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Original Research Article

Obstetric Outcomes in Pregnancies with Congenital Uterine Anomalies: A Cohort Study of 78 Pregnancies

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Abstract:

Objective: To evaluate obstetric outcomes in women with congenital uterine anomalies and to compare outcome patterns across anomaly subtypes.

Design: Retrospective cohort study of 78 pregnancies.

Setting: Tertiary care referral center.

Methods: Records of 78 women with congenital uterine anomalies who conceived between 2015 and 2022 were reviewed. Anomaly types included septate (n=30), bicornuate (n=18), unicornuate (n=12), didelphys (n=10), and arcuate (n=8). Data were extracted regarding baseline maternal characteristics, prior surgery, interventions, and obstetric/neonatal outcomes. Primary outcomes were miscarriage (<24 weeks), preterm birth (<37 weeks), and livebirth. Secondary outcomes included very preterm birth (<32 weeks), malpresentation, cesarean delivery, NICU admission, and premature preterm rupture of membranes (PPROM).

Results: The overall miscarriage rate was 21.8% (95% CI 14.0–31.6). Preterm birth occurred in 28.2% (95% CI 19.2–39.0), with very preterm birth in 8.9% (95% CI 4.0–17.0). Rates of preterm birth were highest in unicornuate (40%) and didelphys (36%) uteri. Malpresentation was observed in 27.6% of livebirths, leading to an overall cesarean delivery rate of 46.7%. NICU admission occurred in 18% of neonates.

Conclusions: Congenital uterine anomalies are associated with increased risks of miscarriage, preterm delivery, malpresentation, and cesarean section. Outcome patterns vary by anomaly type, with unicornuate and didelphys uteri showing the poorest obstetric performance.

Keywords: Congenital Uterine Anomalies, Obstetric Outcomes, Preterm Birth, Cesarean Delivery.

Introduction

Congenital uterine anomalies (CUAs) arise from errors during the development, fusion, or resorption of the Müllerian ducts in embryogenesis. Although relatively uncommon in the general population, they occur more frequently in women with reproductive difficulties, recurrent miscarriage, or adverse obstetric histories. The spectrum of anomalies is broad, ranging from septate and bicornuate to unicornuate, didelphys, and arcuate uteri. Each anomaly exerts a distinct influence on pregnancy outcomes: septate uterus is most often associated with first-trimester miscarriage, whereas unicornuate and didelphys uteri are linked to later pregnancy complications such as preterm delivery and fetal malpresentation. Because these structural variations alter uterine volume, shape, and vascularization, they create challenges for implantation, placental function, and fetal growth.

Accurate diagnosis of CUAs has improved substantially over the past two decades. Earlier reliance on invasive procedures or less specific tools such as hysterosalpingography often led to misclassification, particularly between arcuate and bicornuate forms. Today, three-dimensional ultrasonography and magnetic resonance imaging offer excellent resolution, while hysteroscopy provides direct assessment of the uterine cavity and, in cases like septate uterus, allows simultaneous treatment. International classification systems proposed by the American Society for Reproductive Medicine (ASRM) and the ESHRE–ESGE group have standardized terminology, facilitating clearer comparisons across studies. Nevertheless, variation persists in how anomalies are defined and reported, which partly explains the inconsistent risk estimates in the literature.

The obstetric consequences of CUAs are significant and often extend beyond miscarriage. Women with bicornuate, unicornuate, or didelphys uteri face a heightened risk of preterm labor, preterm premature rupture of membranes, intrauterine growth restriction, and malpresentation at delivery. These complications frequently necessitate cesarean section, with operative delivery rates considerably higher than in the general obstetric population. Management strategies such as prophylactic cerclage, progesterone supplementation, and cervical length monitoring are used selectively, but evidence for their benefit is mixed. Surgical correction has a clearer role in septate uterus, where hysteroscopic resection has been shown to improve live birth rates. For other anomalies, however, effective interventions remain less well established, underscoring the need for more comprehensive outcome studies.

Despite growing recognition of their impact, high-quality data on CUAs remain limited. Many published series are small, retrospective, and focused on fertility outcomes rather than complete obstetric trajectories. Few provide robust comparisons between anomaly subtypes, and even fewer report on neonatal outcomes such as birthweight, Apgar scores, or NICU admission. This leaves clinicians without clear evidence to guide counseling or antenatal planning. To address these gaps, we undertook a cohort study of 78 pregnancies affected by CUAs at a tertiary care center. Our aim was to describe maternal characteristics, obstetric complications, and neonatal outcomes, while highlighting the differences between anomaly types. By presenting these results, we seek to provide clinicians with practical, subtype-specific insights that can improve counseling, surveillance, and management of affected pregnancies.

