal (B) Pet-Scanner 18F-PSMA sections showing hypermetabolic damage to the vertebral body of L2

DISCUSSION

The superior accuracy of PET-Scanner 18F-PSMA was demonstrated in patient subsets with pelvic nodal disease and distant metastases as it was the case of our patients [1].

Indeed, PSA is essential in indicating recurrence of disease, imaging is needed to identify the location [2]. Knowing that biochemical recurrence is most likely to occur within the first 5 years after first treatment, PSMA PET-Scanner is now routinely used in the evaluation of prostate cancer in the context of suspected tumor recurrence [3]. The detection rate increased with increasing PSA values: 63% for PSA < 2 ng/mL versus 94% for PSA > 2 ng/mL [2].

On the other hand, PSMA PET-Scanner is currently also used in primary staging [2]. A recent study compared PSMA PET-CT to MRI for identification of extracapsular extension (ECE) and seminal vesical invasion (SVI) found that PSMA PET-CT had a higher sensitivity for detection for ECE compared to MRI (78 vs. 54%) but no significant difference in SVI (75 vs. 67%) [4].

At the opposite, conventional imaging with computed tomography, magnetic resonance imaging, and bone scintigraphy have certain shortcomings, particularly at low PSA levels when recurrent disease volume may be low [5].

CONCLUSION

Molecular imaging with PSMA targeted PET allows an accurate detection and localization of recurrent disease as well as the optimization of the treatment strategies and the improve of patient outcomes, even at low PSA levels.

REFERENCES :
1. Combes AD, Palma CA, Calopedros R, Wen L, Woo H, et al. PSMA PET-CT in the Diagnosis and Staging of Prostate Cancer. *Diagnostics* (Basel). 2022 Oct 26;12(11):2594. Doi: 10.3390/diagnostics12112594
2. Duan H, Iagaru A. PSMA PET for Detection of Recurrence. *Semin Nucl Med*. 2023 Aug 9;50(001-2998)(23)00056-9. Doi: 10.1053/j.semnucmed.2023.07.002
3. Calire AA, Sun L, Ode O, et al. Delayed prostate-specific antigen recurrence after radical prostatectomy: How to identify and what are their clinical outcomes? *Urology* 74:643-647, 2009
4. Chen, M.; Zhang, Q.; Zhang, C.; Zhou, Y.H.; Zhao, X.; Fu, Y.; Gao, J.; Zhang, B.; Wang, F.; Qiu, X.; et al. Comparison of 68Ga-prostate-specific membrane antigen (PSMA) positron emission tomography/computed tomography (PET/CT) and multiparametric magnetic resonance imaging (MRI) in the evaluation of tumor extension of primary prostate cancer. *Transl. Androl. Urol.* 2020, 9, 382–390
5. Jilg CA, Schultze-Seemann W, Drendel V, et al. Detection of lymph node metastasis in patients with nodal prostate cancer relapse using (18)F/(11)C-choline positron emission tomography/computerized tomography. *J Urol* 192:103-110, 2014