Paralytic Ileus Associated with Intracranial Diseases

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Summary: Paralytic ileus is one of the most important systemic complications associated with intracranial diseases such as subarachnoid hemorrhage (SAH), intracerebral hemorrhage (ICH), cerebral infarction (CI) and cerebral contusion (CC). A patient who suffers from intracranial diseases including cerebrovascular strokes has a tendency to be complicated by a paralytic ileus. In this paper, we present 15 cases with intracranial diseases who suffered from paralytic ileus. Indeed, various factors such as a previous history of an abdominal operation, sepsis, trauma, and drugs may contribute to the mechanism of this complication. On the other hand, nimodipine, a kind of calcium antagonist is an effective hypotensive agent without decreasing the cerebral blood flow. But an administration of this agent sometimes causes a paralytic ileus. Nimodipine were administered for all the patients of our 15 cases with hypertension. It was suggested that an administration of nimodipine was the most significant factor of the paralytic ileus of our patients. Three patients died of paralytic ileus despite the intensive conservative treatments described as below. So we must pay attention to this unexpected complication when we use this agent for those with intracranial diseases.

Key words: paralytic ileus, intracranial organic diseases, nimodipine, hypertension

Patients and Methods

Fifteen consecutive patients with intracranial diseases who were admitted to our neurosurgical department of our institute between April 1998 and May 2000 were complicated by paralytic ileus. Their ages ranged between 44 and 89 (mean 73). They were 7 males and 8 females. Their intracranial diseases were SAH: 2, ICH: 5, CI: 6, CC: 2.

All the presented patients were hypertensive on admission and nimodipine was administered intermittently for some one and injected continuously for the other. The total amounts of nimodipine administered to each patients were variable.

Results

Of our 15 series only one patient (Case 11) had underwent an abdominal operation for his acute appendicitis about 30 years ago. Other patients had not previous histories of an abdominal operation including ventriculo-peritoneal shunt.

Only one patient manifested herniation signs due to massive intracerebral hematoma and underwent an emergency operation (Case 14).

None of them underwent an open direct surgery for paralytic ileus. Conservative treatments such as glycerin enema, hyper alimentation, medication of pantothenate were performed. In spite of these various conservative treatments three patients died of this complication. Other complications except for paralytic ileus were variable demonstrated as Table 1. Abnormal data of electrolytes were observed in 5 cases. (Hypernatremia: 2, hyponatremia: 2, hypokalemia: 1)

Illustrative Cases

Case 2: A 76-year-old male was admitted with left thalamic hemorrhage. He developed serious right hemiparesis and admitted to our hospital. On admission he was hypertensive and received nimodipine continuously (total amounts: 4,243 mg). About two weeks later, he manifested abdominal distension and radiograph revealed an

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Conservative treatments lead to the resolution of his ileus.

Case 14: A 44-year-old male was admitted with consciousness disturbance and decerebrate postures. Computed tomography (CT) revealed a massive intracerebral hemorrhage in his right occipital lobe and an ipsilateral subdural hematoma. Although emergency operation was performed, he manifested persistent vegetative state.

