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Maternal and Perinatal Outcome of Triplet Pregnancies in a Tertiary Care Hospital in North India: A Prospective Observational Study

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Abstract—Background: **The purpose of this study was to identify the present trends in maternal, foetal, and perinatal outcomes and complications associated with triplet pregnancy at a tertiary referral hospital in India.**

***Methods*: A prospective observational study was conducted over 18 months. All adult pregnant patients with ultrasound confirmed triplet pregnancy were included. Patient demographics, measurements, and variables were recorded, with monitoring and follow-up at regular intervals. The primary endpoint of the analysis was to determine the maternal complications and perinatal outcomes associated with triplet pregnancy.**

***Results*: Thirty-four triplet pregnancies were included in this study. The majority, 70.7% (n=31) of these women, had conceived by assisted reproductive technique (ART), mostly in vitro fertilisation (IVF), 52.9% (n=18). The most common maternal complications encountered were pre-term labour, in 82.4% (n=28) of patients. Concerning gestational age at the time of delivery, 47.1% (n=16) of patients were near-term (34-36 weeks).**

The majority of pregnancies, 85.3% (n=29), were terminated by lower segment caesarean section (LSCS), 8.8% (n=3) were delivered vaginally, and mean duration of maternal hospital stay was 4.6 days ± 3.45 (SD 2-14) days. Only 11.8% (n=4) required a prolonged hospital stay of > 7 days due to maternal complications. Ninety-four out of 102 triplets were born alive, with a mean birth weight of 1,597.3 grams ± (SD 367.74 g). The various foetal/neonatal complications were noted, with the commonest being prematurity in 85.3% (n=29). The majority of triplet neonates with complications had a mean duration of NICU stay less than 1 week, 70.8% (n=17).

***Conclusion*: While triplet pregnancies remain rare, they are associated with a significant materno-foetal risk which must be anticipated by obstetricians. Thus, early diagnosis, adequate antenatal care, counselling, and perinatal care and support can help to ensure optimal outcomes.**

***Index Terms*—Triplet Pregnancy; Maternal Complications; Perinatal Outcome; Prematurity.**

I. INTRODUCTION

The rate of multiple births has risen over the last 30 years [1,2]. Two important factors associated with this are the tendency towards advanced maternal age [3], and the increasing use of medically assisted conception [4,5].

This increase in multiple gestations is a cause for concern in contemporary obstetric practices, as these pregnancies are known to be associated with poorer maternal and perinatal outcomes [6]. Such pregnancies carry increased risk for both mother and child, the risk increasing with the number of offspring [6]. For example, 60 percent of twins, 90 percent of triplets, and virtually all quadruplets are born pre-term [7].

While advances in obstetric and neonatal care have generally improved pregnancy outcomes, triplet, and higher-order pregnancies remain challenging to

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manage. Compared with singleton and twin pregnancies, triplet pregnancies are associated with a higher risk of neonatal complications particularly related to prematurity [8,9]. They are at risk of pre-term delivery, low birth weight, infant mortality, and increased long-term disability in survivors [10].

Monochorionicity further increases the risk of morbidity and mortality [11]. And, in addition to these adverse outcomes, the risks of congenital malformations are increased with multifoetal gestation. Importantly, this increased risk is for each foetus and is not simply because there are more foetuses per pregnancy [7].

Multiple pregnancies are also associated with poorer maternal outcomes and increased obstetric complications [12]; these mothers are also at increased risk for depression compared with women with singleton pregnancies [7]. The risk for peripartum hysterectomy is also increased; a 2005 study reported this to be threefold for twins and 24-fold for triplets or quadruplets [13]. According to Hellin's rule, the natural incidence of spontaneous twin pregnancies is 1/80; for triplets, it is 1/802 (1/6,400), and for quadruplets, 1/803 (1/512,000) [14].

It has been estimated that 1 in 80 births are multifoetal, whereas 1 in 8 pregnancies begin multifoetal followed by spontaneous reduction of one or more embryos or foetuses [15]. Interestingly, pregnancy duration and birthweight were inversely related to the initial number of gestational sacs, regardless of the final number of foetuses at delivery [7].

Due to the rarity of higher-order pregnancies, defined as those involving three or more foetuses, very few studies have been conducted regarding their diagnosis and management. Higher-order pregnancies occur in approximately 1 in 8,000 to 1 in 100,000 cases, making them significantly less common than twin pregnancies, which occur in about 1 in 80 births. Such limited number of cases leads to a substantial gap in the literature, with only a handful of studies published in the last few decades focusing specifically on their outcomes and management. These pregnancies are associated with increased risks of maternal and foetal complications, including pre-term labour, low birth weight, and gestational hypertension.

