

Impact of Congenital Uterovaginal Anomalies on Maternal and Fetal Outcomes at a Tertiary Hospital in Punjab: A Prospective Observational Study

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Abstract

Background: Congenital uterovaginal anomalies result from abnormal formation, fusion, or resorption of the Müllerian ducts during embryogenesis. They may remain asymptomatic or present with abnormal uterine bleeding, dyspareunia, subfertility, recurrent pregnancy loss, preterm birth, or fetal malpresentation. This study evaluated maternal and fetal outcomes among pregnant women with congenital uterovaginal anomalies at a tertiary referral hospital.

Materials and methods: This single-center prospective observational comparative study was conducted in the Department of Obstetrics and Gynecology, Government Medical College and its associated tertiary-care hospital, Amritsar, Punjab, India, from April 1, 2022 to March 31, 2025. Consecutive total-enumeration sampling included all eligible singleton pregnancies with a previously diagnosed anomaly or an anomaly identified during the index pregnancy, delivery, or cesarean section. Multiple pregnancies were excluded. All 32 eligible women were included; therefore, no a priori sample-size calculation was performed. Maternal and fetal outcomes were summarized descriptively and compared with contemporaneous aggregate hospital data for pregnant women without a documented uterovaginal anomaly. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated, and categorical outcomes were assessed using Pearson's chi-square test or Fisher's exact test, as appropriate. A two-sided p-value <0.05 was considered statistically significant.

Results: Among 5,407 pregnancies/deliveries recorded during the study period, 32 women had a congenital uterovaginal anomaly (hospital-detected prevalence, 0.59%). Most participants (78.13%) were aged 21-35 years. Arcuate uterus was the most frequent anomaly (28.13%), followed by bicornuate and septate uteri (21.88% each). A history of subfertility was present in 40.63% of women, and 43.75% had experienced a previous preterm birth.

During the index pregnancy, three spontaneous abortions (9.38%) and two ectopic pregnancies (6.25%) occurred. Among the 27 pregnancies continuing beyond these early outcomes, 12 fetuses (44.44%) had a malpresentation, 15 births (55.56%) were preterm, and 19 neonates (70.37%) had a birth weight <2.5 kg. Aggregate hospital comparisons suggested higher odds of abortion, ectopic pregnancy, malpresentation, preterm birth, and low birth weight among women with anomalies; however, estimates were unadjusted and should be interpreted cautiously because the anomaly group was small and only aggregate comparator data were available.

Conclusion: Congenital uterovaginal anomalies should be considered in women with unexplained subfertility, recurrent pregnancy loss, recurrent preterm birth, or fetal malpresentation. Early recognition permits individualized counselling, targeted antenatal surveillance, and delivery planning. Because many anomalies in this cohort were detected only during cesarean delivery, careful documentation and postpartum counselling are essential to guide the management of future pregnancies.

Categories: Obstetrics/Gynecology

Keywords: ectopic pregnancy, fetal outcome, infertility, preterm births, uterovaginal anomalies

Introduction

Congenital uterine anomalies are malformations that develop during embryonic life. In females, the Müllerian ducts give rise to the fallopian tubes and uterus. The unfused cranial portions of the Müllerian ducts form the fallopian tubes, whereas their fused caudal portions contribute to the formation of the uterus and upper vagina. However, in case of uterine malformations, this development may be disturbed. Congenital uterovaginal anomalies occur from the abnormal formation, fusion, or resorption of Müllerian ducts during embryonic life [1].

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Uterovaginal malformations may remain asymptomatic or may present with abnormal uterine bleeding (AUB), dyspareunia, subfertility, and a poor obstetric history [2].

Congenital uterine anomalies in a woman can lead to various complications ranging from recurrent midtrimester abortions, rudimentary horn pregnancy, cervical incompetence to preterm labor, malpresentations, fetal growth restriction, and prolonged and obstructed labor [3-5]. It can also cause postpartum hemorrhage and retained placenta if the placenta is implanted over the septum, which can all cause a burden to the health care system. These can also be the cause of maternal death [6,7].

Hence, there is a need to study the prevalence and effects of uterovaginal anomalies for better management of mother and fetus.

