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ORIGINAL ARTICLE

# Magnetic resonance imaging for diagnosis of pelvic lesions associated with female infertility



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## KEYWORDS

Magnetic resonance imaging;  
Tubal lesions;  
Pelvic endometriosis;  
Ovarian neoplasms

**Abstract Objective:** To study the mandatory indications and accuracy of magnetic resonance (MR) imaging for diagnosis of pelvic lesions associated with female infertility.

*Design:* Prospective cross-sectional study.

*Main outcome measures:* Indications and accuracy of MR imaging for diagnosis of pelvic lesions. Uterovaginal lesions were excluded as they were studied in a previous article (under publication).

*Materials and methods:* 423 infertile women were investigated by hysterosalpingography (HSG), transabdominal and transvaginal ultrasonography after thorough clinical examination. Hundred and thirty (30.95%) patients were associated with pelvic lesions not conclusively diagnosed by HSG or/and ultrasonography and were examined by MR imaging to confirm the diagnosis. Fifty-four patients (41.53%) had uterovaginal lesions. They were discussed in a previous article. Seventy-six (58.46%) patients had other pelvic lesions. The present study concerned with these lesions.

*Results:* The diagnosis by MR imaging was conclusive for 11 cases of pyosalpinx, 3 cases of hematosalpinx, 25 cases of hydrosalpinx, 24 cases of ovarian endometriomas, deep endometriosis of the of rectosigmoid (3 cases), urinary bladder (3 cases), one case of endometriosis of the abdominal wall after repeated cesarean sections and six ovarian tumors, 5 cases of benign cystic teratoma and 1 case of serous cystadenocarcinoma. The diagnosis of these lesions was confirmed by laparoscopy or laparotomy and histopathological examination. Magnetic resonance imaging failed to diagnose peritubal adhesions in 22 out of 39 cases (56.41%) of tubal lesions and peritoneal implants of endometriosis in 12 out of 31 cases (38.70%) of pelvic endometriotic lesions. They were discovered during the surgical treatment of the tubal and ovarian lesions through laparoscopy or laparotomy.

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*Conclusion:* The following pelvic lesions associated with female infertility were not conclusively diagnosed by HSG or/ and US but were precisely diagnosed by MR imaging with 100% accuracy: Pyosalpinx, hydrosalpinx and hematosalpinx, ovarian and deep infiltrating endometriosis and benign and malignant ovarian tumors as benign cystic teratoma and serous cystadenocarcinoma.

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## 1. Introduction

Tubal and ovarian disorders are responsible for more than 70% of causes of infertility (1,2). Pelvic lesions are investigated mainly by hysterosalpingography (HSG) and ultrasonography (US). However, with these methods the diagnosis may not be conclusive. These methods are supplemented with laparoscopy and occasionally magnetic resonance (MR) imaging (2). Being an expensive procedure many investigators are reluctant to use MR imaging in this field.

Magnetic resonance imaging has the advantage of nonuse of ionizing radiation which is an important consideration in women of reproductive age. Another advantage is that MR imaging is less invasive than laparoscopy and less observer dependent than the classic imaging techniques as US. Furthermore, recent advances in MR imaging with phased-array coil have created further imaging possibilities resulting in excellent spatial and tissue contrast resolution, multiplanar capability, and relatively fast techniques. The disadvantages of MR imaging is the high cost and the long time of examination (2).

Magnetic resonance imaging is contraindicated in patients with pacemakers, cochlear implants, certain metallic objects and impaired renal function (2).

The aim of the present study was to identify the obligatory indications and assess the accuracy of MR imaging for the pre-operative diagnosis of pelvic lesions (after exclusion of uterovaginal lesions) associated with female infertility. As a rule we resorted to MR imaging if the other imaging modalities did not provide conclusive diagnosis.

## 2. Materials and methods

Between June 2008 and April 2013, 423 infertile women were investigated by HSG and US in the Department of Obstetrics and Gynecology and Department of Radiodiagnosis, Tanta University Hospitals. Hundred and thirty (30.73%) patients were associated with pelvic lesions not conclusively diagnosed by HSG or/and US and were examined by magnetic resonance (MR) imaging. Fifty-four patients (41.53%) had uterovaginal lesions. They were presented in a previous article (under publication). Seventy-six (58.46%) patients, discussed in the present study, had pelvic lesions other than uterovaginal morbidities. Before examined by HSG and US each patient was asked about the duration of infertility, whether primary or secondary. A detailed menstrual and obstetric history was taken with emphasis on previous pregnancies or history of any abortion and gynecological history with emphasis on genital tract infections.

Detailed general, abdominal and pelvic examinations were performed. Husband's semen analysis was a pre-requisite before any investigation for the female partner.

The following radiological and imaging procedures were performed to diagnose pelvic lesions associated with infertility:

- (a) Transvaginal ultrasonography by 5–7 MHz sector transducer and transabdominal ultrasonography by 3.5 MHz sector transducer for large pelvic-abdominal masses (Seimens Omnia, Medison 9900, Germany).
- (b) Hysterosalpingography to assess tubal and uterine conditions.
- (c) Magnetic resonance imaging was performed when the previous procedures did not give conclusive diagnosis.

### 2.1. Inclusion criteria

All infertile patients with pelvic lesions not conclusively diagnosed by HSG and US were included in the study. Magnetic resonance imaging was mandatory for diagnosis of the following pelvic lesions:

- Differentiation between pyosalpinx, hydrosalpinx and hematosalpinx.
- Sure diagnosis and extent of pelvic endometriosis specially ovarian and deep infiltrating varieties.
- Definite diagnosis of benign cystic teratoma and stage Ia cystadenocarcinoma.

### 2.2. Exclusion criteria

Patients with chronic renal impairment (high serum creatinine), patients with previous allergy to the contrast medium and patients with pacemakers, cochlear implants, and certain metallic objects.

The diagnosis of the associated lesions was confirmed after operative interference by laparoscopy, and conventional abdominal operations and histopathological study.

Operative laparoscopy was resorted for tubal lesions, ovarian endometrioma and one case endometriosis of the urinary bladder all other lesions were managed by traditional surgery.

## 3. Technique of hysterosalpingography (HSG)

Hysterosalpingography was performed during the early follicular phase of the menstrual cycle, 3–4 days after cessation of menstrual flow.

Fractionated technique under the guidance of an image intensifier screen using iodinated water-soluble contrast medium (Telebrix Hystero) was the method of choice. The initial X-ray was taken after the injection of 3 ml of contrast material to visualize the cavity of the uterus to exclude intrauterine adhesions or a mass forming a filling defect. Further injection of

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