ORIGINAL RESEARCH

Evaluation Of Role Of MRI In Detecting Female Infertility

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Received: 25 July, 2023 Accepted: 28 August, 2023

Abstract

Background: The failure to conceive a clinical pregnancy after 12 months or more of consistent, unprotected sexual activity is classified as infertility. The present study assessed role of MRI in detecting female infertility.

Materials & Methods: 74 women aged 20- 40 years underwent MRI using 1.5 Tesla unit equipped with a 32 phased-array surface coil. In all, etiology of female infertility was recorded.

Results: The age group 20-30 years had 40 and 31-40 years had 34 patients. The difference was non-significant (P> 0.05). Various causes of female infertility were pelvic inflammatory disease in 12, endometriosis in 8, PCOS in 10, tubal disease in 14, leiomyoma in 3, adenomyosis in 7 and endometrial polyps in 20 cases. The difference was non- significant (P> 0.05).

Conclusion: When evaluating female infertility, magnetic resonance imaging (MRI) is a great non-invasive, radiation-free modality because it produces exquisite anatomical details through its multiplanar evaluation and superior soft-tissue contrast resolution.

Key words: Infertility, Leiomyoma, MRI

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Introduction

The failure to conceive a clinical pregnancy after 12 months or more of consistent, unprotected sexual activity is classified as infertility by the World Health Organization. Technologies for assisted reproduction are always evolving. Therefore, it is imperative to assess infertile women with the utmost accuracy. In order to determine the organic causes of infertility and to direct clinical management, a multimodality approach to diagnostic work-up is necessary for female infertility.[1]Infertility affects about 10% of married couples. Both sexes are equally impacted. The following categories can be used to broadly classify the causes of infertility in women: uterine causes, which include cervical stenosis, endometrial thickness and vascularity changes, infections, uterine synechiae, focal lesions, intrauterine scars, and congenital anomalies. follicular and ovulation abnormalities, endometriosis, and stromal vascularity are examples of ovarian causes. obstruction and infections are examples of tubal causes.[2]The radiologist's toolkit comprises imaging modalities such as sono-hysterography, MRI, transabdominal and transvaginal ultrasound, and hysterosalpingography (HSG).[3] The most effective method for determining the shape and orientation of pelvic structures is magnetic resonance imaging (MRI). Despite being non-invasive and radiation-free, it is difficult to repeat due to its high cost and limited availability. Other limitations include a longer examination time, an inability to distinguish sub-centimeter uterine lesions, and an inability to characterize endometriomas at certain stages.[4] Patients who have cochlear implants or cardiac pacemakers should not undergo MRIs. Pathological lesions, such as pituitary adenoma and tubal lesions, are also detectable by MRI. In cases of leiomyoma, adenomyosis, and endometriosis that are treated conservatively, it aids in prognostic prediction.[5] The present study assessed role of MRI in detecting female infertility.

Materials & Methods

This study consisted of 74 women aged 20- 40 years reported to the Department of Radiodiagnosis with a complaint of infertility. Patients were selected with their written consent The study protocol was approved by institutional ethical committee. A thorough pelvic examination was carried out. Symptoms such as pelvic pain, dysmenorrhoea etc. was noted. A serum hCG test was done before the examinations. MRI was performed on a 1.5 Tesla unit equipped with a 32 phased-array surface coil, with the patient in the supine position. The following sequences were acquired: – T2-weighted (T2W) turbo spin-echo (TSE) sequences in axial and sagittal planes with: echo time (TE), 90 ms; repetition time (TR), 4,500

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ms; field of view (FOV), 250 x 230; slice thickness, 3.0 mm/1.0 mm. – T1-weighted (T1W) TSE sequence in sagittal plane with: TE, 7 ms; TR, 627 ms; FOV, 250x207; slice thickness, 3.0 mm/1.0 mm. – T1W TSE sequence in axial plane with fat suppression (SPIR sequence). On MRI various anomalies were recorded. Results thus obtained were subjected to statistical analysis using students' t test where significance level was set below 0.05.

Results

Table1: Age wise distribution

Age group (Years)	Number	P value
20-30	40	0.81
31-40	34	

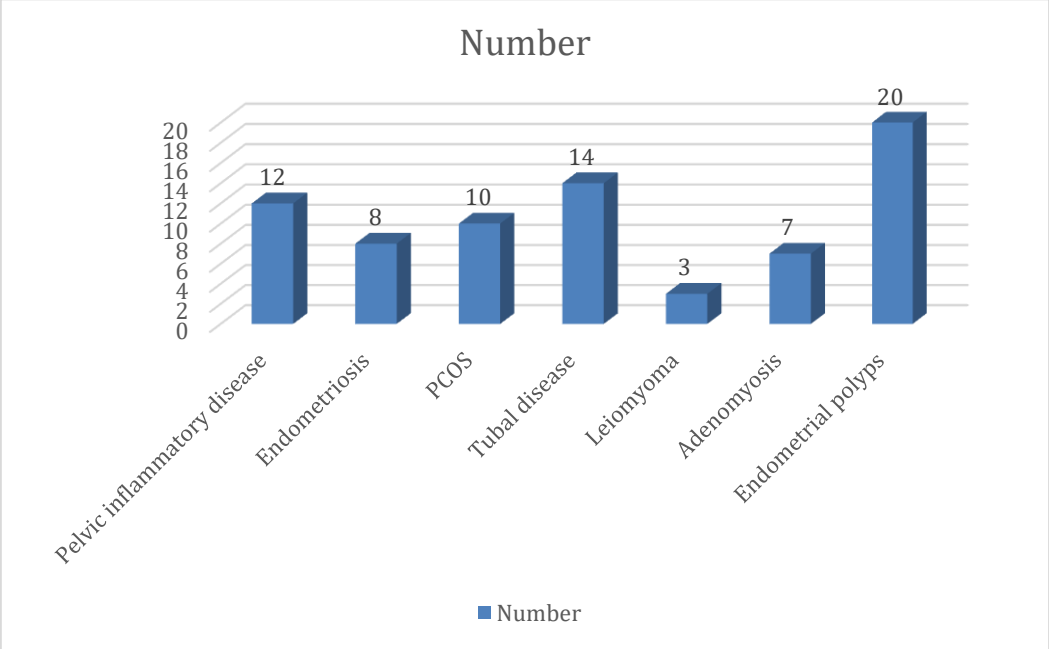
Table: I shows that age group 20-30 years had 40 and 31-40 years had 34 patients. The difference was non-significant (P> 0.05)

