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An observational study of effect of mullerian anomalies on pregnancy

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Abstract
Context: Although uterine anomalies are the most typical kind of mullerian abnormality, it is challenging to determine the disorder's real prevalence [2]. The most typical kind of mullerian anomaly is uterine abnormality. On an average, they have a three to four percent prevalence rate. Congenital mullerian anomalies refer to a variety of uterine malformations brought on by improper embryologic canalization of the mullerian ducts and fusion to create a normal uterine cavity. These flaws are inherited and incurable from birth.
Aims and Objective
- The objectives of this research are to characterize the uterine congenital defects, their severity, and the effects of each on pregnancy.
- This study aims to assess several pregnancy-related outcomes, including malpresentation, premature birth, a greater risk of cesarean section, and abortions in uterine abnormalities.
- To study the mode of delivery in women with mullerian anomalies.

Material and Method: Following receipt of approval from the Institutional Ethics Committee, an observational study was carried out at the Obstetrics and Gynecology Department of Dhiraj Hospital.
Antenatal patients at Dhiraj hospital who had a singleton pregnancy with a history of mullerian malformations, or those who had an accidental diagnosis of mullerian abnormalities by ultrasound or caesarean birth, participated in this study.
Study period: October 2022- April 2023
Study design: Observational study
Sample size: 10
Result: The most common indication for a caesarean section was malpresentation, seen in 8 out 10 cases (66.7%). 30% of the patients were primigravida and around 50% belonged to 2nd and 3rd gravida. Bad pregnancy outcomes were seen in unicornuate and bicornuate uterus with history of 2 and >2 spontaneous abortions respectively in the past. All women with an Arcuate uterus had delivered a fetus at full term in this study. However preterm delivery <34 weeks was seen with unicornuate and didelphys uterus.
Discussion and Conclusion: On a frequent basis, obstetricians are confronted with a fascinating clinical problem that is known as congenital Mullerian deformities. It has been said that the prevalence of this condition varies from 2% to 4% among women of reproductive age; however, the prevalence of this condition can reach anywhere from 5% to 25% among women who have had poor reproductive results. Patients who have uterine abnormalities have a considerably increased risk for a broad variety of poor pregnancy outcomes, such as preterm birth, malpresentation, and cesarean delivery. This risk is much higher for patients who have uterine abnormalities than for patients who do not have uterine abnormalities.

Keywords: Mullerian anomalies, preterm, pregnancy outcome, malpresentation

Introduction
Although uterine abnormalities are the most frequent type of mullerian anomaly, it might be difficult to determine how frequently they occur. They affect 3-4% of the general population, 2-4% of women who are reproductive age, and up to 5-25% of women who have had unsuccessful pregnancies [1, 2]. They are widespread among the populace.
A spectrum of uterine abnormalities known as congenital mullerian anomalies are identified by an incorrect embryologic fusion and canalization of the mullerian ducts to create a normal uterine cavity.
The American Fertility Society developed a method in 1988 [3] for categorizing uterine abnormalities. (Fig 1).

