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**ORIGINAL RESEARCH PAPER**

# Congenital uterine anomalies in women with recurrent spontaneous abortion: a case control study

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## ABSTRACT

***Introduction****: Recent study reveals that the anatomical abnormalities of uterus cause recurrent spontaneous abortion (RSA). It also causes miscarriage by interruption of the endometrial vasculature resulting in abnormal and inadequate placentation.* ***Objective****: Aimed to find out the association of congenital uterine anomalies /Mullerian Duct Anomalies (MDA) with recurrent spontaneous abortion.* ***Materials and methods****: A total of 150 human participants (female) with history of 2 or more episodes of recurrent spontaneous abortion were included in this study. A routine investigation such as HSG and USG was done to detect congenital uterine anomalies. MRI was done in those cases with suspicious USG or HSG findings for confirmation. Similarly 150 numbers of fertile females without any history of abortion were also investigated to detect any congenital uterine anomalies.* ***Results****: Out of 150 cases 11 cases reported to have congenital uterine anomalies. Also, among 150 females without RSA (Control group), only 3 reported congenital uterine anomalies. Chi-square test was carried out for independence of attributes.* ***Conclusion****: Patients with congenital uterine anomalies were commonly found to be associated with recurrent spontaneous abortion (RSA). Therefore women with recurrent spontaneous abortion should be investigated by imaging techniques to rule out congenital uterine anomalies.*

***Keywords****: Miscarriage; mullerian duct anomalies; imaging techniques.*

## INTRODUCTION

Congenital uterine anomalies have been implicated as a cause of adverse pregnancy outcome.[1,2] The reported prevalence of congenital uterine anomalies in women with recurrent spontaneous abortion varies between 6-38%.[3-5]

The female reproductive tract develops from a pair of mullerian ducts that form the fallopian tubes, uterus, cervix and the upper two third of the vagina. Any disruption of mullerian duct development during embryogenesis can result in a broad and complete spectrum of congenital abnormalities termed mullerian duct anomalies (MDA).

Normal development of the mullerian ducts depends on the completion of three phases, i.e., organogenesis, fusion and septal resorption. Failure of formation of mullerian duct results in uterine agenesis, hypoplasia or an unicornuate uterus. When the two mullerian ducts fail to fuse, the resultant anomalies are either a bicornuate uterus or uterus didelphys. Failure of septal resorption results in a septate or arcuate uterus.[6]

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The uterine septum is the congenital uterine anomaly most closely linked to recurrent miscarriages, with as much as a 76% risk of spontaneous pregnancy loss among the affected women.[7] Other mullerian anomalies including unicornuate, didelphic and bicornuate uteri have been associated with lesser risk of recurrent miscarriages.[2,7]

**Classification of Mullerian Duct Anomalies (MDAs)**: Proper classification of MDAs is important owing to the fact that associated risks of adverse pregnancy outcome and management vary among the anomalies. The most widely accepted classification system has been developed by the American Society of Reproductive Medicine (The American Fertility Society Classifications 1998)[8] as shown in **Table 1**.

**Table 1** Classification of mullerian duct anomalies (MDA)[8]

| | |
|---|---|
| CLASS I | **Hypoplasia and Agenesis**: a) Vaginal, b) Cervical, c) Fundal, d) Tubal, e) Combined |
| CLASS II | **Unicornuate**: a) Communicating, b) Non-communicating, c) No cavity, d) No horn |
| CLASS III | **Didelphys** |
| CLASS IV | **Bicornuate**: a) Partial and b) Complete |
| CLASS V | **Septate**: a) Partial and b) Complete |
| CLASS VI | **Arcuate** |
| CLASS VII | **Diethylstilbesterol (DES) drug related** |

The aim of the present study was to find out whether Congenital uterine anomalies (MDAs) have any significant association with Recurrent Spontaneous Abortion (RSA).

## MATERIALS AND METHODS

This case control study was conducted during the period from February 2015 to April 2018 at Gauhati Medical College, Guwahati, Assam.

A total of 150 female participants of reproductive age group ranging from 19-44 years with history of two or more episodes of recurrent spontaneous abortion were included as "case" in this study.

Structured questionnaires were used for collection of data. Prior written informed consent was obtained from the participants. Ethical clearance was obtained from the Institutional Ethics Committee.

The participants were subjected to required radiological investigations with due informed consent as part of routine examination procedures while they attended the Out Patient Department (OPD). Routine investigations such as Hysterosalpingography (HSG) and Ultrasonography (USG) were done to detect Mullerian Duct Abnormalities (MDA) in these participants with history of RSA. Magnetic Resonance Imaging (MRI) was done in those cases with suspicious USG or HSG findings for confirmation.

