

MOTILIN LEVELS AND ELECTROGASTROENTEROGRAM STUDIES IN HYPOTHYROIDISM

WANG Hang-yong(王杭勇)¹, CAO Qian(曹倩)², LI You-ming(厉有名)¹

(¹ First Affiliated Hospital, College of Medicine, Zhejiang University, Hangzhou 310003, China)

(² Sir Run Run Shaw Hospital, Medical College, Zhejiang University, Hangzhou 310016, China)

Received Nov.26, 2000; revision accepted June 21, 2001

Abstract: To study the relationship between gastrointestinal dysfunction and motilin in patients with hypothyroidism. The plasma motilin concentration was measured by radioimmunoassay(RIA) in 30 patients with hypothyroidism and also in 30 controls. At the same time, the electrogastroenterogram was also taken. Among the hypothyroidism patients, 56.6% had decreased gastric motility, especially in gastric body and greater gastric curvature; 86.6% had decreased colonic motility, especially in the left half of the colon. There were no significant differences of plasma motilin concentration between patients with hypothyroidism and controls ($P > 0.05$). There were also no differences between pre-treatment and post-treatment individuals, but significant differences were observed in the electrogastroenterogram. We conclude that the plasma motilin concentration in hypothyroidism patients was the same as that in normal patients, and that electrogastroenterogram studies in patients with gastrointestinal dysfunction may be valuable.

Key words: hypothyroidism, motilin, electrogastroenterogram

Document code: A **CLC number:** R574

INTRODUCTION

Besides intrinsic gastrointestinal abnormalities, dysmotility of gastrointestinal tracts can also be caused by endocrinologic problems such as diabetes mellitus, gastroparesis for example (Rathmann et al., 1991). The relationship between gastrointestinal dysfunction and plasma motilin in patients with hypothyroidism is rarely reported. In order to address this question, we conducted this current study started 1996.

METHODS

Patients: From 1996 to 1998, 30 out-patients with hypothyroidism were enrolled. All the patients had the diagnosis confirmed by symptoms, clinical signs and laboratory examinations. Seven were males, twenty-three were females, with age ranging from 21 to 56 (mean, 37.5 ± 8.4). Thyroid function test showed all the patients' TT3 $< 1.2 \sim 3.4 \mu\text{mol/L}$, TT4 $< 54 \sim 174 \mu\text{mol/L}$, STSH $> 0.4 \sim 4 \text{ mIU/L}$. Among 25 thyroiditis patients, 3 had a history of thyroid surgery and 2 had I^{131} therapy before their entry into the study. Their clinical stages were 4.5 ~

11 months. All the patients had no symptoms and signs of peptic ulcer, no history of abdomen surgery, no gastrointestinal diseases via gastroenterography or endoscopy. Their liver and renal functions were normal, no history of smoking or drinking, no drugs using. Twenty-two patients had one or more symptoms of fatigue, cold intolerance, alopecia, coarse voice, menorrhagia, abdominal distension, anorexia, constipation, etc. All the patients had no typical myxedema.

Controls: From among 54 healthy volunteers, we selected 30 whose ages were similar to those of the patients (Table 1).

Table 1 Base-line characteristics of the patients and controls

Characteristic	Patients($n = 30$)	Controls($n = 30$)
Age-yr	37.5 ± 8.4	36.5 ± 6.8
Sex-no.		
Male	7	7
Female	23	23
Thyroid function		
TT3 ($\mu\text{mol/L}$)	$0.64 \sim 1.02$	> 3.4
TT4 ($\mu\text{mol/L}$)	$25 \sim 67.3$	> 174
STSH (mIU/L)	$31.4 \sim 61.2$	< 0.4
Thyroiditis-no.	25	0
Post thyroid surgery	3	0
Post I^{131} therapy	2	0

Methods: First, patients' thyroid function was assessed by RIA. After an overnight fast, blood samples were drawn; then the plasma motilin concentrations were measured by RIA with a motilin antiserum specific to the carboxyl terminal. At the same time, the plasma motilin concentrations in controls were also measured.

After blood draws, patients and controls were put into a silent and dark room, resting supine for 15 ~ 20 min, the electrogastrogram and electroenterogram were recorded according to Wang Hang-yong et al. (Wang et al., 1992; Chen et al., 1993; Wang et al., 1995). Then L-T₄ 125 μg/d was given to ten of the patients with hypothyroidism. At the end of 6 ~ 8 months, their thyroid function was assessed again. The plasma motilin concentrations were also measured and electrogastroenterogram was taken again.