Current diagnostic methods, such as ultrasound, play a crucial role in identifying multiple gestations early in pregnancy, allowing for appropriate prenatal care and monitoring. However, the scarcity of research makes it challenging to establish standardised protocols for the management of higher-order multiples, underscoring the urgent need for further studies to fill this gap and improve clinical outcomes. The aim of this study was to identify current trends in maternal, foetal, and perinatal outcomes and complications associated with triplet pregnancy.

II. MATERIALS AND METHODS

Study Design and Setting

This was a prospective observational study, conducted at the postgraduate Department of Obstetrics and Gynaecology in a tertiary government hospital and referral unit in the state of Jammu and Kashmir, India. Using a convenience sampling technique, respondents were enrolled over a 1.5-year period from June 2018 to December 2019.

Selection of Participants

We included forty-six patients, aged 18 years and over with a triplet pregnancy confirmed by prior obstetric ultrasound scan, who presented to the hospital outpatient or emergency department. Patients diagnosed with a fibroid uterus were excluded. Our final sample size was 34 patients, from whom informed written consent was obtained before their enrolment.

Measurements

Maternal data were collected using a questionnaire administered to participants who met the inclusion criteria. Standard obstetric surveillance and maternal monitoring included a thorough general and systemic physical examination, regular blood pressure monitoring, screening for gestational diabetes, and haemoglobin recording in every trimester. Foetal monitoring was done using a serial ultrasound scan

between 8 – 10 weeks, followed by 11 – 13 weeks, an anomaly scan, and growth scans every 2 – 3 weeks beyond 26 weeks of gestation, the neonates were also followed postnatally until one month of age.

The criteria recommended by the International Society for the Study of Hypertension in Pregnancy (ISSHP) in 2018 were used to define hypertensive disorders [16]. Gestational diabetes was diagnosed according to the criteria of the International Association of Diabetes and Pregnancy Study Groups (IADPSG) [17]. Anaemia was diagnosed if the haemoglobin level was lower than 11g/dl. Cervical length screening was done at 16 and 20 weeks; if the measurement was less than 25mm, the couple was counselled about cerclage/progesterone support. Participants at risk of iatrogenic/spontaneous preterm birth, per the Royal College of Obstetricians and Gynaecologists (RCOG) Guidelines [18] Guidelines were given antenatal corticosteroids.

Variables

The independent variables included various maternal characteristics such as maternal age, parity, weight gain during pregnancy, and mode of conception, which could be spontaneous, through in vitro fertilisation (IVF), or via ovulation induction. Gestational age at delivery and significant medical history (e.g. hyperemesis gravidarum, first or second trimester bleeding, or cerclage) were also taken into account. Chorionicity was an important variable, categorised as trichorionic triamniotic (TCTA), dichorionic triamniotic (DCTA), dichorionic diamniotic (DCDA), monochorionic diamniotic (MCDA), or monochorionic triamniotic (MCTA). Lastly, the mode of delivery was included as an independent variable.

In addition to maternal characteristics, maternal complications were recorded, including hyperemesis gravidarum, anaemia, pre-eclampsia, eclampsia, gestational diabetes, obstetric cholestasis, pre-term labour, premature rupture of membranes (PROM), placental abruption, placenta previa, postpartum haemorrhage (PPH), and thromboembolism. The mean duration of hospitalisation was also documented.

Neonatal-related variables included gestational age at delivery, birth outcomes (live births, stillbirths, and neonatal deaths), and birth weight in grams, classified as low birth weight (LBW < 2500g), very low birth weight (VLBW < 1500g), and extremely low birth weight (ELBW < 1000g). Additional factors included APGAR scores assessed at 1-minute and 5-minute intervals, the need for NICU admission (classified as Level I, Level II, Level III, or Level IV), and the duration of hospital stay.

Neonatal complications were also documented, and included congenital anomalies, intrauterine growth restriction (IUGR), foetal growth discordance, foetal demise, prematurity, birth defects, cord entanglement, and oligohydramnios. Post-discharge, maternal and neonatal follow-up evaluations were conducted, with status recorded at 1-week and 4-week intervals postpartum.

The study was approved by the Scientific and Ethics Review Board of the Ethical Committee of the Government Medical College Srinagar (GMC/Gynae). IBM Corporation's SPSS Statistics for Windows (Version 27.0, released in 2020, Armonk, NY, USA) was used for statistical analysis, and frequencies and percentages were used to represent categorical variables.

Investigative Goals

The primary endpoint of our analysis was to determine the maternal complications and perinatal outcomes associated with triplet pregnancy.