150 fertile female participants in the age range of 19 to 44 years without any history of RSA were included in this study as "control". These individuals came to the Obstetrics and Gynaecology department for other gynaecological problems. They were subjected to routine USG as advised by the treating Gynaecologist. Prior written informed consent was obtained from these individuals while enrolling them as "control".

The congenital uterine anomalies or more precisely Mullerian Duct Anomalies(MDA) detected in this study were classified according to classification developed by the American Society of Reproductive Medicine (The American Fertility Society classifications 1998).[8]

The data thus collected were analysed with SPSS software version 20.

## RESULTS

In this study, among 150 females with RSA (Case group), 11 reported to have mullerian duct anomalies (MDAs).

Maximum number of patients (n=4, 36.36% of overall anomalies) had class V anomaly (**Figure 1**) followed by class II anomaly (n=3, 27.27%).

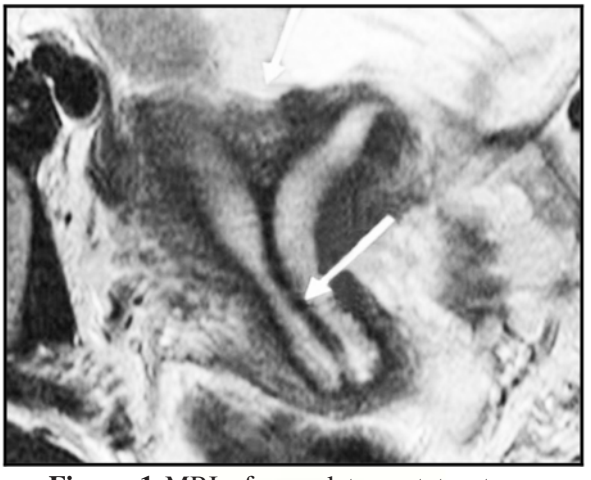

**Figure 1** MRI of complete septate uterus

Class VI (**Figure 2**) anomaly was detected in two patients (18.18%). Class III anomaly was observed in one patient (9.09%), while another patient (9.09%) presented with Class IV anomaly. Class I and class VII anomalies were detected in none of the patients (**Table 2**).

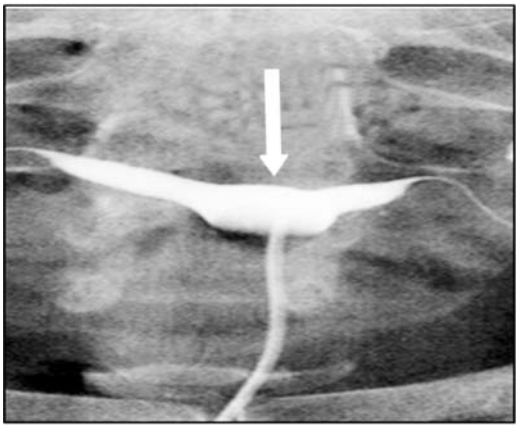

**Figure 2** HSG of arcuate uterus

Among 150 females without RSA (control group), MDAs were detected in 3 individuals. Class I, II, III, V and VII anomalies were conspicuously absent among controls. Class IV anomaly (**Figure 3**) was detected in one individual (33.33% of overall anomaly) while in two individuals (66.67% of overall anomaly) Class VI anomaly was detected (**Table 2**).

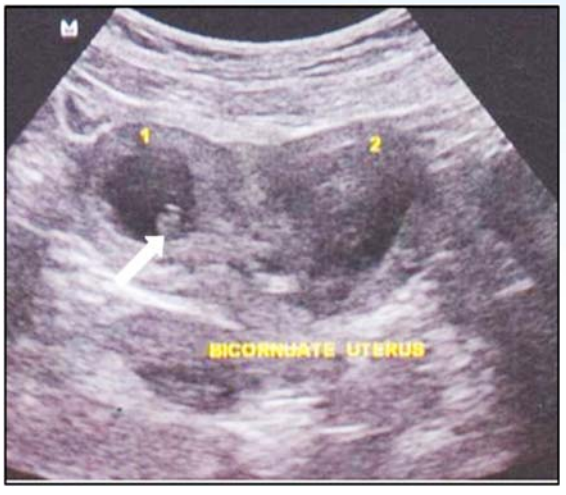


**Figure 3** Bicornuate uterus (USG) with viable foetus in right cornue (arrow head)

**Table 2** Type of MDAs in Cases and Control group

| Classification | Type of Anomaly | No. of Anomalies | |
|---|---|---|---|
| | | Case | Control |
| CLASS I | Agenesis/Hypoplasia | - | - |
| CLASS II | Unicornuate | 3 | - |
| CLASS III | Didelphus | 1 | - |
| CLASS IV | Bicornuate | 1 | 1 |
| CLASS V | Septate | 4 | - |
| CLASS VI | Arcuate | 2 | 2 |
| CLASS VII | Diethylstillbesterol | - | - |

To study whether Mullerian duct anomalies (MDAs) has any significant association with Recurrent Spontaneous Abortion (RSA) or not, Chi-square test was carried out.

