

Correlation of β -human chorionic gonadotropin with ultrasound diagnosis of ectopic pregnancy in the ED^{☆☆☆☆☆}

To the Editor,

Women with ectopic pregnancies tend to have lower β -human chorionic gonadotropin (β -hCG) levels than women with intrauterine pregnancies (IUP) [1]. Transvaginal ultrasound (TVUS) is capable of detecting IUPs when β -hCG levels are greater than 1500 mIU/mL, the so-called discriminatory zone [2–4]. When serum β -hCG levels are less than 1500 mIU/mL and no IUP is detected, possibility of ectopic pregnancy or early IUP exists. Because of the discriminatory zone, emergency physicians often opt not to perform ultrasound on patients whose β -hCG level is less than 1500 mIU/mL. Many ectopic pregnancies, however, are detected by emergency TVUS with β -hCG levels less than 1500 mIU/mL [1,5].

Our primary objective was to determine the frequency of patients with β -hCG levels less than 1500 mIU/mL who are diagnosed with ectopic pregnancy by emergency ultrasound. Our secondary objective was to evaluate the presenting complaints of women diagnosed with ectopic pregnancy and any associated risk factors.

This retrospective chart review, approved by the institutional review board, was conducted at an academic center with emergency medicine physicians trained and credentialed in TVUS.

Charts with a discharge diagnosis of ectopic pregnancy, miscarriage, pregnancy, abdominal pain, and/or vaginal bleeding were reviewed. Inclusion criteria were positive pregnancy with documented β -hCG level and ultrasound performed at the time of the emergency department (ED) visit. There were no exclusion criteria. Ectopic pregnancy was defined by sonographic criteria consistent with an ectopic pregnancy and reported diagnosis of ectopic pregnancy. Ultrasounds performed by emergency physicians as well as radiology and obstetrics-gynecology (OB) were included.

From October 2007 through June 2010, 3707 charts were identified and reviewed. Data from 876 patients meeting inclusion criteria were recorded on standardized data sheets and entered into Microsoft Excel 2008 for analysis.

Of the 876 patients, 47 were diagnosed with ectopic pregnancy by emergency ultrasound, representing 5.4% of the total number of pregnancies. Emergency medicine physicians diagnosed 22 (46.8%) of 47 ectopic pregnancies by emergency ultrasound. Thirteen (27.7%) were diagnosed by ultrasounds performed by OB and 7 (14.9%) by radiology. Five (10.6%) had ultrasounds performed by both the emergency physician and either OB or radiology.

Recorded β -hCG levels of the 47 ectopic pregnancies ranged from 125 to 68 138 mIU/mL (Fig). Seven ectopic pregnancies (14.9%) were diagnosed with β -hCG levels less than 500 mIU/mL; 6 (12.8%), with β -hCG levels between 500 and 1000 mIU/mL; and 2 (4.3%), with β -hCG levels between 1000 and 1500 mIU/mL. Overall, 15 ectopic pregnancies (31.9%) were diagnosed by ultrasound with β -hCG levels less than 1500 mIU/mL.

Of the 32 ectopic pregnancies for which follow-up data were available, 87.5% were taken to the operating room and had confirmed surgical diagnosis of ectopic pregnancy, whereas 12.5% were treated

with methotrexate. Although 25% of those diagnosed surgically with an ectopic pregnancy had β -hCG levels less than 1500 mIU/mL, none of the 11 ectopics that were ruptured at the time of surgery had β -hCG less than 1500 mIU/mL.

Most patients with a diagnosis of ectopic pregnancy had complaints of abdominal pain and vaginal bleeding, with abdominal pain being the most common complaint (91.5%). Only 57.4% of the patients with ectopic pregnancies had both abdominal pain and vaginal bleeding. Abdominal pain alone (27.7%) was more common than vaginal bleeding alone (6.4%). Eight patients (17%) diagnosed with ectopic pregnancy in this study had a history of an ectopic pregnancy in the past, and 75% of those with a prior ectopic also had a history of a sexually transmitted disease (STD) as well. Overall, 34% of patients diagnosed with an ectopic pregnancy had a history of *Chlamydia* and/or gonorrhea, and 4 patients had a history of some other STD. No women in this study reported using fertility drugs (Table).

As this was a retrospective chart review, it is possible that not all complaints were recorded in the charts. It is also possible that the records may be missing information regarding history of prior ectopic pregnancies, prior history of STDs, and use of fertility drugs.

Death from ectopic pregnancy remains the leading cause of maternal death in the first trimester [6]. Diagnosis of ectopic pregnancy, therefore, is crucial when caring for pregnant women who present to the ED with complaints suspicious for an ectopic pregnancy. As this study as well as prior studies have indicated [4,7,8], pregnant women who present to the ED in the first trimester of pregnancy with complaints of abdominal pain and/or vaginal bleeding or risk factors of prior ectopic pregnancy or history of STDs should raise concern for a possible ectopic pregnancy.

Data from this retrospective chart review confirm that ectopic pregnancies can be diagnosed at β -hCG levels much less than 1500 mIU/mL by emergency ultrasound. Therefore, β -hCG levels should not be used to determine the need for an emergency TVUS in a patient at risk for an ectopic pregnancy. Because 32% of the ectopic pregnancies diagnosed in our sample had a β -hCG less than 1500 mIU/mL, emergency TVUS should be performed regardless of β -hCG level in any pregnant woman with suspicion of an ectopic pregnancy.

