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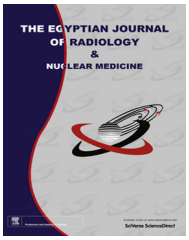

ORIGINAL ARTICLE

A two-stage imaging protocol for evaluating women presenting with acute pelvic pain

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KEYWORDS

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Abstract *Purpose:* To evaluate a two-stage imaging protocol for diagnosing women presenting with acute pelvic pain.
Materials and methods: Forty-nine female patients aged 20–49 years (mean 29.5 years) who were presenting with acute pelvic pain underwent US examination of the pelvis. MRI of the pelvis was done for seventeen patients with indeterminate ultrasound findings. Data from both MRI and US were obtained, and the definite diagnosis was established with laparoscopic or surgical findings and results of clinical follow-up as the reference standard.
Results: Positive pelvic US and MRI findings for gynecological causes were seen in thirty-six out of forty-nine cases (36/49). Final diagnoses of our positive cases (36) were as follows: hemorrhagic ovarian cyst seven cases (19%), ovarian torsion five cases (14%), endometriosis five cases (14%), teratodermoid four cases (11%), ectopic pregnancy four cases (11%), tubo-ovarian abscess three cases (8%), degenerating fibroid three cases (8%), adenomyosis two cases (6%), pedunculated prolapsed submucosal fibroid one case (3%), uterine AVM one case (3%) and pelvic hematoma one case (3%), Thirteen cases (13/49) were excluded from the study as they had other non gynecological causes of pelvic pain like appendicitis, lower ureteric stones, crohn's disease and diverticulitis. In 19 cases the diagnosis was established with US alone and so MRI was done for the remaining 17 cases where US was inconclusive.

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Conclusion: A two-stage protocol for evaluating women presenting with acute pelvic pain with the use of ultrasonography first, and then MRI for cases with inconclusive ultrasound findings, will optimize diagnostic accuracy.

1. Introduction

Acute pelvic pain is generally defined as pain in the lower abdomen or pelvis lasting <3 months. Diagnosis of pelvic pain in women can be challenging because many symptoms and signs are insensitive and nonspecific. As the first priority, urgent life-threatening conditions (e.g., ectopic pregnancy, ruptured and hemorrhagic ovarian cysts) and fertility-threatening conditions (e.g., pelvic inflammatory disease, ovarian torsion) must be considered. A careful history focusing on pain characteristics, review of systems, and gynecologic, sexual, and social history, in addition to physical examination helps narrow the differential diagnosis (1). Specific painful gynecological disorders that were inadequately diagnosed by US and more adequately assessed by MRI are analyzed in this article.

Adnexal torsion is the rotation of at least one turn of the ovaries, adnexa or the fallopian tube around the line of the tubo-ovarian ligament and the infundibulopelvic ligament (2). Symptoms of ovarian torsion are often nonspecific, making it difficult to differentiate from other causes of acute abdominal pain. The classic presentation includes sharp, localized right or left lower abdominal pain and tenderness with a palpable abdominal mass and peritoneal signs. Waves of nausea and vomiting as well as pyrexia have been observed. In some cases, patients experience intermittent pain, making the diagnosis even more challenging (3).

Endometriosis, which is defined, as the presence of ectopic endometrial glands and stroma outside the uterus, is a common cause of pelvic pain and infertility, affecting as many as 10% of premenopausal women (4).

Mature cystic teratoma, also known as dermoid cyst, is the most common neoplasm of the ovary. Most cystic teratomas are asymptomatic but 3% may present as torsion and more rarely as dermoid cyst rupture. Patients present with acute pelvic pain, nausea and/or vomiting (5).

Pelvic inflammatory disease (PID) is one of the most common causes of acute pelvic pain in sexually active women (6). PID should be suspected in all patients presenting with pelvic pain/cervical motion tenderness, fever, and leukocytosis (7).

Fibroids (leiomyoma) are the most common pelvic tumors affecting females in the fertile age group. They occur in 20–40% of females above 30 years of age (8). As fibroids may cause acute pain, patients may present at the emergency department. Acute pain may be caused by the degeneration of a fibroid when it outgrows its blood supply, torsion of a pedunculated fibroid or prolapse of a submucosal fibroid (9).

Adenomyosis occurs in women usually ranging in age between 35 and 55 years and it is due to the abnormal implant of the basal layer of the endometrium within the myometrium. The rate of adenomyosis at pathology after hysterectomy ranges from 5% to 70%. Symptoms are present in approximately 50% of patients, including pain, menorrhagia and dysmenorrhea. Adenomyosis can be diagnosed by means of US. However, US can especially misinterpret focal adenomyosis as a fibroid (10).

Uterine arteriovenous malformation (AVM) can be defined as a tangle of abnormal arterio-venous connections lacking an intervening capillary net-work on histopathologic examination (11,12). Distinguishing between gestational trophoblastic disease and uterine AVMs is critical because the latter can be treated safely and effectively with percutaneous transcatheter embolization but may be complicated by surgical intervention and curettage with heavy, even life-threatening, bleeding (13).

Subacute hematomas are commonly detected in the female pelvis in women after surgery, and in women receiving anticoagulant therapy who present with pelvic pain and/or a palpable mass. Pelvic hematomas tend to have loculations with different rates of clot maturation that result in heterogeneous appearance on MR images. Foci of high signal intensity on T1-weighted images representing methemoglobin may be present within the hematoma (14).

Non-gynecologic conditions may overlap in the presentation of acute pelvic pain and should also be considered. The most important of these is acute appendicitis. (7).

Ultrasound (US) is the primary modality for evaluating lower quadrant pain in young girls and women. However, transabdominal and transvaginal US might be inconclusive, even when combined with color and pulsed Doppler images. Computed tomography (CT) exposes patients to ionizing radiation, which can be problematic, especially in young people and females with suspected pregnancy (10).

With its high contrast resolution, its ability to provide good tissue characterization, and its multiplanar imaging capabilities, magnetic resonance imaging (MRI) is increasingly used to evaluate pelvic pathology (15–18). This technique has superb soft-tissue contrast, particularly of the gynecologic organs, additional benefits include absence of ionizing radiation and exposure to iodinated contrast material (19). There is a significant difference, however, in the inherent costs of MRI and ultrasound. The dilemma for referring physicians and general radiologists is to decide when it is appropriate to refer patients for MRI (18).

The aim of this study is to evaluate a two stage imaging protocol for diagnosing women presenting with acute pelvic pain.

2. Patients and methods

2.1. Patients

Patients presented to the emergency department of Ain Shams University Hospitals during the period from August 2011 to December 2012 with acute pelvic pain associated with or without other symptoms like vaginal bleeding, fever, infertility or dysmenorrhea (Table 2). All patients were subjected to Medical history and clinical examination, pelvic ultrasound was the initial screening investigation done for all patients, and MRI