Pattern of Morphological Anomalies of Uterus as Observed by Modern Investigation Techniques

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ABSTRACT

Background: Due to the high prevalence and possible impact on the reproductive health of the of woman, congenital uterine malformation of female genital tract is a challenge for the therapeutic decision-making process. The current study aimed to evaluate the morphological anomalies of the uterus as observed by modern investigation techniques.

Methods: This cross-sectional observational study was done in Prathima Institute of Medical Sciences, Nagnoor, Karimnagar, Telangana state. Women who were infertile and anxious to conceive and women were subjected to 2D ultrasound Screening followed by Hysterosalpingography. Those women who were fertile and found to have uterine anomalies and needed reconfirmation of the provisional diagnosis were subjected to Hysterosalpingography.

Results: Out of n=300 cases studied n=288 (96%) were with normal uterine anatomy and n=12 (4%) cases were detected with uterine malformations as seen by USG. N=5 (40.5%) had a Bicornuate Uterus. While uterus didelphys and unicornuate uterus were seen in n=2 (16.67%) each. Arcuate uterus, uterine septum, uterine Aplasia/Hypoplasia were seen in n=1(8.33%) women each respectively.

Conclusion: Due to the psychological consequences associated with infertility, the effects of uterine anomalies on the life of women are very important. It is critical to know the exact nature of the anomaly, to plan for the most appropriate treatment modality. As most of these anomalies cannot be rectified by medical management, they need surgical correction. For optimal results, it is important to know the exact type of anomaly for surgical correction. The 2D USG can be recommended as the basic modality to evaluate uterine anomalies. HSG/MRI may be used to delineate detail of anomalies if initially detected by the 2D scan.

KEYWORDS: Anomalies of Uterus, 2D ultrasound scan, MRI, Hysterosalpingography

INTRODUCTION

Many of the congenital manifestations are asymptomatic and therefore go undetected. Patients with symptomatic anomalies will usually have signs of obstruction or reproductive failure like infertility, abortions, Ectopic pregnancy preterm labor, and low birth weight. Accurate assessment of the anomaly will lead to successful treatment and prevention of future complications. In the females during the embryogenesis period of the 8th to 16th week the paired paramesonephric ducts or Müllerian ducts which are the primal equivalent of female genitalia segregate from uterine adnexa. They form the fallopian tubes, corpus uterus the cervix, and the superior aspect of the vagina. [1]Braum et al., [2] and Letterie [3]have divided the process into three stages. 1: Organogenesis: where there is the development of both Mullerian ducts. 2: Fusion the lower Mullerian ducts fuse from the upper part of the vagina, cervix, and uterus which is also termed lateral fusion. The cranial part of Mullerian ducts remains unfused and forms the fallopian tubes. 3: septal absorption occurs after the lower Mullerian ducts fuse and the central septum is resorbed in 9 weeks leading to a single uterine cavity and cervix. [4] The process of fusion sometimes occurs abnormally leads to a variety of congenital uterine malformations, such as uterus bicornis bicollis, uterus didelphys, uterus sub septae, uterus arcuatus, and uterus unicornis. [5]Many of the congenital uterine abnormalities will be difficult to diagnose in early life because the anomaly may not be obvious till the female enters the reproductive age. Research has shown that the congenital uterine anomalies are a risk factor for recurrent miscarriages and other has found an association between major congenital anomaly and poor reproductive outcome. [6]It is therefore important to accurately evaluate the prevalence of these anomalies especially in females reporting with recurrent miscarriages and infertility. The diagnostic methods of determining the exact nature of anomaly have now progressed. Pelvic ultrasound with convex abdominal and transvaginal probes, 2D Ultrasound, 3D Ultrasound, Hysterosalpingography, MRI imaging of pelvic organs are increasingly being used as diagnostic modalities. Therefore, we in the current study tried to evaluate the mor-

phological anomalies of the uterus as observed by modern investigation techniques.

MATERIAL AND METHODS

This cross-sectional observational study was done in the Department of Anatomy along with the support of Departments of Obstetrics and Radiology, Prathima Institute of Medical Sciences, Nagnoor, Karimnagar, Telangana state. Institutional Ethical committee permission was obtained for the study. Written consent was obtained from all the participants of the study.