Statistical analysis: Plasma motilin results were expressed as means ± SD. Electrogastroenterogram abnormality was expressed as percent ratio. Differences between groups were evaluated by *t*-test and χ^2 test (*P* < 0.05).

RESULTS

The mean plasma motilin concentration in hypothyroidism patients was (226.65 ± 72.65) pg/ml, and that the controls was (252.80 ± 40.97) pg/ml; there was no significant difference between with hypothyroidism and the controls (*t* = 0.106, *P* > 0.05).

The electrogastroenterogram was expressed as normality or abnormality (amplitude abnormality and frequency abnormality). Among patients' electrogastrograms 36.7% were amplitude abnormal, 56.6% were frequency abnormal. Among patients' electroenterograms 20% were amplitude abnormal, 86.6% were frequency abnormal. (Figs 1 and 2, Table 2)

Table 2 Electroenterogram expression in hypothyroidism patients

	Amplitude abnormality(%)	Frequency abnormality(%)	Locations of abdominal surface
EKG	11(36.7)	17(56.6)	GB and GGC
EEG	6(20.0)	26(86.6)	left half colon

EKG: electrogastrogram; EEG: electroenterogram; GB: gastric body; GGC: gastric greater curvature

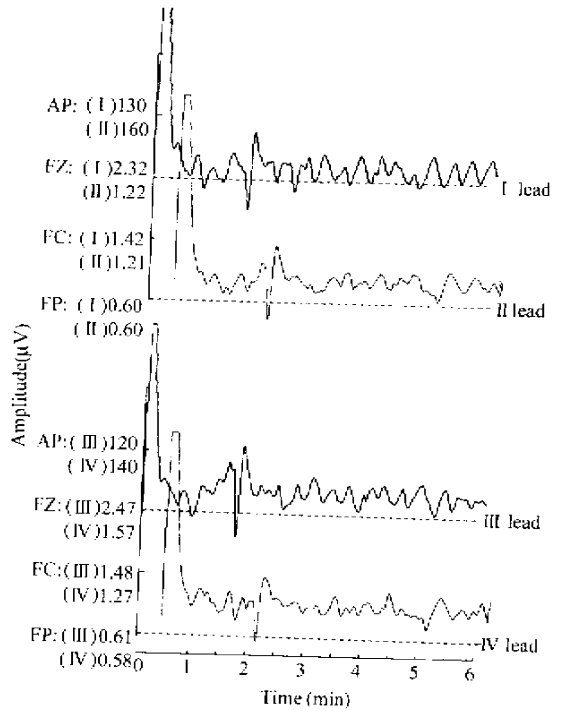


Fig.1 EEG expression in hypothyroidism patient
 I lead: gastric antrum; II lead: gastric body;
 III lead: gastric lesser curvature;
 IV lead: gastric grater curvature;
 AP: amplitude; FZ: frequency zero;
 FC: frequency cliax; FP: frequency primary

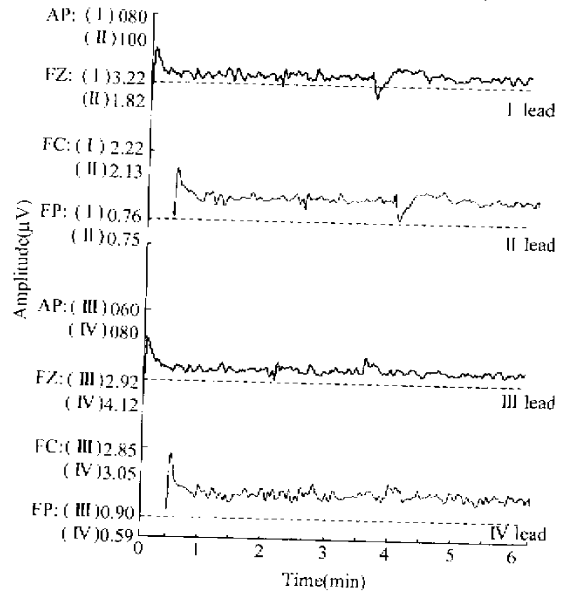


Fig.2 EEG expression in hypothyroidism patient
 I lead: ascending colon; II lead: descending colon;
 III lead: ileocecal region; IV lead: sigmoid colon;
 AP: amplitude; FZ: frequency zero;
 FC: Frequency cliax; FP: frequency primary