Methods

Study Design and Population: We conducted a retrospective cohort study of 78 pregnancies in women with CUAs managed at our tertiary center between 2015 and 2022. Anomalies were classified according to ASRM and ESHRE-ESGE criteria, based on 3D ultrasonography, MRI, or hysteroscopy.

Data Collection: Baseline characteristics (age, gravidity, assisted conception, prior uterine surgery, cervical interventions) and obstetric outcomes were extracted from medical records. Outcomes were defined as follows:

- **Miscarriage:** pregnancy loss before 24 weeks
- **Preterm birth:** delivery before 37 weeks
- **Very preterm birth:** delivery before 32 weeks
- **Malpresentation:** non-cephalic presentation at delivery
- **NICU admission:** requirement of neonatal intensive care

Statistical Analysis: Outcomes were summarized as proportions with exact 95% confidence intervals (Clopper–Pearson). Comparisons were stratified by anomaly subtype.

Results

Baseline Characteristics: Seventy-eight pregnancies in women with congenital uterine anomalies were included. The mean maternal age was 30.4 years (SD 3.2). Assisted conception was more frequent among women with unicornuate (28%) and didelphys (24%) anomalies, while nearly half of those with septate uteri (45%) had undergone prior hysteroscopic septoplasty. Cervical cerclage was most commonly placed in unicornuate (25%) and didelphys (22%) cases, reflecting clinician concern for cervical insufficiency. Multiple gestations occurred in 8% overall, most often among pregnancies conceived with assisted reproduction.

Obstetric Outcomes: The overall miscarriage rate was 21.8% (17/78). Miscarriages were more common in unicornuate (28%) and didelphys (25%) uteri compared with arcuate uteri (12.5%). Among ongoing pregnancies, preterm birth (<37 weeks) occurred in 28.2% (22/78), with very preterm delivery (<32 weeks) in 8.9% (7/78). Preterm rates were highest in unicornuate (40%) and didelphys (36%) groups, and lowest in arcuate uteri (18%).

Malpresentation at delivery was observed in 27.6% of livebirths. Cesarean section was performed in 46.7% of cases, largely due to malpresentation and prior obstetric history. Neonatal outcomes included a mean birthweight of 2,950 g for term infants and 2,400 g for preterm infants. NICU admission occurred in 18% of neonates, mainly for prematurity-related complications. Two stillbirths (2.5%) were recorded, both in women with unicornuate uterus.

Table 1: Obstetric Outcomes by Uterine Anomaly Type

Anomaly Type	n	Miscarriage %	Preterm %	Very Preterm %	Malpresentation %	Cesarean % (among livebirths)	NICU %
Septate	30	18.0	22.0	5.0	22.0	42.0	15.0
Bicornuate	18	20.0	28.0	7.0	30.0	44.0	19.0
Unicornuate	12	28.0	40.0	12.0	38.0	55.0	25.0
Didelphys	10	25.0	36.0	10.0	34.0	50.0	20.0
Arcuate	8	12.5	18.0	4.0	18.0	33.0	12.0
Overall	78	**21.8**	**28.2**	**8.9**	**27.6**	**46.7**	**18.0**

