Clinical vignette

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A case of a patient with biochemical recurrence and inadequate results of suspected bone metastases in imaging methods — will [^{68}Ga]Ga-PSMA-11 PET/CT give us an answer?

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Abstract

We present a case of a 79-year-old asymptomatic patient with prostate adenocarcinoma, Gleason score 9 (4 + 5), with the initial prostate-specific antigen (PSA) level of 17 ng/mL, treated with radiotherapy and hormonotherapy, who was diagnosed with the rapid growth of PSA levels up to 78.8 ng/mL. Due to suspected bone metastases, first, bone scintigraphy was performed. However, it showed only one intense "hot" lesion in the Th7 projection. This image was not consistent with a high level of PSA, for which reason a computed tomography (CT) scan was performed. It revealed lytic metastasis in Th7 and one more suspicious change in L2, which still was inconsistent with the patient's clinical picture. The patient was referred for [^{68}Ga]Ga-PSMA-11 PET/CT. It showed an uncountable number of foci of increased marker accumulation in bones, mostly without visible change in CT examination. This case showed that the clinical results and suspicions of the advancement of a patient's disease are still the most important data in care and therapy planning.

KEY words: PSMA; recurrent prostate cancer; bone metastases; [^{68}Ga]Ga-PSMA-11

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Bone metastases are a significant clinical problem, indicating a disseminated, advanced neoplastic disease. Among the cancers: prostate and breast cancers are responsible for the highest incidence of bone metastases. Prostate cancer is the most common cancer among men in Poland and the second most lethal. The positron emission tomography/computed tomography (PET/CT) targeted at the prostate-specific membrane antigen (PSMA) expressed on prostate cancer cells is currently the best solution for prostate cancer imaging with the highest sensitivity.

A 79-year-old man with prostate adenocarcinoma, Gleason score 9 (4 + 5), with an initial PSA level of 17 ng/mL, treated with radiotherapy and hormonotherapy was diagnosed with the rapid growth of PSA levels up to 78.8 ng/mL. Apart from the elevated level of the neoplastic marker, the patient was asymptomatic. The PSA level was higher than 2 ng/mL more than the patient's minimal level, so the biochemical recurrence has been recognized. Due to the high level of the marker, distant metastases were suspected, and the patient underwent bone scintigraphy. It showed one intense "hot" lesion in the Th7 projection, which was inconsistent

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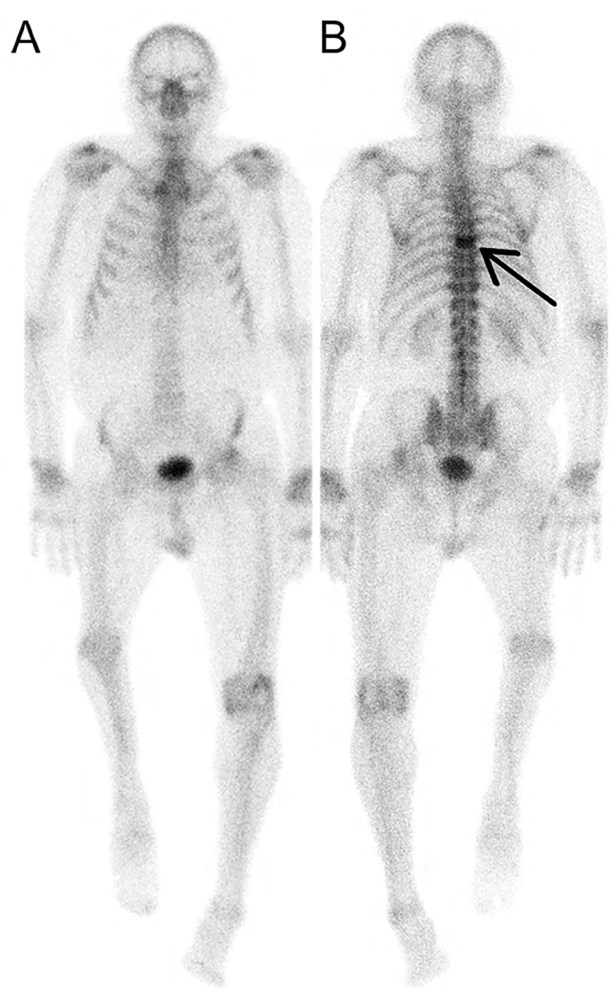