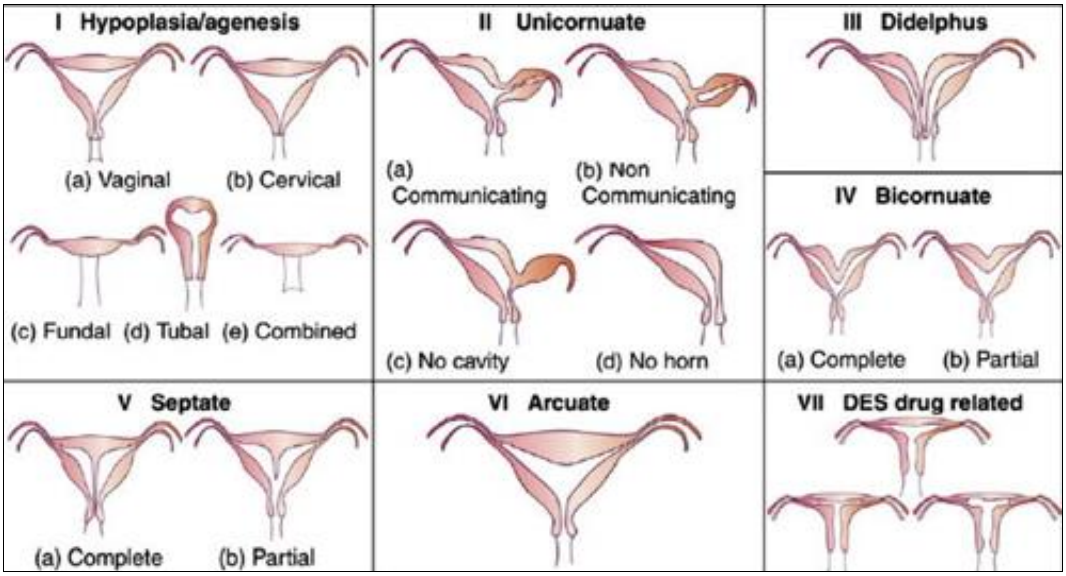


Fig 1: Sexual differentiation: normal and abnormal

Development of the female reproductive system (Figure 2)

1. Agenesis of both ducts, which can occur locally or over the full length of the ducts.
2. Development of just one side of the Mullerian duct to full maturity, whereas the other side of the duct undergoes incomplete or no development at all.
3. Either an inability to successfully fuse the ducts in the midline or their complete absence.
4. Incomplete or inappropriate canalization.

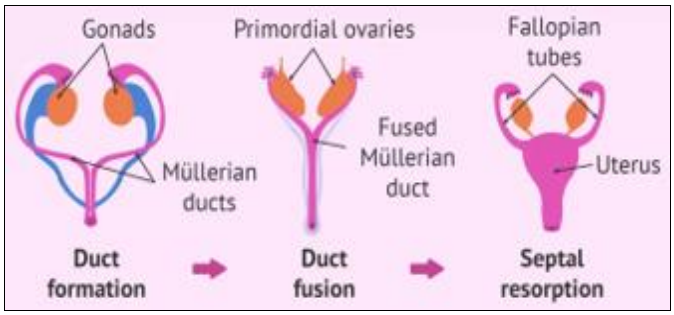


Fig 2: Development of the female reproductive system

Uterine congenital abnormalities have been linked in some people to infertility, repeated miscarriages, preterm birth, and other obstetric problems that increase the risk of perinatal morbidity and mortality (Green and Harris, 1976; Heinonen *et al*., 1982; Golan *et al*., 1989). An elevated risk of prenatal morbidity and death is linked to these disorders. On the other hand, some people may have uterine anomalies that don't manifest any symptoms (Simo'n *et al*., 1991) [5, 6, 7].

Renal abnormalities are typically found in conjunction with uterine abnormalities because of the intimate embryologic relationship between the development of the urinary and reproductive organs. This is due to the fact that during embryogenesis, the development of the urinary and reproductive systems proceeds concurrently [8, 9].

Preterm labor, fetal growth restriction, prolonged labor, obstructed labor, increased cesarean delivery, retained placenta, and preeclampsia are among the obstetric complications linked to mullerian anomalies. Mid-trimester abortion, which may be caused by recurrent rudimentary horn pregnancy, cervical incompetence, and an increased incidence of malpresentation are other complications. Fetal growth limitation is another obstetric problem linked to mullerian abnormalities. Two other problems are retained placenta and placenta previa (commonly known as PPH).

Reduced cavity size, insufficient muscle, a restricted ability to expand, poor myometrial and cervical function, insufficient vascularity, and abnormal endometrial development are all characteristics of uterine abnormalities. The most frequent type of birth abnormality affecting women is uterine malformation. Another symptom that may be related to uterine abnormalities is a decreased ability to extend the uterus cavity [10]. As a result of these structural restrictions, Mullerian anomalies in pregnancy frequently lead to adverse pregnancy outcomes.

