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DYSFUNCTION IN GASTRIC MYOELECTRIC AND MOTOR ACTIVITY IN *HELICOBACTER PYLORI* POSITIVE GASTRITIS PATIENTS WITH NON-ULCER DYSPEPSIA

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Helicobacter pylori (Hp) infection has been shown to affect gastric acid secretion and the somatostatin-gastrin ratio but its effects on gastric motility have not been evaluated. This study was carried out in 12 patients (10 males and 2 females, mean age 33 ± 6 yrs) who underwent endoscopy and *Campylobacter*-like Organism (CLO)-test. All patients were found initially to be Hp positive according to CLO-test. Gastric emptying was evaluated by measuring antral diameter with ultrasonography (Hitachi EUB 240) in fasted and fed patients. Electrogastrography (EGG) with antral manometry were done 5 h before and 4 h after a meal before the therapy and one month after the eradication with triple therapy (lanzoprazole 30 mg daily — 2×250 mg clarithromycin 500 mg t.i.d. — 3×500 mg and metronidazole 500 mg b.i.d. — 2×500 mg). In Hp positive patients before the triple therapy the mean fasted antral diameter was 4.3 cm^2, initial EGG showed significant dysrhythmia of electrical control activity (ECA) with tachygastria up to 25% of recording time in 9 of 12 Hp positive patients without normal increase of the power of signal in any of tested subjects. In 7 Hp positive fasted antral manometry failed to exhibit gastric phases III of the migrating motor complex (MMC). Hp eradication was accomplished in 10 of 12 examined patients and this was followed by a decrease in tachygastria to 3 cpm rhythm with an increase of the ECA power after meal. Phase III of MMC was observed again in 7 Hp negative patients with a decrease of fasted antral diameter ($p < 0.05$). Fasted and fed antral motility pattern increased after eradication. Two patients remained Hp positive after standard therapy. We conclude that most symptomatic non ulcer dyspeptic Hp positive patients show changes in ECA and antral hypomotility that are associated with Hp infections.

Key words: *gastric motility, electrogastrography, Helicobacter infection, gastritis.*

INTRODUCTION

Chronic non ulcer dyspepsia (NUD) is a constellation of persistent (more than 3 month lasting) symptoms originating in the upper abdomen. Etiology and pathology of NUD is not quite clear understood. Alterations in autonomic

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nervous system functions resulting in motor and sensory disturbances, excessive gastric secretion, the lack of relaxation of the gastric muscle wall to distension, and enhanced backflow of gastric contents have been implicated (1).

Among possible mechanisms, the prevalence of Hp related inflammation of gastric mucosa has been incriminated as a cause of functional dyspepsia, however, the results published are controversial (2). Hp infection has been shown also to affect gastric acid secretion and somatostatin-gastrin link (3) but possible relation between Hp infection and motor disturbances have been studied with conflicting results (4).

The aim of the study was to evaluate the effects of antral gastritis on gastric motility and emptying before and after standard triple therapy in Hp positive patients.

PATIENTS AND METHODS

Studies were carried out in 12 patients (10 males 2 females, mean age 33 ± 7) qualified for studies from the cohort of 112 dyspepsia patients presented to Motility Lab of our Institute as a referral centre from general practice and hospitals for complete evaluation in the last year. Patients were included in the study on the basis of previously done endoscopy, CLO-test and ^{14}C-urea breath test (UBT). Inclusion criteria for dyspeptic patients were the presence of at least two symptoms (pain, early satiety, bloating, abdominal fullness) with moderate to severe intensity of complaints persisting for at least half a year. All subjects were Hp positive in both (CLO as well ^{14}C BTU tests, and endoscopically had type B gastritis. Before the beginning of therapy in Hp positive patients gastric motility studies (EGG, gastric emptying and manometry) were done on separate days. Gastric emptying was tested with real-time ultrasonography (Hitachi EUB 240, Japan) by measuring antral diameter in aortomesenteric plane in fasted and fed patients (Salvipeptid MCT 500 ml, 500 kcal, Clintec, Salvia, Hamburg, FRG) every 10 min. Cutaneous EGG were done one hour before and one hour after meal using datalogger (2MB Synectics, Sweden) for storing and analyzing the data. On a separate day antral manometry was recorded with four channel microtransducer Koenigsberg catheter localized in the most distal part of the antrum 5 hours before and 4 hours after meal. The same motility studies were repeated after Hp eradication with 2 week triple therapy; lanzoprazole (Lanzul, Krka, Slovenia) 30 mg b.i.d., clarithromycin (Klacid, Abbott, Chicago, USA) 250 mg b.i.d., and metronidazole 500 mg b.i.d. Efficacy of eradication was assessed according to the ^{14}C UBT test within one month after treatment.

