

Comparison of the “Twenty-Four Hour pH Monitoring Test” Results of the Pregnant and Non-Pregnant Reflux Patients

Mehmet VURAL¹, Ülkü BAYAR², Yücel ÜSTÜNDAĞ³, Selim AYDEMİR³, Mustafa BAŞARAN²

Şanlıurfa, Turkey

OBJECTIVE: Twenty-four hour pH monitoring test is an important and helpful tool in diagnosis of the gastro-esophageal reflux disease. In this study we aimed to compare test results of pregnant and non-pregnant patients with gastro-esophageal reflux disease.

STUDY DESIGN: Twenty-four hour pH monitoring test performed in 10 pregnant and 10 non-pregnant control patients. Among 10 pregnant gastroesophageal reflux patients; 3 were in third trimester and 7 were in second trimester. All patients had clinical diagnosis of gastroesophageal reflux disease and have filled a detailed questionnaire about reflux symptoms.

RESULTS: Except one patient in each group whole patients had reflux diagnosis confirmed. There was high seropositivity for helicobacter in both groups. We observed no significant difference in deemeester scores of the groups.

CONCLUSIONS: Although only significance detected in the longest reflux time in proximal test results, other proximal test results of the pregnant group were markedly worse also. In the larger study groups this difference can be elucidated more meaningfully.

Key Words: Twenty-four hour pH monitoring test, Pregnancy, Gastroesophageal reflux disease

Gynecol Obstet Reprod Med 2010;16:75-8

Introduction

It is accepted that pregnancy and heartburn and gastroesophageal reflux disease (GERD) are strongly related.¹ Even if reflux symptoms especially appear in the second half of pregnancy,² Castro³ showed that more than half of the pregnant patients have first heartburn in the first trimester. On the other hand, most do not take medical help for this symptom until suffering.

In a large study Marrero and colleagues⁴ have investigated 607 pregnant women related with heartburn and found that severity of symptoms increasing by week of gestation. Suffering from heartburn percentage was 22% in the first trimester, 39% in second and 72% in the third trimester. This study showed strong relation with week of gestation and heart-

burn prevalence. Fortunately almost all women get free of these symptoms soon after delivery. High parity and history of heartburn in the previous pregnancy also are subjected to increase risk of heartburn.⁵

Pathogenesis of GERD during pregnancy is controversial and probably multifactorial. Besides lower esophageal sphincter (LES) relaxation there are some other mechanisms also discussed as cause: defect in the esophageal peristalsis,¹ defect in the mucosal resistance,⁶ delay in the gastric empty time.⁴

Lind and colleagues⁷ showed that pregnant patients have higher intragastric pressure, lower LES pressure and less increase in LES pressure in response to increase in intragastric pressure when compared to asymptomatic control patients. Decrease in the LES pressure also attributed to the effect of the increasing hormone levels during pregnancy especially estrogen and progesterone. Van Thiel and coworkers⁸ hypothesized that progesterone alone in combination with other hormones related with reduction of LES pressure. In a very early study in 1967, mechanical effect of pregnancy in pathogenesis of GERD was analyzed. Intragastric pressure of pregnant and control patients were analyzed under general anesthesia and found approximately twice higher pressure values in pregnant group.⁹

Even if principal diagnosis tool for GERD is based on symptoms, pH monitoring of LES is a more objective and numerical tool. However, it is hard to convince pregnant patient for procedure. The aim of this study is to investigate GERD

¹Harran University Faculty of Medicine Department of Obstetrics and Gynecology, Şanlıurfa

²Karalmas University Faculty of Medicine Department of Obstetrics and Gynecology and ³Department of Internal Medicine Division of Gastroenterology, Zonguldak

Address of Correspondence: Mehmet Vural
Harran Üniversitesi Tıp Fakültesi
Yenişehir Kampüsü Morfoloji Binası
Kat 3 Şanlıurfa
drmvural@yahoo.com

Submitted for Publication: 21.12.2009

Accepted for Publication: 04.04.2010

during pregnancy by twenty-four hour pH monitoring and compare results with the non-pregnant control group.

