

Case report

Fused PET/MRI images in the therapeutic follow-up of recurrent chordoma: A case report

Fatma Chaltout*, Nawres Ben Fkih, Maali Ben Nasr, Mohamed Amine Chaari, Wissem Amouri, Khalil Chtourou, Fadhel Guerhazi

Department of Nuclear Medicine, Habib Bourguiba University Hospital, Sfax, Tunisia

Abstract

Chordoma is an uncommon and malignant bone tumor that mainly occurs in the sacrum. Despite successful radical resection followed by radiotherapy, this tumor is still associated with a high rate of recurrence. As far as we know, this is the first reported case of recurrent chordoma where the integrated PET/MRI was used to ensure accuracy for staging and treatment management. We present a case of a 76-year-old man with a history of sacrococcygeal chordoma treated surgically 2 years earlier. Recently, a local recurrence has been suspected following the appearance of a subcutaneous nodule on the surgical scar. Therefore, a pelvic MRI scan was done showing hypointense and hyperintense nodules in weighted T1 and T2 images, respectively. The fused PET/MRI images revealed the presence of abnormal foci of ¹⁸F-FDG uptake not only in the multiple lesions identified in the MRI but also in the adjacent soft tissue, suggestive of extensive sites of recurrence. In conclusion, fused PET/MRI acquisitions hold the potential for a significant contribution to managing recurrent chordomas and refining therapeutic follow-up.

Keywords: Chordoma, recurrence, PET, MRI, PET/MRI.

Received: December 16, 2023; Accepted: January 10, 2024

1. Introduction

Chordoma is a rare bone cancer, accounting for 2-4% of all primary osseous malignancies [1]. It mostly occurs in the 5-7th decades of life with a predilection for males [2]. It is thought to arise from embryological remnants located along the axial skeleton from the clivus to the sacrum [2]. The most frequent site of involvement is the sacrococcygeal area (50%), followed by the skull base (35%), and the remaining 15% are distributed among the cervical, thoracic, and lumbar spine [3].

The standard treatment is a radical en bloc resection with wide surgical margins followed by radiation therapy as an adjuvant to the surgery. Even though this therapeutic approach has been relatively rewarding in terms of recurrence-free survival, this tumor is still associated with a high rate of recurrence [4].

In the literature, there are only very few cases of recurrent chordoma detected by ¹⁸F FDG PET/CT. However, to our knowledge, this is the first reported case of a recurrent sacrococcygeal chordoma in an adult patient, where fused PET/MRI images were used and contributed to managing this disease and refining the therapeutic follow-up.

2. Case report

A 76-year-old man, with no particular history, was diagnosed with sacrococcygeal chordoma two years earlier. He underwent a radical en bloc resection with wide surgical margins followed by radiation therapy to reduce the risk of ulterior recurrence.

Recently, a local recurrence of this chordoma has been suspected following the appearance of a subcutaneous nodule on the surgical scar, exactly at the height of the fourth lumbar vertebrae. Therefore, a pelvic MRI scan was done. It showed multiple lobulated nodules spread throughout the surgical site. These nodules were quite T2 hyperintense and T1 with intensive contrast agent intake.

These findings suggest multifocal locoregional recurrence. Consequently, FDG PET/CT was conducted to ensure optimal accuracy for staging and treatment planning. The patient was required to fast 6h before imaging and serum glucose level was 6.6 mmol/l. The acquisition has begun one hour after intravenous administration of 3.5 Mbq of ¹⁸F-FDG per kilogram of body weight. Then, we realized a fusion between PET and MRI images. It revealed the presence of abnormal foci of intensive tracer uptake not only in the multiple lesions identified in the MRI but also in the adjacent soft tissue (SUV MAX=5), suggestive of extensive sites of recurrence (Fig.1). This imaging procedure helped also to better delineate the planning target volume for

*correspondence: Dr. Fatma Chaltout, Department of Nuclear Medicine, Habib Bourguiba University Hospital, Sfax, Tunisia. E-mail: chaltoutfatma@gmail.com

preoperative radiotherapy as it simultaneously provides functional and anatomical information.

3. Discussion

Locoregional recurrence of sacrococcygeal chordoma is a serious issue and represents a common event following initial treatment. Many published series have shown that loco-regional recurrence occurs in more than 50% of patients treated with complete radical resection followed or not by radiotherapy [5]. Managing patients with recurrent chordoma poses many challenges and only a minority has a good prognosis. Recently, 18F FDG PET/CT has proven to be a beneficial approach for assessing for recurrent chordoma, but to date, this is the first published case of recurrent sacrococcygeal chordoma where fused PET/MRI images were applied for restaging and treatment planning.

It is proven that chordoma has a heterogeneously

increased FDG avidity, ranging from minimal uptake to intense metabolic activity [6]. The integrated PET/MRI allows multiparametric analysis, combining information from metabolic activity, vascularity, and diffusion restriction along with excellent anatomic details. This information is needed for better delineating soft tissue extension required for surgical removal and radiotherapy target volume. In our case, the fused PET/MRI images identified other sites of recurrence in the adjacent soft tissue, not detected by the MRI modality. Consequently, this affects markedly positively on the patient prognosis because incomplete resection and inappropriate target volume are associated with reduced overall survival.