Twelve healthy volunteers (8 males and 5 females, mean age 25 yrs range 21—28) served as controls. All participants stopped taking any drugs at least 72 hours before the study. The protocol was approved by the Ethical Committee of the University Medical School and informed consent was obtained from all study participants.

Results were analyzed with stat 3 (Synectics) program. Differences were considered significant if $p < 0.05$.

RESULTS

Mean antral area before treatment in fasted Hp positive patients was doubled when compared to control group 4.3 ± 2 vs 2.1 ± 1 cm^2. Feeding resulted in further increase in antral diameter to 11.8 ± 3 as compared to 7 ± 2

cm^2 in healthy control. Gastric emptying was significantly ($p<0.05$) slower in NUD Hp positive patients before treatment than in control group (*Fig. 1*). Initial EGG before treatment showed significant dysrhythmia of electrical control activity (ECA) with tachygastria up to $25\pm5\%$ of recording time in

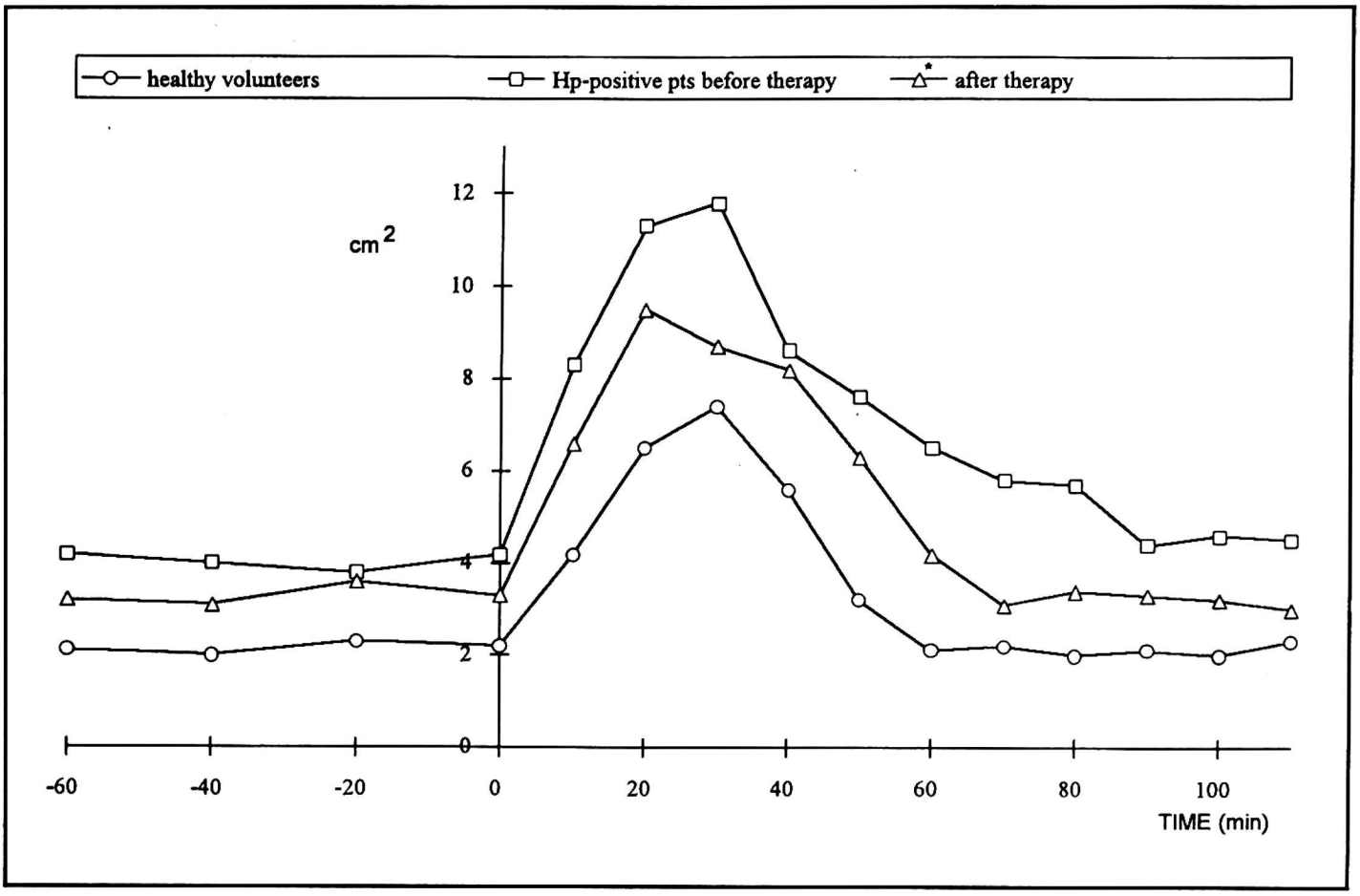

Fig. 1. Antral area as measured by ultrasonography in control group and in patients with gastris before and after eradication of Hp.

9 of 12 Hp positive patients without normal increase of ECA power after standard meal in all patients (*Fig. 2*). In 10 of 12 Hp positive patients manometry before treatment showed a decrease in antral interdigestive motility with the absence of gastric phase III. Analysis of antral motility before eradication in presented in *Tabl. I.*

Hp eradication obtained in 10 of 12 patients after 2 week triple therapy was followed by the increase in fasted and fed motility patterns and accelerated gastric emptying. Antral diameter decreased almost to the level observed in control group. Gastric phase III was present in all Hp negative patients with normal timing of phase III (*Tabl II*) and non significant ($p>0.05$) decrease of gastric phase II timing. In EGG recording tachygastria decreased to normal 3 cpm (cycle per min) in 60% of Hp negative patients in remaining 40% was on pretreatment level. Power of EGG signal increased after therapy up to 50% after meal in Hp negative patients and motility index was doubled after eradication (*Fig. 3, Tabl. 2*).