Inclusion criteria: Women between 20 — 45yrs of age, those referred for pelvic imaging for various symptoms and infertile women who were referred for pelvic imaging.

Exclusion criteria: Females with confirmed pregnancy, previous hysterectomy/myomectomy, and malignancy of female reproductive structures

All the selected women were analyzed in detail by history and clinical examination was performed by the Gynecologist and based on the history and clinical examinations those women who were referred for imaging of the pelvic organs were included in the study. Those women who were infertile and anxious to conceive were subjected to 2D ultrasound Screening. The infertile women were in addition to 2D ultrasound subjected to Hysetrosalpingography to see for uterine and cervical anomalies, in addition to testing for tubal patency and tubal abnormalities. Those women who were fertile and found to have uterine anomalies and needed reconfirmation of the provisional diagnosis were subjected to Hysterosalpingography. Those women where the diagnosis needed reconfirmation or those who needed the detailed anomaly picture for interventions were subjected to MRI. Statistical analysis was done by uploading the data on an MS Excel spreadsheet and descriptive statistics were analyzed using SPSS version 21 on windows format.

RESULT

Based on the inclusion and exclusion criteria n=300 cases were examined who underwent 2D USG out of which n=20 (6.67%) cases were aged between 20 – 30 years and n=280 (93.33%) were between 31 – 45 years. N=30(10%) cases were scanned due to determine the cause of infertility. Out of 300 women screened 192(64%) had lower abdominal pain the distribution of symptoms in the cases has been depicted in Table 1.

Out of the cases studied n=288(96%) were with normal uterine anatomy and n=12(4%) cases were detected with uterine malformations. N=5 (40.5%) had a BicornuateUterus. While uterus didelphys and unicornuate uterus were seen in n=2(16.67%) each.Arcuate uterus, uterine septum, uterine Aplasia/Hypoplasia were seen in n=1(8.33%) women each respectively Table 2

Symptoms	Frequency
Lower abdominal pain	192 (64%)
Dysmenorrhea	22 (7.33%)
Menstrual distribution	30 (10 %)
Other systemic symptoms	23 (7.7%)
Infertility	30 (10%)
Recurrent PregnancyLosses	3 (0.1%)
Total	300 (100)

Table 1: Distribution of presenting symptoms

Type of Anomaly	Frequency	Percentage
Bicornuate	5	41.67
Uterine septum	1	8.33
Didelphys uterus	2	16.67
Unicornuate uterus	2	16.67
Aplasia / Hypoplasia	1	8.33
Arcuate	1	8.33
Total	12	100

Table 2: Distribution of type of anomalies on 2 D Ultrasound

N=12 women had uterine anomalies out of which n=7(58.33%) cases were infertile and n=5 (41.67%) cases were fertile. Based on the overall population the incidence of anomalies was n=12(4%). The incidence of anomalies in infertile women was 23% and 1.8% in the case of fertile women. The distribution of anomalies has been shown in Table 3.

The bicornuate uterus was most common in all groups with 41.67%, in the overall population, 8.33% had septate, and uterine hypoplasia each. While 16.67% haddidelphys uterus and unicornuate uterus each. While Arcuate uterus was seen in8.33%.Infertile women Bicornuate, septate, didelphys, unicornuate Arcuate were all8.33%.In infertile women, Bicornuate is most common with 3.33%. While didelphys, unicornuate, Hypoplastic were 8.33%.Out of the total cases, n=40 women were also screened by Hysterosalpingography (HSG) out of which n=29(72.5%) cases were found with normal uterine anatomy and n=11(27.5%) cases were with uterine anomalies. The data is as presented in Table 4.

Out of n=11 women underwent MRI out of which n=5 women were confirmed to havebicornuate uterus, n=2 women had a unicornuate uterus, n=2 had uterine didelphys and n=1 woman had a hypoplastic uterus.

