

STUDY OF MORPHOLOGY OF UTERUS USING ULTRASOUND SCAN

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ABSTRACT

Background: The anatomical variations of uterus particularly those concerning the body of uterus are well known in medical literature. Knowledge of these variations is important in reproductive periods of life, as well as in deciding the surgical procedures involving caesarean section delivery. However there are some exceptional variations in the body of uterus that may puzzle the obstetrician and gynaecologist dealing with gynaecological patients. Normal development of the female reproductive tract requires a complex series of events. Failure of any part of this process can result in congenital anomaly. Careful sonography and an awareness of the sonographic findings of early pregnancy in anomalous uteri should improve the detection of these anomalies. Recognition of such anomalies will also allow differentiation of those patients requiring repeat dilatation and curettage from those requiring laparotomy, as in the presence of a blind uterine horn or ectopic gestation. 3D ultrasonography permits the obtaining of planar reformatted sections through the uterus, which allow precise evaluation of fundal indentation & length of the septum. Aim This study was undertaken to assess the morphology of uterus and evaluate the anomalies.

Materials: 1500 subjects within the age of 15-45 were assessed using ultrasound scan and the anomalies were analyzed.

Results: 5-7% cases involving the variations of morphology of the uterus were reported in this study, that 3DUS has recently become the only mandatory step in the initial investigation.

Conclusion: With timely and accurate diagnosis, appropriate management is likely to provide the best possible outcome for all such patients.

KEY WORDS: Mullerian duct, Arcuate uterus, Bicornuate uterus, 3D Ultrasonogram, Miscarriage.

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INTRODUCTION

Congenital anomalies of the female reproductive tract may involve the uterus, cervix, fallopian tubes or vagina. Uterine anomalies are the most common of the mullerian anomalies. Since many women are asymptomatic and sensitive imaging modalities have only recently become available the true incidence is not known. Mullerian duct anomalies are the commonest cause of primary amenorrhoea [1]. The anomaly most frequently associated with reproductive failure was the septate uterus [2].

Patients with vascularized septa had a higher prevalence of obstetrical complications than those with nonvascularized septa [3]. Women with a subseptate uterus had a significantly higher proportion of first-trimester loss [4]. The septate uterus seems to be the most frequent anomaly accounting for 30 to 50% of all the cases, followed by the bicornuate uteruses and unicornuate uteruses respectively [5].

Patients in their first pregnancy with incidental finding of anomalous uterus should be followed

closely monitoring cervical length. Cervical cerclage is indicated in patients with history or diagnosis of cervical incompetence [6].

Arcuate uteri were associated with increased rates of second-trimester miscarriage [7]. Live birth rate of arcuate uterus achieved was higher than bicornuate and septate uterus. Most publications reported poor reproductive outcome in septate uterus [8].

Aim of the study: To assess the morphology of uterus in reproductive age group of women using ultrasound scan.

Objectives of the study: A. To study the uterine anatomy by ultrasound scan and B. To evaluate accurate characterization of anomaly, its embryological basis and its applications in treatment procedures.

MATERIALS AND METHODS

Study was conducted with a total number of 1500 subjects between the age group of 15-45 years, patients with Pregnancy and history of Hysterectomy was excluded from the study, sampling technique adapted for the study was Complete Enumeration Method, Ultrasonography images are collected from radiology Department, these images evaluated and subjected to statistical data analysis and results were analysed.

RESULTS

In the study out of 1500 cases a total of 11 various congenital anomalies were identified Prevalence of congenital malformation is estimated to be 5-7%.

They are

- 1 Agenesis,
- 4 Bicornuate,
- 6 Arcuate uteri.