Figure 1. Whole body scintigraphy: **A** — anterior-posterior view; **B** — posterior-anterior view; The arrow shows the only visible hot lesion in the Th7 vertebra

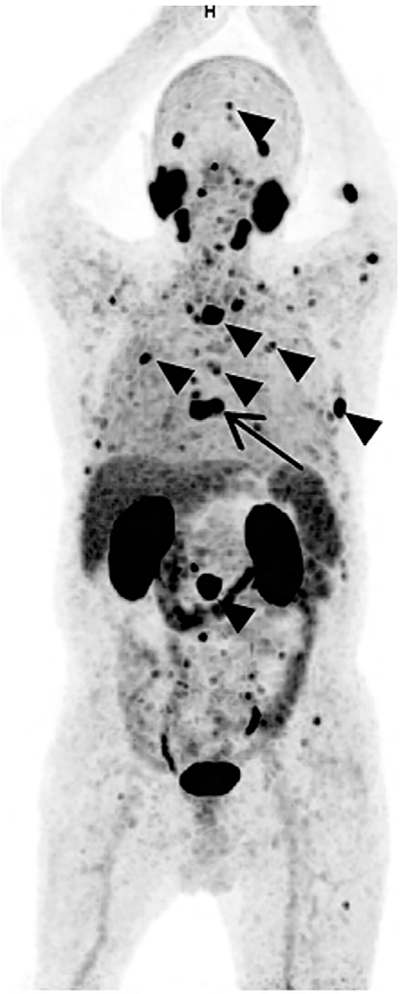

Figure 2. Maximum intensity projection (MIP) of [^{68}Ga]Ga-PSMA-11 PET/CT — arrow indicates the only focus of bone metastases which was visible in the bone scintigraphy, the arrowheads indicate some of many other foci of bone metastases

with such a rapid growth of the PSA level (Fig. 1). The next stage of diagnosis was the computed tomography (CT) examination, which revealed lytic metastasis in Th7 and one more suspicious change in L2. The results still did not agree with the biochemical advancement; therefore, steps were taken on further diagnostics. The patient was referred for [^{68}Ga]Ga-PSMA-11 PET/CT. Which was performed one month after, with a PSA level of 151.5 ng/mL, with the last dose of hormonotherapy 2 months before. It showed an uncountable number of foci of increased marker accumulation in bones, mostly without visible lesions in CT examination (Fig. 2, 3). The result of this, final study was consistent with the clinical suspicion concerning the advancement of the disease.

This case showed that the clinical results and suspicions of the advancement of a patient's disease are still the most important data in care and therapy planning. Despite the wide access to imaging tests, their results, contradicting the clinic, should raise concern and lead to a further diagnosis. It is worth considering choosing more and more advanced methods — in this case, bone scintigraphy, despite its high sensitivity at this PSA level, turned out to be insufficient. The [^{68}Ga]Ga-PSMA-11 PET/CT allowed us to know the real scale of the disease in this patient's case, which helped in planning an appropriate treatment path. The results of the imaging tests initially performed could lead to a treatment, that would not help the patient' but only extend the time to the final diagnosis. This shows that in the case of difficult patients, we should always strive for a full diagnosis, using more and more complicated methods.

In clinical suspicions of bone metastases, with inadequate classical imaging methods, it is worth to consider a [^{68}Ga]Ga-PSMA-11 PET/CT study — it is currently the best method for prostate cancer imaging.

Conflicts of interest

The authors declare no conflicts of interest.