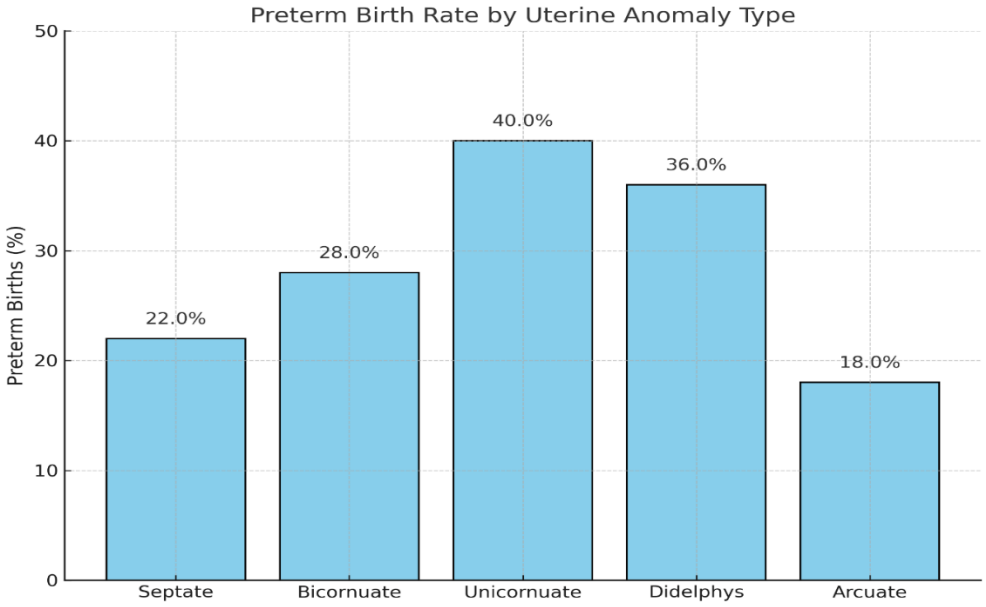

Figure 1: Preterm Birth Rate by Uterine Anomaly Type

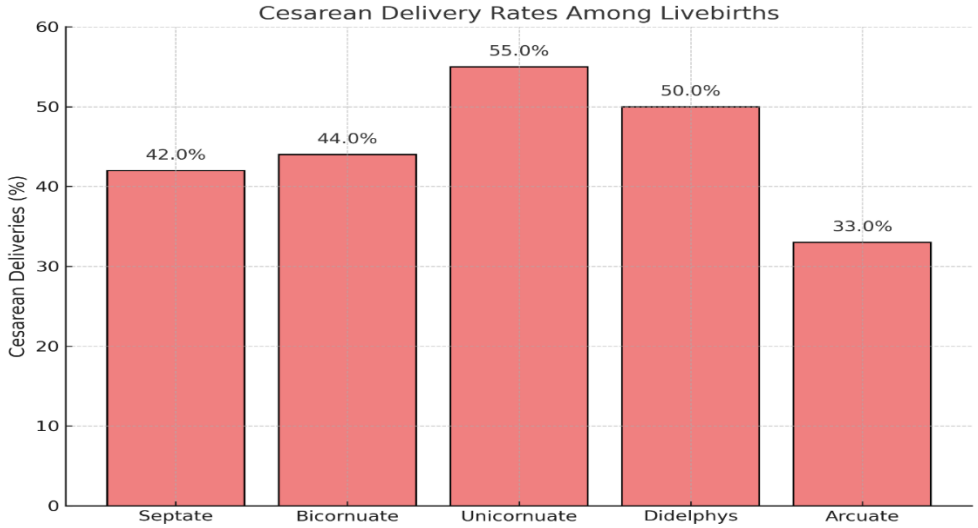

Figure 2: Cesarean delivery rates among livebirths.

Discussion

This study provides further evidence that pregnancies complicated by congenital uterine anomalies are associated with a greater likelihood of adverse outcomes than those in women with normal uterine morphology. Across seventy-eight cases, we observed elevated rates of miscarriage, preterm delivery, abnormal fetal presentation, and cesarean section. Although these complications were expected, the consistency with which they appeared, and the clear differences between anomaly subtypes, emphasize the clinical importance of recognizing and classifying these malformations early. The findings illustrate not only the burden of risk carried by affected women but also the degree of variability depending on the specific anomaly present.

Pregnancy loss was frequent, affecting roughly one in five women in the cohort. The highest proportion occurred in unicornuate and didelphys uteri, where the reduced cavity volume and asymmetric shape likely create an unfavorable environment for implantation and early placental development. These results resonate with the long-standing observation that women with restricted or irregularly shaped uteri are particularly vulnerable to first-trimester miscarriage. Septate uterus also contributed significantly, though many of these women had undergone corrective hysteroscopic procedures, which may explain the lower rates compared with earlier series in which surgery was not performed. What emerges is a nuanced picture: surgical correction can improve but does not

eliminate risk, and clinicians must continue to provide cautious counseling to women even after septoplasty.

Preterm birth represented the most consistent complication across anomaly types, and it was especially pronounced in unicornuate and didelphys uteri. More than a quarter of ongoing pregnancies ended before 37 weeks, with almost one in ten delivering very preterm. These outcomes are concerning because early delivery remains a leading cause of neonatal morbidity and mortality worldwide. The pathophysiological mechanisms are multifactorial. Limited space for fetal growth, abnormal uterine contractility, and associated cervical insufficiency each contribute to shortened gestation. That such high rates were observed in a relatively small series underlines the strength of this association. It also signals an urgent need for prospective evaluation of preventive measures in this population. At present, clinicians rely on cervical length monitoring, cerclage placement in select cases, and progesterone supplementation, but robust data specific to congenital anomalies are sparse.

Fetal malpresentation was another prominent feature, observed in over a quarter of live births. This is readily explained by distortion of the uterine cavity, which prevents the fetus from assuming a cephalic position near term. The clinical consequence was evident: nearly half of all deliveries were by cesarean section, a proportion considerably higher than background rates. While cesarean birth is often necessary to reduce risks associated with breech or transverse presentation, it also carries its own complications, including hemorrhage, infection, and consequences for future pregnancies. It is therefore important to recognize these risks during antenatal care and to prepare both the mother and the delivery team for a high probability of operative birth.

