RESEARCH PAPER

# Neonatal Outcomes in Spontaneous Late Preterm Monochorionic Quadramniotic Quadruplets Delivered at 35+5 Weeks: A Case Report

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## ABSTRACT

Spontaneous monozygotic quadruplet pregnancies are among the rarest forms of human multiple gestation, with an estimated incidence of approximately 1 in 11–15 million pregnancies. Monochorionic quadramniotic (MCQA) configurations represent only a subset of these cases and are reported almost exclusively as isolated case reports. Published literature on MCQA quadruplet pregnancies largely focuses on antenatal findings, with limited reporting of postnatal outcomes and early neonatal follow-up. We report a spontaneously conceived MCQA quadruplet pregnancy in a 32-year-old Indonesian woman that reached late preterm gestation. The pregnancy was antenatally diagnosed as triplets, with a fourth fetus unexpectedly identified during emergency caesarean section at 35+5 weeks of gestation. Post-delivery placental examination, including colored-dye vascular injection, confirmed a single monochorionic quadramniotic placenta with superficial vascular anastomoses. Birth weights ranged from 1,190 g to 1,816 g, with a maximum inter-twin discordance of 34.5%. There was no clinical or hematological evidence of twin-to-twin transfusion sequence. All four female neonates achieved spontaneous cardiorespiratory adaptation requiring only brief free-flow oxygen. None required positive pressure ventilation, continuous positive airway pressure, intubation, or surfactant therapy. All neonates tolerated enteral feeding, were discharged in stable condition during the early postnatal period, and demonstrated appropriate early postnatal growth and normal early sensory screening findings. This case demonstrates that spontaneous MCQA quadruplet pregnancies can achieve favorable early neonatal outcomes when gestation is prolonged into the late preterm period, even in the presence of significant growth discordance. These findings add objective neonatal outcome data to the limited existing literature for this exceptionally rare pregnancy configuration.

**Keywords:** monochorionic quadramniotic quadruplets; spontaneous quadruplets; neonatal outcomes; late preterm birth; multiple pregnancy.

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## INTRODUCTION

Higher-order multifetal pregnancies have become rare spontaneous events since the widespread use of assisted reproductive technology (ART). The natural incidence of spontaneous quadruplets of all chorionicities is estimated at approximately 1 in 512,000–700,000 deliveries, representing only 4–6% of all quadruplet gestations in the modern era.[1–3] Within this already rare group, monochorionic quadramniotic (MCQA) quadruplets are extraordinarily uncommon, with an estimated incidence of approximately 1 in 11–15 million pregnancies and fewer than 72 documented cases of spontaneous monozygotic quadruplets reported worldwide.[4,5] Most spontaneous quadruplet cases described in recent literature originate from low- and middle-income countries, where access to ovulation induction monitoring may be limited; however, MCQA variants remain exceedingly rare regardless of geographic location.[4,6]

Neonatal prognosis in quadruplet pregnancies has historically been poor, largely driven by extreme prematurity, with reported mean gestational ages ranging from 29 to 32 weeks. Associated complications include very low birth weight, respiratory distress syndrome requiring mechanical ventilation, intraventricular hemorrhage, and prolonged neonatal intensive care unit hospitalization.[1,2,7–10] Monochorionic placentation further increases neonatal

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risk due to shared placental vascular communications, which may result in twin-to-twin transfusion syndrome (TTTS), twin anemia–polycythemia sequence (TAPS), or selective fetal growth restriction.[11–13] The clinical complexity of four fetuses sharing a single placenta poses diagnostic and postnatal management challenges that are infrequently documented in detail.

We report a spontaneously conceived monochorionic quadramniotic quadruplet pregnancy that reached 35+5 weeks of gestation among the most advanced gestational ages reported for this condition with an undiagnosed fourth fetus identified only at caesarean delivery and uniformly favorable early neonatal outcomes despite marked inter-twin growth discordance.

## CASE PRESENTATION

A 32-year-old Indonesian woman G2P1001, presented to RSPAL Dr. Ramelan, Surabaya, on 24 October 2025 at exactly 35+5 weeks of gestation with mild gestational hypertension (blood pressure 138/97 mmHg). Her obstetric history included one previous spontaneous preterm delivery at 36 weeks of gestation resulting in a healthy infant weighing 3,000 g. Gestational age was determined based on the last menstrual period (16 February 2025) and confirmed by first-trimester ultrasonography.