According to AFS classification-(fig. 1)

They were classified as follows: (Table-1)

1. ARCUATE UTERUS: The most common anomaly found is arcuate uterus. Morphological characteristic of arcuate uterus in women with recurrent miscarriage, length of normal uterine cavity was significantly shorter and the degree

of distortion of uterine cavity was significantly higher than in low risk women. Clinical Characteristics (Arcuate uterus): This anomaly is typically asymptomatic and has no known impact on reproductive or obstetric outcomes. (Fig-2)

No of cases with arcuate uterus and reproductive outcome (Table 2) In 6 cases of arcuate uterus. 2 women never succeeded to conceive (G0), 1 woman had one miscarriage no living children (G1 A1 L0), 3 women was 2 times pregnant having 2 living children (G2L2)

2. BICORNUATE UTERUS: Clinical Characteristics (Bicornuate uterus): Women with bicornuate uterus have a higher prevalence of pregnancy loss but are asymptomatic, and, because these women have fewer reproductive problems than do women with other anomalies, the pathologic condition may go undiagnosed until cesarean delivery. It may also be identified incidentally at imaging performed for other indications. (Fig-3). In 4 cases of bicornuate uterus

2 women had 1 time pregnant one living children (G1 L1), 1 woman 2 times pregnant 2 living children (G2L2), 1 woman 3 times pregnant one in uterofetal death of 17 weeks gestational age 2 living children (G3 A1 L2)

Bicornuate uterus and Reproductive outcome – (Table 3)

3. MULLERIAN AGENESIS: Clinical Characteristics (Mullerian Agenesis): Symptoms at present depend on the presence or absence of functioning uterine remnants. Complete agenesis manifests at puberty with primary amenorrhea, where as if a functional remnant is present, the patient presents with primary amenorrhea and severe cyclic abdominal pain secondary to crypto menorrhea and hematomata. Patients will uniformly demonstrate secondary sex characteristics reflecting normal ovarian function. (Fig-4)

The least common type of mullerian duct anomaly was found to be blind end vagina with absent uterus in girl with primary amenorrhea.

According to AFS classification most of patients belonging to class 6 followed by class 4 and class 1.

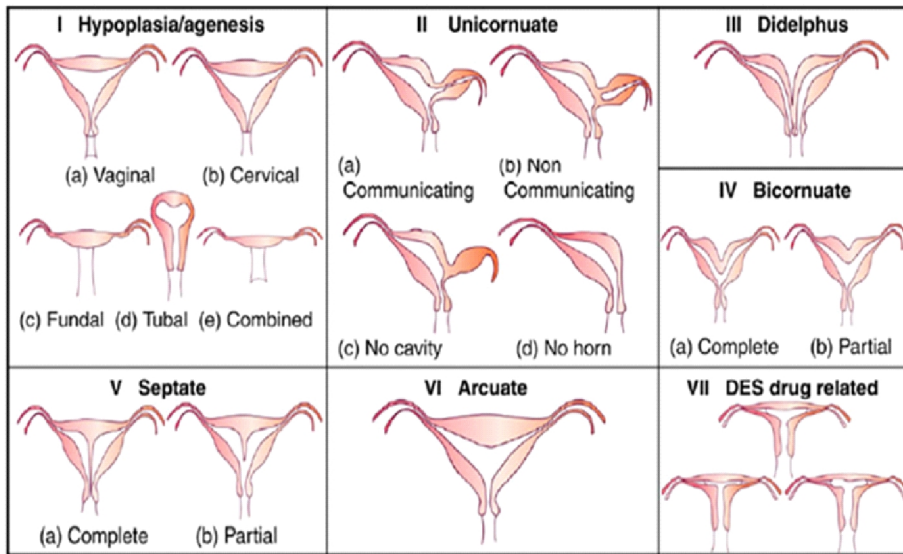
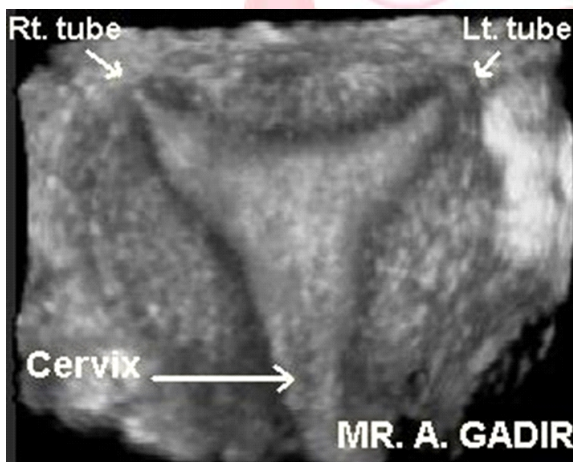


