Effect Of Transient Myometrial Contractions On 3D Ultrasound Diagnosis Of Partial Uterine Septum

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Abstract

Background: To evaluate the value of repetition the 3D scan in cases of partial uterine septum with observed presence of uterine contractions.

Patients and methods: This was a prospective observational study. We included women with either infertility or recurrent miscarriage or previous preterm labour with partial uterine septum diagnosed by 3D ultrasonography and during the scan we suspected presence of myometrial contractions by direct ultrasonographic visualization. All the 3D ultrasounds were done at the luteal phase between cycle day 17- 24 by the same operator, then the scan was repeated by the same operator after 30 minutes.

Results: There was no significant difference in inter-ostial distance (28.03±4.9 versus 28.33±5.4 in 2nd scan), fundal myometrium (7.56±1.5 versus 7.44±1.5 in 2nd scan) and indentation/fundal myometrial (1.05±0.4 versus 0.95±0.6 in 2nd scan). However, there was significant decrease in indentation from 7.68 mm ±2.7 to 6.75 mm ±4.1 in second scan (p value 0.02). Also the diagnosis was changed in 7 cases (19.4%) from partial septum to normal according to ESHRE/ESGE (p value 0.01).

Conclusion: Re-scanning patients with partial septum after 30 minutes may be recommended to avoid false diagnosis of partial uterine septum and unnecessary interventions such as hysteroscopy.

BACKGROUND

Uterine septum either partial or complete is considered the most common congenital mullerian anomalies in high-risk patients (1). It develops due to failure of resorption of the fused Mullerian duct (2) The incidence of uterine septum in the general population is unclear but its incidence in patients with infertility is 3.0% and 5.3% in patients with miscarriage (1).

A systematic review reported that the uterine septum is associated with decrease of conception rate (ODDs Ratio "OR" 0.86; 95% Confidence Interval "CI" 0.77–0.96) and increased risk of first-trimester miscarriage (OR 2.89; 95% CI 2.02–4.14), increase in preterm birth (OR 2.14; 95% CI 1.48–3.11), and also increase in fetal mal-presentation at delivery (OR 6.24; 95% CI 4.05–9.62).(3)

Transvaginal 3D ultrasound with the ability to scan the coronal plane of the uterus provides the chance to visualize both the external and the internal contour of the uterus simultaneously. 3D ultrasound can be used to classify uterine anomalies accurately because it can differentiate between bicornuate and spetate uterus. (4)

3D ultrasound is now considered by many societies as the gold standard for evaluation of uterine anomalies because it is not invasive and provides measureable information for the anatomy of the uterine cavity, indentations, and myometrial wall thickness (4- 6)

Many classifications system are present for Mullerian anomalies with the American Fertility Society (AFS) and the European Society of Human Reproduction and Embryology/European Society for Gynaecological Endoscopy (ESHRE/ESGE) most commonly used for daily practice. The ESHRE/ESGE classification in contrast to the AFS system has the advantage of classifying the uterine anomalies based on specific morphological measurement of the internal and external indentation relative to the myometrial wall thickness. (7)

The uterine septum is class U2 in the ESHRE / ESGE classification. The criteria for diagnose uterine septum according to the ESHRE/ESGE classification is the presence of internal fundal indentation more than 50 % of myometrial wall thickness. It can be either partial (U2a) or complete (U2b) depending on if it reaches the level of the internal cervical os or not (8).

The uterus is a dynamic organ with uterine contractions or peristalsis with different frequency and direction throughout the menstrual cycle. in the follicular phase, the uterine contraction direction from the cervix to the fundus to help the transfer of the sperm and the direction from the fundus to the cervix in the luteal phase (9). One feature of these contraction is being transient but may last for 60 minutes (10). The importance of these transient myometrial contraction is that it changes the shape of the uterus and of the myometrial wall thickness (11)

The aim of the present study is to evaluate the value of repetition the 3D scan in cases of partial uterine septum with observed presence of uterine contractions.

PATIENTS AND METHODS

This prospective observational study was conducted in our mateno-fetal clinic, Local ethical approval was obtained. It took place during the period from November 2020 to October 2021.

Inclusion criteria included patients who were referred to our clinic with either infertility or recurrent miscarriage or failed IVF/ICSI trial with partial uterine septum diagnosed by 3D ultrasonography. During the scan we suspected the presence of myometrial contractions by direct ultrasonographic visualization which was defined as rhythmic and subtle wave-like endometrial movements associated with contractions of the inner myometrium (12).

Exclusion criteria included patients with complete uterine septum or other uterine pathology as myoma or adenomyosis.