Aim

To study the maternal and fetal outcomes of pregnant women with uterovaginal anomalies.

Primary Objective

To determine the hospital-based prevalence of congenital uterine anomalies among pregnant women attending a tertiary care center.

Secondary Objectives

The secondary objectives of the present study were as follows: (1) to describe the spectrum and distribution of congenital uterine anomalies identified during pregnancy; (2) to evaluate maternal, fetal, and neonatal outcomes among pregnant women with congenital uterine anomalies; and (3) to compare selected maternal and perinatal outcomes between pregnancies with and without documented congenital uterine anomalies.

Materials And Methods

Study design

This was a single-center prospective observational study with a contemporaneous institutional comparator.

Study setting

The study was conducted in the Department of Obstetrics and Gynecology, Government Medical College, Amritsar, Punjab, India.

Study duration

The study was conducted from April 1, 2022 to March 31, 2025.

Study population and sampling

Consecutive total-enumeration sampling was used. All pregnant women who attended or delivered at the study hospital during the study period were screened through antenatal records, imaging reports, delivery records, and operative notes. Every eligible woman with a congenital uterovaginal anomaly was enrolled prospectively; no eligible case was selectively sampled.

Inclusion Criteria

The following inclusion criteria were applied: (1) a singleton pregnancy; (2) a congenital uterovaginal anomaly diagnosed before conception or previously documented; (3) an anomaly newly identified by clinical examination or imaging during the index pregnancy; or (4) an anomaly identified during vaginal delivery, cesarean delivery, or another pregnancy-related operative procedure.

Exclusion Criteria

The following exclusion criteria were applied: (1) women with multiple gestations were excluded because multifetal pregnancy independently increases the risks of preterm birth, fetal growth restriction, low birth weight, and operative delivery; (2) women with acquired uterine abnormalities without a congenital anomaly and records lacking sufficient information to ascertain the primary outcomes were also excluded.

Comparator Population

The comparison data were obtained from contemporaneous aggregate institutional records for pregnant women without a documented uterovaginal anomaly during the same study period. Only the five outcomes

routinely available in the hospital register - abortion, ectopic pregnancy, malpresentation, preterm birth, and low birth weight - could be compared. Individual-level demographic or clinical characteristics were unavailable for this comparator; consequently, a separate baseline-characteristics table and adjusted analyses could not be produced.

Exposure Ascertainment and Classification

A uterovaginal anomaly was considered present when documented before pregnancy or identified during the index pregnancy by imaging, examination, or direct operative visualization. Anomalies were categorized as arcuate, unicornuate, bicornuate, didelphys, or septate uterus according to the diagnosis recorded by the treating team. American Society of Reproductive Medicine (ASRM) 2021 Classification was used in the present study [8].

Data Collection and Follow-up

Maternal age, parity, timing and mode of diagnosis, anomaly subtype, previous obstetric history, gestational age at outcome, fetal presentation, delivery mode, maternal complications, birth weight, live birth, stillbirth, neonatal death, and neonatal intensive care unit (NICU) admission were recorded on a structured case-record form. Participants were followed from enrollment or diagnosis until maternal discharge and neonatal discharge or death, whichever occurred first.

Outcome Definitions

Spontaneous abortion was defined as non-induced pregnancy loss before the institutional threshold of viability. Ectopic pregnancy included implantation outside the normal uterine cavity, including pregnancy in a rudimentary horn. Preterm birth was delivery before 37 completed weeks; gestational-age categories were 28-<34 weeks, 34-<37 weeks, and ≥37 weeks. Preterm prelabor rupture of membranes (PPROM) was defined as rupture of the fetal membranes before 37 weeks of gestation and before the onset of labor. Low birth weight was defined as a birth weight of less than 2,500 g, irrespective of gestational age. Fetal growth restriction was based on the contemporaneous clinical diagnosis recorded by the treating team. Stillbirth, neonatal death, and NICU admission were recorded from delivery and neonatal records.