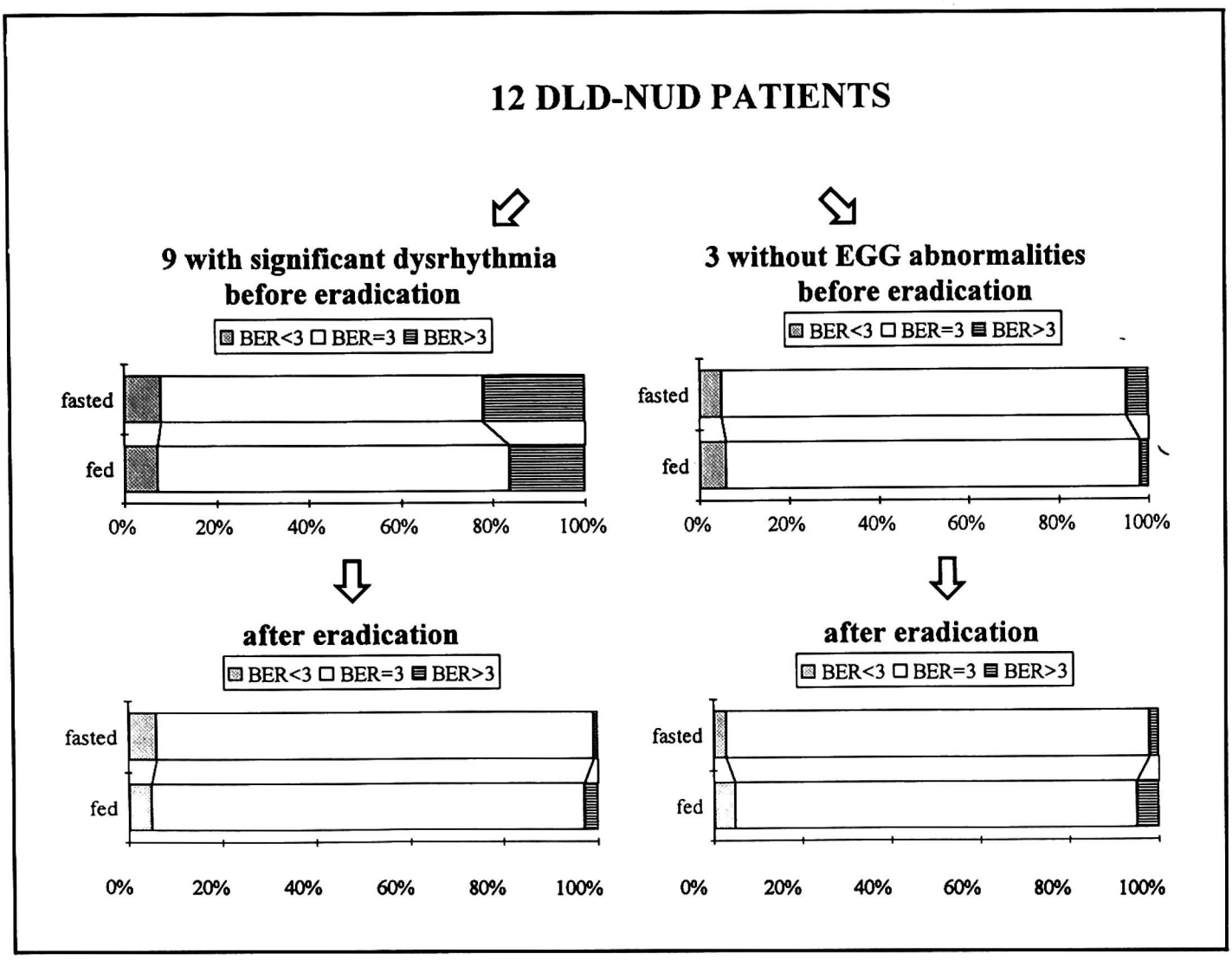

Fig. 2. Dominant frequency distribution in patients before and after standard triple therapy.

Table 1. MOTILITY (before eradication — 12 pts)

	FASTED (4h)	FED (4h)
GASTRIC MMC present in	12 pts	
PHASE III INTERVAL (min)	140	
#CONTRACTION	98	134
