May 5th, 12:00 AM

Case report: Octreotide Associated Hyperkalemia

Darren Finn
Rowan University

Eric Maddock
Rowan University

James Espinosa
Rowan University

Andrew Caravello
Rowan University

Alan Lucerna
Rowan University

See next page for additional authors

Case report: Octreotide Associated Hyperkalemia

[1]Darren Finn, [1]Eric Maddock, [1]James Espinosa, [1]Andrew Caravello, [2]Alan Lucerna, [3]Henry Schuitema

[1]Emergency Medicine Residency and Department of Emergency Medicine, Rowan University, SOM/Jefferson NJ

[2]Program Director, Emergency Medicine, Jefferson NJ/Rowan University SOM

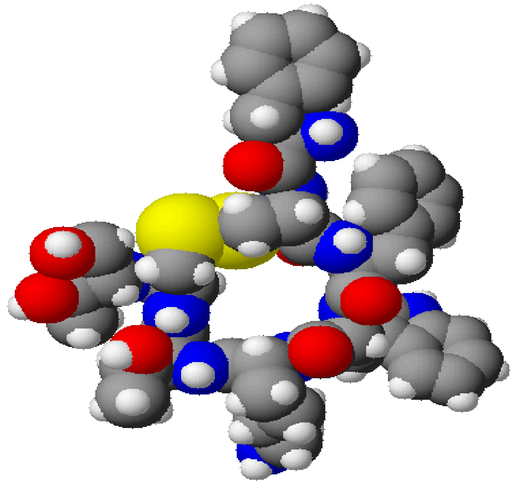
[3] Chief, Department of Emergency Medicine, and Associate Chief Medical Officer, Jefferson, NJ

Abstract:

78-year-old female with past medical history of acromegaly status post pituitary adenoma status post resection presents to the emergency department with abdominal pain. ED workup was not significant for any acute intra-abdominal abnormalities; however, incidental finding of hyperkalemia was pertinent to the visit. Patient was treated in the ED for her condition but her potassium levels remained elevated despite repeated saline infusions. Patient was ultimately admitted to the hospital where it was discovered that she had recently been switched from octreotide injections to an oral somatostatin analogue Mycapssa. We believe that this patient's hyperkalemia was caused by octreotide-induced insulin suppression and resultant impaired cellular potassium uptake. Although octreotide has a wide variety of medical applications it can/should be used with caution as complications arising from elevated potassium can be potentially dangerous.

Case Presentation:

Patient is a 78 year old with past medical history of pituitary adenoma, ovarian cancer, partial bowel resection secondary to diverticulitis with colostomy placement, mixed hyperlipidemia, stage 3 chronic kidney disease, and acromegaly, who presented to the Emergency Department at Jefferson Stratford for the evaluation of left lower quadrant pain. Patient states that her condition began approximately 1.5 weeks prior. Patient reports inciting event (lifting heavy cat litter); however, she denies any frank/overt trauma. Patient described her pain as "pulling", constant, progressive, 7/10 at time of ED evaluation and non-radiating. Patient endorsed that pain was exacerbated by standing and/or walking. Patient stated that pain was alleviated by warm compresses. Patient endorsed persistent diarrhea but denied any other associated symptoms. ED workup at that time was negative for any acute intra abdominal abnormalities; however, BMP was significant for the incidental finding of hyperkalemia. EKG showed no significant changes. Patient was subsequently treated with multiple boluses of IV saline in the ED but her potassium remained elevated at 6.1. Upon further questioning, it was discovered that the patient had been recently switched 10 days prior from regularly scheduled injections of octreotide to an oral somatostatin analogue called Mycapssa by her endocrinologist. According to the patient, she had been on octreotide for treatment of refractory acromegaly status post pituitary resection. The patient was ultimately admitted to the hospital for cardiac monitoring and treated with insulin/dextrose and calcium gluconate for her elevated potassium. In addition, the patient's octreotide was withheld due to concern that this medication could be directly contributing to her condition. Endocrinology was consulted on the case and after establishing that her IGF-1 levels were normal, it was deemed appropriate for the patient to remain off of this medication until she could follow up with her own endocrine specialist after discharge home.