The SPSS software was used for the calculation, and the output is given in **Table 3.**

**Table 3** Chi square test table for independence of patient groups and their anatomical condition

| | Value | df | Asymp. Sig. 2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|---|---|---|---|---|---|
| Pearson Chi-Square | 4.795[a] | 1 | .029 | | |
| Continuity Correction[b] | 3.671 | 1 | .055 | | |
| Likelihood Ratio | 5.084 | 1 | .024 | | |
| Fisher's Exact Test | | | | .052 | .026 |
| Linear-by-Linear | | | | | |
| Association | 4.779 | 1 | .029 | | |
| N of Valid Cases | 300 | | | | |

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.00.

b. Computed only for a 2x2 table

From the above table it was observed that the p-value for Pearson Chi-square test is 0.029 which is less than 0.05 and hence conclusion can be made that there is a significant association of Mullerian duct anomalies (MDAs) with Recurrent Spontaneous Abortion (RSA).

Odds ratio was calculated and it was found that the odds of MDA are 3.8 times higher among women with RSA compared to women without RSA.

## DISCUSSION

In the present study, we have found a significant association of congenital uterine anomalies (MDA) with recurrent spontaneous abortion. The exposure rate for cases were found to be higher than control.

The exact role of congenital uterine anomalies in recurrent miscarriage remains unclear since the prevalence and reproductive outcomes of uterine anomalies in the general population are not known.[9] A systemic review of past studies concluded that congenital uterine anomalies were present in 4.3% (range: 2.7%-16.7%) of normal fertile women and in 12.6% (range:1.8%-37.6%) of women with recurrent miscarriages.[10] The wide variability in prevalence is due to the difference in the inclusion criteria and type of diagnostic techniques used for detection of the anomalies.

In the present study only 3 cases of mullerian anomalies were found in the control group, i.e., 2% in comparison to 7.33% of cases. According to Jaslow[11] congenital anomalies are found in 8.4%-12.6% women with recurrent miscarriages, which is seven to eight times higher than the general population. So our findings are similar to that of made by the other authors in the past.

The congenital uterine anomalies most commonly associated with recurrent spontaneous abortion include bicornuate, septate and uterus didelphus.[7] In our study the most common uterine anomaly found in cases was septate uterus with an incidence of 36.36%. According to John et al[12] septate uterus is the major anomaly responsible for recurrent spontaneous abortion. Talaviya and Suvagya[13] also stated that among the various congenital uterine anomalies, the septate uterus is the most common anomaly associated with recurrent miscarriage.

It is beyond doubt that septate uterus is associated with an increased risk of spontaneous abortion because it interferes with implantation. Though septate uterus remains the most common and anatomically less complex congenital anomaly, it is associated with the poorest reproductive outcome, with miscarriage rates more than 60 percent and fetal survival rate as low as 6 to 28 percent.[14]

The second most common anomaly found in our study was unicornuate uterus with an incidence of 27.27%. Ludmir et

al[15] reported that there is a high rate of pregnancy loss (80%) in unicornuate uterus. Unicornuate uterus with non-communicating rudimentary horn is susceptible to many gynaecological and obstetric complications which can occur at any stage of reproductive life.[16] In our study we found a case of unicornuate uterus with non-communicating rudimentary horn.

In present study, we found two cases of arcuate uterus among 150 women with history of recurrent abortion. Similarly two cases of arcuate uterus were also detected in the control group. According to Raga et al[2] live birth rate (82.7%) of arcuate uterus is higher as compared with other uterine anomalies, eg. bicornuate uterus (62.5%) and septate uterus (62%). Compared with women with a normal uterus, women with an arcuate uterus have a higher proportion of second trimester losses and preterm labour.[17] Priya and Vijayalakshmi[18] reported arcuate uterus to be the most common uterine anomaly in their study in an unselected population.

In our study, didelphys and bicornuate uterine anomalies were detected in women with recurrent miscarriages, both with the incidence of 9.09% among the all abnormalities. The prevalence of bicornuate and uterus didelphys is significantly higher in patients with recurrent miscarriage than in general population.[19,20]

In our study, in the control group an woman with bicornuate uterus was detected who came out with a successful pregnancy outcome delivering a baby at term. A bicornuate uterus does not always lead to obstetric complications. It may carry a pregnancy to term.[21]

Raga et al[2] in their study concluded that uterine anomalies are relatively frequent in fertile women and more frequent in infertile patients. They observed that the reproductive performance of the unicornuate and didelphys uteri was poor as compared to the septate and bicornuate uteri. According to them arcuate uterus had no impact on reproduction.