FREQUENCY (#/min)	0,4	0,78
MEAN AMPLITUDE (mmHg)	22	21
MEAN DURATION (sec)	4,67,9	5,8
MI Σ(mmHg*sec)/min	345 ± 59	398 ± 95

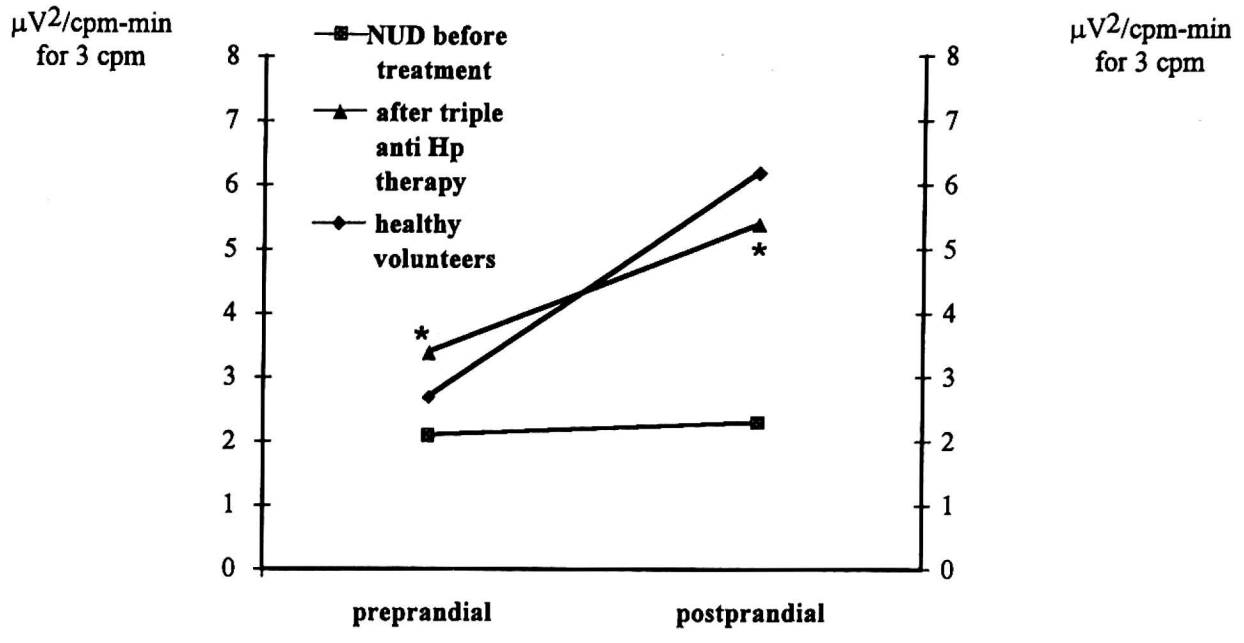

Fig. 3. Basal and postprandial mean running spectrum total power (RSTP) in healthy volunteers and NUD Hp positive patients before and after therapy.