III. RESULTS

Over the study period of 18 months, a total of 34 patients with triplet pregnancy were included. The majority were aged between 25-36 years, 79.4% (n=27). A majority,70.7% (n=31), had conceived via artificial reproductive technique (ART), 52.9% (n=18) through in vitro fertilisation (IVF), 8.8% (n=3) by ovulation induction, and 38.3% (n=13) of conceptions were spontaneous. Among all of the above, 67.6% (n=23) of foetuses were TCTA, 20.6% (n=7)

were DCTA, 5.9% (n=2) were DCDA, while MCDA and MCTA chorionicity accounted for 2.9% (n=1) each.

Among the pregnant mothers, 67.6% (n=23) were nulliparous, 26.5% (n=9) had previously given birth once (para 1), and 5.9% (n=2) had given birth twice (para 2). Pre-existing maternal comorbidities at the time of presentation were observed in only 20.6% (n=7) of the patients; of these, 11.8% (n=4) had hypothyroidism, 5.9% (n=2) had polycystic ovarian disease (PCOD), and 2.9% (n=1) had chronic pancreatitis, which was managed or resolved. Maternal weight gain was recorded in all cases: 23.5% (n=8) of the mothers gained 10–14 kg, 55.9% (n=19) gained 15–19 kg, and 20.6% (n=7) gained 20 kg or more.

The participants encountered various maternal complications during their pregnancies, with 82.4% (n=28) going into pre-term labour, 61.8% (n=21) diagnosed with anaemia, 55.9% (n=19) developing hyperemesis gravidarum, 52.9% (n=18) developing PPROM, 41.2% (n=14) diagnosed with preeclampsia and hypertensive disorders of pregnancy, 20.6% (n=7) developing GDM and the same number developing obstetric cholestasis, 17.6% (n=6) experiencing first/second trimester bleeding, 14.7% (n=5) complicated with PPH, and only 5.9% (n=2) requiring cerclage.

Gestational age at delivery varied, with the majority (47.1%, n=16) being near term (34–36 weeks), followed by 17.6% (n=6) severely premature (28–31 weeks), 14.7% (n=5) at term, 11.8% (n=4) moderately premature (32–33 weeks), and 8.8% (n=3) extremely premature (< 28 weeks). A total of 85.3% (n=29) were delivered by LSCS, 8.8% (n=3) were delivered vaginally, and 5.9% (n=2) resulted in abortion. The mean duration of maternal hospital stay was 4.6 ± 3.45 days (SD 2–14), with 61.8% (n=21) discharged within ≤ 3 days, 26.5% (n=9) staying for 4–7 days, and only 11.8% (n=4) requiring a prolonged hospital stay of > 7 days due to maternal complications. Foetal and neonatal variables were also recorded over the course of the study, with 94 out of 102 live births. The gender distribution of the neonates was equal between male and female, at 50% each. Birth weights varied, with a mean birth weight of 1597.3 grams (SD367.74). A majority of neonates, 51.6% (n=49), had a birth weight of 1500-2000 grams, 23.2% (n=22) weighed 2000-2500 grams, 18.9% (n=18) were only 1000-1500 grams, and 6.3% (n=6) weighed less than 1000 grams. The average APGAR score at 1 minute and 5 minutes after delivery was 5.6 ± (SD 1.39) and 5.9 (SD 1.3), respectively.

The various foetal/neonatal complications were noted, the commonest complication being prematurity in 85.3% (n=29) of neonates, followed by RDS in 22.1% (n=21), neonatal sepsis in 15.8% (n=15), early neonatal death in 12.6 (n=12), abortion in 5.9%(n=2), vanishing foetus in 1% (n=1), twin-twin transfusion syndrome (TTTS) in 2.9% (n=1), and IUFD in 1.1% (n=1).

NICU admission was required by 25.3% (n=24) of neonates; the mean duration of NICU stay was < 1 week for the majority, 70.8% (n=17), 1-4 weeks for 25% (n=6), and a prolonged stay of > 4 weeks for 4.2% (n=1).

IV. DISCUSSION

Early identification of potential complications is critical during pregnancy to ensure the health of both mother and baby. Regular antenatal visits allow healthcare providers to monitor the mother's health, identify risk factors, and implement interventions as needed. Conditions such as gestational diabetes, hypertension, and infections can be detected early, enabling timely management to reduce adverse outcomes. The primary aim of this study was to assess maternal, foetal, and perinatal outcomes, including maternal and neonatal complications, associated with triplet pregnancies, using a number of variables to help us determine the results. The age-related decline of women's biological capacity to reproduce is well established, and the current trend to postpone childbearing until later in life often requires more aggressive fertility treatments, thus increasing the risk

of multiple pregnancy.

