

Role of Ultrasound in the Diagnosis of Endometritis- A Systemic Review

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Abstract

Endometritis is the most sustainable disease of the endometrium that leads to infertility in premenopausal women and many other pathologies in postmenopausal women. The role of ultrasound in the diagnosis of endometritis is indefinite, the sonographic signs of endometritis are most helpful for early detection and management. The aim to the study was to evaluate the role of ultrasound, as a diagnostic tool, for the diagnosis and management of endometritis. For this purpose, the literature of 2005-2020 from different search engines includes PubMed, Google Scholar, Science Direct, MEDLINE, Embase, and ResearchGate were studied and reviewed using MeSH (medical subject heading). Different retrospective studies were included, which had the same and diverse criteria for the diagnosis, to compare and find the accuracy of sonography as a first line tool. The exclusion criteria were not to include any prospective study, case-control study, and study former than 2005. The results of this systematic review indicated that the transvaginal ultrasound, hysterosonography, and abdominal ultrasonography can be used as a basic tool of investigation because of its availability and non-invasive technique. The other methods of molecular microbiology aided the diagnosis by confirming and to indicate the pathogens which cause endometritis. Hence, it is concluded that although the importance of ultrasound cannot be neglected but shouldn't be limited to it. The other techniques used together provide much more authentic results.

Keywords: Endometritis, Ultrasonography, Infertility.

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1. Introduction

In modern gynecology endometritis became the most significant and ponderable disease that eventually leads the altered reproductive functions in women such as infertility, miscarriage or futile results of other artificial reproductive methods¹. Chronic endometritis is the inflammation of the endometrial lining that causes an increased level of plasma cells and neutrophils in the endometrial stroma². About 10% of women have been affected by chronic endometritis (CE), a benign gynecologic condition, and could be presented with acute pelvic pain, vaginal discharge, abnormal uterine bleeding, leucorrhoea, dyspareunia, or pain during intercourse³.

Due to the lack and unawareness of diagnostic tools (histologic and microscopic), chronic endometritis remains neglected in the majority of women. The ratio of CE in inexplicable infertility is >1 in every ten patients as they undergo in vitro fertilization. Recurrent implantation failure resulted in 42 % of patients that later on diagnosed by the microbiome and had confirmed CE⁴. Repeated implantation failure at IVF in 30.3% of patients and 11.5% lower implantation rates after IVF was due to endometritis⁵. Furthermore, the adverse outcomes of endometritis include recurrent pregnancy loss, failure of implantation, and infertility that varies from abnormal uterine bleeding (1.4%) to complete infertility (56%)³. The association of infertility, repeated implantation failure at IVF, and recurrent miscarriages with chronic endometritis is still ambiguous due to the lack of diagnostic mechanisms. The justification for this association explains by the way that the inflammation of endometrium resulted in changed uterine motility⁶. According to the different researches, it has been found a great diversity in diagnosis and methods of diagnosis of endometritis⁷.

The diagnosis of endometritis is a challenge for clinicians but according to the established standard criteria is the presence of plasma cells in the endometrial stroma. Furthermore, the findings of micropolyps at hysteroscopy may indicate endometritis disease⁸. Many other methods used for the precise diagnosis of endometritis may include hysteroscopy, ultrasound, immunohistochemical research of tissues the of endometrium, microbiological examination and histological examination, etc⁹.

Ultrasonography and transvaginal ultrasonography are considered the first-line investigation tools for the diagnosis of endometritis in symptomatic and asymptomatic patients¹⁰. But these are not considered as specific diagnostic tools for describing all endometrial pathologies due to anatomical features of the female breeding organs and other drawbacks of procedures. However, inflammatory diseases of the uterus and appendages can be well-addressed by the ultrasound, a non-invasive diagnostic tool¹¹. The ultrasound is highly preferable due to many advantages as it is easily accessible and the most important lack of radiation. Endometritis presents as thickened and heterogeneous endometrium on transvaginal ultrasound, as well as uterine enlargement or the presence of fluid in the endometrial cavity, has been stated as the indications of CE diagnosis¹².

