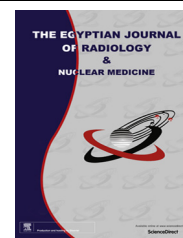




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## ORIGINAL ARTICLE

# Calcific endometritis as a cause of infertility: Ultrasonography as the main diagnostic modality



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### KEYWORDS

Calcific endometritis;  
 Ultrasonography;  
 Non-contrast MRI;  
 Infertility;  
 Tuberculosis

**Abstract Objective:** The main objective of the study was to evaluate calcific endometritis as a cause of infertility using different imaging modalities.

**Patients and methods:** A prospective study was performed wherein 100 patients with the complaint of infertility were evaluated using ultrasonography and those having sonographic picture of calcific endometritis were subjected to Color Doppler study, non-contrast MRI of the pelvis (to evaluate for any additional role) and diagnostic/therapeutic dilatation and curettage. All procedures performed in this study were in accordance with 1964 Helsinki declaration and its later amendments and Institutional Ethics Committee approval was obtained. Informed consent was obtained from all the patients included in the study.

**Results:** Six patients were diagnosed as having calcific endometritis. Five of them were presenting for secondary infertility and only one was primary infertility. Post diagnosis and treatment, four patients conceived within six months and two within nine months. MRI was accurate in diagnosing four patients and ultrasound in all six patients.

**Conclusion:** Ultrasonography is diagnostic in cases of calcific endometritis. MRI has no added role.

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## 1. Introduction

Endometrial calcification (Calcific endometritis) is an uncommon finding and is an uncommon cause of infertility with ultrasonography having a high degree of precision for the diagnosis. Endometrial calcifications in relation to retained

products of conception or as osseous metaplasia, have been described earlier (1). Calcific endometritis is a well known condition predisposing to infertility and recurrent abortions (2). The most common causes of calcific endometritis are post-abortion (causing chronic inflammation from retained tissue after first and second trimester abortion) and chronic endometritis (due to genital TB, non-specific chronic endometritis and pyometra).

The purpose of our study was to evaluate the role of different imaging modalities in the diagnosis of calcific endometritis as a cause of infertility.

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## 2. Patients and methods

Over a period of one year, 100 patients of infertility were evaluated using Voluson 730 Pro (General Electric Medical System, Little Chalfont, Buckinghamshire, United Kingdom). Detailed history and clinical examination of all these patients were obtained. All hematological and hormonal profiles were obtained. All causes of secondary infertility were ruled out before labeling the patients as having calcific endometritis. Color Doppler study in addition to Gray scale was performed. 6 cases of calcific endometritis were diagnosed using ultrasonography from this cohort. They were also subjected to non-contrast MRI of the pelvis. Post diagnosis all of these 6 patients were subjected to dilatation and curettage and retrieved material was subjected to histopathological analysis. The patients were put on Progesterone treatment and followed for 9 months.

Infertility was defined as “inability to achieve a clinical pregnancy even after 12 months of unprotected and regular sexual intercourse”. It was classified as primary and secondary infertility. Primary refers to inability to conceive even once while the secondary infertility refers to inability to become pregnant or to carry pregnancy till term following a previous pregnancy. All the patients reporting for infertility were subjected to Gray-scale as well as Color Doppler ultrasonography. Prior to this a detailed history including menstrual history, birth history, family history, history of any past intervention, history of any past prolonged medication like that for tuberculosis, was elicited. A detailed examination of the patient was made recording all the vital parameters such as age, height, weight, pulse, and blood pressure; and respiratory and cardiovascular including gynecological examination was done. All the biochemical parameters were recorded including liver function tests, renal function tests, TSH, T<sub>3</sub>, T<sub>4</sub>, FSH, LH, FSH/LH ratio, CA-125, prolactin. The patients suspected to have calcific endometritis on ultrasonography were subjected to non-contrast MRI of the pelvis using T<sub>1</sub>W and T<sub>2</sub>W sagittal and axial sequences. Post final diagnosis of calcific endometritis on imaging, patients were subjected to dilatation and curettage. The curettage products retrieved were sent to pathology department for histopathological analysis and PCR analysis was also performed. Then the patients were put on the oral progesterone therapy and followed for 9 months.

## 3. Observations and results

Out of six patients, 5 reported for secondary infertility (2 had recurrent abortions), 1 reported for primary infertility, and 1 reported for menstrual irregularity, in addition to the complaint of infertility. Out of six patients, 4 had history of previous D & C for second trimester abortion, 1 had genital tuberculosis (diagnosed using PCR of menstrual blood as per the history given by patient) and 1 had chronic non-specific endometritis (previous diagnosis two and a half years back) as the preliminary factor for the development of calcific endometritis. These two patients had no history of previous D & C.

The clinical examination was normal in 5 patients and 1 had foul smelling discharge per vaginum. All the hormonal and biochemical parameters were in normal limits of all the 6 patients.