The patient had used depot medroxyprogesterone acetate contraception continuously for six years and conceived spontaneously one month after the last injection. Pre-pregnancy body mass index was 33.7 kg/m², consistent with class I obesity.

Antenatal care consisted of six visits at community and secondary-level healthcare facilities. First-trimester ultrasonography performed at 12 weeks of gestation identified a triplet pregnancy, with apparent trichorionicity based on visualization of three separate placental masses. Serial fetal growth assessments at 28, 32, and 34 weeks demonstrated appropriate interval growth for the three identified fetuses, with estimated fetal weights between the 40th and 60th percentiles. Amniotic fluid volumes were within normal limits, umbilical artery pulsatility indices remained below 1.0, middle cerebral artery pulsatility indices were consistently above 1.5, and cervical length measurements were persistently greater than 3.5 cm. No ultrasonographic features suggestive of twin-to-twin transfusion syndrome or selective fetal growth restriction were observed. A fourth fetus was not detected during antenatal surveillance.

Two doses of intramuscular dexamethasone (6 mg administered 12 hours apart) were given for fetal lung maturation. Preterm labor developed on the same day, prompting emergency caesarean section under spinal anesthesia. Four live female infants were unexpectedly delivered within five minutes through a single lower transverse uterine incision. All amniotic fluid was clear.

### Placental Examination

Post-delivery macroscopic examination revealed a single fused placental mass weighing 745 g, containing four distinct amniotic sacs and four separate umbilical cord insertions, consistent with monochorionic quadramniotic placentation (Figure 1). The placental surface appeared multilobulated, likely contributing to antenatal misinterpretation of chorionicity.

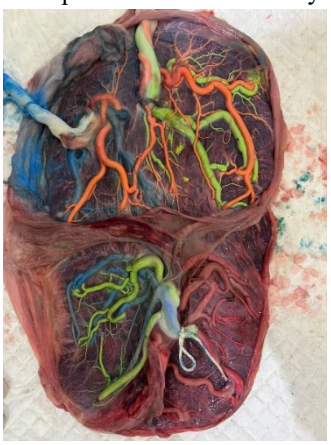

**Figure 1. Post-delivery placental examination revealed a single fused placental mass with four amniotic sacs and umbilical cord insertions**

Placental vascular mapping using colored-dye injection demonstrated multiple superficial vascular anastomoses distributed across the placental surface, a pattern previously described in monochorionic multiple gestations,[11] without evidence of deep arterio-venous communications (Figure 2). Individual umbilical cords were not labeled at delivery, precluding definitive correlation between placental territories and individual neonates.

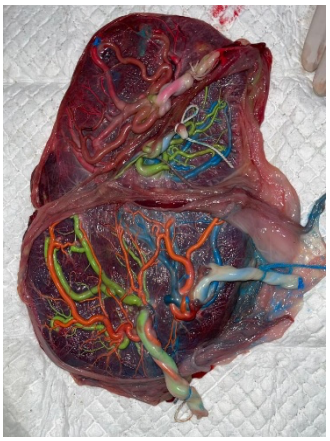

**Figure 2. Colored-dye vascular injection demonstrated multiple superficial vascular anastomoses without deep arterio-venous communications**

### Neonatal Outcomes

Birth weights were 1,816 g, 1,755 g, 1,405 g, and 1,190 g, corresponding to a maximum inter-twin discordance of 34.5% (Table 1). Two infants were appropriate for gestational age, one was small for gestational age, and one was severely small for gestational age. The two larger neonates were managed in intermediate care, while the two smaller infants were observed in the neonatal intensive care unit.

**Table 1. Perinatal and neonatal characteristics at birth**

| Parameter | Neonate 1 | Neonate 2 | Neonate 3 | Neonate 4 |
|---|---|---|---|---|
| Gestational age | 35+5 weeks | 35+5 weeks | 35+5 weeks | 35+5 weeks |
| Sex | Female | Female | Female | Female |
| Mode of delivery | Caesarean section | Caesarean section | Caesarean section | Caesarean section |
| Birth weight (g) | 1,816 | 1,755 | 1,405 | 1,190 |
| Growth status | AGA | AGA | SGA | Severe SGA |
| Apgar score (1 / 5 min) | 8 / 9 | 8 / 9 | 8 / 8 | 7 / 8 |
| Initial respiratory status | Spontaneous breathing | Spontaneous breathing | Spontaneous breathing | Spontaneous breathing |
| Respiratory support | Free-flow oxygen | Free-flow oxygen | Free-flow oxygen | Free-flow oxygen |
| Need for PPV / CPAP / MV | No | No | No | No |
| Time to room air (min) | 4 | 3.5 | 6 | 9 |
| Level of care | Intermediate care | Intermediate care | NICU observation | NICU observation |