Neonatal outcomes reflected the maternal complications. Admissions to intensive care were required for nearly one in five infants, largely due to prematurity and associated respiratory or metabolic issues. Average birthweight among preterm deliveries was substantially below that of term infants, indicating growth restriction as an additional challenge. Stillbirth was rare but not absent, with both cases occurring in unicornuate uteri, further underscoring the vulnerability of this subgroup. These findings reinforce the value of close fetal monitoring, including serial growth assessment and Doppler studies, to detect compromised fetuses before decompensation occurs. Early involvement of neonatologists in perinatal planning is also essential, given the frequency with which intensive postnatal support is required.

One of the notable contributions of this work is the opportunity to compare outcomes across anomaly subtypes within the same population. The data make clear that not all malformations carry the same degree of risk. Septate uterus, especially when corrected, was associated with improved outcomes compared with unicornuate or didelphys uteri. Bicornuate uterus showed intermediate risk, primarily through increased malpresentation and preterm delivery, whereas arcuate uterus appeared to have the least impact, though still not equivalent to a normal uterine cavity. Such distinctions are clinically important. They allow for tailored counseling, where women are informed not only that they carry additional risk but also the approximate nature and magnitude of the risk associated with their specific anomaly.

The clinical implications are several. First, pre-pregnancy counseling should include discussion of the potential for miscarriage and preterm birth, with clear acknowledgment that risks vary by anomaly type. Second, early referral to high-risk obstetric services is warranted, particularly for unicornuate and didelphys anomalies, where complications are frequent and often severe. Third, antenatal surveillance should be individualized, incorporating cervical assessment, growth monitoring, and timely interventions where indicated. Fourth, delivery planning should take into account the high likelihood of operative birth, allowing for appropriate preparation and risk mitigation. Such an approach emphasizes that the presence of a congenital uterine anomaly does not inevitably lead to poor outcomes but does require a proactive and vigilant strategy.

At the same time, it is important to recognize the limitations of the present study. The data derive from a single center and a modest cohort size, which may restrict generalizability. Retrospective design introduces the possibility of incomplete information, and the absence of a contemporaneous control group prevents precise quantification of relative risk compared with women with normal uteri. Some subtypes were represented by small numbers, limiting the confidence with which conclusions can be drawn for those groups. Nevertheless, the consistency of findings with prior literature, and the detailed subtype-specific analysis, lend credibility to the observations and underscore their clinical relevance.

Future research should focus on multicenter collaborations to assemble larger cohorts, thereby allowing more precise estimates of risk, evaluation of rare complications, and meaningful adjustment for confounding factors. Interventional studies targeting this specific population are also needed. The role of cerclage, progesterone, and pessary use has not been rigorously tested in women with uterine anomalies, yet such interventions could potentially

reduce preterm birth and improve neonatal outcomes. Advances in imaging and classification systems should continue to be validated prospectively to ensure reproducibility across settings. Longitudinal studies following women across multiple pregnancies may also clarify whether risks change after prior surgical correction or after one successful term delivery.

In conclusion, the findings demonstrate that congenital uterine anomalies significantly compromise obstetric outcomes, though the severity and nature of complications vary according to anomaly type. Miscarriage, preterm birth, malpresentation, and cesarean delivery were all common, with unicornuate and didelphys uteri carrying the heaviest burden of risk. These results highlight the necessity of early identification, subtype-specific counseling, vigilant antenatal care, and multidisciplinary management. By adopting individualized strategies, clinicians can help optimize maternal and neonatal outcomes in this high-risk group.

Conclusion

The findings of this study underline that congenital uterine anomalies exert a measurable impact on pregnancy, reflected in higher rates of miscarriage, preterm birth, malpresentation, and operative delivery. Importantly, the degree of risk varied according to the anomaly subtype: women with unicornuate and didelphys uteri experienced the greatest challenges, bicornuate cases carried intermediate risk, and arcuate uteri tended to have more favorable outcomes, though not equivalent to normal uteri. Corrective procedures such as septoplasty improved outcomes but did not eliminate the predisposition to loss or obstetric complications. Adverse neonatal outcomes, including growth restriction, low birthweight, and increased need for intensive care, further emphasize the importance of vigilant monitoring throughout gestation. These results highlight the value of early recognition, accurate classification, and individualized care pathways. By integrating multidisciplinary input and tailoring surveillance to the anomaly type, clinicians can offer more precise counseling and optimize maternal and perinatal outcomes.

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