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Use of Pamidronate to Treat Hypercalcemia in an Oncology Dialysis Patient: A Case Report

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Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Conflict of interest: None declared

Patient: Female, 60
Final Diagnosis: Hypercalcemia secondary to malignancy
Symptoms: Hypercalcemia
Medication: —
Clinical Procedure: —
Specialty: Nephrology

Objective: Unusual clinical course

Background: Hypercalcemia is a common complication in the intensive care unit (ICU). It can be a result of diverse etiologies, such as malignancy. In this case, bisphosphonates can serve as an effective therapeutic option. However, bisphosphonates are not safe to use in patients with end stage renal disease.

Case Report: We report a case of severe hypercalcemia possibly secondary to bone metastasis. The patient is known to have end-stage renal disease (ESRD) and undergoing dialysis 3 times a week. She had severe persistent hypercalcemia which did not resolve with regular measures or calcitonin. The literature was searched for the possibility of administering bisphosphonate as a treatment option. It was found that pamidronate pharmacokinetics can be safe and effective in end-stage renal disease patients. Therefore, Pamidronate was administered, showing effective results with regards to the level of calcium and no observed adverse effects. Re-dosing was required at an 8-week interval, with no adverse effects.

Conclusions: Pamidronate is a safe option to use in treating hypercalcemia in end-stage renal disease patients on dialysis. This can be especially beneficial in patients with sustained hypercalcemia secondary to malignancy.

MeSH Keywords: Dialysis • Hypercalcemia • Medical Oncology • Nephrology

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Background

Hypercalcemia is a common complication that can occur in critically ill patients. It is defined as a calcium level higher than 2.6 mmol/L (corrected) [1,2]. Etiologies of hypercalcemia include: immobilization, metabolic bone disorder, hyperparathyroidism, malignancy, dehydration, and medication [2]. This condition can be problematic, as severe hypercalcemia can cause symptoms such as cognitive disturbance, lethargy, muscle weakness, and coma. Other symptoms include dehydration and gastrointestinal symptoms. Malignancy is considered the most common cause of hypercalcemia secondary to hyperparathyroidism. It is estimated that an average of 25% of all hospitalized patients with malignancy develop hypercalcemia during their hospital stay [2].

The first-line therapies for hypercalcemia include mobilization and IV fluids. There are additional treatment regimens according to the correlating etiology, some of which include calcitonin and bisphosphonates. A literature search was conducted, showing theoretical evidence based on a pharmacokinetics study, which showed that pamidronate may be used in patients with renal failure based on theoretical pharmacokinetics data [3–7].

Case Report

Our patient was a 61-year-old woman admitted to the ICU for severe shortness of breath, orthopnea, generalized body ache, and chest pain.

She had been in her usual state of health until she was admitted to the hospital with severe shortness of breath secondary to volume overload. The patient was known to have end-stage renal disease and was on regular hemodialysis. She also had non-insulin-dependent diabetes mellitus, hypertension, and peripheral vascular disease. The patient had been diagnosed with breast cancer followed by mastectomy to the left side. She developed bone metastasis and was lost to follow-up with the Oncology Department after it was decided that no interventions were to be provided and she was referred to palliative care. On admission, a CT scan showed liver and adrenal hypodense areas indicating metastasis.

Hospital course: On admission, the patient required non-invasive ventilation support and emergency hemodialysis. Afterwards, she developed hospital-acquired pneumonia and septic shock. Later during the hospital course, she also developed GI bleeding that upon investigation was found to have sigmoid and rectal ulceration with acute inflammation. The necessary measures were carried out. On day 20 after admission, the patient started developing hypercalcemia at 3.2 mmol/L. Parathyroid level was 245, which is acceptable for stage 5 CKD according to the KDOGI guidelines. Vitamin D levels were within normal limits. Fluids were given but the corrected calcium increased again from 2.39 to 2.96 mmol/L over 2 days. Despite discontinuing all calcium supplements, hypercalcemia persisted. On day 22, the levels continued to rise to as high as 3.21 mmol/L. At this point, calcitonin was given at a dose of 4 u/kg every 12 h, which was increased later to 8 u/kg every 12 h. Calcitonin treatment managed to lower calcium levels from 3.2 to 2.8 mmol/L over 2 days. However, it failed to reduce the levels further, despite increasing the dose. This was followed by another rise of up to 3.1 mmol/L.

Other therapeutic options were considered with limitation due to end stage renal disease. The patient was already on steroids for treating ulcerative colitis and mobilization was not possible due to poor clinical status. As a result, it was decided to consider bisphosphonates as a therapeutic option. However, not all bisphosphonates are safe to give in renal impairment and doses were not known. A literature search was carried out using PubMed using the following keywords: “Bisphosphonates”, “hypercalcemia”, “pamidronate”, “malignancy”, “dialysis”, “renal impairment” and “end-stage renal disease” in different combinations. One study by Koseoglu and Arslan showed that pamidronate, clodronate (oral and IV), and ibandronate (IV, not oral) can be used in creatinine clearance less than 30 mL/min. It was agreed to give the patient 60 mg pamidronate IV as it was an agent listed in the formulary. On the second day of pamidronate administration, her calcium level decreased gradually from 3.1 to 2.5 over a period of 4 days. The patient did not have any serious adverse effects after administration of pamidronate.