Early hematological evaluation showed hemoglobin values within expected physiological ranges for late preterm infants. One infant demonstrated transient hematocrit elevation (57.9%), which did not meet criteria for intervention and resolved spontaneously, consistent with physiological ranges described in late preterm infants.[14] No clinical or laboratory evidence of TTTS or TAPS was identified (Table 2). All neonates tolerated enteral feeding and were discharged on day 4 of life in stable condition.

**Table 2. Early hematological findings**

| Neonate | Hemoglobin (g/dL) | Hematocrit (%) | WBC (/µL) | Platelets (/µL) | Interpretation |
|---|---|---|---|---|---|
| 1 | Not examined | – | – | – | No indication |
| 2 | Not examined | – | – | – | No indication |
| 3 | 16.6 | 50.0 | 10,210 | 267,000 | Within normal range |
| 4 | 19.5 | 57.9 | 9,580 | 207,000 | High-normal, no intervention |

*Note: Hematological values remained below thresholds requiring treatment for neonatal polycythemia.*

**Early Follow-up Outcomes**

At the first outpatient visit on day 10 of life, all infants were clinically stable and feeding adequately. Weight gain ranged from 100 g to 195 g compared with birth weight (Table 3). Follow-up at approximately three weeks of age confirmed continued appropriate weight gain in all infants.

**Table 3. Post-discharge growth outcomes**

| Neonate | Birth weight (g) | Weight at day 10 (g) | Weight gain day 10 (g) | Additional gain at ~3 weeks (g) |
|---|---|---|---|---|
| 1 | 1,816 | 2,000 | +184 | +120 |
| 2 | 1,755 | 1,900 | +145 | +150 |
| 3 | 1,405 | 1,600 | +195 | +110 |
| 4 | 1,190 | 1,290 | +100 | +140 |

Ophthalmologic screening for retinopathy of prematurity performed on 1 December 2025 demonstrated normal findings in all four infants, in accordance with international classification criteria and post-discharge follow-up recommendations,[15,16] with no retinal hemorrhage or detachment observed (Table

4). Otolaryngology evaluation on 30 December 2025 revealed patent external auditory canals and intact tympanic membranes bilaterally. Hearing screening using otoacoustic emission testing was planned according to institutional protocol.

**Table 4. Early sensory follow-up outcomes**

| Neonate | ROP screening (1 Dec 2025) | Otolaryngology exam (30 Dec 2025) | Hearing screening |
|---|---|---|---|
| 1 | Normal | Normal otoscopy | OAE planned |
| 2 | Normal | Normal otoscopy | OAE planned |
| 3 | Normal | Normal otoscopy | OAE planned |
| 4 | Normal | Normal otoscopy | OAE planned |

*Abbreviations: ROP = retinopathy of prematurity; OAE = otoacoustic emission.*

## DISCUSSION

Spontaneous monochorionic quadramniotic (MCQA) quadruplet pregnancies represent one of the rarest forms of human multiple gestation, with an estimated incidence of approximately 1 in 11–15 million pregnancies. Within the broader category of spontaneous quadruplets which reported to occur in approximately 1 in 512,000–700,000 deliveries, monochorionic variants comprise only a very small fraction and are associated with disproportionately higher risks due to shared placental circulation. In contemporary practice, the vast majority of quadruplet pregnancies are iatrogenic and related to assisted reproductive technology, with consistently reported associations with extreme prematurity (mean gestational age 29–32 weeks), respiratory distress syndrome, prolonged mechanical ventilation, and extended neonatal intensive care unit (NICU) hospitalization lasting 4–8 weeks or longer.

Historical reports from the pre assisted reproductive technology era suggest that spontaneous quadruplet pregnancies reaching advanced gestational age were exceedingly uncommon, with limited and inconsistent reporting of chorionicity and neonatal outcomes. In contrast, more recent spontaneous quadruplet reports from low- and middle-income settings, including an Indonesian case reported by Nugraha et al. in 2025, have described deliveries at 31–33 weeks of gestation accompanied by substantial neonatal morbidity. For MCQA quadruplets specifically, published cases remain exceedingly scarce, with most reports describing early pregnancy loss or delivery at extremely preterm gestational ages accompanied by significant neonatal complications.

