Positive somatostatin receptor imaging does not predict somatostatin analogue efficacy in tumor-induced osteomalacia

Agnieszka Łebek-Szatańska1, Lucyna Papierska1, Ewa Marcinowska-Suchowierska2, Karolina M. Nowak1, Wojciech Zgliczyński1, Waldemar Misiorowski1

1 Department of Endocrinology, Centre of Postgraduate Medical Education, Bielański Hospital, Warsaw, Poland
2 Department of Geriatrics, Centre of Postgraduate Medical Education, Bielański Hospital, Warsaw, Poland

A 41-year-old man, a professional truck driver, was referred to the Department of Endocrinology with a history of hypophosphatemic osteomalacia lasting several years, resulting from fibroblast growth factor 23 (FGF23) hypersecretion of an unknown origin. Positron emission tomography (PET) with 18F-fluorodeoxyglucose failed to detect any lesions; however, the patient was scanned at a level of above one-third of the thighs. Thus, we decided to perform somatostatin receptor scintigraphy (99mTc-EDDA/HYNIC-Tyr3-octreotide, 730 mBq). An increased radionuclide uptake in the projection of medial condyle of the right femoral epiphysis was shown (FIGURE 1A). The possible phosphaturic mesenchymal tumor (PMT) was next visualized by computed tomography and magnetic resonance imaging (FIGURE 1B and 1C). The diagnosis was eventually confirmed by biopsy.

The first attempt to remove the tumor was ineffective, and the patient refused a more extensive surgery. Therefore, a pharmacological approach was considered. Phosphorus supplementation, although efficient in maintaining normal phosphorus levels for the last several years, now resulted in secondary hyperparathyroidism. The addition of calcium supplements or alfacalcidol was also ineffective in reducing elevated parathormone levels for the last several years, now resulted in secondary hyperparathyroidism. As histopathology revealed positive staining for somatostatin receptor type 2 (SSTR2) in most cells and focal SSTR5 immunohistochemical reaction, we decided to introduce somatostatin analogue therapy. Octreotide (100 µg 3 times daily) for 3 days did not increase serum phosphate levels or reduce 24-hour urine phosphorus excretion. Similarly, pasireotide (600 µg twice daily) resulted only in insignificant improvement of blood phosphatemia.

Whole-body somatostatin receptor scintigraphy has been proved to be a useful tool for detecting mesenchymal tumors. However, the role of somatostatin signaling in PMTs is unclear, and literature data regarding somatostatin analogue efficacy in the treatment of patients with tumor-induced osteomalacia (TIO) are inconsistent. Octreotide efficacy was shown by Seufert et al in a 50-year-old man with PMT in the left thigh, although there is a considerable controversy around its wider use in this patient population. Some authors described a decrease in FGF23 levels, although with no clinically important effect. Recently, Ovejero et al reported no significant changes in blood phosphate, FGF23, 1,25-dihydroxycholecalciferol, or tubular reabsorption of phosphates (TRP) during octreotide treatment of 5 TIO patients for 3 days, concluding that these drugs are not efficient in the short term. However, from our previous experience, octreotide, both as a long- or short-acting agent, can help improve the level of blood phosphates in the preoperative period.

Our study was the first attempt to use pasireotide in the treatment of a patient with TIO. Pasireotide is a potent somatostatin analogue with a 40-fold increased affinity to SSTR5 as compared with octreotide, as well as a comparable binding affinity to SSTR2. It seems that positive somatostatin receptor imaging or positive somatostatin receptor staining in histopathological specimens could serve as indicators of the possible effectiveness of somatostatin analogues. However, in our case, neither octreotide nor pasireotide was in fact effective. Concerning conflicting observations and significant costs of therapy, we conclude that before deciding on a long-term use of somatostatin analogues in TIO patients, the clinical utility of these agents should first be proved in individual cases.
This is an Open Access article distributed under the terms of the Creative Commons Attribution NonCommercial ShareAlike 4.0 International License (CC BY-NC-SA 4.0), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material, provided the original work is properly cited, distributed under the same license, and used for non-commercial purposes only. For commercial use, please contact the journal office at pamw@mp.pl.

REFERENCES