Our study included 34 pregnant women with a USG-confirmed triplet pregnancy. They were aged between 25 to 36 years, with the majority in the 30 to 34 year age group. This is in agreement with previous studies which reported that bearing children at an older age results in multiple gestations [19]. 23 patients (67.6%) in our study were nulliparous. Further more, 62% of the triplet pregnancies were secondary to infertility treatment, which is comparable to other studies (55–94%) [20].

Routine antenatal care, on a patient by patient basis, was implemented for uncomplicated triplet pregnancies with standard obstetric and regular USG assessments of foetal growth. No routine prophylactic measures, such as bed rest, home monitoring of uterine contractions, or oral tocolysis, were advised, except in two cases which presented in the second trimester in pre-term labour and in whom emergency cerclage was performed. Both these patients had to undergo emergency lower (uterine) segment caesarean section (LSCS) at 32 and 34 weeks respectively, in view of PPROM and frank leaking.

Pre-term birth was the most common complication (85%) observed in our study, similar to the incidence (78–86%) reported in previous studies [21]. The incidence of pre-term birth among triplets has varied from 64% to almost 100% in the findings of other studies [22,23]. Discordant growth between triplets is due to blood flow alteration in the uterus and placenta, and notably to the restricted intrauterine space that represents also the main cause of pre-term labour [24]. Likewise, in our study, the most common complication encountered was pre-term labour, in 82.4%.

Gestational age represents the main factor affecting birth weight, which correlates with morbidity and survival rates [25]. The optimal gestational age at birth for triplet pregnancies is reported to be 34–35 weeks, with a weight of 1,900–2,200 grams [26].

The feasibility of a vaginal delivery depends on the size, position, and health of the infants, as well as the size and shape of the mother's pelvic bones. Caesarean section is often needed for twin pregnancies, and is expected for delivery of triplets [27,28]. In our study, the incidence of caesarean section delivery was 85.3%, which is comparable with other studies [27,28].

It is well known that caesarean section triplets experience lower perinatal mortality and morbidity than vaginally delivered triplets. Vaginal triplet births are associated with higher risk of cord prolapse, foetal collision, reduced placental perfusion, and haemorrhage from separating placentae [29].

Neonatal morbidity and mortality increase with the number of foetuses in a pregnancy, but simultaneously the term of the pregnancy decreases so that problems associated with premature birth gain importance. Of the 34 triplet pregnancies (102 foetuses) in our study, 94 were born alive; there were 2 triplet miscarriages, 1 vanishing foetus and 1 intrauterine foetal death. The incidence of pre-term delivery in triplet pregnancies has been reported in the literature to be approximately 90% [30], and is the only complication that occurred significantly more often in triplet than in twin gestation [31].

Premature birth is the most important determinant of neonatal outcome in triplet pregnancy. Although previous studies have reported higher neonatal morbidity and mortality in the third-born triplet [32], we found no difference in outcome according to the birth order, which was probably due to the policy of delivering all triplet pregnancies by caesarean section.

There are conflicting reports regarding the difference between pregnancy complications in triplets conceived through ART, and spontaneous conceptions. An old study reported a higher incidence of complications among spontaneously conceived triplets [33]. In contrast, another study found higher incidences of pregnancy-induced hypertension (PIH), antepartum haemorrhage, intrauterine growth retardation, and placenta previa among ART-conceived triplet pregnancies [34]. Another study reported an

incidence of 67% PIH in triplet pregnancies [35], while another study in the last 20 years reported 26% in a large series [36]. In contrast, we found a much lower incidence of PIH (23.1% vs 52.4%), GDM (7.7% vs 28.6%), anaemia (53.8% vs 66.7%), PPROM (38.5% vs 61.9%) and preterm labour (61.5% vs 95.2%) in spontaneously conceived triplets than in those conceived by ART.

The primary limitation of this study is the relatively small sample size, which may limit the statistical power and generalisability of the findings to broader populations of triplet pregnancies.

V. CONCLUSION

While triplet pregnancies are relatively rare, they are associated with significant maternal and foetal risks that require proactive management by obstetricians. Given the complexities and potential complications inherent in such pregnancies, it is essential to prioritise early diagnosis and thorough antenatal care. This approach allows for the timely identification of risk factors and complications, enabling healthcare providers to implement appropriate interventions.

Moreover, comprehensive counselling for expectant mothers is vital to help them understand the challenges associated with triplet pregnancies and to prepare them for the journey ahead. Effective perinatal care, coupled with robust neonatal support, can significantly enhance health outcomes for both mothers and their infants.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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