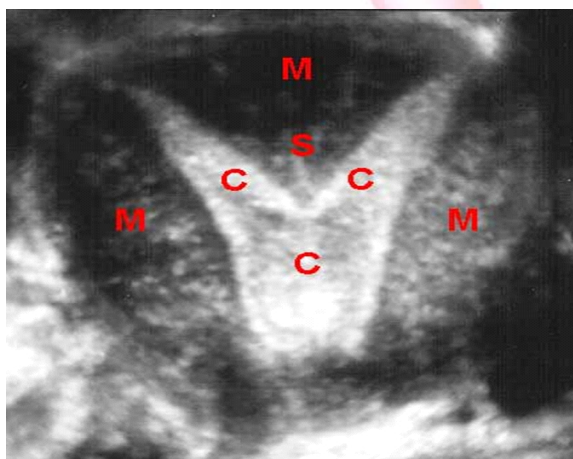
Fig. 1: Classification of mullerian anomalies developed by the American Fertility Society.

Fig. 2: Arcuate uterus.



The longitudinal ultrasound image shows the uterus (cur-sors) with a flat fundal contour (long arrow), a single endometrial cavity and a hypoplastic cervix.

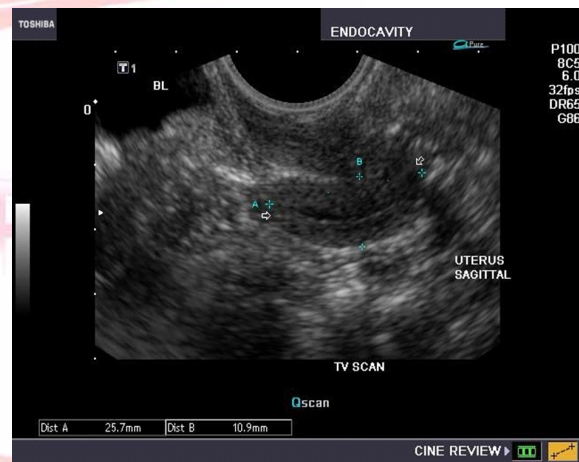
Fig. 3: Bicornuate uterus.



M = the uterine muscle; C = the endometrial lining and uterine cavity; S = septum.

Trans axial ultrasound image shows a bicornuate uterus with two separate endometrial cavities: one on right (long arrow) and one on left (short arrow).

Fig. 4: Mullerian agenesis.



Transvaginal ultrasound images show the uterus measuring about 2.5 x 2 x 1 cms, clearly too small for a woman in the 30s. The uterine cavity (endometrial cavity shows minimal fluid within it). Transverse section ultrasound image shows markedly reduced intercornual distance (less than 2 cms.).

The rudimentary Fallopian tubes are visible, but the ovaries appear very small.

Fig. 5: Anomalies of uterus in numbers.

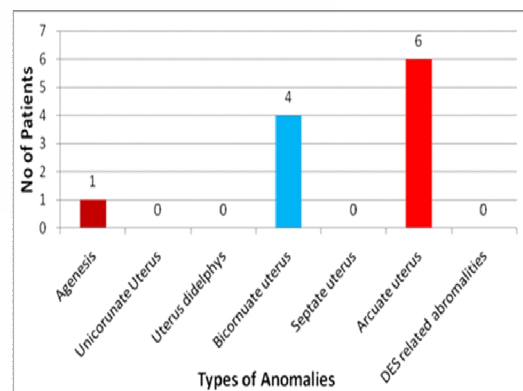


Table 1: No of cases with arcuate uterus and reproductive.