Aims and Objective

- The objectives of this study are to characterize the uterine congenital abnormalities, their severity, and the effects of each on pregnancy.
- This study aims to assess several pregnancy-related outcomes, including malpresentation, premature birth, a greater risk of cesarean section, and miscarriage in uterine abnormalities, among others.
- To study the mode of delivery in women with mullerian anomalies.

Materials and Methods

Following receipt of approval from the Institutional Ethics Committee, an observational study was carried out at the Obstetrics and Gynecology Department of Dhiraj Hospital.

Antenatal patients at Dhiraj hospital who had a singleton pregnancy with a history of mullerian malformations, or those who had an accidental diagnosis of mullerian abnormalities by ultrasound or caesarean birth, participated in the study as participants. Study period: October 2022- April 2023

Study design: Observational study

Sample size: 10

Inclusion Criteria

- Patients with a previously known uterine abnormality;
- Patients with an accidentally discovered uterine anomaly during a caesarean section.
- Diagnosed cases of uterine anomaly during the evaluation

of obstetric history and infertility work up.
- Cases of uterine anomalies that were identified by coincidence during the patient's prenatal checkup.

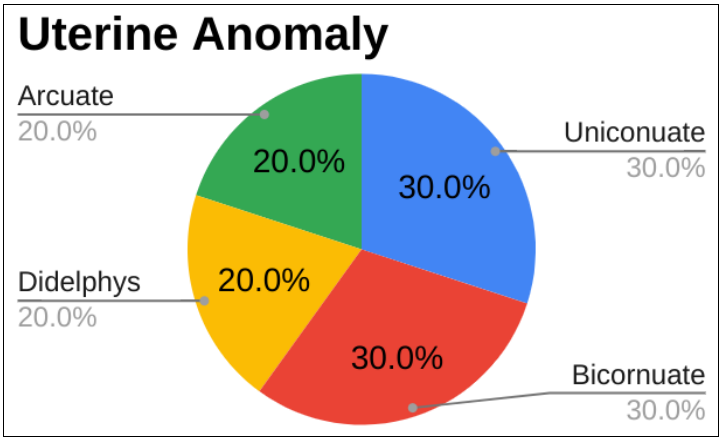
Exclusion Criteria
- Patients who were offered the opportunity to take part in the study experiment but were unwilling for the same.
- Patients with infertility who have been diagnosed with Mullerian abnormalities but have not yet conceived.
- Patients who have major comorbidities, such as severe preeclampsia, uncontrolled hypertension, gestational diabetes, maternal cardiovascular disease, hyperthyroidism, or hypothyroidism.
- Additional risk factors associated with pregnancy including PIH, gestational diabetes mellitus, APH
- Patients who have already undergone surgical repair prior to pregnancy.
- Patients with multiple gestation
- Pregnancy <28 weeks of gestation
- Pregnancy with intrauterine fetal death.

Methodology: Between October 2022 and April 2023, an observational study was conducted at Dhiraj Hospital lasting for 6 months after obtaining authorization from the Institutional Ethics Committee. The patient's menstrual and obstetric details, as well as their prenatal care history and the total number of visits, were gathered in order to create a thorough antenatal history. It was determined for every patient whether they had a previous history of infertility (including either primary or secondary infertility), and it was also determined for each and every patient whether they had received any sort of testing or therapy for infertility. Each patient underwent routine general and systemic examinations.
Every single delivery note and termination procedure that was performed was carefully documented in this medical file.
Patients were observed closely for the onset of any obstetric difficulties, including but not limited to: miscarriage; preterm delivery; fetal growth restriction, malpresentation; the need for a cesarean section; preeclampsia; retained placenta; and the need for a blood transfusion. The neonatal outcome is examined for birth weight, Apgar score, or other abnormalities.
A variety of standard medical procedures, including blood tests and prenatal ultrasound scans, were executed during the pregnancy.

Results: The total number of women who were found to have uterine abnormalities over the course of the investigation was ten. There are two examples with an arcuate uterus, three cases of bicornuate uterus, two cases of didelphys uterus, and three cases of unicornuate uterus in this study. (Table 1).