Maternal outcomes: Spontaneous abortion, ectopic pregnancy (including rudimentary-horn pregnancy), preterm labor or PPRM, malpresentation, fetal growth restriction, fetal distress, labor abnormalities, retained placenta, uterine rupture, and operative interventions (cesarean delivery, instrumental delivery, laparotomy, cervical cerclage, manual removal of the placenta, and cesarean hysterectomy).

Fetal and neonatal outcomes: Live birth, stillbirth, neonatal death, preterm birth, birth-weight category, and NICU admission.

Potential Confounders

Maternal age, parity, previous pregnancy loss, previous preterm birth, subfertility, referral status, antenatal booking status, previous cesarean delivery, and anomaly subtype were considered potential confounders because they could influence both case detection and pregnancy outcome. Individual-level covariates were not available for the aggregate comparator, and only 32 anomaly cases were observed; therefore, multivariable adjustment was not performed. All reported ORs are unadjusted.

Sample-Size Considerations

No a priori sample-size calculation was performed because the study used total-enumeration sampling for a rare exposure. All 32 eligible cases detected among 5,407 pregnancies/deliveries during the fixed three-year study period were included. The small exposed sample limited precision and the number of covariates that could be analyzed; 95% CIs are therefore presented with effect estimates.

Statistical analysis

Categorical variables were summarized as frequencies and percentages. Hospital-detected prevalence was calculated as the number of identified anomaly cases divided by the total number of pregnancies/deliveries recorded during the study period. For selected binary outcomes, unadjusted ORs with 95% CIs compared women with anomalies with the contemporaneous hospital comparator. Pearson's chi-square test was used when expected cell counts were adequate; Fisher's exact test was used when any expected count was <5. Tests were two-sided, and $p < 0.05$ was considered statistically significant. No imputation was performed for missing data.

Ethical approval

The study was conducted in accordance with the Declaration of Helsinki. Ethical permission was taken from

the Institutional Ethics Committee, Government Medical College, Amritsar, vide approval no. GMC/IEC/22/JK/64, dated March 19, 2022, before the commencement of the study.

Results

A total of 32 women with congenital uterovaginal anomalies were identified among 5,407 deliveries recorded during the three-year study period, corresponding to a hospital-detected prevalence of 0.59%. The majority (25, 78.13%) of the patients in our study belonged to the age group 21-35. Only two patients (6.25%) were older than 35 years (Table 1).

Age	No	%
< or = 20	5	15.63
21-35	25	78.13
> or = 35	2	6.25

TABLE 1: Age distribution of the 32 pregnant women with congenital uterovaginal anomalies; values are presented as number and percentage of the anomaly cohort.

The majority of patients with Müllerian abnormalities in the present study were either primipara (13, 40.63%) or nullipara (12, 37.5%). Only one patient (3.13%) in the present study was para 3. This is an important observation concerning the adverse obstetrical effects of Müllerian abnormalities (Table 2).

Parity	No	%
Nullipara	12	37.5
Para 1	13	40.63
Para 2	6	18.75
Para 3	1	3.13
>or=Para 4	0	0

TABLE 2: Parity distribution of the 32 pregnant women with congenital uterovaginal anomalies; values are presented as number and percentage.

Only seven patients (21.88%) were aware of their anomaly, whereas Müllerian anomaly was diagnosed in the current pregnancy in 25 patients (78.13%). Among 25 patients in whom the uterovaginal anomaly was diagnosed in the current pregnancy, 11 patients (34.37%) had prev 1 or more lower-segment cesarean sections (LSCS) but still were not aware of their uterovaginal anomaly. If a uterovaginal anomaly was diagnosed intraoperatively, the patient was informed and counselled regarding its impact on future obstetrical outcome (Table 3).

Category	Patients (n)	Percentage (%)
Diagnosed pre-pregnancy	7	21.88
Diagnosed in current pregnancy	25	78.13

TABLE 3: Timing of the diagnosis of congenital uterovaginal anomalies, showing diagnoses established before pregnancy and those first recognized during the index pregnancy.

In the majority (28, 87.5%) of patients, Müllerian anomaly was diagnosed intraoperatively during LSCS, whereas anomaly was diagnosed by imaging (USG or MRI) or examination in only four (12.5%) patients. If

uterovaginal anomaly is diagnosed intraoperatively, the patient should be informed and counselled regarding its impact on future obstetrical outcome. In our study, we found 11 patients who had prev 1 or more LSCS but were still not aware of their anomaly (Table 4).