In 10 patients who had L-T₄ therapy, an increasing tendency of motilin was observed, and the change was not significant ($t = 1.543$, $P > 0.05$) but patients' gastrointestinal function obviously recovered after therapy ($P < 0.05$). (Table 4)

Table 3 Comparison of motilin concentration and electrogastroenterogram in 10 patients

	Motilin(pg/ml)	EGG Abnormality(<i>n</i>)	EEG Abnormality(<i>n</i>)
Before treatment	214.70 ± 48.83	10	10
After treatment	225.41 ± 39.90	2	2
<i>t</i> -test	$t = 1.543$	$\chi^2 = 10.21$	$\chi^2 = 10.21$
χ^2 -test	$P > 0.05$	$P < 0.005$	$P < 0.005$

DISCUSSION

Hypothyroidism is a hypometabolic disease caused by thyroid hormone deficiency. Many patients went to doctor for treatment for dyspepsia, which led to misdiagnosis.

Motilin is an important gastrointestinal hormone that stimulates gastrointestinal motor activity; its effect on the gastric antrum is more obvious than that on the gastric body. Motility also modifies lower esophageal sphincter motility to prevent gastric contents reflux into the esophagus (Vaezi, et al., 1997; Xu, et al., 1998).

Our study showed that the plasma motilin concentrations in hypothyroidism patients were normal before and after their treatment. In clinical practice, vomiting is rarely seen in patients with hypothyroidism, despite their having decreased gastric motility or delayed gastric emptying, no reflux into the esophagus was observed. According to our study, there may be a slightly positive correlation in normal plasma motilin concentration.

Nutrition absorption mostly depends on jejunum. Motilin can stimulate duodenal smooth muscle cell receptors to modify intestinal motility. Nutrition deficiency is not common in hypothyroidism patients even with hypometabolism; whether normal level of plasma motilin plays a

role needs to be further studied.

Our study showing that patients' gastric motility was decreased obviously (Wang et al., 1993), suggested that the motilin level of a hypothyroidism patients was not high enough to stimulate gastric motility, although it was at normal level. Patients with hypothyroidism often had early satiety, epigastric distension, anorexia and nausea, which may be related to decreased gastric body and greater curvature motility.

Electroenterogram showed decreased intestinal motility (obviously left half colon) in patients with hypothyroidism. It may be related to chronic constipation, dry stools, intestinal obstruction due to fecalith. The studied patients had no myxedema, although their colon motility had changed. If the patients had myxedematous megacolon, their colon motility would have changed more obviously.

After L-T₄ therapy, the gastrointestinal motility of ten patients with hypothyroidism returned to normal; the gastrointestinal symptoms disappeared. We can conclude that besides promotility drugs using thyroxine to treat patients with gastrointestinal symptoms is very important.

References

- Chen, J.D., McCallum R.W., 1993. Clinical applications of eletrogastrography. *Am JGastroenterology*, **88**(6): 1324 - 1336.
- Rathmann, W., Enck, P., Frieling, T. et al., 1991. Visceral afferent neuropathy in diabetic gastropresis. *Diabetes Care*, **14**:1086.
- Vaezi, M.F., Richter, J.E., 1997. Contribution of acid and duodenogastro-oesophageal reflux to oesophageal mucosal injury and symptoms in partial gastrectomy patients. *Gut*, **41**:297 - 302.
- Wang, H.Y., Ji, F., Fang, L.L. et al., 1992. Preliminary study on relationship between ECG pattern and clinical symptoms. *Journal of zhejiang medical university*. **21**(4):172 - 173.
- Wang, H.Y., Lin, X.J., Chen, Z.Y. et al., 1993. Preliminary study on relationship between gastric alorhythmia and gastric dysperiatalsis. *Journal of Gastroenterology and Hepatology*, **8**(suppl 2): s236.
- Wang, H.Y., Fang, L.L., Wang, Q.Y. et al., 1995. The analysis 34 cases of determination by electroenterograph. *Chinese journal of new gastroenterology*. **3** (suppl 3): 145 - 146.
- Xu, G.M., Zou, D.W., Yin, N., et al., 1998. 24 - Hour electrogastrogram in healthy volunteers. *Chin J Digestion*, **18**(2):76 ~ 78.