Table 1: Distribution of cases

Uterine Anomaly	No of cases
Unicornuate	3
Bicornuate	3
Didelphys	2
Arcuate	2
	Total 10

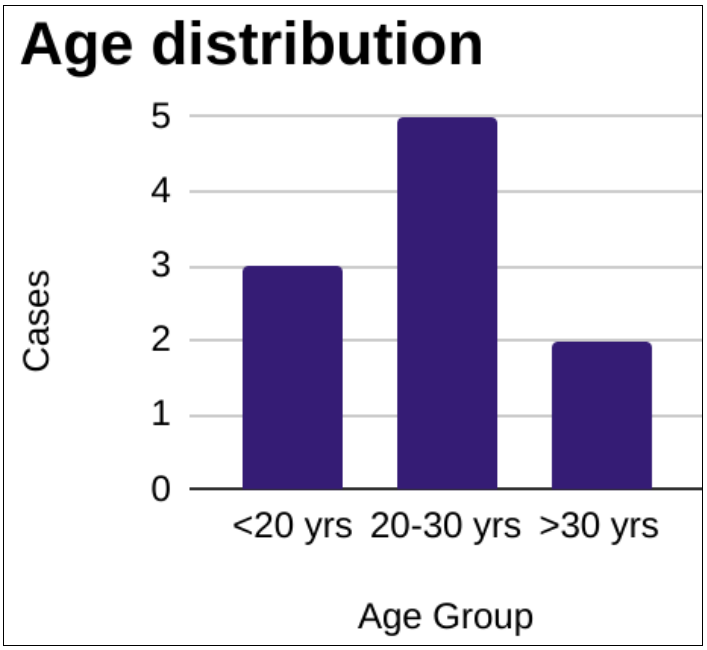


Graph 1: The graphical distribution of the cases according to the anomaly present.

Table 2: Age distribution

Age Group	Cases
<20 yrs.	3
20-30 yrs.	5
>30 yrs.	2

The majority of women in India who get pregnant are between the ages of 20 and 30, primarily as a result of early marriage and pregnancy.

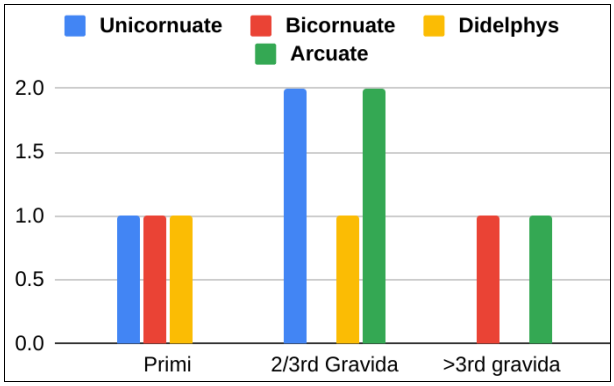


Graph 2: Distribution of cases as per age group of the patient

Table 3: Distribution based on Parity

	Unicornuate	Bicornuate	Didelphys	Arcuate	Total	%
Primi	1	1	1	-	3	30%
2/3rd Gravida	2	-	1	2	5	50%
>3rd gravida	-	1	-	1	2	20%

30% of the instances were considered to be primigravida, 50% of the cases were either 2nd or 3rd gravida, and the remaining 20% of the cases were considered to be beyond 3rd gravida.



Graph 3: Distribution of cases according to the Gravid status.