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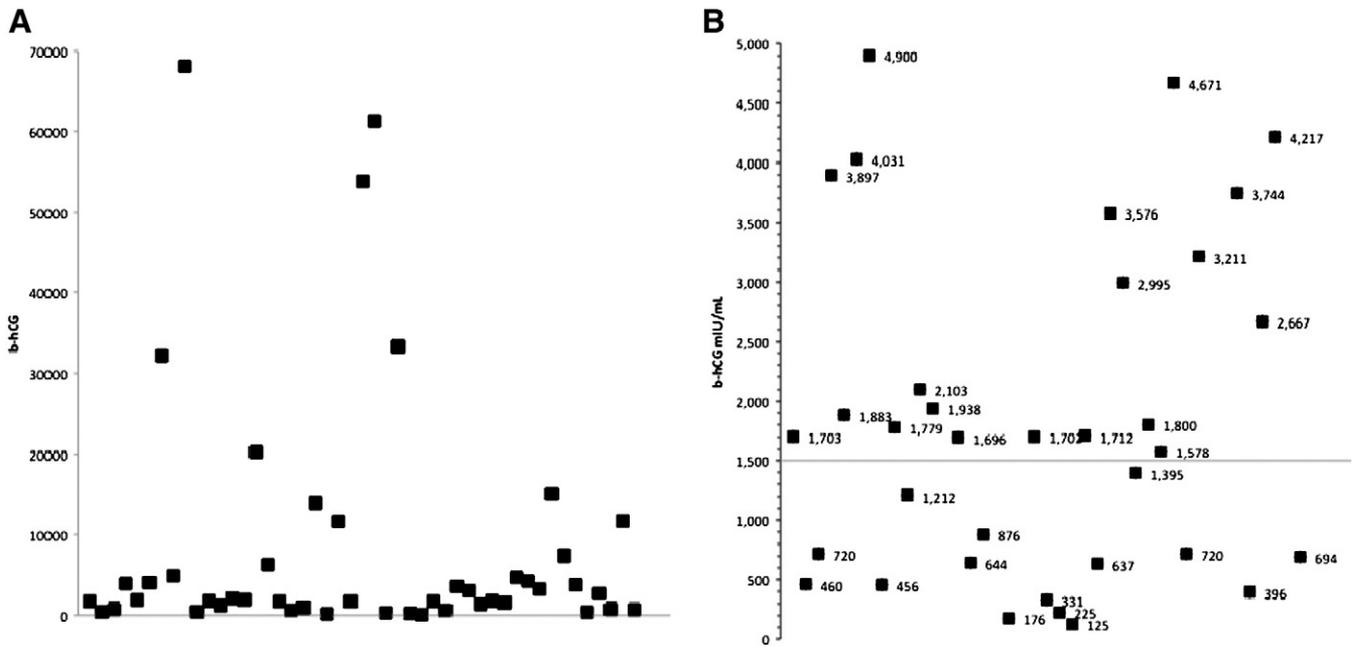


Fig. β -Human chorionic gonadotropin levels in mIU/mL of all 47 identified ectopic pregnancies (A) and 35 of the ectopic pregnancies identified with β -hCG levels less than 5000 mIU/mL (B).

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Gram stain for *Vibrio* species

To the Editor,

We read with great interest the article by Ryu et al [1] that described a case of necrotizing soft tissue infection caused by *Vibrio vulnificus*, which was initially identified as *Pseudomonas aeruginosa*. In that report, a bacterial culture of surgical specimens was reported as *P aeruginosa*; however, its associated antibiotic susceptibility pattern was unusual. Therefore, a retest of the bacterium was performed, and finally, *V vulnificus* was confirmed by 16S rRNA. In addition to conventional laboratory or advanced molecular methods for the identification of bacterium, we would like to remind the readers to not overlook the importance of Gram stain, which is a relative rapid and easy procedure for diagnosis. Especially for *Vibrio* species, its morphology should be that of a curved gram-negative rod on the microscopic examination. Based on the characteristics of *Vibrio* species' morphology, a Gram stain can promptly help differentiate *Vibrio* species from *Pseudomonas* species. Therefore, if the Gram stain is done for a surgical specimen or the clinical isolate from a culture colony, *Pseudomonas* species can be easily excluded and *Vibrio* species may be considered first. Most importantly, we would like to emphasize the clinical significance of Gram stain as a diagnostic tool for bacterial infection.

Table
 Clinical characteristics of the 47 ectopic pregnancies

Characteristics of the ectopic pregnancies	n (n = 47)
Symptoms	
Pain	44 (93.6%)
Abdominal pain	43 (91.5%)
Back pain	2 (4.3%)
Abdominal pain and no other symptoms	13 (27.7%)
Vaginal bleeding	31 (66.0%)
Vaginal bleed and no other symptoms	3 (6.4%)
Abdominal pain and vaginal bleeding	27 (57.4%)
Other reported symptoms	
Nausea and vomiting	7 (14.9%)
Fever	1 (2.1%)
Increased urinary frequency	1 (2.1%)
Prior medical history	
History of prior ectopic pregnancy	8 (17.0%)
History of prior ectopic and STD	6/8 (75.0%)
History of <i>Chlamydia</i> /gonorrhea	16 (34.0%)
History of STD other than <i>Chlamydia</i> /gonorrhea	4 (8.5%)
History of <i>Trichomonas</i>	2 (4.3%)
History of human papillomavirus	1 (2.1%)
History of herpes simplex virus	1 (2.1%)
History of use of fertility drugs	0 (0%)

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