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Moxifloxacin: A Unique Cause of Severe Hypoglycemia

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Introduction:
As a class, quinolone antibiotics have been rarely associated with hypoglycemia in non-diabetic patients and rare reversible episodes of hypoglycemia documented in the literature typically occur within the duration of action of the medication. In this case, however, we believe the effect of the medication persisted much longer.

Case Description:
A thin 61-year-old man with a past medical history significant for schizoaffective disorder, bipolar disorder and recent episode of community acquired pneumonia (CAP) presented with shaking and confusion after having fallen while under observation as an inpatient with a diagnosis of schizoaffective disorder, bipolar disorder and recent episode of community acquired pneumonia (CAP). The patient was recently treated for CAP with levofloxacin for 7 days and received his last dose of the medication 4 days prior to presentation. He had no other recent changes in medications.

Blood Glucose Measurements:

<table>
<thead>
<tr>
<th>Time</th>
<th>Blood Glucose (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 a.m.</td>
<td>110 (Day 1)</td>
</tr>
<tr>
<td>6 a.m.</td>
<td>120 (Day 2)</td>
</tr>
<tr>
<td>6 a.m.</td>
<td>130 (Day 3)</td>
</tr>
<tr>
<td>6 a.m.</td>
<td>140 (Day 4)</td>
</tr>
</tbody>
</table>

Upon presentation, the origin of the patient's hypoglycemia was thought to be the most likely culprit. Pharmacy and endocrinology services were consulted and both agreed that this was the most likely explanation for the patient's presenting symptoms. Among diabetic patients, especially those taking sulfonylureas, dysglycemia is a well-established side effect of fluoroquinolone antibiotics with moxifloxacin being most likely to cause hypoglycemia in these patients. 2-5 Rarely fluoroquinolones have been shown to cause persistent hypoglycemia in non-diabetic patients. 1,6-8 A handful of case reports have been published showing an association between levofloxacin and hypoglycemia. 2,6,8 A phase IV study of 1701 patients treated with levofloxacin for CAP found only 2 suffered an adverse hypoglycemic event. 3 moxifloxacin is much less commonly cited as a cause of hypoglycemia among non-diabetic patients. 1,4 Additionally, a perplexing aspect of this case was the duration of time from discontinuation of the offending medication to appearance of severe, symptomatic hypoglycemia. The patient reported decreased oral intake the morning preceding presentation, which may have worsened any persistent underlying hypoglycemia and resulted in altered mental status and fall. Advanced age and reduced renal function are thought to be risk factors for the development of hypoglycemia among non-diabetic patients treated with fluoroquinolones. This case adds to the base of literature regarding severe hypoglycemia resulting from moxifloxacin administration and brings awareness to the rare, but potentially fatal side effect of this commonly used class of medications.

Proposed Mechanism of Fluoroquinolone-Induced Hypoglycemia:
Like sulfonylureas, the medications disrupt the function of the ATP-sensitive K+ channel, resulting in increased insulin release by pancreatic beta cells.

References:
6163 (2013).
Blood Glucose Measurements

Day 1
Patient on D5W Infusion 100 mL/hr

Day 2
D5W stopped
D5W re-started

Day 3
D5W stopped
oral glucose & food given
before lunch

Day 4
6 a.m.

Remaining Inpatient Days Without Hypoglycemic Episodes (Total stay 7 days)