Table 1

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Age/Sex</th>
<th>Disease</th>
<th>Prev. hist.</th>
<th>OP</th>
<th>Cons (JCS)</th>
<th>Other complications</th>
<th>Electrolyte</th>
<th>Treatment</th>
<th>Amounts [mg]</th>
<th>Methods</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>58/F</td>
<td>SAH</td>
<td>HT</td>
<td>no</td>
<td>2</td>
<td>Resp. disturb.</td>
<td>hypoK</td>
<td>panto.</td>
<td>2,400</td>
<td>continuous</td>
<td>GR</td>
</tr>
<tr>
<td>2</td>
<td>76/M</td>
<td>ICH</td>
<td>HT</td>
<td>no</td>
<td>1</td>
<td>no</td>
<td>no</td>
<td>panto.</td>
<td>4,243</td>
<td>continuous</td>
<td>MD</td>
</tr>
<tr>
<td>3</td>
<td>67/M</td>
<td>ICH</td>
<td>HT</td>
<td>no</td>
<td>10</td>
<td>Resp disturb</td>
<td>hyperNa</td>
<td>panto.</td>
<td>14,155</td>
<td>continuous</td>
<td>GR</td>
</tr>
<tr>
<td>4</td>
<td>57/F</td>
<td>SAH</td>
<td>HT</td>
<td>no</td>
<td>10</td>
<td>no</td>
<td>no</td>
<td>panto.</td>
<td>1,810</td>
<td>continuous</td>
<td>GR</td>
</tr>
<tr>
<td>5</td>
<td>72/F</td>
<td>SAH</td>
<td>HT</td>
<td>no</td>
<td>1</td>
<td>no</td>
<td>no</td>
<td>panto.</td>
<td>621</td>
<td>continuous</td>
<td>MD</td>
</tr>
<tr>
<td>6</td>
<td>84/F</td>
<td>CI</td>
<td>HT</td>
<td>no</td>
<td>1</td>
<td>UTI, ARF, Anemia</td>
<td>no</td>
<td>panto.</td>
<td>412</td>
<td>intermittent</td>
<td>MD</td>
</tr>
<tr>
<td>7</td>
<td>89/F</td>
<td>CI</td>
<td>HT</td>
<td>no</td>
<td>2</td>
<td>pneumonia</td>
<td>hypoNa</td>
<td>panto.</td>
<td>563</td>
<td>intermittent</td>
<td>SD</td>
</tr>
<tr>
<td>8</td>
<td>71/M</td>
<td>ICH</td>
<td>HT</td>
<td>no</td>
<td>1</td>
<td>MOF</td>
<td>no</td>
<td>panto.</td>
<td>7,671</td>
<td>continuous</td>
<td>dead</td>
</tr>
<tr>
<td>9</td>
<td>89/F</td>
<td>CI</td>
<td>HT</td>
<td>no</td>
<td>1</td>
<td>ARF</td>
<td>no</td>
<td>panto.</td>
<td>825</td>
<td>intermittent</td>
<td>dead</td>
</tr>
<tr>
<td>10</td>
<td>70/F</td>
<td>CI</td>
<td>HT</td>
<td>no</td>
<td>1</td>
<td>no</td>
<td>no</td>
<td>panto.</td>
<td>348</td>
<td>intermittent</td>
<td>GR</td>
</tr>
<tr>
<td>11</td>
<td>81/M</td>
<td>CC</td>
<td>appendectomy</td>
<td>no</td>
<td>1</td>
<td>pneumonia</td>
<td>no</td>
<td>panto.</td>
<td>262</td>
<td>intermittent</td>
<td>MD</td>
</tr>
<tr>
<td>12</td>
<td>77/F</td>
<td>CI</td>
<td>HT</td>
<td>no</td>
<td>1</td>
<td>pleural effusion</td>
<td>no</td>
<td>panto.</td>
<td>127</td>
<td>intermittent</td>
<td>MD</td>
</tr>
<tr>
<td>13</td>
<td>81/M</td>
<td>CI</td>
<td>HT</td>
<td>no</td>
<td>1</td>
<td>dysuria</td>
<td>no</td>
<td>panto.</td>
<td>222</td>
<td>intermittent</td>
<td>MD</td>
</tr>
<tr>
<td>14</td>
<td>44/M</td>
<td>CI</td>
<td>HT</td>
<td>no</td>
<td>200 (herniation)</td>
<td>intestinal bleeding</td>
<td>hypoNa</td>
<td>panto.</td>
<td>4,236</td>
<td>continuous</td>
<td>VS</td>
</tr>
<tr>
<td>15</td>
<td>79/M</td>
<td>CC</td>
<td>HT</td>
<td>no</td>
<td>30</td>
<td>Resp disturb</td>
<td>hyperNa</td>
<td>panto.</td>
<td>2,236</td>
<td>continuous</td>
<td>dead</td>
</tr>
</tbody>
</table>

Case 15: A 79-year-old male was collided by a car while he was riding a motorbike and was transferred to our institute by ambulance. His neurological symptoms were Japan coma scale (JCS) 30 with no herniation signs. CT demonstrated a cerebral contusion and traumatic SAH mainly in his right frontotemporal lobe (Fig. 3). This patient received nimodipine (2,236 mg) continuously and suffered from not only paralytic ileus but also other complications such as respiratory disturbance due to pneumonia, acute renal failure and hypernatremia. Ten days later from admission, he died of paralytic ileus despite various conservative treatments.