The diagnosis of endometritis cannot be confirmed only by the investigations revealed by the ultrasound reports¹³. However, it is an investigation tool that provides the suspicion for the disease by highlighting any inflammatory process of the uterus, both structurally and anatomically. Chronic endometritis diagnostic process is a combined evaluation of the patient's state and tests' results, not limited to only anyone diagnostic tool results. Ultrasound reports emphasis on the risk factors by specific ultrasound features related to diseases¹⁴.

This study aimed to find the role of ultrasound in the diagnosis of endometritis and how much it contributes to point out the disease in the early stages at which endometritis is treatable to prevent any loss like infertility.

2. Materials and Methods

2.1 Data sources and searches

The literature of 2005-2020 from different search engines includes PubMed, Google Scholar, Science Direct, MEDLINE, Embase, and ResearchGate were studied and reviewed using MeSH (medical subject heading).

2.2 Study Selection

Different retrospective studies were included, which had the same and diverse criteria for the diagnosis, to compare and find the accuracy of sonography as a first line tool. The exclusion criteria were not to include any prospective study, case-control study, and study former than 2005.

3. Discussion

Endometritis is a dangerous pathology of the pelvis or uterus that can lead to infertility. Often it remains asymptomatic but can aggravate other diseases of genital organs. Ultrasonography, a transvaginal ultrasound, and Doppler studies are baseline diagnostic tools for the indication of inflammatory diseases of the pelvis such as endometritis. Other methods include hysteroscopy, histology, microbial culture, immunohistochemistry, and molecular microbiology methods used for the diagnosis. Most of the studies take hysteroscopy as a gold standard tool of the investigation but they don't neglect the importance of ultrasound. Although, not only a single method can confirm the illness unless used in a combined way. In my study, I focused on the characteristics, specificity, sensitivity, and accuracy of ultrasonography. I supported this statement by studying different literature and found satisfactory results.

Gillies et al. in 2017 supported the hypothesis of the presence of sonographic findings i.e. hypoechoic rim sign and endo-myometrial junction indistinctness in acute puerperal endometritis by their research. Other sonographic signs include the presence of gas bubbles, acoustic effect, fibrosis, sclerosis, calcinosis, etc. moreover the sign of endometrial thickness is most common but it's an important sign for the CE¹⁵.

In Doppler, changes in hemodynamics of the vessels of the uterus and pelvis can be diagnosed, which indicates the presence of endometritis¹⁶. The sensitivity and specificity of the methods of diagnosis (ultrasound and Doppler) used in this study are 78.1% and 82.5%, respectively¹⁷.

The sonographic features of chronic endometritis were evaluated by Professor V.N. Demidov in 1993, firstly, at 5-7 and 17-21 days of the menstrual cycle¹⁵. Nevertheless, other laboratory investigations have an impact on the diagnosis of endometritis but they had some disadvantages regarding deficient sampling and false positive or false negative results that create ambiguity that can be corrected on ultrasound. Furthermore, other methodologies such as MRI, hysteroscopy are also helpful and sensitive but they have other drawbacks as MRI is time-consuming and expensive, and hysteroscopy is invasive¹⁸.

Another method of ultrasonography is hysterosonography, in which sterile saline solution got infused into the uterus during the scanning. This non-invasive technique is helpful for the diagnosis of endometrial abnormalities, myometrial pathologies, and other deeper layers of tissue pathologies¹⁹. According to research, the accuracy of hysterosonography is 80%-90% for endometrial polyp, and sensitivity for endometrial pathologies is 33.3%²⁰.

The sensitivity of ultrasound, as a diagnostic tool for endometritis, varies due to sonographers' skills as it is operator dependent technique. Besides this, ultrasound machines also influence the sensitivity and specificity that can be improved by improving color Doppler, harmonic fusion, three dimensional, focal strength capabilities and gain suppression, etc²¹.

Conclusion

This systematic review concludes that the ultrasound can practice for the evaluation of endometritis as a first investigative tool with greater sensitivity and specificity. The early detection of endometritis can provide better results with a decrease in infertility cases and early treatment of pelvic abnormalities. However, diagnosis by sonographic methods have many difficulties and cannot be limited to ultrasound only. Other methods are also used together with sonography for confirmation.

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