Table 2: Etiology of female infertility

Etiology	Number	P value
Pelvic inflammatory disease	12	0.05
Endometriosis	8	
PCOS	10	
Tubal disease	14	
Leiomyoma	3	
Adenomyosis	7	
Endometrial polyps	20	

Table: II, graph I shows that various causes of female infertility was pelvic inflammatory disease in 12, endometriosis in 8, PCOS in 10, tubal disease in 14, leiomyoma in 3, adenomyosis in 7 and endometrial polyps in 20 cases. The difference was non- significant (P> 0.05).

Graph 1 Etiology of female infertility



Discussion

MRI is a vital tool in the diagnosis and treatment of female infertility in the age of evidence-based medicine. MRI increases the diagnostic performance of transvaginal sonography in the accurate detection of extensive pelvic inflammation, complex tubo ovarian pathologies, leiomyomas, exact delineation of endometriosis and adenomyosis.[6] Prior to surgery, MRI maps the location and vascularity of leiomyomas and directs the course of treatment. When endometriosis and intrauterine adhesions are diagnosed definitively through magnetic resonance imaging (MRI), invasive diagnostic procedures such as laparoscopy and hysteroscopy are not necessary.[7] Because of its high spatial resolution, magnetic resonance imaging (MRI) is thought to be the standard of care for patients with Mullerian duct anomalies because it provides precise anatomical

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information about these conditions.[8] The present study assessed role of MRI in detecting female infertility. We found that the age group 20-30 years had 40 and 31-40 years had 34 patients. Although it can affect other pelvic structures in a secondary manner, endometriosis primarily affects the ovaries. The best method is ultrasound (USG), which displays a typical endometrioma in the ovary as a distinct cystic lesion with uniform low-level internal echoes.[9] An endometrioma appears hyperintense on T1W images and hypo- to hyperintense on T2W images; MRI is more sensitive in identifying this condition. T1W images that have been fat-suppressed are excellent for identifying peritoneal implants. Owing to abnormalities in the uterine cavity and shape, leiomyoma rarely results in infertility by obstructing sperm transport or implantation. But when it comes to assessing the location, quantity, and size of leiomyomas prior to surgery, MRI is the better option.[10,11] When patients receive treatment that preserves the uterus, MRI can track changes that occur after the treatment and any recurrences. MRI is excellent in not just arriving at a definitive diagnosis in sonographically undiagnosed tubo-ovarian masses, but also in delineating stage, severity, and extent of spread of pelvic inflammatory disease. Characteristic MRI appearances in tubo-ovarian abscesses include, complex cystic solid masses in adnexal region, with ovaries not separately delineated.[12,13]We observed that various causes of female infertility were pelvic inflammatory disease in 12, endometriosis in 8, PCOS in 10, tubal disease in 14, leiomyoma in 3, adenomyosis in 7 and endometrial polyps in 20 cases. Volondot et al[14] compared the diagnostic accuracy of MR-hysterosalpingography (MR-HSG) and conventional hysterosalpingography (X-HSG) in the evaluation of female infertility. 40 women received prospectively both X- HSG, and MR-HSG on the same day. A 1.5 Tesla MRI was performed with classical sequences for pelvic analysis and an additional 3D T1-weighted sequence with intra-uterine injection of gadolinium. 26 patients were included. Diagnostic performance of MR-HSG was: Se: 91.7% (95% CI 61.5–99.8); Sp: 92.9% (95% CI 66.1–99.8); PPV: 91.7% (95% CI 61.5–99.8); NPV: 92.9% (95% CI 66.1–99.8). Pain analysis showed a significant statistical difference between the two procedures: average VAS for X-HSG was 4.43 (95% CI 3.50–5.36) versus 3.46 (95% CI 2.62–4.31) for MR-HSG, p=0,01. Intra- and inter-rater agreements for the detection of tubal or intracavity abnormalities were 0.92 and 0.76.

Various investigators have opined that MRI has a superior sensitivity (95% vs 81%), specificity (89% vs. 78%), and overall diagnostic accuracy (93% vs. 80%) for the diagnosis of pelvic inflammatory disease as compared to transvaginal ultrasound. These authors have further concluded that the superior performance of MRI may reduce the need for diagnostic laparoscopy.[15,16]

Conclusion

When evaluating female infertility, magnetic resonance imaging (MRI) is a great non-invasive, radiation-free modality because it produces exquisite anatomical details through its multiplanar evaluation and superior soft-tissue contrast resolution.

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