Discussion

Paralytic ileus is a significant complication of intracranial diseases including cerebrovascular strokes but is unfamiliar with us in general.14 Common causes of paralytic ileus are various and are a previous history of an abdominal operation, sepsis, myocardial infarction, basal pneumonia, rib fractures and...
intraperitoneal inflammation including acute appendicitis, cholecystitis. Administering some kinds of drugs such as heroin, probanthine, antacids, anticoagulants and hexamethonium derivatives sometimes causes this disease.\(^7\)\(^{20}\) Nimodipine, a kind of calcium antagonist is one of them. Now we are intended to present the factors of paralytic ileus associated with our patients.

A previous history of an abdominal operation may be strongly related to this complication.\(^9\) But only one patient (Case 11) of our series underwent an abdominal operation for his acute appendicitis about 30 years ago.

A patient who suffers from intracranial diseases including cerebrovascular strokes has a tendency to be complicated by a paralytic ileus.\(^{21}\) Only a few reports described this mechanism in detail.\(^{3}\)\(^{5}\) In the case of SAH, the mechanism of paralytic ileus mainly depends on both
lifting the sympathetic dilative stimulation and blocking the parasympathetic contractile one of the intestine.\textsuperscript{7,20,21,25} However, only one patient (Case 1) suffered from SAH among the presented 15 cases with intracranial organic diseases.

It is possible that serious damage to the hypothalamus by a massive intracerebral hemorrhage induces paralytic ileus mediated with autonomic nervous system.\textsuperscript{16} However, none of the presented cases except for one (No. 14) was in such critical state.

Ages of the patients may be related to this complication. Patients of our series are relatively elderly. Their ages ranged between 44 and 89 (mean 73). The functions of their gastro-intestines were considered to be poor and it might contribute to causing their paralytic ileus. Anyway, these various factors including abnormal data of the electrolytes probably contribute to this mechanism relating mutually in addition to the poor general conditions of the patients.\textsuperscript{24}

Generally speaking, it is very important for us to control the blood pressure of the patients suffering from strokes in normal range. All of the presented cases had the previous histories of essential hypertension and received administrations of nimodipine on admission. Nimodipine is an effective hypotensive agent without decreasing the cerebral blood flow and now widely used for treatment and prevention of cerebrovascular spasm.\textsuperscript{2,8,12,17,18,21,20,24} In some reports, it may favorably influence outcome in patients with traumatic SAH.\textsuperscript{8,12,15,23} However, this agent inhibits smooth muscle contraction not only in cerebral vessels but also in gastro-intestine.\textsuperscript{4–7,10–15,17,19–22,25} Although we could not detect the statistical relationships between the amounts of nimodipine administered to our patients and the degrees of paralytic ileus of them, all the patients presented in this paper underwent administrations of this agents. So it is strongly suggested that an administration of nimodipine caused paralytic ileus.

Three cases of our series were lost for this unexpected complication despite the intensive conservative treatments.\textsuperscript{1} Therefore the possibility of paralytic ileus must be kept in mind when dealing with the patients who suffered from intracranial organic diseases especially in infusing nimodipine.

References


Fig. 3 Case 15: Computed tomography scans on admission showing a cerebral contusion and traumatic SAH mainly in his right frontotemporal lobe (left), and radiograph taken five days later from admission revealing a markedly distended colon (right).

要 旨

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われわれは日常診療上、頭部外傷、脳出血、脳梗塞などの頭蓋内疾患に麻痹性イレウスを合併する症例をしばしば経験することがある。しかし、頭蓋内疾患と麻痹性イレウスとの関係に言及した論文は少なく、イレウスの発症機序については、ほとんど考察がなされていない。今回、われわれは当院入院患者のうち、頭蓋内疾患に伴って発症した麻痹性イレウス症例15例に対し、問診歴の既往などイレウスを起こしうる原因について検索した。われわれのシリーズにおいては、入院時、全例高血圧症を有しており、いずれもCa拮抗剤であるnimodipineの投与を受けていた。本合併症発症には、患者の年齢を含めさまざまな要因の関与が考えられるものの、Ca拮抗剤の副作用に関する文献的な考察により、nimodipineが原因となった可能性が濃厚に示唆された。nimodipineは、脳血流を低下させることなく、全身血圧を導下させる有用な薬剤であるが、頭蓋内疾患の患者に対する投与には慎重を期すべきと、考えられた。