Category	Patients (n)	Percentage (%)
Diagnosed by imaging/exam	4	12.5
Diagnosed intraoperatively	28	87.5

TABLE 4: Diagnostic route for congenital uterovaginal anomalies, categorized as imaging/clinical examination or intraoperative recognition.

Arcuate uterus (28.13%) was the most common type of Müllerian abnormality detected, followed by septate uterus (21.88%) and bicornuate uterus (21.88%). Didelphys uterus (9.38%) was the least common Müllerian abnormality detected in our study (Table 5, Figures 1-3).

S. No.	Anomaly	No of patients	%
1	Arcuate	9	28.13
2	Unicornuate	6	18.75
3	Bicornuate	7	21.88
4	Didelphys	3	9.38
5	Septate	7	21.88

TABLE 5: Distribution of congenital uterovaginal anomaly subtypes among the 32 enrolled women; percentages use the full anomaly cohort as the denominator.



FIGURE 1: Intraoperative photograph of a unicornuate uterus demonstrating an asymmetric uterine body with a single developed uterine horn.



FIGURE 2: Intraoperative photograph of a bicornuate uterus showing two distinct uterine horns separated by a deep external fundal cleft.



FIGURE 3: Intraoperative photograph showing the external uterine morphology in a patient diagnosed with a septate uterus.

As high as 13 (40.63%) patients reported subfertility. Among seven patients (21.88%) who had a history of previous abortions, three patients (9.38%) had a history of two or more abortions. Another significant finding was that among 14 patients (43.75%) who had a history of previous preterm births, four patients (12.5%) had a history of two or more preterm births (Table 6).

Previous history	Patients (n)	Percentage (%)
Subfertility	13	40.63
Previous abortion, any	7	21.88
Previous one abortion	4	12.50
Previous two or more abortions	3	9.38
Previous preterm birth, any	14	43.75
Previous one preterm birth	10	31.25
Previous two or more preterm births	4	12.50

TABLE 6: Previous reproductive and obstetric outcomes among the 32 women with congenital uterovaginal anomalies; categories are descriptive and may overlap.

In the current pregnancy, two patients with a bicornuate uterus and one patient with uterus didelphys experienced spontaneous abortion; two additional women had ectopic pregnancies. So, in our study, out of 32 patients, three patients (9.38%) had abortions, and two patients (6.25%) had ectopic pregnancy in the current pregnancy (Table 7).

Anomaly	Patients (n)	Abortion	Ectopic
Arcuate	9	0	0
Unicornuate	6	0	0
Bicornuate	7	2	0
Didelphys	3	1	1
Septate	7	0	1
Total	32	3	2

TABLE 7: Early outcomes of the index pregnancy by uterine anomaly subtype, including spontaneous abortion and ectopic pregnancy.

These five early pregnancy outcomes were excluded only from analyses requiring an ongoing pregnancy or delivery outcome, including presentation, gestational age at birth, delivery mode and birth weight, and other obstetric complications like PPRM, fetal distress, oligohydramnios, intrauterine growth restriction, stillbirth and retained placenta.

Accordingly, the denominator for subsequent delivery-related analyses was 27.

Among the 27 pregnancies that continued till delivery, 12 fetuses (44.45%) had a malpresentation. Malpresentation occurred across anomaly subtypes and was particularly frequent in unicornuate and septate uterus; it was also observed in four out of nine patients with an arcuate uterus (Table 8).

Anomaly	Patients (n)	Cephalic	Breech	Transverse
Arcuate	9	5	4	0
Unicornuate	6	3	3	0
Bicornuate	5	4	1	0
Didelphys	1	1	0	0
Septate	6	2	2	2
Total	27	15	10	2

TABLE 8: Fetal presentation by congenital uterovaginal anomaly subtype among the 27 pregnancies continuing beyond abortion or ectopic pregnancy.

The three abortions and two ectopic pregnancies were excluded from analyses of gestational age at birth, fetal growth restriction, and birth weight. Among the 27 births, 15 patients (55.55%) had preterm births before 37 completed weeks (Table 9).