Patients and Methods

Subjects

Study included ten pregnant patients who had clinical GERD symptoms. All pregnant patients were a volunteer for further investigation with twenty-four hour pH monitoring. Patients selected from pregnancy follow-up clinic from 2005 to 2007. All ten pregnant patient filled a questionnaire related with reflux disease and informed consent related with risks. The questionnaire included questions on six gastroesophageal symptoms:¹ retrosternal heartburn,² retrosternal pain,³ epigastric heartburn,⁴ epigastric pain,⁵ acid regurgitation, and⁶ unpleasant movement of material upwards to larynx from the stomach. Non-pregnant group was consisting of also ten women who had twenty-four hour pH monitoring test in the Gastroenterology Department for the symptoms of reflux disease. Patients with systemic diseases and multiple pregnancies excluded from study.

The study was approved by local ethic committee and an informed consent was obtained from all patients.

Study protocol

In this study ambulatory 24-h dual-probe pH monitoring was performed for all patients. In an overnight fasted patient two pH sensitive electrodes were passed per nares and positioned. The pH 2 probe (esophageal probe) was placed 5 cm above the the upper border of LES and pH 1 probe was also placed 5 cm below the oropharyngeal region. Both electrodes were connected to a recording device (Synectics Medical Inc., Irving, TX). The pH electrodes was calibrated using buffers of pH 1 and 7. Patients were instructed to keep record of their upright and supine positions and they had been told to discontinue all medications that might affect pH recording seven days prior to the test. The pH tracings were analyzed by a commercial computer software program and reviewed by the author. Reflux was considered pathological if any of the fol-

lowing criteria were exceeded:(1) percent of total time pH <4 (normal <5.5);(2) percent of upright with pH <4 (normal < 8.2%); 3) percent of supine with pH <4 (normal <3%).¹⁰

Statistical Analysis

Statistical analysis of data was performed by SPSS 16.0 software. Data are expressed as mean \pm S.D. except where otherwise stated. Mann-Whitney U test performed for comparison of nonparametric and independent groups. Difference accepted significant at $p < 0.05$ level.

Results

All pregnant patients have filled a questionnaire including demographic characteristics and GERD symptoms before twenty-four hour pH monitoring test.

However non-pregnant group data were collected retrospectively from archive pool of Gastroenterology Department. There was no significant difference between age, height and weight values of two groups.

Mean age at was 28.8 and 28.2 in the pregnant and non-pregnant group respectively. Mean height was 165 cm and 164.4 cm respectively. Mean week of gestation in the pregnancy group was 26 ± 6.3 . Five patients were nulliparous and 5 were multiparous.

When we look the questionnaire results of the 10 pregnant patients; only three patients had reflux symptoms before pregnancy, none of the multiparous women have had symptoms in the previous pregnancy and four of them were not using any medication for the symptoms. Those who are using medication were mostly using anti-acid drugs, only one patient was using proton pump blocking pills. Only two patients had benefit from medications. Except one patient, none was obeying the general advices related with habits and lifestyle.

Among test results, only significant difference was found between the proximal longest reflux time values of the two groups ($p < 0.05$) (Table 1).

Table 1: Twenty-four hour pH monitoring test results of the group separately.

	Proximal measurements		p	Distal measurements		p
	Pregnant group (\pm 2SD)	Non-pregnant group (\pm 2SD)		Pregnant group (\pm 2SD)	Non-pregnant group (\pm 2SD)	
Total reflux time (%)	4.24 \pm 3.74	0.89 \pm 0.67	NS	31.08 \pm 28.30	30.75 \pm 30.23	NS
Upright reflux time (%)	5.01 \pm 5.54	1.00 \pm 1.20	NS	30.03 \pm 33.36	32.20 \pm 31.40	NS
Supine reflux time (%)	3.31 \pm 3.39	0.70 \pm 0.62	NS	32.06 \pm 25.27	29.66 \pm 31.06	NS
Number of reflux time (in 24 hour)	42.01 \pm 34.70	16.89 \pm 13.43	NS	102.28 \pm 67.58	143.51 \pm 151.97	NS
Number of long reflux time (>5 min.)	1.78 \pm 3.32	0.10 \pm 0.31	NS	8.00 \pm 6.81	14.62 \pm 16.90	NS
Longest reflux time (in 24 hour)	12.42 \pm 13.43	2.49 \pm 1.43	<0,05	161.90 \pm 237.69	81.92 \pm 116.01	NS
DeMeester score (14.72 is upper limit of 95.0 percentile of normal)	15.14 \pm 12.93	3.69 \pm 2.38	NS	103.35 \pm 86.67	100.29 \pm 98.81	NS

NS: Not significant

According to the twenty-four hour pH monitoring test we accept scores greater than the 14.72 value as positive for reflux disease diagnosis with the 95% confidence interval. According to this cut-off point, in the pregnancy group proximal results yield 50% reflux diagnosis but none in the non-pregnant group. We found no difference in the distal part (Table 2).