Table 2. MOTILITY (after eradication — 12 pts)

	FASED (4h)	FED (4h)
GASTRIC MMC present in	12 pts	
PHASE III INTERVAL (min)	110	
#CONTRACTION	170	243
FREQUENCY (#min)	0,7	1,56
MEAN AMPLITUDE (mmHg)	34	38
MEAN DURATION (sec)	7,9	8,1
MI Σ(mmHg*sec)/min	734±140	1100±342

Endoscopy after therapy showed significant healing of inflammatory changes in 8 Hp negative patients, however, in two Hp positive patients resistant to treatment, gastritis did not improve.

DISCUSSION

Functional dyspepsia has no generally agreed definition. It is assumed to represent a complex of symptoms with probably various pathophysiological background but typical clinical picture emanating from the upper gastrointestinal tract. It has been estimated that up to 30% of population have NUD (1) but these data are questionable because of the lack of a clear cut definition of disease. Abnormal gastroduodenal motility occurs in about 60% of NUD patients (5). Results of studies on the influence of Hp infection on motility are conflicting. Wegener at al (4) reported that Hp positive patients with NUD have delayed gastric emptying but Tucci et al (6) did not confirm these findings. We qualified to our study NUD patients with gastritis only without gastro-duodenal ulcers or ulcer scarring to create a group of cases with similar dysmotility background. The most common cause of gastritis was Hp infection (7). In our study Hp positive patients had usually wide antrum, diminished antral motility and delayed gastric emptying before treatment as in the study of Wegener et al (4), however, this study was carried out in the patients with NUD symptoms only.

After triple Hp therapy, gastric emptying was improved in 60% of our patients, contrary to the studies of Minocha at al (8), who did not find any relationship between Hp infection and gastric emptying though the orocecal transit time (OCTT) in their Hp positive patients was shorter. The discrepancy between the results could be caused by different methods applied in measuring of gastric emptying. Minocha used in his study a solid food and scintygraphy. Acceleration of OCTT in his studies was probably caused by the changes in the intestinal interdigestive motility patterns. As was reported by Qvist at al (9) the duration of intestinal phase I of the MMC in Hp positive gastritis patients was shorter and simultaneously phase II was prolonged, however, duodenal phase III timing remained normal. Prolongation of phase II of MMC in their patients could result in faster OCTT. Eradication of Hp infection resulted in similar motility patterns to those observed in normal individuals but there were no difference in the intestinal motility between patients with gastritis due to Hp infection and those with gastritis due to the other factors. In our study we observed both interdigestive and postprandial hypomotility of the antrum with absence of phase III in the antral part of the stomach of Hp positive patients. Thus, the changes in gastric ECA such as of tachygastria and the absence of postprandial increase of signal power of EGG in our Hp positive patients, could be attributed to the mucosal inflammation related factors and may be not specific for the Hp infection. Diminished antral postprandial motility in Hp positive patients was also described by Mearin at al (10) in NUD patients. The author studied relationship between gastritis due to Hp infection and gastric perception to distension. He reported that Hp infection did not increase

perception of gastric distension and there was no relationship between symptoms and Hp infection. The absence of antral phase III of MMC observed in our patients may be responsible for prolonged solid phase lag time as shown by Scott at al (11) in NUD patients with gastritis due to Hp infection. Contrary to this, Pieramico at al (12) did not find difference between intestinal and gastric motility in Hp positive or Hp negative patients. In Pieramico's study postprandial antral motility was even higher in Hp positive than Hp negative patients. This discrepancy cannot be attributed to the applied technical procedure but could result from patients selection with more chronic symptoms in our NUD gastritis patients as compared to those of Pieramico. Motility changes in Hp positive patients could be also time-dependent as the inverse correlation between mucosal inflammation and postprandial antral motility described by Moore at al in peptic ulcer disease (13). Hp infection associated with prolonged hipergastrinemia described by Dunn (14) may suggest the possibility of abnormal gastrointestinal hormone profile in those patients. Changes in hormones release and/or sensitivity of smooth muscle to their action could be partially responsible for the observed changes in gastric motility, however, long-term studies are needed to validate this hypothesis.

We conclude that most of the Hp positive NUD patients present profound alterations in antral hypomotility with failure of gastric phase III in the antrum probably related to Hp infection. The triple Hp therapy is an effective in the treatment of dysmotility related to mucosal damage induced by Hp infection.

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