Table 4: History of spontaneous abortion in the past (n=4 cases)

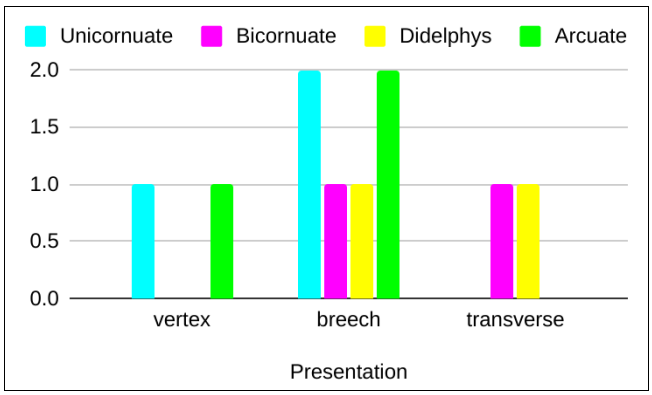
No. of Abortions	Unicornuate	Bicornuate	Didelphys	Arcuate
1 Abortion	-	-	1	1
2 Abortions	1	-	-	-
>2 Abortions	-	1	-	-

The crucial discovery in this particular series is the observation that a high number of pregnancies terminate in the first trimester. Uterine malformations were once thought to be related to preterm births and late miscarriages (Green and Harris, 1976; Heinonen *et al*., 1982; Golan *et al*., 1989) [5, 6, 7]. It was demonstrated that women with unicornuate and bicornuate uterus had bad obstetric history of two and more than two more spontaneous abortions in the past respectively.

Table 5: Distribution of cases based on presenting part

Presentation	Unicornuate	Bicornuate	Didelphys	Arcuate
vertex	1	-	-	1
breech	2	1	1	2
transverse	-	1	1	-

It was discovered that arcuate, bicornuate, unicornuate and didelphys uterus had malpresentation.

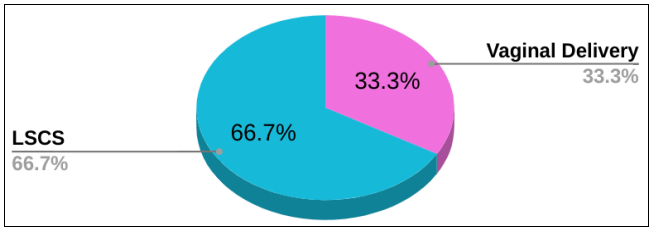


Graph 4: Graphical depiction of the varying presentations with each anomaly.

Table 6: Mode of delivery

	Unicornuate	Bicornuate	Didelphys	Arcuate
Vaginal Delivery	1	-	1	-
LSCS	2	2	1	3

Malpresentation was the most prevalent cause of caesarean section, accounting for 66.7% of all cases. Only two of the eight LSCS procedures were carried out voluntarily in patients with identified Mullerian abnormalities who had IVF conception. Only two out of the total 10 instances (33.3%) involved normal vaginal delivery. Other reasons for having a cesarean section included fetal distress and second stage arrest.



Graph 5: Distribution of cases according to the mode of termination.

Table 7: Gestational Age

Gestational age	Unicornuate	Bicornuate	Didelphys	Arcuate
28-34 weeks	1	-	1	-
34-37 weeks	1	1	1	-
>37 weeks	1	1	-	3

A loss in muscle mass, in particular in a uterus that is unicornuate, plays a substantial part in the process that leads to preterm delivery, according to the scientists who established a correlation between uterine anomalies and premature birth. These authors demonstrated that there is a connection between the two [11]. One instance of preterm birth in this study happened before 34 weeks of gestation, whereas the second case was between 34 and 37 weeks of pregnancy, both involving unicornuate uterus.

There was one case of didelphys uterus involving multigravida with preterm labour <34 weeks with normal vaginal delivery. The other was a primigravida with 36 weeks of gestation with in -vitro fertilization (IVF) who underwent a caesarean delivery due to fetal malpresentation.

The results of a study conducted by Ludmir *et al*. indicate that better outcomes are related with pregnancies that extend longer than 25 weeks of gestation. On the other hand, cesarean deliveries and significant rates of malpresentation are also associated with these results.

All women with an arcuate uterus had delivered at full term in this study. When compared to women with other uterine abnormalities, such as a bicornuate uterus (62.5%) and a septate uterus (62%), women with an arcuate uterus had a higher live birth rate in the study conducted by Raga and his colleagues.