Type of anomalies	Infertile women	Fertile women	Overall population
Bicornuate Uterus	4(33.3%)	1(8.3%)	5 (41.7%)
Septate uterus	-	1(8.3%)	1(8.3%)
Didelphys uterus	1(8.3%)	1(8.3%)	2(16.7%)
Unicornuate uterus	1(8.3%)	1(8.3%)	2(16.7%)
Uterine aplasia/ Hypoplasia	1(8.3%)	-	1(8.3%)
Arcuate uterus	-	1(8.3%)	1(8.3%)
Total	7(58.3%)	5(41.7%)	12(100%)

Table 3: Distribution of anomalies on 2D USG in fertile women, infertile women and overall population

Type of Anomalies	Frequency	Percentage
Bicornuate	5	45.45
Unicornuate	2	18.18
Uterus didelphys	2	18.18
Hypoplastic uterus	1	9.09
Septate	1	9.09
Total	11	100

Table 4: Hysterosalpingography distribution of types of anomalies.

DISCUSSION

Our study was undertaken to see the prevalence of uterine anomalies in the general population also studied the distribution of various subtypes of anomalies. The incidence of anomalies was also compared in the general population of infertile women and fertile women. The study was undertaken using modern investigative techniques of 2-Dimensionalultrasound. Hysterosalpingography and MRI. Our study included 300 women, out of which n=270 were fertile women and n=30infertile women were included in the study. The age group selected was 20 years to 45 years. The presence of anomalies in the current study was 1.8% women (fertile), 23.33% in infertile women and 4% of all the cases studied the comparison between the incidence of anomalies between fertile women and infertile women by chi-square test revealed p <0.01 hence considered significant. Nahum GG[7] in a similar study found the incidence of uterine anomalies in 0.17% of fertile women, 13.5% in cases of infertility, and 0.5% of the overall population. They also found P <0.00001 like the results of the current study. SH Saravelos et al.,[8]in their study found the existence of congenital uterine anomalies in 6.7% of the general population and 7.3% in infertile women. The role of congenital anomalies in infertility is controversial.[9–11]However, research has shown that uterine anomalies may contribute to infertility by interfering with normal implantation and placentation.[12]In the current study, we found the most common anomaly to be bicornuate uterus in n=5 cases followed by Unicornuate and Didephys in n=2 cases each and n=1 case of the septate uterus, Agenesis, and Arcuate Uterus. Studies have shown the prevalence of congenital uterine anomalies in the general population is 6.7 – 7.4%.[13, 14]Although, these numbers appear to be higher than compared to other studies.[7, 10, 15]The other studies in this field have found a pooled prevalence of 2.4%.[16, 17]The commonest congenital anomaly reported is the arcuate uterus.[16–18]However, in the current study we found the lower prevalence of arcuate uterus could be due to smaller sample size and racial differences.[10, 12, 15]The commonest anomalies follow in order of arcuate, septate, and bicornuate at the ratio of 17:7:1. The role of investigations in the diagnosis of uterine anomalies revealed that two-dimensional ultrasound plays a useful role, and the advantage of ultrasound is it allows measurements and quantification of observations to be made. But there are no universally accepted criteria for the ultrasound diagnosis of congenital uterine anomalies.[8] [19]Since it uses fluid into the uterine cavity to enhance ultrasound imaging studies. It is helpful to demarcate the internal uterine contour. It is considered a safe procedure and not particularly painful to patients.[20]In our study out of n=12 cases, hysterosonography was not able to identify a case of aplasia which is one of the limitations. MRI investigations were done in this study it appears that MRI is a sensitive tool, and it could be used instead of invasive procedures such as Laparoscopy for diagnosis of the double uterus.[21]

CONCLUSION

Due to the psychological consequences associated with infertility, the effects of uterine anomalies on the life of women are very important. It is critical to know the exact nature of the anomaly, to plan for the most appropriate treatment modality. As most of these anomalies cannot be rectified by medical management, they need surgical correction. For optimal results, it is important to know the exact type of anomaly for surgical correction. 2D USG can be recommended as the basic modality to evaluate uterine anomalies. HSG is an excellent recommended basic modality to evaluate uterine anomalies.3D USG with higher resolution can give further detailing of uterine anomalies.MRI can be recommended as a higher-end modality for selected cases for more specific evaluation of uterine anomalies.

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