Table 2: Ph monitoring test results of both groups according to DeMeester score.

	Proximal twenty-four hour pH monitoring test		Distal twenty-four hour pH monitoring test	
	GERD	Normal	GERD	Normal
Pregnant	5	5	9	1
Non-pregnant	0	10	9	1

Only one patient had normal results in the distal measurements and just advised to have routine follow up controls. All other patients are given medical treatment.

Discussion

The data of the present study suggested that LES pressure in the pregnant woman may be reduced because of the hormonal and physiological factors. There are few studies related with this topic in the literature. Mostly due to difficulty in the explanation of twenty-four hour pH monitoring test is totally harmless to the pregnant women and the baby. However because of the fear to have deleterious effect on the growing baby most patients refuse and choose symptomatic relief of the symptoms by some medical solutions. Also we have had difficulty in recruiting pregnant patients to the study. Because of these reasons we also did not performed esophageal manometry to evaluate LES pressure.

Actually in the diagnosis of the GERD diagnosis, twenty-four hour pH monitoring test is not the gold standard technique but it gives some important clues to clarify the relation of pregnancy with this disease and help to understand pathophysiology. Moreover in some cases if the severity of the reflux is so much, clinician may offer longer medical treatment, different choices of drugs or may refer to the endoscopy even during the pregnancy.

There are articles proving the deleterious effect of pregnancy to the GERD in the literature.^{4,8,10} Marchand and colleagues have found that most women first experience reflux symptoms after fifth month of gestation. Similarly, also in our study, mean gestational week at admission of medical help was 26th week.

Data obtained questionnaire filled by 10 pregnant women yield some interesting results. Patients claim that not the night

eating but kind of food is more effective in the symptom development.¹¹

Anton and colleagues¹² have shown that there is positive correlation between gestational week and the severity of reflux parameters in the twenty-four hour pH monitoring test but we couldn't prove in our study that correlation with all parameters significantly. This may be due to limited number of patients in our study.

It is also important to note that high seropositivity of helicobacter pylori IgG in both groups (70% and 60% in groups respectively). The high prevalence of helicobacter pylori IgG was similar with the prevalence of Turkish population.¹³ Raghunath et al have found that the prevalence of H pylori infection was significantly lower in patients with than without gastro-oesophageal reflux.¹⁴ In another study from the East showed that H. pylori infection protects against the development of GERD.¹⁵ According the data in the literature we suggested that high seropositivity of helicobacter pylori Ig G did not affect the occurrence of reflux symptoms in our study.

Although parameters within the twenty-four hour pH monitoring test showed no significant difference between test results of distal part, only significance detected from one of the proximal test result parameters which is "longest reflux time" ($p < 0.05$). Even if no significant difference detected from other parameters of proximal test results it is obvious that there is prominent difference in the pregnancy group towards worse side. This result also shows that similar twenty-four hour pH monitoring test results can be obtained from pregnant and non-pregnant patients who are clinically having GERD in the distal part of esophagus, however everything worse on the proximal part of the esophagus in the pregnant patients. This may be due to both mechanical factors and also hormonal effects of progesterone and estrogen.

Moreover according to the DeMeester score, both groups had similar test results in the distal part measurements but there was marked difference in the proximal part. Test results of the pregnant patients in the proximal part were markedly abnormal.

Conclusion

This study demonstrated similar twenty-four hour pH monitoring test results in the pregnant and non-pregnant patients having reflux symptoms. Either due to hormonal or mechanical factors tests results of the proximal part of the esophagus yield markedly more abnormal in the pregnant than non-pregnant patients of reflux disease. This difference can be a subject for a study to investigate hormonal receptor differences between proximal and distal part of LES.