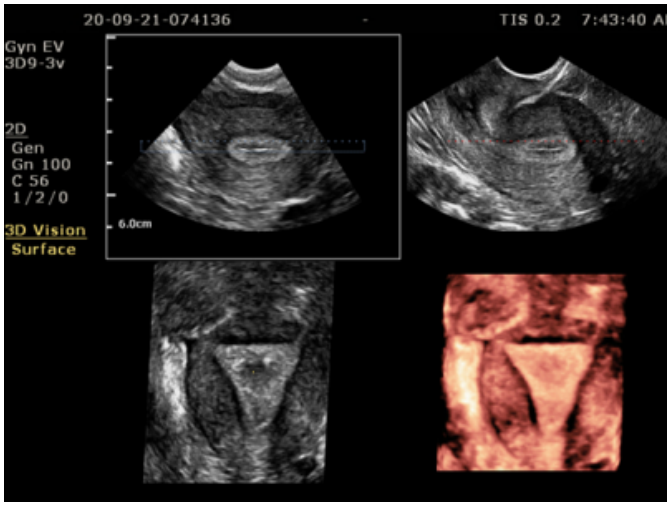
Three-dimensional ultrasound

All the 3D ultrasounds were done by the same operator using the same ultrasound machine (ClearVue 650 ultrasound system Philips equipped with 3D 9-3v 3-9 MHz 4D endocavity transducer). Patients were evaluated at the luteal phase between cycle days 17- 24.

With empty urinary bladder, we first introduced our probe to have mid-sagittal plane with good visualization of the fundus and the cervix. We asked our patients to hold breathing and avoid movement during acquiring the volume. An automated sweep was then carried out using the widest angle for angle for acquisition (85°) manipulation of the multiplaner view of the uterus using the Z technique (13) to have the coronal plane. Figure 1.

Figure 1

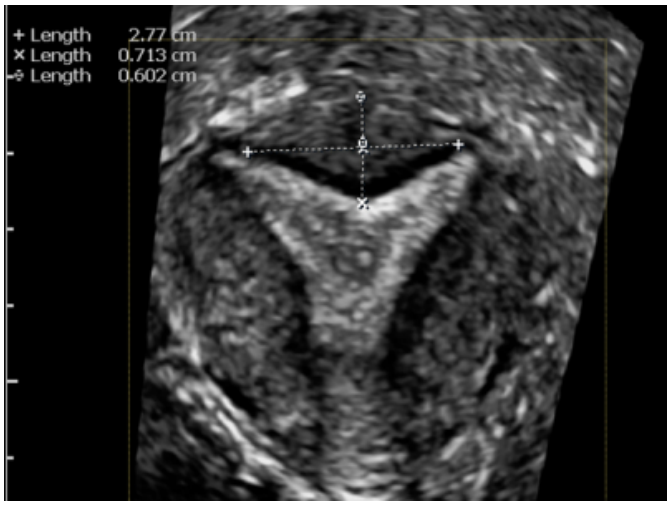
Mutliplanar view



Measurements (Figure 2)

Figure 2

Measurement of the inter-ostial, internal fundal indentation and fundal myometrial wall thickness



1. The inter-ostial distance was measured between the tubal ostia
2. Internal indentation from the maximum part of the indentation to the inter-ostial line
3. Fundal myometrial wall thickness was measured from the inter-ostial line to the maximum point at the fundus
4. Calculation of the internal indentation to uterine

wall thickness ration (I:WT ratio), if the ratio was more than 50 % the case was diagnosed as septate uterus (class U2 ESHRE/ESGE).

The scan was repeated by the same operator after 30 minutes and These 4 measurements were repeated after 30 minutes after the first 3d ultrasound examination.

Statistical Analysis:

Data analysis was done using SPSS 16 Computer based Statistical software. The results were statistically analyzed using independent sample student's t-Test to compare numerical value & chi-square test or Fisher exact test to compare categorical data. P-value < 0.05 was considered statistically significant.

RESULT

During study period we examined 130 cases, only 36 (27.7%) were included due to presence of suspected uterine contractions during scan.

The data of 36 cases Shawn in (table I), the mean age was 27.1 ± 5.4. most of cases presented with primary infertility 23/36 (63.9%) followed by secondary infertility 6/36 (16.7%) while only 4 cases presented with recurrent miscarriage (11.1%) and 3 cases with previous preterm labour (8.3%).