Anomaly	Patients (n)	28-34 week	34-37 week	>or=37 week
Arcuate	9	0	2	7
Unicornuate	6	1	4	1
Bicornuate	5	1	3	1
Didelphys	1	0	1	0
Septate	6	0	3	3
Total	27	2	13	12

TABLE 9: Gestational age at birth by congenital uterovaginal anomaly subtype among 27 births; preterm birth was defined as delivery before 37 completed weeks.

All 27 women who progressed to delivery underwent cesarean delivery. This finding should not be interpreted as the population cesarean rate for uterine anomalies because mild anomalies may be less likely to be diagnosed among women delivering vaginally, creating detection bias.

One referred patient underwent emergency LSCS in the second stage. She had a history of some perineal surgery in childhood for anal reconstruction. Intraoperatively, a unicornuate uterus was found. Lateral and downward deep extension of the uterine incision occurred, and cesarean hysterectomy was done (Table 10).

Anomaly	Patients (n)	NVD	LSCS
Arcuate	9	0	9
Unicornuate	6	0	6
Bicornuate	5	0	5
Didelphys	1	0	1
Septate	6	0	6

TABLE 10: Mode of delivery by congenital uterovaginal anomaly subtype among 27 patients one unicornuate case included cesarean hysterectomy.

NVD, normal vaginal delivery; LSCS, lower-segment cesarean section.

Among the 27 patients in whom pregnancy continued till delivery, fetal growth restriction was recorded in 10 patients (37.04%), fetal distress in six patients (22.22%), and PPROM was found in three patients (11.11%). One patient (3.70%) had a retained placenta, for which manual removal of the placenta was done (Table 11).

Anomaly	Patients (n)	IUGR	Fetal distress	Stillbirth	PPROM	Oligohydramnios or hydramnios	Retained placenta
Arcuate	9	3	2	0	1	2	0
Unicornuate	6	3	2	0	0	1	1
Bicornuate	5	3	2	0	2	2	0
Didelphys	1	0	0	0	0	0	0
Septate	6	1	0	0	0	0	0
Total	27	10	6	0	3	5	1

TABLE 11: Maternal and fetal complications by congenital uterovaginal anomaly subtype among 27 ongoing pregnancies; categories may overlap within an individual pregnancy.

IUGR, intrauterine growth restriction; PPROM, preterm prelabor rupture of membranes.

Among the neonates delivered in 27 patients with uterovaginal anomalies, 19 (70.37%) neonates were low birth weight (birth weight <2.5 kg) and eight neonates (29.63%) weighed <2.0 kg (Table 12).

Anomaly	Patients (n)	1.5-2 kg	>2-2.5 kg	>2.5-3 kg	>or=3 kg
Arcuate	9	2	3	3	1
Unicornuate	6	2	3	1	0
Bicornuate	5	2	2	1	0
Didelphys	1	1	0	0	0
Septate	6	1	3	2	0
Total	27	8	11	7	1

TABLE 12: Birth-weight distribution by congenital uterovaginal anomaly subtype among 27 neonates; values are numbers within prespecified weight categories.

Discussion

During the three-year study period, 32 congenital uterovaginal anomalies were identified among 5,407 deliveries, yielding a hospital-detected prevalence of 0.59%. This estimate reflects anomalies recognized in clinical practice rather than prevalence established by systematic screening. A meta-analysis using optimal diagnostic tests reported congenital uterine anomalies in approximately 5.5% of unselected women and substantially higher prevalence among women with infertility or recurrent miscarriage, demonstrating how strongly prevalence depends on the population and diagnostic method [9].

The comparator consisted of contemporaneous aggregate institutional records (Table 13) because the hospital register contained outcome totals but not patient-level demographic or clinical variables. The tertiary referral setting also included a high proportion of high-risk pregnancies, which may explain the comparatively high institutional rates of preterm birth and low birth weight. National Family Health Survey-5 analyses reported a low-birth-weight prevalence of 18.24% in India, with substantial geographic variation [6]. Selected outcomes were more frequent in the anomaly cohort than in the aggregate hospital comparator. The comparisons are unadjusted and should be interpreted as exploratory because individual-level comparator characteristics were unavailable and outcome-specific denominators differed after early pregnancy loss.

