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ROLE OF BEDSIDE TRANSVAGINAL ULTRASONOGRAPHY IN THE DIAGNOSIS OF TUBO-OVARIAN ABSCESS IN THE EMERGENCY DEPARTMENT

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□ **Abstract—Tubo-ovarian Abscess (TOA) is a complication of pelvic inflammatory disease (PID) requiring admission, i.v. antibiotics and, possibly, aspiration or surgery. The purpose of this study was to describe the role of emergency department (ED) bedside transvaginal ultrasonography (US) in the diagnosis of TOA. This was a retrospective review of non-pregnant ED patients presenting with pelvic pain who were diagnosed with TOA using bedside transvaginal US. ED US examinations were performed by emergency medicine residents and ultrasound-credentialed attending physicians within 1 h after clinical assessment. ED US logs were reviewed for the diagnosis of TOA. Medical records were reviewed for risk factors, medical and sexual history, physical examination findings, laboratory results, additional diagnostic testing, hospital course, and a discharge diagnosis of TOA by the admitting gynecology service. A total of 20 patients with TOA were identified over a 3-year period. Ages ranged from 14 to 45 years (mean 27 years). Seven (35%) patients reported a prior history of PID or sexually transmitted disease, and 1 (5%) was febrile. All had lower abdominal tenderness and 9 (45%) had cervical motion or adnexal tenderness. The sonographic abnormalities included 14 (70%) with a complex adnexal mass, 5 (25%) with echogenic fluid in the cul-de-sac, and 3 (15%) patients with pyosalpinx. The discharge diagnosis was TOA by the admitting gynecology service for all patients. Our study illustrates the limitations of clinical criteria in diagnosing TOA and supports the use of bedside US when evaluating patients with pelvic pain and symptoms that do not meet classic Centers for Disease Control and Prevention criteria for PID. © 2008 Elsevier Inc.**

□ **Keywords—tubo-ovarian abscess; ultrasound; emergency ultrasound; pelvic inflammatory disease; pelvic ultrasound**

INTRODUCTION

Pelvic inflammatory disease (PID) is an infection of the upper genital tract involving endometrium, fallopian tubes, ovaries, and adjacent structures. Tubo-ovarian abscess (TOA) is an advanced form of PID in which there is a total breakdown of the normal architecture of adnexa, resulting in a complex tender adnexal mass or fluid collection. TOA is a serious complication of PID requiring admission, i.v. antibiotics and, possibly, transvaginal aspiration or surgical intervention. Fifteen percent to 20% of women with PID will develop major complications (1). Approximately 30% of women hospitalized with PID develop a TOA (2,3). Due to the frequency of PID in the population, TOA has become the most common cause of an intra-abdominal abscess in premenopausal women (4). Surgical intervention is necessary in approximately 25% of cases of unruptured TOAs (5). Complicating this disease process further, 15% of TOAs rupture, causing a surgical emergency, and the mortality rate of a ruptured TOA is as high as 8.6% (4,6). Early

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diagnosis and treatment are essential to prevent further sequelae, including infertility, ectopic pregnancy, and chronic pelvic pain.

Distinction between PID and TOA helps avoid complications and direct specific treatment regimens. However, differentiating between PID and TOA based on clinical criteria alone is difficult (7). Whereas PID is clinically suspected in patients with abdominal pain, fever, cervical discharge, and cervical motion or adnexal tenderness, suspicion of a TOA is based on remarkably similar signs and symptoms. Signs of TOA are thought to include severe abdominal or pelvic tenderness, peritoneal signs on palpation, and presence of an adnexal mass on bimanual examination. Unfortunately, laboratory studies such as white blood cell count, erythrocyte sedimentation rate, and C-reactive protein are insensitive in diagnosing PID or differentiating PID from TOA. Making the distinction between the two is obviously difficult without the help of diagnostic imaging. Pelvic sonography has been shown to be highly sensitive and specific in detecting TOAs but is not routinely performed in all patients with PID (5).

In recent years, ultrasound performed at the patient's bedside has made pelvic ultrasound more common in the initial patient evaluation by the clinician. This is a change from the traditional imaging approach where patients who were more likely to fit the traditional diagnostic criteria of TOA were imaged on initial evaluation. We sought to evaluate the role of emergency department bedside transvaginal ultrasonography in the diagnosis of tubo-ovarian abscess.

METHODS

This was a 3-year retrospective study of non-pregnant emergency department (ED) patients with pelvic pain who were diagnosed with TOA using bedside transvaginal ultrasonography. This study took place at a Level 1 academic, urban ED with an annual census of 80,000. The study was approved by the institutional review board. The department sees a large number of patients with pelvic pain, and the overall prevalence of PID in our patient population with pelvic pain is approximately 50%.

The ED has a residency and an active ultrasound (US) education program, including an emergency US fellowship. Hospital-based credentialing in emergency ultrasound is available and is derived from American College of Emergency Physicians ultrasound guidelines (8). Every ultrasound examination performed by emergency medicine residents and faculty is recorded on a videotape or DVD for quality assurance, and ultrasound findings are logged separately in a log book. In the ED, patients were evaluated by both an emergency medicine resident and an attending physician. All patients underwent general physical and pelvic examinations. Patients were included in the study if they were not pregnant, were seen in the ED for pelvic pain, and underwent a bedside transvaginal ultrasound examination suggesting TOA. No specific ED ultrasound protocol for evaluating pelvic pain was followed. Patients received bedside US when credentialed emergency sonologists were on duty. Patients were selected for scanning when they had pain disproportionate to severity of PID or returned to the ED due to lack of improvement in symptoms. The bedside US examinations of the pelvis were performed using either a Phillips HDI 4000 system (Bothell, WA) with an 8-4 MHz sheathed endocavitary or a SonoSite Titan (Bothell, WA) with a 4–8 MHz endocavity transducer. The ED US examinations were performed by emergency medicine residents and attending physicians within 1 h after clinical assessment. The final interpretation and diagnosis was made by the attending physicians at the bedside. The eight emergency medicine faculty members who contributed to this study are credentialed by the hospital to perform ultrasound examinations. All eight emergency sonologists had previously taken a standardized 16-h course on emergency ultrasonography that included a 2-h lecture and 4 h of hands-on training dedicated to pelvic ultrasonography. All had at least 2 years of US experience in the ED before the study and each had performed at least 50 pelvic US and 200 non-pelvic US examinations before the study.

The US protocol included scanning with an empty bladder and examining the uterus in sagittal and transverse planes. The adnexa and cul-de-sac were also visualized in two planes. Criteria used to diagnose a TOA include the finding of a complex irregular adnexal mass or dilatated thick-walled fallopian tube with multiple internal echoes and septations, or speckled, echogenic fluid in the cul-de-sac. A total of three chart reviewers participated in data extraction. Chart review was performed over a 2-week period after institutional review board approval. A data extraction form was developed using Microsoft Office Excel (Microsoft Inc., Redmond, WA). The data extraction form included information about US findings, final interpretation, ED assessment, hospital course, outcome, and final diagnosis. The chart reviewers were not blinded to the study hypothesis and results. ED US logs were reviewed for the diagnosis of TOA. Medical records were then reviewed for risk factors, medical and sexual history, physical examination findings, laboratory results, additional diagnostic testing, hospital course, and a discharge diagnosis of TOA by the admitting gynecology service. Ambiguous data were evaluated by each reviewer, with the final decision made by consensus. The admitting Gynecology service made the final diagnosis based on their evaluation, which included additional imaging studies such as US findings