Octreotide molecule (bing.com)

Discussion:

Octreotide (Sandostatin, Mycapssa) is a synthetic somatostatin analog that is a potent inhibitor of growth hormone, glucagon and insulin via competitive agonism of somatostatin receptors SSTR2 and SSTR5. It was first synthesized in 1979 by chemist Wilfried Bauer and was approved for use in the United States in 1988. As it resembles somatostatin it can precipitate many of the same physiologic reactions as its hormonal counterpart, such as inhibition of gastrin, cholecystokinin, glucagon, growth hormone, insulin, secretin, pancreatic polypeptide, TSH, and vasoactive intestinal peptide. In addition, octreotide can also reduce gastrointestinal motility, inhibit contraction of the gallbladder, cause vasoconstriction, decrease pancreatic/intestinal fluid secretion and alleviate portal vein pressure. Consequently, this medication has longstanding and valued application among diagnosis and treatment of a wide variety of diseases, including (but not limited to): endocrine disorders (acromegaly, gigantism, congenital hyperinsulinism, Grave's disease, diabetic retinopathy, and sulfonylurea-induced hypoglycemia), pituitary adenomas (somatotropinoma, thyrotropinoma), non-endocrine malignancy (breast, colon, prostate, lung, hepatocellular, tumors), digestive diseases (refractory diarrhea, gastrointestinal hemorrhage, carcinoid syndrome, intestinal fistula) and even foreign body ingestion. Similarly, there are many well-known/well-studied adverse effects of octreotide when used in the treatment of the aforementioned disorders. The most common side effects documented include (but are not limited to) headache, hypothyroidism, arrhythmia, gastrointestinal reactions (cramps, nausea, vomiting, diarrhea, constipation), gallstones, and, most relevant to our case study, hyperkalemia.

Conclusion:

The mechanism by which octreotide analogues precipitate elevated potassium levels is via the suppression of endogenous pancreatic insulin secretion and resultant impaired cellular potassium uptake. It is for this very trait that octreotide is often utilized for the treatment of sulfonylurea toxicity, a medication which conversely induces endogenous insulin secretion in diabetic patients. Other causes of hyperkalemia were also considered in this patient, including factors that pertain to decreased potassium excretion (renal failure, potassium sparing diuretics, ace inhibitors, aldosterone deficiency), increased potassium load (tumor lysis, rhabdomyolysis, potassium supplementation), cellular potassium shifts (acidosis, beta blockade, digitalis toxicity); however, no other sources for the patient's elevated potassium levels could be identified. There is limited data regarding the safety of octreotide regarding hyperkalemia, especially in those patients who are already predisposed to having elevated levels of potassium (dialysis patients) and those using certain medications (beta blockers, ace inhibitors, digoxin, spironolactone). It should therefore be utilized with caution and potassium levels closely monitored under such circumstances.

References:

1.Blohm E, Sell P, Neavyn M. Cannabinoid toxicity in pediatrics. Curr Opin Pediatr. 2019 Apr;31(2):256-261. doi: 10.1097/MOP.0000000000000739. PMID: 30694824.

2.Levene RJ, Pollak-Christian E, Wolfram S. A 21st Century Problem: Cannabis Toxicity in a 13-Month-Old Child. J Emerg Med. 2019 Jan;56(1):94-96. doi: 10.1016/j.jemermed.2018.09.040. Epub 2018 Oct 16. PMID: 30340924.

3.Takakuwa KM, Schears RM. The emergency department care of the cannabis and synthetic cannabinoid patient: a narrative review. Int J Emerg Med. 2021 Feb 10;14(1):10. doi: 10.1186/s12245-021-00330-3. PMID: 33568074; PMCID: PMC7874647.

4.Vo KT, Horng H, Li K, Ho RY, Wu AHB, Lynch KL, Smollin CG. Cannabis Intoxication Case Series: The Dangers of Edibles Containing Tetrahydrocannabinol. Ann Emerg Med. 2018 Mar;71(3):306-313. doi: 10.1016/j.annemergmed.2017.09.008. Epub 2017 Nov 3. PMID: 29103798.

5.Whitehill JM, Dilley JA, Brooks-Russell A, Terpak L, Graves JM. Edible Cannabis Exposures Among Children: 2017-2019. Pediatrics. 2021 Apr;147(4):e2020019893. doi: 10.1542/peds.2020-019893. Epub 2021 Mar 22. PMID: 33753541.

6.Wong KU, Baum CR. Acute Cannabis Toxicity. Pediatr Emerg Care. 2019 Nov;35(11):799-804. doi: 10.1097/PEC.0000000000001970. PMID: 31688799.

Communicating Author:

James Espinosa MD
Department of Emergency Medicine
Rowan University SOM/Jefferson NJ Stratford
Jim010@aol.com