Outcome	General population (%)	Anomalies (n)	Anomalies denominator (n)	Anomalies (%)	Odds ratio	P value
Abortions	2.8	3	32	9.38	3.58	P = 0.0371
Ectopic	1.02	2	32	6.25	6.45	P = 0.0121
Malpresentation	5.72	12	27	44.44	13.21	P < 0.001
Preterm birth	35.43	15	27	55.55	2.28	P = 0.042
Low birth weight	29.42	19	27	70.37	5.70	P < 0.001

TABLE 13: Unadjusted comparison of selected adverse pregnancy outcomes between women with congenital uterovaginal anomalies and the contemporaneous aggregate hospital comparator.

ORs are presented with 95% CIs and two-sided p-values.

For comparing the early pregnancy outcomes like abortion and ectopic pregnancy, the denominator for the study group was taken as 32, but for all other late pregnancy or delivery-related outcomes, the denominator in the study group was taken as 27 after excluding the five patients with early pregnancy losses.

Malpresentations were 44.45 % in pregnant patients with anomalies compared to 5.72% in the general population without any known anomaly.

In our study, 55.55% (15/27) patients had preterm birth and 70.37% (19/27) patients had low birth weight, whereas we observed 35.43% preterm birth and 29.42% low birth weight (LBW) in the general pregnant population (without any documented uterovaginal anomalies) in our hospital during the study period.

Arcuate uterus was the most frequent anomaly in this cohort (28.13%), followed by bicornuate and septate uteri (21.88% each); uterus didelphys was least frequent (9.38%). The distribution of subtypes varies across studies because diagnostic criteria and referral patterns differ.

Liston & Gomathy reported 32 women with congenital uterine anomalies; bicornuate uterus was most frequent (43.8%), followed by arcuate uterus (25.0%) [3].

Raj & Chavan studied 30 pregnancies and found septate uterus (36.6%) to be most frequent, followed by arcuate uterus (23.3%), uterus didelphys (20.0%), and unicornuate uterus (13.3%) [7].

Jena et al. reported bicornuate uterus as the most common anomaly (45.2%), followed by arcuate uterus (19.3%), among 62 affected pregnancies [5].

Most women in the present study were aged 21-35 years, and only two (6.25%) were older than 35 years. Age at detection likely reflects the reproductive-age population attending the hospital rather than an age-dependent etiology.

This age distribution was broadly comparable to Raj & Chavan, in whose study 53.3% of participants were

aged 20–30 years [7], and to Liston & Gomathy, who reported that most participants were aged 20–25 years [3].

In this cohort, 37.50% of women were nulliparous, and 40.63% were para 1. The predominance of low parity is clinically plausible because congenital uterine anomalies are overrepresented among women with infertility and pregnancy loss; however, the lack of patient-level comparator data prevents causal interpretation.

Subfertility was reported by 40.63% of women, previous abortion by 21.88%, and previous preterm birth by 43.75%. These findings agree with systematic-review evidence linking congenital uterine anomalies to impaired reproductive performance, miscarriage, preterm birth, and malpresentation [9,10].

All 27 women who progressed to delivery underwent cesarean delivery. This very high rate likely reflects referral and ascertainment bias because 87.5% of anomalies were recognized intraoperatively, and women with mild anomalies who delivered vaginally may have remained undiagnosed. In a large cohort of 457 women with Müllerian anomalies, Wang et al. reported a cesarean rate of 77.2%, while malpresentation, PPROM, and preterm delivery were also significantly more frequent than in controls [1].

The 44.45% malpresentation rate among ongoing pregnancies is consistent with the strong association reported in prior cohorts. Hua et al. found markedly increased odds of breech presentation and preterm birth among women with uterine anomalies, even after adjustment for measured covariates [11]. A 2022 systematic review similarly estimated pooled risks of approximately 40% for fetal malpresentation and 25% for preterm birth, although risks varied substantially by anomaly subtype [12].