## CONCLUSION

Mullerian Duct Anomalies are one of the important causes of recurrent pregnancy loss. Most of the anomalies can be diagnosed initially by routine hysterosalpingography and ultrasonography. However advanced imaging techniques such as MRI may be required for a definitive diagnosis. Since women with recurrent miscarriages have a higher prevalence of congenital uterine anomalies, they should be thoroughly investigated with proper imaging techniques for early detection and proper management of such cases.

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(3) All author(s) have contributed sufficiently in the article to take public responsibility for it and

(4) All author(s) have reviewed the final version of the above manuscript and approved it for publication.

## REFERENCES

1. Acien P. Reproductive performance of women with congenital uterine anomalies. Human Reproduction 1993;8:122-6.
2. Raga F, Baucet C, Remohi J, Bonilla-Musoles F, Simon C, Pellicer A. Reproductive impact of congenital mullerian anomalies. Human Reproduction 1997;12(10):2277-81.
3. Makino T, Hara T, Oka C, Toyoshima K, Sugi T, Iwasaki K, et al. Survey of 1120 Japanese women with a history of recurrent spontaneous abortions. Eur J Obstet Gynecol Reprod Biol 1992;44:123-30.
4. Clifford K, Raij R, Watson H, Regan L. An informative protocol for the investigation of recurrent miscarriage: Preliminary experience of 500 consecutive cases. Human Reproduction 1994;9(7):1328-32.
5. Acien P. Uterine anomalies and recurrent miscarriage. Infertil Reprod Med Clin N Amer 1996;7:698-719.
6. Chandler TM, Machan LS, Cooperberg PL, Harris AC, Chang SD. Mullerian duct anomalies: From diagnosis to intervention. Br J Rasiol 2009;82(984): 1034-42.
7. Lin PC. Reproductive outcomes in women with uterine anomalies. J Women Reproductive Health 2004;13:33-9.
8. American Fertility Society classifications of adnexal adhesions, distal tubal obstruction, tubal occlusions secondary to tubal ligation, tubal pregnencies, Mullerian anomalies and intrauterine adhesions. Fertil Steril 1998;49:944-55.
9. Regan L, Backos M, Rai R. The investigation and treatment of couples with recurrent first trimester and second trimester miscarriage. RCOG Green-top Guidelines 2011;17:7-8

10. Grimbizis GF, Camus M, Tarlatzis BC, Bontis JN, Devroey P. Clinical implications of uterine malformations and hysteroscopic treatment results. Hum Reprod update 2001;7(2):161-74.
11. Jaslow C. Uterine factors. Obstet Gynecol Clin North Am 2014;57-86.
12. Jones, HW Jr. Uterine factors in repeated miscarriage. Acta Eur Fertil 1992;23:271-4.
13. Talaviya P, Suvagiya V. A review on Recurrent miscarriage. J of Pharmacy Research 2011;4(11): 4243-8.
14. Homer HA, Li TC, Cook ID. The septate uterus. a review of management and reproductive outcome. Fertil Steril 2000;73:01-14.
15. Ludmir J, Samuels P, Brooks S, Mennuti MT. Pregnancy outcome of patients with uncorrected uterine anomalies managed in a high risk obstetric setting. Obstet Gynecol 1990 Jun 1;75(6):906-10.
16. Goel P, Aggarwal A, Devi K, Takkar N, Saha PK, Huria A. Unicornuate uterus with non-communicating rudimentary horn-different clinical presentations. J Obstet Gynecol 2005 March/April;55(2):155-8.
17. Woelfer B, Salim R, Banerjee S, Elson J, Regan L, Jurkovic D. Reproductive outcomes in women with congenital uterine anomalies detected by three-dimensional ultrasound screening. Obstet Gynaecol 2001;98:1099-103.
18. P Priya, S Vijayalakshmi. Study of morphology of uterus using ultrasound scan. Int J Anat Res 2015;3(1):935-40.
19. Chan YY, Jayaprakasan K, Zamora J, Thronton JG, Raine-Fenning N, Coomarasamy A. The prevalence of congenital uterine anomalies in unselected and high risk population: a systemic review. Hum Reprod update 2011;17(6):761-71.
20. Bonilla-Musoles F, Martin N, Esquembre MP, Caballero O, Castillo JC, Bonilla FJ et al. Uterine Malformations:Diagnosis with 3D/4D Ultrasound. Donald School J of Ultrasound in Obstetrics and Gynecology. 2015; 9(2):123-48.
21. Borgohain D, Srivastava S. Pregnancy in bicornuate uterus. Int J Reprod Contracept Obstet Gynecol 2018;7:342-5.