Premature births are more common in patients with uterine abnormalities, and the three most frequent causes of preterm labor are (a) cervical incompetence [12], (b) abnormal uterine contractions [13], and (c) decreased uterine volume [14]. Patients with uterine abnormalities are more likely to birth prematurely [15]. The majority of the research came to the conclusion that cervical cerclage is an effective technique for reducing the risk of spontaneous abortion in women with mullerian abnormalities during the second trimester of pregnancy.

Discussion

Obstetricians frequently encounter congenital Mullerian abnormalities, a fascinating clinical problem. Severity of uterine anomalies increased with younger maternal age, decreased parity, higher proportion of preterm delivery and caesarean sections.

Hua and colleagues discovered a connection between uterine abnormalities and preterm birth, cesarean section, and intrauterine growth restriction (IUGR), which is characterized by birth weight below the 10th percentile [16]. Patients with a

significant fusion defect basically have a unilateral placenta implanted, which may cause one uterine artery to be functionally excluded from the uteroplacental circulation. Based on flow velocity waveforms collected from the placental and non-placental uterine arteries in patients with mullerian abnormalities and unexposed individuals, Leible *et al*. got to this result [17]. In an animal model investigation, Meyer *et al*. discovered that unilateral uterine horn ligation resulted in smaller and heavier placentas as well as higher IUGR [18].

We chose to include arcuate uterus in our analysis due to the elevated likelihood of various undesirable outcomes, including second trimester pregnancy loss and malpresentation at delivery.

We discovered two patients with uterine didelphys at our facility. One of them experienced first-trimester vaginal bleeding, which was followed by an unexpected abortion. The second woman was a primigravida with an IVF conception. This mullerian aberration results from a complete lack of fusion, which causes the formation of two fully separate horns, vagina, and cervix. A longitudinal vaginal septum and two cervix seen during a pelvic examination suggest that the patient may have these abnormalities. The majority of females also have a longitudinal vaginal septum, sometimes known as a double vagina. *et al*. Chan [19].