Low birth weight affected 70.37% of neonates in the present cohort, whereas Wang et al. reported a much lower absolute low-birth-weight rate but a statistically significant excess compared with controls [1]. The difference may reflect the small sample, tertiary referral case mix, local definitions, and the unusually high proportion of preterm births in this cohort. Because gestational age and growth restriction both influence birth weight, future studies should distinguish constitutionally small neonates, small-for-gestational-age neonates, and fetal growth restriction using standardized criteria (Table 14).

Study	Patients (n)	Study duration	Prevalence	Age	Most common anomaly	Preterm (%)	Low birth weight (%)	Malpresentation (%)
Liston & Gomathy (2017) [3]	32	2.5 years	0.4%	20–25 years	Bicornuate uterus	18.8%	31.25%	50%
Rao et al. (2017) [4]	21	7 yrs	0.3 per 1000 pregnant women	Not reported	Septate uterus and arcuate uterus	42.85%	Not reported	57.1%
Jena et al. (2021) [5]	62	2 yrs	Not reported	Mean age 27.2 years	Bicornuate uterus	40.3%	Not reported	61.3%
Wang et al. (2023) [1]	457	12 years	0.4 %	Mean age 29.82	Septate uterus	27.4%	3.1%	34.4%
Raj & Chavan [7]	30	Not reported	Not reported	20–30 years	Septate uterus	20%	Not reported	36.6%
Our study	32	3 years	0.59%	21–35 years	Arcuate followed by bicornuate and septate	55.55%	70.37%	44.44%

TABLE 14: Comparison of the present cohort with published studies of congenital uterovaginal anomalies, including sample size, study duration, prevalence, common subtype, preterm birth/low birth weight, and malpresentation.

Yadav et al., Onyambu et al., and Ameen et al., in their studies observed that there was a significant association between newborns with congenital anomalies and maternal age above 30 years, patients with medical disorders, past history of abortion/still birth, and past history of congenital malformation [13–15].

The principal strengths of this study were prospective case identification over a defined three-year period and detailed description of anomaly subtypes and obstetric outcomes. Important limitations include the single-center design, small exposed cohort, reliance on aggregate comparator data, absence of systematic

three-dimensional ultrasonography or magnetic resonance imaging for all participants, possible misclassification of anomaly subtype, and strong detection bias because most anomalies were identified during cesarean delivery. The estimates were unadjusted for maternal age, parity, previous obstetric history, referral status, and other confounders; they should therefore be interpreted as exploratory associations rather than causal effects.

Conclusions

This study offers valuable insights into the prevalence and range of congenital anomalies detected during antenatal care or shortly after birth. In this tertiary-care cohort, congenital uterovaginal anomalies were linked to considerable reproductive and obstetric morbidity, including subfertility, previous pregnancy loss, preterm delivery, fetal malpresentation, low birth weight, and operative delivery. Because antenatal imaging did not detect every anomaly, clinicians should remain alert to the possibility of an underlying uterovaginal abnormality, particularly in women with recurrent adverse pregnancy outcomes or fetal malpresentation. Any anomaly identified during delivery should also be carefully documented.

Prompt diagnosis can facilitate individualized counselling, enhanced antenatal monitoring, and appropriate planning for future pregnancies. Early recognition and suitable counselling may support informed clinical decision-making, improve perinatal outcomes, and potentially reduce the substantial psychological and financial burden experienced by affected families, including catastrophic out-of-pocket expenditure. Further multicenter studies incorporating standardized classification systems, systematically screened comparison groups, and multivariable adjustment are necessary to determine subtype-specific risks with greater precision.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Jagdeep Kaur, Suparna Grover, Deepika .

Acquisition, analysis, or interpretation of data: Jagdeep Kaur, Suparna Grover, Deepika .

Drafting of the manuscript: Jagdeep Kaur, Suparna Grover, Deepika .

Critical review of the manuscript for important intellectual content: Jagdeep Kaur, Suparna Grover, Deepika .

Supervision: Jagdeep Kaur, Suparna Grover

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Institutional Ethics Committee, Government Medical College, Amritsar issued approval GMC/IEC/22/JK/64, dated March 19, 2022. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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