Eight weeks later, the patient re-developed hypercalcemia. This time, calcitonin was administered but failed to lower calcium levels, suggesting the need for re-dosing with pamidronate. Therefore, it was re-administered at the same dose of 60 mg IV. On the second day of pamidronate administration, the calcium levels decreased from 2.87 to 2.46 mmol/L over 2 days, with no identified adverse events.

Figure 1 is a graphical representation of calcium levels between days 20 and 41.

Discussion

An extensive literature search was carried out and there were no studies found that are related to the use of bisphosphonates in dialysis patients. One study suggested that bisphosphonates may be used in renal impairment and that it can be dialyzable [8]. Based on pharmacokinetics data and listing in the formulary, pamidronate was the agent of choice in

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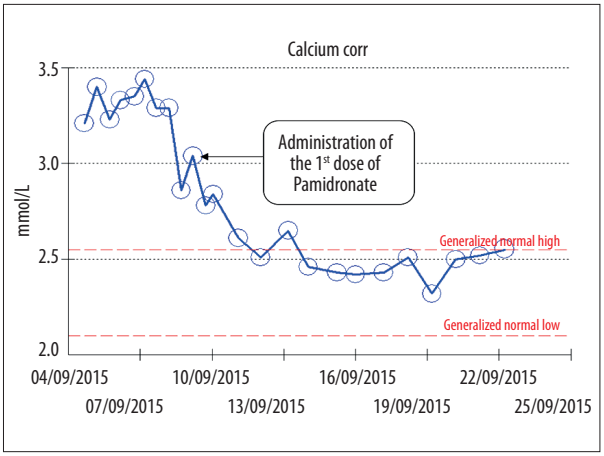

Figure 1. Graphical presentation of calcium levels between days 20 and 41. This shows the effect of administration of pamidronate (labeled on graph).

this case [4,6]. However, there were no studies reporting safety, appropriate dosing, or frequency in dialysis patients [5,9].

One case report described the use of pamidronate in a patient with calciphylaxis and chronic renal failure [3]. It was decided to still report our case because the patients are different in terms of causes of hypercalcemia. Also, in the present report we provide a different dosing regimen for a patient who is receiving regular dialysis.

Previous studies were conducted that reported the efficacy of pamidronate and bisphosphonates in general for the treatment of hypercalcemia in oncology patients, but these patients did not have renal impairment [4,5]. There are other studies about the use of bisphosphonates in renal failure, but there is very little information about pamidronate [6,7]

The team was not certain of the exact doses required in dialysis patients. Our choice of dosing was based on 1 study that showed that pamidronate is dialyzable [5]. At first, 30 mg was given over 5 hours, followed by a second dose of 30 mg.

Conclusions

In summary, this is a case report indicating that pamidronate may be a safe and effective treatment option in patients with end-stage renal disease on hemodialysis, without noticeable adverse effects. We suggest that 60 mg is safe to use, with a possible requirement of re-dosing at an 8-week interval.

Conflict of interest

None.

References:

1. Levey AS, Coresh J, Bolton K et al: K/DOQI clinical practice guidelines for chronic kidney disease: Evaluation, classification, and stratification. Am J Kidney Dis, 2002; 39(2): S1–266
2. Shepard M, Smith J: Hypercalcemia. Am J Med Sci, 2007; 334(5): 381–85
3. Monney P, Nguyen Q, Perroud H et al: Rapid improvement of calciphylaxis after intravenous pamidronate therapy in a patient with chronic renal failure. Nephrol Dial Transplant, 2004; 19; 2130–32
4. Koseoglu F, Arslan C: Bisphosphonate therapy in metastatic carcinoma patients with chronic renal failure: Are bisphosphonates an enemy or crony? Support Care Cancer, 2015; 23(6): 1489–91
5. Van Holten-Verzantvoort A, Kroon H, Bijovet O et al: Palliative pamidronate treatment in patients with bone metastases from breast cancer. J Clin Oncol, 1993; 11: 491–98
6. Buttazzoni M, Diez G, Jager V et al: Elimination and clearance of pamidronate by hemodialysis. Nephrology, 2006; 11: 197–200
7. Ozmen B: Use of bisphosphonates in chronic kidney disease World J Nephrol Urol, 2012; 1(1): 1–7
8. Miller PD: Is there a role for bisphosphonates in chronic kidney disease? Semin Dial, 2007; 186–90
9. Torregrosa JV, Moreno A, Mas M et al: Usefulness of pamidronate in severe secondary hyperparathyroidism in patients undergoing hemodialysis. Kidney Int Suppl, 2003; 63: S88–90

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