Against this background, the combination of near-term gestation at 35+5 weeks, absence of twin-to-twin transfusion sequence despite marked inter-twin growth discordance, minimal respiratory support requirements limited to brief free-flow oxygen, and discharge of all four neonates by day 4 of life represents a highly favorable early outcome and contributes meaningful prognostic information for this ultra-rare condition.

The unexpectedly identified fourth fetus illustrates a recognized limitation of conventional two-dimensional ultrasonography in higher-order multiple pregnancies. Fetal crowding, overlapping structures, and acoustic shadowing may obscure one gestational sac, particularly in monochorionic pregnancies in which multilobulated placental architecture can mimic multiple separate placentas. In the present case, the single monochorionic placenta with multiple lobes was misinterpreted antenatally as three distinct placentas, resulting in the diagnosis of triplet rather than quadruplet pregnancy. While adjunctive imaging modalities such as three-dimensional ultrasonography or fetal magnetic resonance imaging may improve diagnostic accuracy in selected cases, their routine use remains limited by cost, availability, and expertise in many clinical settings.

Post-delivery placental examination confirmed monochorionic quadramniotic placentation based on gross morphology demonstrating a single fused placental mass with four amniotic sacs and four umbilical cord insertions. Colored-dye vascular injection revealed multiple superficial vascular anastomoses without evidence of deep arterio-venous communications (Figure 1). The multilobulated placental configuration provides a plausible anatomical explanation for the antenatal diagnostic challenge.

Despite the presence of vascular anastomoses and a maximum birth-weight discordance of 34.5%, no clinical or laboratory features of twin-to-twin transfusion sequence or twin anemia–polycythemia sequence were observed. The transient elevation in hematocrit (maximum 57.9%) among the smaller neonates remained within physiological limits for late preterm infants and resolved spontaneously, further supporting relatively balanced placental perfusion.

Several maternal and pregnancy-related factors may have contributed to this favorable outcome, including maternal age below 35 years, multiparity, absence of pre-eclampsia, class I obesity without gestational diabetes, preserved cervical length throughout pregnancy, and timely administration of antenatal corticosteroids. The rapid spontaneous conception following discontinuation of depot medroxyprogesterone acetate is consistent with rebound ovarian activity; however, the precise

biological mechanism underlying monozygotic quadruplet formation remains incompletely understood.

The neonatal outcomes warrant particular emphasis. Despite late preterm delivery and significant growth discordance, all four neonates demonstrated spontaneous cardiorespiratory adaptation without the need for positive pressure ventilation, continuous positive airway pressure, endotracheal intubation, or surfactant administration. This contrasts sharply with historical quadruplet cohorts, in which respiratory distress syndrome requiring mechanical ventilation is common. Early discharge of all four infants by day 4 of life, exclusive enteral feeding, and appropriate postnatal weight gain further distinguish this case from previously reported outcomes.

This report has several limitations. Individual neonates could not be definitively matched to specific placental territories due to the absence of umbilical cord labeling at delivery. Formal histopathological examination was not performed to confirm chorionicity at the microscopic level, early gestational data relied on referral ultrasonography reports, and long-term neurodevelopmental outcomes are not yet available. Nevertheless, the concordance of gross placental morphology and vascular injection findings provides robust evidence supporting the diagnosis of monochorionic quadramniotic placentation. Future reports would benefit from systematic cord labeling, detailed placental vascular mapping, and standardized long-term follow-up when similarly rare chorionicity patterns are encountered.

## CONCLUSION

This spontaneously conceived monochorionic quadramniotic quadruplet pregnancy, antenatally misdiagnosed as triplets, achieved delivery at 35+5 weeks among the latest gestational ages reported for this exceptionally rare condition with minimal neonatal morbidity and early discharge on day 4 of life. The absence of twin-to-twin transfusion sequence despite significant growth discordance and the excellent neonatal respiratory adaptation provide valuable outcome data for counseling in MCQA pregnancies. This case emphasizes the critical importance of gestational age prolongation, highlights diagnostic challenges in higher-order multiple pregnancies, and demonstrates that favorable outcomes are achievable in MCQA quadruplets when gestation can be prolonged and balanced placental vascular architecture is present.

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