Uterine Didelphys

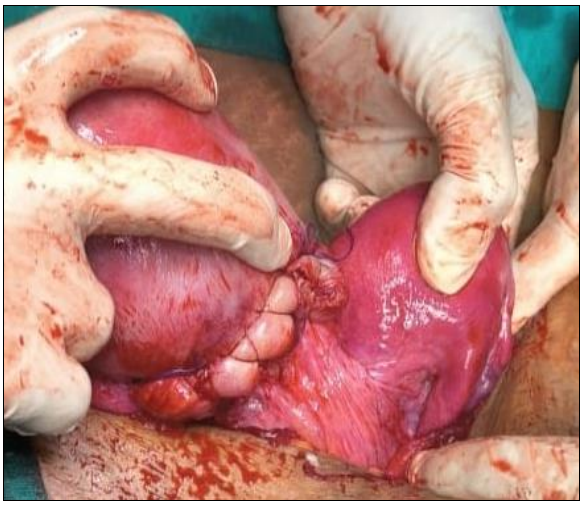


Fig 3: Showing didelphys uterus

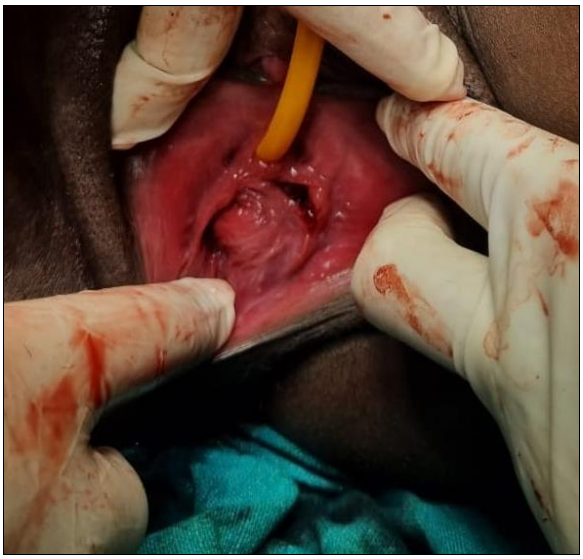


Fig 4: Didelphys uterus with double cervical opening

Arcuate Uterus

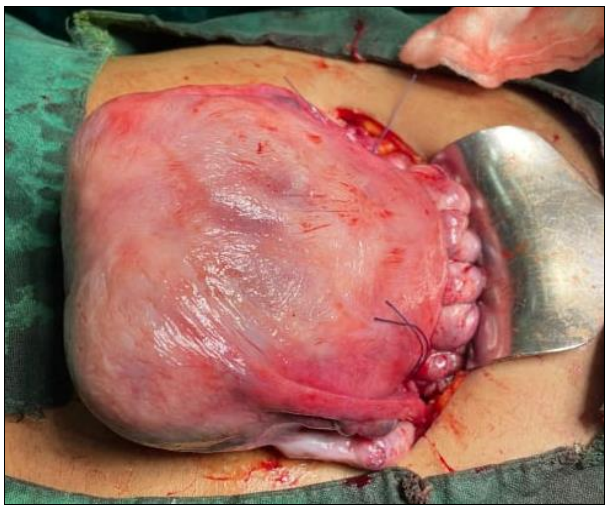


Fig 5: showing Arcuate uterus

Unicornuate Uterus Bicornuate Uterus

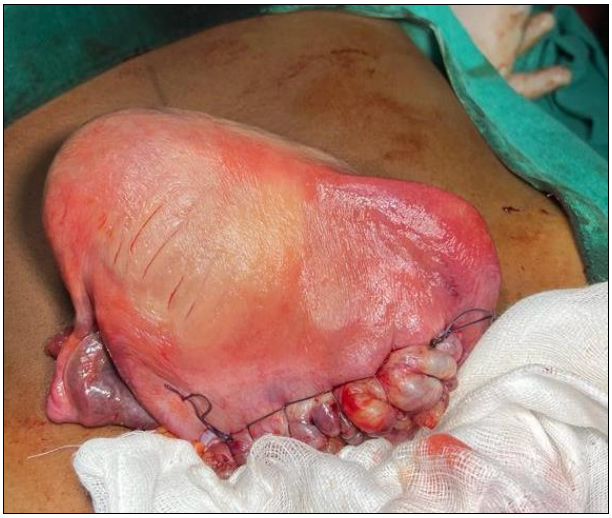


Fig 6: showing uniconuate uterus

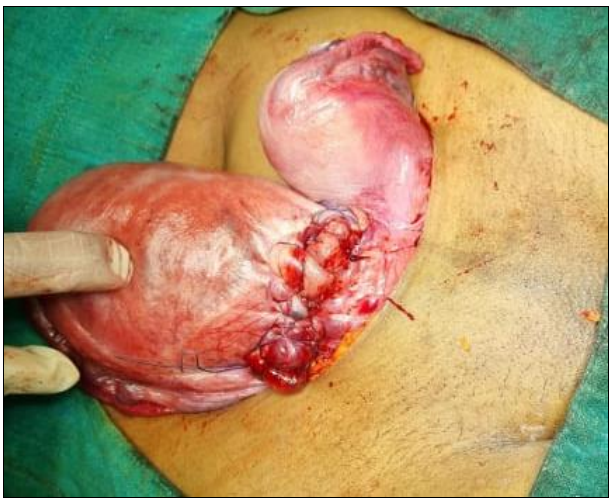


Fig 7: Showing bicornuate uterus

Conclusion

In this particular study, we discovered that those with uterine abnormalities had a noticeably increased chance of having a negative pregnancy outcome. This was true for preterm birth,

cesarean delivery and malpresentation. Despite the fact that pregnancy in women with Mullerian malformations was not always a necessity for caesarean section, these abnormalities did cause an elevated prevalence of dystocia and a particularly high incidence of fetal position abnormality. Some cases involved fetal distress and second stage arrest of labour. Hence mode of delivery should be selected according to individual differences in clinical practice.

Patients with Mullerian abnormalities should get thorough counseling on all anticipated prenatal and neonatal challenges from a senior obstetrician.

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