In conclusion, PET/MRI is a promising hybrid imaging that allows a combination of anatomical and functional information. Further employment of this modality may be useful for evaluating recurrent chordoma and for treatment management, thereby enhancing overall life expectancy.

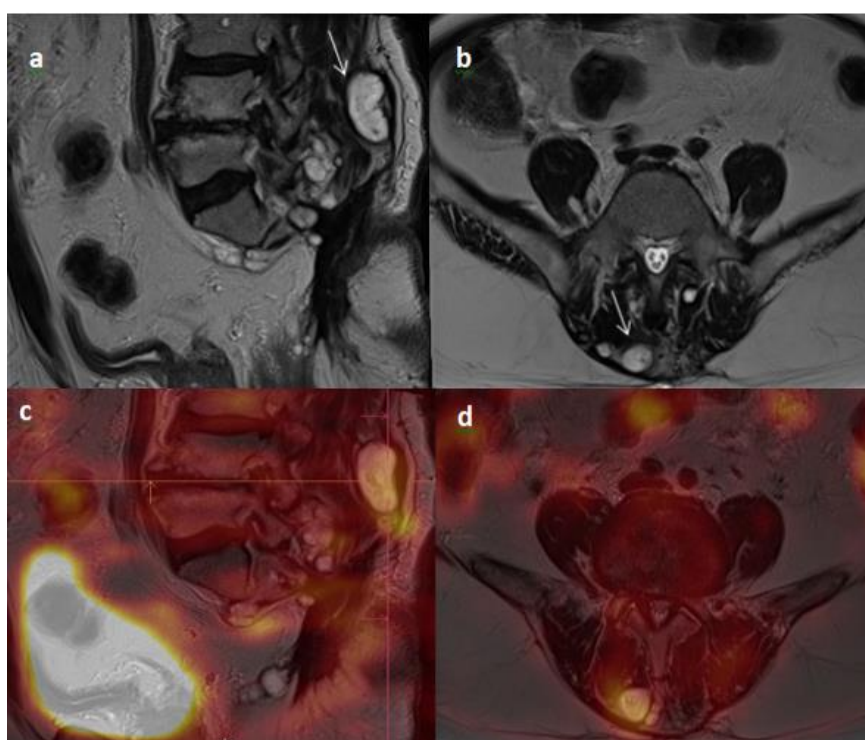


Fig. 1. T2 weighted MRI (a and b) and fused 18 FDG PET/MRI (c and d) images demonstrate large T2 hyperintense multicystic mass extending in the low pelvis with high FDG uptake.

Consent of patient

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Funding

None.

Conflict of Interest Disclosures

All authors declare that they have no conflict of interest.

Authors' contributions

All authors have read and agreed to the published version of the manuscript.

References

- [1] Roth C, Sabri O, Kluge R, Fischer L, Monecke A, Wachowiak R, et al. Simultaneous F18-FDG-PET/MR Optimized Treatment Planning in a Young Patient with Sacro-Coccygeal Chordoma. *Klin Pädiatr.* 2018; 230(06):326-7. <https://doi.org/10.1055/a-0715-1768>
- [2] Williams BJ, Raper DMS, Godbout E, Bourne TD, Prevedello DM, Kassam AB, et al. Diagnosis and Treatment of Chordoma. *J Natl Compr Canc Netw.* 2013;11(6):726-31. <https://doi.org/10.6004/jnccn.2013.0089>

- [3] Meyer JE, Lepke RA, Lindfors KK, Pagani JJ, Hirschy JC, Hayman LA, et al. Chordomas: their CT appearance in the cervical, thoracic and lumbar spine. *Radiology*. 1984;153(3):693-6. <https://doi.org/10.1148/radiology.153.3.6494465>
- [4] Sabet A, Ahmadzadehfar H, Lopez FJH, Muckle M, Schmiedel A, Biersack HJ, et al. Detection of chordoma recurrence by F-18. *Iran J Radiat Res*. 2012;10(2): 109-10.
- [5] Stacchiotti S, Gronchi A, Fossati P, Akiyama T, Alapetite C, Baumann M, et al. Best practices for the management of local-regional recurrent chordoma: a position paper by the Chordoma Global Consensus Group. *Ann Oncol*. 2017;28(6):1230-42. <https://doi.org/10.1093/annonc/mdx054>
- [6] Olson JT, Wenger DE, Rose PS, Petersen IA, Broski SM. Chordoma. 18F-FDG PET/CT and MRI imaging features. *Skeletal Radiol*. 2021;50(8):1657-66. <https://doi.org/10.1007/s00256-021-03723-w>

Cite this article as: Chaltout F, Ben Fkih N, Ben Nasr M, Chaari MA, Amouri W, Chtourou K, Guermazi F. Fused PET/MRI images in the therapeutic follow-up of recurrent chordoma: A case report. *Biomedicine Healthcare Res*. 2024;2:45-47. <https://doi.org/10.5281/zenodo.10570037>