Comparison of measurement between 2 scans (table II) revealed that there was no significant difference in inter-ostial distance (28.03±4.9 versus 28.33±5.4 in 2nd scan), Fundal myometrium (7.56±1.5 versus 7.44±1.5 in 2nd scan) and Indentation/ Fundal myometrial (1.05±0.4 versus 0.95±0.6 in 2nd scan).

However there was significant decrease in Indentation from 7.68 mm ±2.7 to 6.75 mm ±4.1 in second scan (p value 0.02). Also the diagnosis was changed in 7 cases (19.4%) from partial septum to normal according to ESHRE/ESGE (p value 0.01)

Figure 3 shows an example of case with partial uterine septum with no change after rescan

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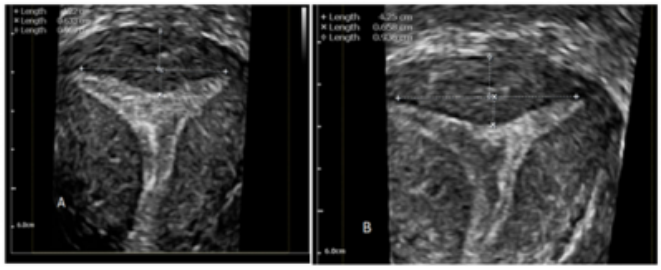


Figure 4 shows an example of 2 cases of partial uterine septum with no indentation after rescan

Figure 4a

Complete disappearance of the internal indention

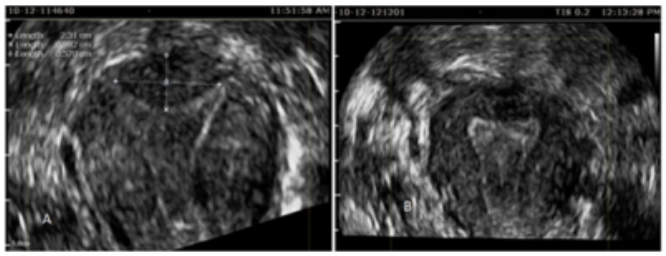
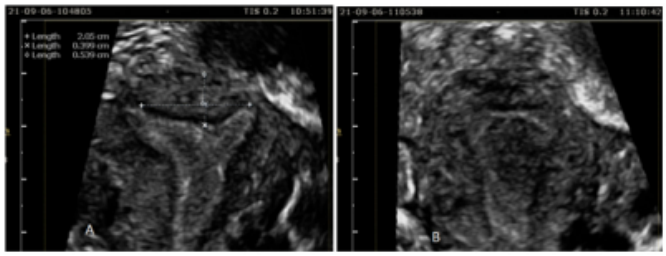


Figure 4b

Complete disappearance of the internal indentation



DISCUSSION

The result of the present study was that rescanning of patients with suspected partial septum with change in 31/36 (86 %) was of clinical relevance in 7/36 (19.5%)

Our results confirm the importance of the strategy suggested by Van den Bosch et al who suggest repeat 3D scan after 30 minutes in case of suspected Mullerian anomalies in the initial scan (11). The results also agree with the strategy practiced by Leone et al. who rescan patients with suspected T shaped uterus after 15–20 minutes after the initial examination in order to exclude the effect of myometrial contractions (14).

JYM Lam et al. studied the incidence of transient

myometrial contraction and the value of repeat T2 sagittal sequence during pelvic MRI in case of suspected myoma or adenomyosis. They found 12% of cases with transient myometrium contractions that mimics myoma or adenomyosis with 85% with complete resolution of the pathology mimic on repeat sequence (15).

The results of our study may explain the difference between morphology and internal fundal indentation in the follicular and luteal phase (16).

The results of our study are important clinically because 19.4 % of cases were diagnosed as partial septum in the initial scan and diagnosed as normal uterus after rescan. This finding may have save these patient from unneeded hysterscopic metroplasty.

One of the strength of the present study is that this is the 1st study to evaluate the importance of rescanning cases with suspected mullerian anomalies.

The limitation of this study is the small sample size. Also, we did not follow the patients in their future reproductive outcomes. Future studies with larger sample size is recommended.

CONCLUSION

Rescanning patients with partial septum after 30 minutes may be recommended to avoid false diagnosis of partial uterine septum and unnecessary interventions such as hysteroscopy.

List of abbreviation:

AFS (American Fertility Society)
CI (Confidence Interval)
ESGE (European Society for Gynaecological Endoscopy).
ESHRE (European Society of Human Reproduction and Embryology).
IVF/ICSI (Invitro-fertilization/ Intracytoplasmic sperm injection)
I :WT ratio (internal indentation to uterine wall thickness ration)
OR (Odds Ratio).

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