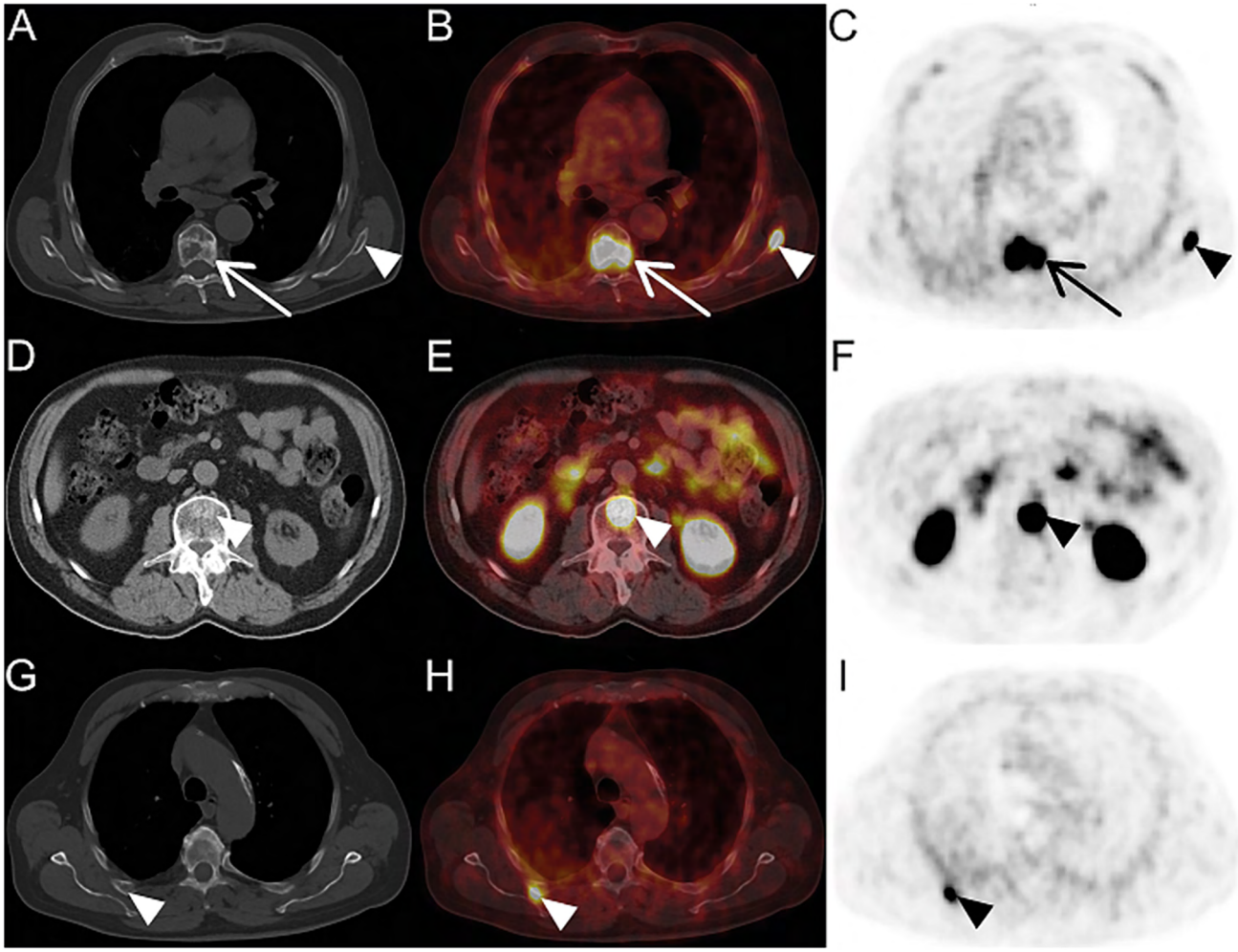

Figure 3. [^{68}Ga]Ga-PSMA-11 PET/CT images which show foci of increased marker accumulation in bones, mostly without visible change in CT examination; **A** — CT; **B** — fusion; **C** — PET — the arrow points to the lesion in Th7 vertebra, visible on the PET as well as on the CT as mixed bone metastasis, the arrowhead points at the foci in left scapula — bone metastases visible only in the PET/CT; **D** — CT; **E** — fusion; **F** — PET — the axial cross-section through L1 vertebra — the arrowhead points into the focus of increased tracer accumulation in PET with a hardly visible lesion in CT; **G** — CT; **H** — fusion; **I** — PET — the axial cross-section through left rib — the arrowhead points into the focus of increased tracer accumulation visible only in PET without visible lesion in CT

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