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The Role of Magnesium in the Etiology of Paralytic Ileus

MOHAMED S. HAFEZ, M.D.; NADER A. ABULATA, M.D. and SAMIR H. SAHLAB, M.D.

The Department of Surgery, Faculty of Medicine, Cairo University.

Abstract

Serum magnesium, calcium, sodium, potassium and urea were studied in 60 patients comprising 3 groups of 20 patients each. The first group included patients subjected to abdominal surgery, and in whom the bowel sounds were delayed for more than 72 hrs, with no passage of flatus or stools. The second group were also post-abdominal operation patients, but who restored the bowel function within 3 days. The third group were rather healthy volunteers. The levels of serum magnesium were lower in both postoperative groups, comparing with the control, but the differences were statistically insignificant. Similarly, there were no significant differences in the levels of serum calcium, sodium and urea between the 3 groups. On the other hand, the serum potassium levels were significantly lower in the ileus groups, when compared with the non-ileus postoperative cases or with the control ($P < 0.05$).

Introduction

PARALYTIC ileus is still an ambiguous problem. Metabolic disturbances, including electrolyte imbalances are among the etiological factors. Many authors demonstrated that hypokalaemia is a cause of intestinal atony[**1,2**].

Magnesium, like calcium blocks acetyl choline release causing muscle relaxation. It also inhibits the sodium pump, with decrease in cell polarization, and consequently decrease of neuromuscular excitability[**3,4**]. In fact, hypermagnesemia has been found associated with neonates born suffering from the small left colon syndrome (meconium plug syndrome)[**5**].

On the contrary, it has been suggested that decreased serum magnesium can also play a role in the production of ileus[**6**]. This exceptional view can be explained by the fact that magnesium has many other physiological effects, since it is an activator to many enzymes, and it is essential for activation of ATP[**4,7**].

Patients and Methods

The study was carried out on 40 patients and 20 volunteers, comprising 3 groups of 20 patients each. The first group were postabdominal surgery patients, in whom the bowel sounds were delayed for more than 72 hours postoperatively,

with no passage of flatus or stools. Variable degrees of abdominal distension and hyperresonance were invariably present. Nasogastric suction was still needed, and so was I.V. pluid therapy. The second group included also 20 postabdominal surgery patients, but in whom return of bowel function was detected within 3 days A third group of 20 rather healthy individuals was also included in the study as a control.

Serum magnesium, together with serum sodium, potassium, calcium and urea were estimated on the third postoperative day.

Results

The three groups were comparable concerning the age and sex. The postoperative groups were also comparable as regard the magnitude of surgery.

Serum magnesium levels were lower in the postoperative patients, particularly the ileus groups, than the controls (Table 1). The mean values were 1.65 mEq/L in the ileus group, 1 96 mEq/L in the non-ileus group and 2.35 mEq/L in the control group. However, differences were statistically insignificant.

The mean levels for serum sodium were 133.10 mEq/L in patients suffering from ileus, 140.96 mEq/L in the normal postoperative group and 143.52 mEq/L in the normal conrol group. These proved insignificant also. The mean serum calcium levels were 4.65, 4.98 and 4.86 mEq/L respectively, without significant difference. Serum urea was higher in the postoperative group.

groups. The mean was 46.69 mg/dL when ileus was present and 36.21 mg/dL in patients with early restoration of intestinal motility. The mean value in the control group was 31.8 mg/dL. But the differences were not significant.

The only significant difference was a lower serum potassium level in patients suffering from ileus (3.61 mEq/L, mean value), when compared with the control group (4.47 mEq/L) or the non-ileus postoperative group (4.32 mEq/L), with P less than 0.05 (Table 2).

Discussion

The aim of this study was primarily to find out, if there is aberration in serum magnesium level in association with postoperative ileus. The results showed that although decrease in serum magnesium occurs, it is minimal within the early postoperative days. Besides, reduction is present in all postoperative patients irrespective of their bowel functions. Consequently magnesium cannot be a significant contribution in the usual postoperative ileus, and there is no need to give it as substitutional therapy to patients fasting for few days after major abdominal surgery.

Serum sodium, potassium, calcium and urea were also estimated to ascertain comparability of the groups concerning these variables, which can be also relevant to the etiology of intestinal atony. In fact, as a side issue, significant hypokalaemia was noticed in patients of the ileus

Table (1) : Serum Magnesium in the Postoperative Patients Suffering Ileus (First Group), in the Postoperative Patients with Early Restoration of Intestinal Motility (Second Group) and the Normal Controls (Third Group).

Patients	First Group	Second Group	Third Group
	Mg^{++} mEq/L	Mg^{++} mEq/L	Mg^{++} mEq/L
1	1.56	1.99	2.69
2	1.82	2.27	1.89
3	1.54	2.14	2.30
4	1.71	2.10	2.40
5	1.84	2.14	2.14
6	1.89	2.13	2.45
7	1.59	1.99	2.72
8	1.38	1.71	2.34
9	1.95	1.83	1.92
10	1.38	2.27	2.05
11	1.69	1.68	2.69
12	1.33	1.83	2.14
13	1.81	1.90	2.83
14	1.89	2.14	1.85
15	1.34	1.83	2.91
16	1.93	2.14	2.71
17	1.86	1.62	2.22
18	1.38	1.92	2.30
19	1.71	1.62	2.16
20	1.79	1.95	2.47
Mean value	1.65	1.96	2.35
P (at < 0.05)	Not significant	Not significant	—

Table (2) : Serum Potassium in the Postoperative Patients Suffering Ileus (First Group), in the Postoperative Patients with Early Restoration of Intestinal Motility (Second Group), and the Normal Controls (Third Group).

Patients	First Group	Second Group	Third Group
	K+ mEq/L	K+ mEq/L	K+ mEq/L
1	3.86	3.36	5.20
2	3.41	4.82	4.44
3	4.09	4.83	5.45
4	3.68	3.5	3.71
5	3.02	3.36	4.17
6	3.39	4.22	4.44
7	3.84	3.36	4.51
8	2.68	4.82	4.17
9	3.90	4.24	4.27
10	2.84	3.56	3.93
11	3.68	4.88	4.61
12	3.85	4.24	4.27
13	3.85	3.78	3.93
14	3.69	5.12	4.51
15	3.36	5.12	5.13
16	3.02	3.75	4.27
17	4.09	5.12	4.44
18	3.96	4.82	4.61
19	4.09	5.12	4.51
20	3.85	4.26	4.94
Mean value	3.61	4.32	4.47
P (at $<$ 0.05)	Significant	Not significant	—

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