Classification	Anomaly	No of patients
Class 1	Agenesis (or) Hypoplasia	1
Class 2	Unicornuate	None
Class 3	Didelphus	None
Class 4	Bicornuate	4
Class 5	Septate	None
Class 6	Arcuate	6
Class 7	Diethylstilbestrol related	None

Table 2: No of cases with arcuate uterus and reproductive outcome.

Pregnant (frequency)	Miscarriage once	Miscarriage twice	Miscarriage Three times	Living children	Total
Never(0)	-	-	-	-	2
1	1	-	-	-	1
2	0	-	-	2	3

Table3: No of cases with bicornuate uterus and Reproductive outcome.

Pregnant (frequency)	Miscarriage	In uterofetal death	Living children	Total
1	-	-	1	2
2	-	-	2	1
3	-	1	2	1

DISCUSSION

The paired mullerian (Paramesonephric) ducts are identifiable by 6th week of development and arise from coelomic epithelium along the lateral wall of the urogenital ridge. These solid tissues elongate caudally, cross the wolffian (mesonephric) ducts medially and fuse in the midline form the primitive uterovaginal canal.

By 10th week the caudal end of the fused mullerian ducts connects with the urogenital sinus. Next internal canalization of the mullerian duct occurs, resulting in two channels divided by septum. This septum is subsequently resorbed in the caudal to cephalic direction. This entire process is completed by 20th week. The fused caudal portion of the mullerian ducts becomes the uterus and upper vagina and the unfused cephalic portion becomes the fallopian tubes-(Fig-6)

The various Mullerian anomalies are the consequence of 4 major disturbances in the development of the female genital system during the fetal life [9].

1. Failure of one or more mullerian duct to develop (agenesis, unicornuate uterus without rudimentary horn).
2. Failure of the ducts to canalize (Unicornuate uterus with rudimentary horn without proper cavities).
3. Failure to fuse or abnormal fusion of the ducts (Uterus didelphys, bicornuate uterus)
4. Failure of resorption of the midline uterine septum (Septate uterus, arcuate uterus).

In the present study the morphology of uterus is studied using ultrasonography technique in a 1500 general population. A cross sectional hospital based study is conducted to analyze the

categorical variables to estimate the frequency &percentage distribution of uterine anomalies.

Since the introduction of 3d ultrasonography more uterine anomalies can be detected. It is due to capability of ultrasonography to get a certain view of the uterus which is impossible using 2d ultrasound tool. The commonest congenital uterine anomaly diagnose in 3D ultrasound is arcuate uterus.

Prevalence of congenital uterine anomalies in the general / fertile population is 6.7%. According to study the commonest anomalies were 17 arcuate 7 septate and 1 bicornuate [10]. The higher prevalence of septate uteri in infertility and higher prevalence of arcuate uteri in RM population (12.2%) highlights the potentially important role at this anomaly something which should not be under estimated [10]. These finding correlates with this study.

A recent major study done by Medscape indicated the prevalence of uterine anomalies (such as hypoplastic or arcuate uteri) is 7% - 8% in the normal fertile population and >25% in women with recurrent spontaneous abortion. The prevalence of other anomalies Didelphys, bicornuate, septate, unicornuate uterus is estimated to be 5% in the general population, 2%-3% in fertile women, 3% in infertile women and 5%-10% in the recurrent miscarriage population.

Historically, the most common uterine malformation has been the bicornuate uterus.

In this study arcuate uterus probably has no impact on reproductive capacity. The uterine septum is more definitely associated with recurrent miscarriage. In the current view of this study suggest that the women presenting with miscarriage may also warrant investigations for the presence of minor congenital uterine anomaly (Arcuate uterus).

The bicornuate uterus appears to cause an increased miscarriage rate and preterm delivery. In this study the bicornuate uterus appears to cause an intrauterine fetal death in one case, but she succeeded to have 2 living children.

Unicornuate uterus accounts for 13% of all MDA [2]. The frequency of uterine malformations in fertile patients is 3.8% and that infertile patients it is almost twice as high [11]. Ultrasound examinations for non-obstetric indications in 2065 consecutive girls and women aged 8-93 years showed that 8 had anomalies, including bicornuate uterus, septate uterus and double uterus [12].