*Ultrasonography* revealed hyperechoic line along the endometrial cavity with posterior acoustics in 4 patients and a split like hyperechoic foci along the endometrial cavity (Figs. 1 and 2). The bulk of the uterus was normal in 5 patients, and position was anteverted and anteflexed in all patients. 1 patient had bulky uterus and thickened adnexa conforming to pelvic inflammatory disease. She had already undergone HSG and tubal factors related to infertility had been ruled out. Both ovaries were normal in all the patients in echotexture, bulk and follicle maturation. No other mass lesion was noted in the pelvic region in any of the patients. Preliminary diagnosis of calcific endometritis in 5 patients and chronic PID with calcific endometritis in 1 patient was made.

*Doppler study* revealed increase blood flow in the myometrium and endometrium in 3 patients with peak systolic velocity (PSV) of more than 60 cm/s and resistive index (RI) less than 0.5 of subendometrial and myometrial vessels (Fig. 3). In other 3 patients, Doppler flow is within normal limits.

*Non-contrast MRI of the Pelvis* was performed in all six patients suspected of having calcific endometritis. NCCT was not performed due to the reproductive age group and high radiation dose. MRI was performed in T<sub>1</sub>W and T<sub>2</sub>W sagittal and axial sequences. The study revealed a thin hypointense line along the endometrial cavity in T<sub>2</sub>W sagittal sequences (Fig. 4) in 4 patients while in 2 patients the study was inconclusive. No mass lesion was visualized in the uterus and the position of the uterus was normal in all the patients.

*Diagnostic dilatation and curettage* was performed for all the 6 patients which confirmed the diagnosis and eventually also proved to be therapeutic. D & C revealed lymphocytic and granulocytic (chronic inflammatory) infiltrate predominantly with specks of calcification scattered with the endometrial cells.

After all these investigations, patients were given the preliminary diagnosis of calcific endometritis. Post diagnosis and treatment, 4 patients conceived within 6 months and 2 within 9 months.

## 4. Discussion

Calcific endometritis is an uncommon cause of infertility with ultrasonography having a high sensitivity for the diagnosis. Roth and Taylor postulated that endometrial stroma is capable of cartilaginous metaplasia (3). Calcific foci within the inner myometrium are also in women with a history of uterine instrumentation.

Microscopic diffuse calcific foci (psammoma bodies) not associated with IUD or malignancy are also seen commonly (4).

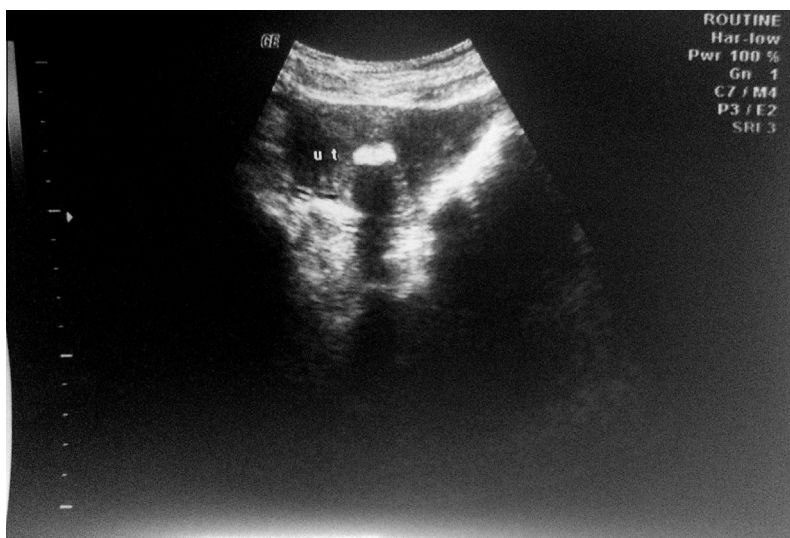
The scientific literature proposes several different mechanisms. Two big hypotheses are as follows:

- a. Persistence of embryonic bones that keep developing after curettage or the appearance of bone tissue that is a result of persistent inflammation derived from remaining bony or necrotized embryonic tissue.
- b. Induction of osteogenesis by one's own embryonal cells provoking the osseous differentiation of hypothetic pluripotent endocrine cells.

In India, endometrial tuberculosis should always be kept in mind as it can cause infertility as well as calcification and



**Fig. 1** Longitudinal/sagittal USG section showing the uterus and hyperechoic line along the endometrial cavity with posterior acoustics suggestive of calcific endometritis.



**Fig. 2** Transverse USG section displaying calcific endometrial infiltrations with posterior acoustics.

ossification with subsequent ossification. Chronic endometritis stimulates the proliferation of mesenchymal cells that have inherent property of metaplasia and can differentiate into chondroblasts and osteoblasts (5).

Baheci and Demirel suggested that post-abortive chronic endometritis stimulates the release of superoxide radicals and tumor necrosis factor from the inflammatory cells and long term exposure of superoxide radicals and TNF on multipotent stromal cells in patients with deficient superoxide dismutase activity (6).