Gebe Olan ve Olmayan Reflü Hastalarının “24 Saat pH Monitorizasyon Testi” ile Karşılaştırılması

AMAÇ: 24 saat pH monitorizasyon testi gastroözofajiyal reflü tanısı için önemli ve yararlı bir araçtır. Bu çalışmada gebe olan ve olmayan gastroözofajiyal reflü hastalarında test sonuçlarını karşılaştırmayı amaçladık.

GEREÇ VE YÖNTEM: 10 gebe ve 10 gebe olmayan control hastasına 24 saat pH monitorizasyon testi uygulandı. Gebe olan 10 reflü hastasının 3'ü üçüncü trimesterde ve 7'si ikinci trimesterde idi. Bütün hastalar klinik olarak gastroözofajiyal reflü hastalığı tanısı almıştı. Hastalar reflü semptomları ile ilgili detaylı anket doldurdu.

BULGULAR: Her iki grupta birer hasta hariç bu test ile reflü hastalığı doğrulandı. Her iki grupta da yüksek helicobakter seropozitifliği vardı. Demeester skorlaması ile gruplar arasında anlamlı farklılık saptanmadı.

SONUÇ: Sadece proksimal ölçümlerden en uzun reflü zamanı parametresinde anlamlı farklılık saptansa da, bütün ölçümlerde gebe hastaların sonuçları daha fazla hastalık lehine idi. Daha büyük çalışma gruplarında daha anlamlı sonuçlar elde edilebilir.

Anahtar Kelimeler: 24 saat pH monitorizasyon testi, Gebelik, Gastroözofageal reflü hastalığı

Reference

1. Rayburn W, Liles E, Christensen H, Robinson M: Antacids vs. antacids plus non-prescription ranitidine for heartburn during pregnancy. *Int J Gynaecol Obstet* 1999; 66:35-7.
2. Marchand P: The gastro-oesophageal sphincter and the mechanism of regurgitation. *Br J Surg* 1955;42:504-13.
3. de Castro LP: Reflux esophagitis as the cause of heartburn in pregnancy. *Am J Obstet Gynecol* 1967;98:1-10.
4. Marrero JM, Goggin PM, de Caestecker JS, Pearce JM, Maxwell JD: Determinants of pregnancy heartburn. *Br J Obstet Gynaecol* 1992; 99:731-4.
5. Bainbridge E, Temple J, Nicholas S: Symptomatic gastroesophageal reflux in pregnancy: a comparative study of white Europeans and Asians in Birmingham. *Br J Clin Practice* 1983;37:53-7.
6. Klauser AG, Schindlbeck NE, Muller-Lissner SA: Symptoms in gastro-oesophageal reflux disease. *Lancet* 1990;335:205-8.
7. Lind JF, Smith AM, McIver DK, Coopland AT, Crispin JS: Heartburn in pregnancy--a manometric study. *Can Med Assoc J* 1968; 98:571-4.
8. Van Thiel DH, Gavalier JS, Joshi SN, Sara RK, Stremple J: Heartburn of pregnancy. *Gastroenterology* 1977;72: 666-8.
9. Spence AA, Moir DD, Finlay WE: Observations on intra-gastric pressure. *Anaesthesia* 1967; 22(2):249-56.
10. Al-Amri SM: Twenty-four hour pH monitoring during pregnancy and at postpartum: a preliminary study. *Eur J Obstet Gynecol Reprod Biol* 2002;102:127-30.
11. Vemulapalli R: Diet and lifestyle modifications in the management of gastroesophageal reflux disease. *Nutr Clin Pract* 2008;23:293-8.
12. Anton C, Anton E, Drug V, Stanciu C: [Gastroesophageal reflux during pregnancy: 24-hour esophageal ph monitoring]. *Rev Med Chir Soc Med Nat Iasi* 2001;105:740-5.
13. Us D, Hascelik G: Seroprevalence of Helicobacter pylori infection in an Asymptomatic Turkish population. *J Infect* 1998;37:148-50.
14. Raghunath A, Hungin AP, Wooff D, Childs S: Prevalence of Helicobacter pylori in patients with gastro-oesophageal reflux disease: systematic review. *BMJ* 2003;326:737.
15. Wu JC, Sung JJ, Ng EK, Go MY, Chan WB, Chan FK, Leung WK, Choi CL, Chung SC: Prevalence and distribution of Helicobacter pylori in gastroesophageal reflux disease: a study from the East. *Am J Gastroenterol* 1999; 94:1790-4.