The study shows the presence of arcuate, bicornuate uterus and agenesis and unicornuate uterus was not reported.

Uterine anomalies in women undergoing hysteroscopy for abnormal uterine bleeding, showed that a mullerian anomaly could be detected in about 10% of women undergoing hysteroscopy for abnormal uterine bleeding, and confirmed that hysteroscopy is a valuable technique in assessing uterine cavity and showed that the prevalence of septate / bicornuate and arcuate uteri in women with abnormal uterine bleeding ranged between 3% to 7% and no history of reproductive problems [13].

The most common uterine anomaly diagnosed in the unselected population is the arcuate uterus (3.9%) followed by canalization defects (2.3%) and then the bicornuate uterus (0.4%). This shows that bicornuate uteri are more prevalent and certainly not uncommon in women with infertility (1.1%) compared with the unselected population (0.4%) [7]. The current study also shows that prevalence of bicornuate uterus is 0.4%.

Congenital uterine anomalies were found in 23.8% of women with recurrent miscarriage. The most common anomaly however was the arcuate uterus; major anomalies were present in 6.9% of women. Their result shows that distortion of uterine anatomy in subseptate uterus is greater in women with recurrent pregnancy loss [14]. The most common anomaly found in this study also is arcuate uterus.

When examining the various types of a uterine anomaly, the most common finding was bicornuate uterus; the second most common was septate uterus [9]. In current study most common uterine abnormality is arcuate uterus.

Frequency of uterine anomalies was 3% within 83.3% in women with secondary infertility 16.7% in women with primary infertility and the second most commonest uterine abnormality was arcuate uterus [15]. It was observed that septate and arcuate uteri represented 66% of the malformation while the bicornuate, didelphys and unicornuate uteri constituted the remaining 33% [11]. The present study also agrees with the above findings that 6 Arcuate uterus, 4 Bicornuate, and 1 Agenesis.

CONCLUSION

Analysis of 1500 cases congenital malformations of the female genital tract in general population was 0.9%. The congenital malformations were analyzed and classified based on AFS classification method. The results were compared with various other studies. It was found that prevalence of congenital malformation is estimated to be 5-7%.

Mullerian anomalies are often treatable. Patients with MDAs are known to have a higher incidence of infertility, repeated first trimester, spontaneous abortions, IUGR, fetal malposition, preterm labor and retained placenta.

Endovaginal three-dimensional ultrasonography (3DUS) is a non-invasive, outpatient diagnostic modality, which enables a detailed assessment of uterine morphology.

3DUS has recently become the only mandatory step in the initial investigation of MDA before resorting to invasive procedures such as hysteroscopy. It is necessary for every woman with bad obstetric history to undergo ultrasono-

graphy, to rule out anatomical abnormality, evaluation by their obstetrician and gynaecologists.

Congenital uterine malformations are more common than generally recognized. Knowledge concerning their prevalence and varieties is important in recognizing and managing the obstetric and gynaecologic complications.

In recent years many cases were found due to availability of better diagnostic procedures and awareness of people. Three dimensional ultrasound has recently been introduced into the clinical practice enables non - invasive and accurate diagnosis of congenital uterine anomalies.

ABBREVIATIONS

A	: Abortion.
AFS	: American fertility society.
CI	: Confidence Interval.
3-DHS	: Three dimensional hysterosalpingography.
3-DUS	: Three dimensional ultrasonography.
G	: Gravida.
IUGR	: Intra uterine growth restriction
HSG	: Hysterosalpingography.
L	: Living children.
LSCS	: Lower segment cesarean section.
MDAS	: Mullerian duct anomalies.
MRI	: Magnetic resonance imaging.
PTB	: Preterm birth.
PCOS	: Polycystic ovarian syndrome.
RPL	: Recurrent pregnancy loss.
RM	: Recurrent miscarriage

Conflicts of Interests: None

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