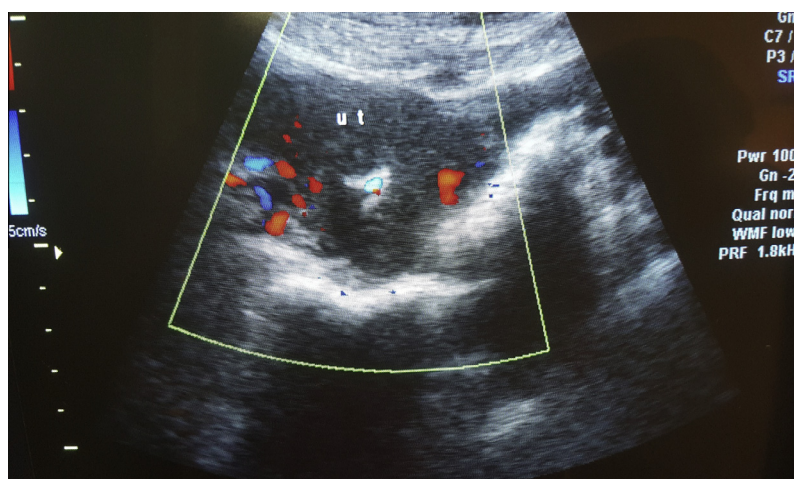
The incidence of endometrial calcified lesions in the general population and in patients with recurrent miscarriage is not known. However, the work of Burks et al., suggests that it may be significant in patients with previous uterine instrumentation (7).

As far as diagnostic technique is concerned, ultrasonography is one of the most affordable and easily available

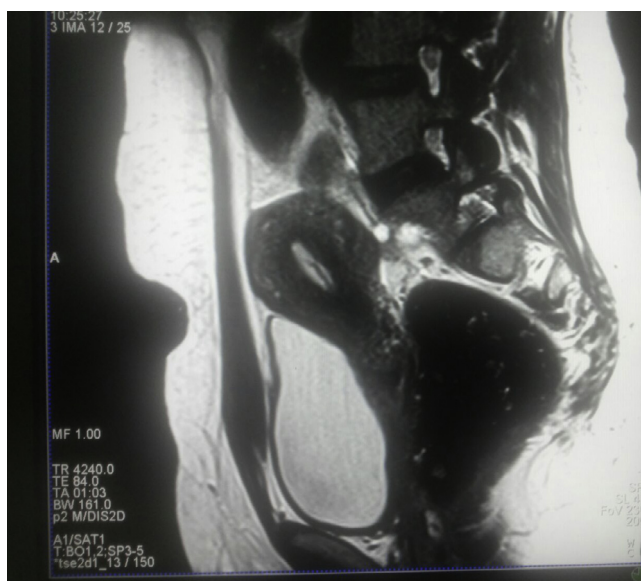
technique with high sensitivity in diagnosing calcific endometritis. Endometrial sampling method if used has the disadvantage of deficient sampling or false positive/false negatives. Ultrasonography helps to decrease such errors. Non-contrast MRI of the pelvis is also sensitive; however, ultrasonography is more sensitive than that for the diagnosis of the calcific endometritis.

Most common cause of calcific endometritis (also in our case series) is post-abortive instrumentation. However genital tuberculosis and chronic endometritis should always be kept in mind although they cause limited cases. In India and other developing countries where genital TB is so common and unhygienic practices prevail, the abovementioned conditions (genital TB and chronic endometritis) form an important diagnostic workup.

Calcific endometritis is an important and rare cause of infertility (mostly secondary infertility and very rarely causing



**Fig. 3** Color Doppler Study showing subendometrial and myometrial vasculature.



**Fig. 4** T<sub>2</sub>W Sagittal non-contrast MRI section of the pelvis revealing the thin hypointense line along endometrial cavity suggestive of calcification.

primary infertility as in one of our cases). Dilatation and curettage form an important diagnostic and therapeutic workup procedure. Progesterone treatment is an effective modality in the treatment of such cases.

The most essential result of our study is that calcific endometritis can be diagnosed by ultrasonography alone with a high degree of sensitivity and management started on ultrasonography findings to get timely treatment done and there is no need to subject the patient to unnecessary and costly investigations such as MRI.

### 5. Study limitations

The main limitation of the study was that the cause of the calcific endometritis could not be ascertained using ultrasonography or

MRI which required clinical history and histopathological examination of the curettage products.

### 6. Conclusion

Calcific endometritis is an important cause of infertility usually due to post-abortive instrumentation and rarely by chronic endometritis and genital TB. Ultrasonography forms an important tool in the diagnosis of preventing the misdiagnosis and mismanagement of such cases. Ultrasound is superior to MRI in the diagnosis of calcific endometritis. D & C with progesterone therapy form the basic line of treatment for calcific endometritis.

### Conflict of interest

The authors declared that there is no conflict of interest.

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