Therapeutic effect of $^{153}$Sm-EDTMP on bone metastases from prostate cancer: A case report

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Case Report

Abstract

Prostate cancer is an osteophilic cancer, in which bone metastases remains found in 30-70% of patients. In this case, the pain is the most common symptom and the most difficult to support. Its treatment aims to improve the quality of life of patients. Metabolic radiotherapy with $^{153}$Samarium-EDTMP, is an analgesic treatment of painful bone metastases, based on the action of targeted radioactive beta-particles emitted at the metastatic bone lesions. Occasionally a tumor regression occurs, especially after repeated doses. We report the case of a complete disappearance of multiple painful bone metastases after repeated doses of $^{153}$Sm-EDTMP.

Keywords: Metastasis; Cancer; Prostate; Pain; Samarium; Radioisotopes

Introduction

Bone is a very common site of prostate cancer metastases and in most patients the only site of disease progression. Skeletal metastases are responsible for most of the morbidity associated with hormone-refractory prostate cancer. Metabolic radiotherapy with $^{153}$Sm-ethylene-diaminetetramethylene phosphonate ($^{153}$Sm-EDTMP), is an analgesic treatment of painful bone metastases, based on the action of targeted radioactive beta-particles emitted at the metastatic bone lesions. It has been approved for palliation of painful bone metastases. Occasionally a tumor regression occurs, especially after repeated doses. We report the case of a complete disappearance of multiple painful bone metastases after repeated doses of $^{153}$Sm-EDTMP.

Case presentation

We report the case of a 73-year-old man with hormone refractory prostate adenocarcinoma and multiple painful bone metastases. He was addressed to our department for metabolic radiotherapy with $^{153}$Samarium-EDTMP. He had in total 6 cures of $^{153}$Sm-EDTMP and for each cure; he received a therapeutic activity of 37MegaBequerels/Kg of this radiopharmaceutic.

For assessment of therapy effectiveness, three parameters were evaluated: motor activity, pain relief and reduction in analgesic requirements. Toxicity $^{153}$Samarium-EDTMP was also estimated. The first infusion of $^{153}$Sm-EDTMP was received in November 2007. The post therapeutic scintigraphy showed enhanced tracer uptake in the known metastatic lesions. The patient had presented a partial pain relief. Repeated doses were given every 8 to 12 weeks. Pain improved after each administration with mild (Grade 1 or 2) and transient hematologic toxicity. The 6th post therapeutic whole body scan (March 2009) showed a complete disappearance of bone metastases. The Prostate-specific antigen (PSA) decreased to a normal level. The patient died one year later due to disease progression.

Discussion

The effectiveness of Radio-metabolic therapy with bone-seeking agent for bone palliation in patients with multiple osseous metastases was clearly approved. This systemic treatment targets multiple osteoblastic sites simultaneously. In this regard, there are indications that bone-seeking radiopharmaceuticals, such as $^{153}$Sm-EDTMP,

FIG 1: Whole-body scans, 24 h after $^{153}$Sm-EDTMP administration. (A) 1st dose (B) 3rd dose (C) 6th dose. Serial scans showed gradual to total regression of bone metastases.

may not only control pain, but also may have a tumoricidal effect. Preliminary reports indicate, like in our case, objective tumor responses (as evaluated by reduction in the PSA levels and in the number of bone lesions) in hormone-refractory prostate cancer patients treated with repeated $^{153}$Sm-EDTMP but with lower doses.  

Furthermore, a retrospective study showed an improvement of the overall survival after repeated $^{188}$Re-HEDP Therapy of hormone-refractory bone metastases of prostate cancer. $^{7}$

$^{153}$Sm-EDTMP in combination with chemotherapy (docetaxel) has been reported to provide an objective anti-tumour effects and prolonger survival, while there were no additive toxicities. The favourable outcome with combined therapeutic approach might be explained by some synergistic effect between the cytotoxic activity of chemotherapy on tumour cells and the additional modulating effects of radionuclide therapy. $^{8}$-$^{9}$

These results provide a rationale for further prospective studies aimed at assessing combined chemotherapy and bone-targeted radiotherapy as a valid therapeutic strategy in patients with advanced disease.

**Conclusion**

According to our case and literature data, $^{153}$Samarium-EDTMP should no longer be a solution of last resort; due to its efficiency and low toxicity. Its early introduction in the management of patient with prostate cancer and painful bone metastases could greatly improve his quality of life.

**Conflict of interest**

The authors declare that they have no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

**References**