Carpal Spasm in a Patient with Hypophosphatemia

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Introduction

- Phosphate is an essential ion and plays a vital role in many physiological processes
- Neurologic symptoms reported in hypophosphatemia are neuropathy, paresthesias, dysarthria, altered mental status, seizures, delirium and convulsion and they are rare but seen in severe hypophosphatemia
- Carpopedal spasm is known as a symptom of hypocalcemia or rarely hypomagnesemia
- We present an unusual case of carpal spasm seen in a patient with hypophosphatemia

Case report

- A fourteen-year-old boy was admitted with acute onset of both carpal spasm
- He had a shrimp salad for dinner 1 day before
- After 2 times of vomiting and diarrhea, both carpal spasm and paresthesia were developed 3 hours later
- When he visited our clinic for gynecosmatia 1 week before, thyroid hormone, growth hormone, sex hormones including estrogen, progesterone and testosterone were in normal range at his age
- He was awake, alert and his vital sign was stable
- On physical examination, he had intact strength in all four extremities but paresthesia, tingling sensation was on his both hands and around his lips
- Neurologic examination were unremarkable
- Nerve conduction study of median nerve and ulnar nerve on both hands showed normal patterns
- Serum electrolytes and blood gas analysis were within normal limits
- Biochemical investigation revealed only hypophosphatemia without hypocalcemia and hypomagnesemia
- Other hormone tests related to calcium/phosphate metabolism were within normal limits
- He treated with intravenous phosphate (over 36 hours at a rate of 2 mmol/hours)
- Carpal spasm improved with correction of hypophosphatemia

![Graph showing changes in calcium, phosphate, and ionized calcium levels](image)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Before admission</th>
<th>Hospitalization</th>
<th>After Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium (mg/dL)</td>
<td>9.3</td>
<td>9.4</td>
<td>9.3</td>
</tr>
<tr>
<td>Phosphate (mg/dL)</td>
<td>4.2</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Ionized calcium (mEq/L)</td>
<td>-</td>
<td>2.4</td>
<td>2.4</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Result</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parathyroid hormone</td>
<td>14.5 mg/mL</td>
<td>13-34 mg/mL</td>
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<tr>
<td>Calciton</td>
<td>1.7 pg/mL</td>
<td>0.5-9.6 pg/mL</td>
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<tr>
<td>Vitamin D3-1,25(OH)2</td>
<td>38.75 pg/mL</td>
<td>19.6-54.3 pg/mL</td>
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<tr>
<td>Vitamin D3-25(OH)</td>
<td>11.36 ng/mL</td>
<td>4.1-28.7 ng/mL</td>
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<tr>
<td>Calcium (urine)</td>
<td>1.8 mg/dL</td>
<td>0.22-9.47 mg/dL</td>
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<tr>
<td>Phosphate (urine)</td>
<td>41.0 mg/dL</td>
<td>5-189 mg/dL</td>
</tr>
</tbody>
</table>

Conclusion

- The pathophysiology of neurologic dysfunction related to hypophosphatemia is not clear yet
- The physiological effects of hypophosphatemia is suggested to play a role in pathophysiology of neurologic dysfunction
- In hypophosphatemia, increased oxyhaemoglobin affinity and hemolytic anemia can develop, then they can lead to tissue hypoxia and altered tissue function
- Careful observation of serum electrolytes including phosphate is necessary when the patient has neurologic symptoms

References