

Conjoined Twins in Rural Cameroon: Diagnostic Success, Referral Failure: A Case of Thoraco-Omphalopagus Twins and the Challenges of Complicated Obstetric Care in a Remote Setting

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How to cite this paper: Giraud, M.A.A., Comarin, K.E., Yimlefack, N.C., Milton, F.N., Flora, K.K. and Njamen, T.N. (2026) Conjoined Twins in Rural Cameroon: Diagnostic Success, Referral Failure: A Case of Thoraco-Omphalopagus Twins and the Challenges of Complicated Obstetric Care in a Remote Setting. *Open Journal of Obstetrics and Gynecology*, 16, 1260-1269. <https://doi.org/10.4236/ojog.2026.169116>

Received: August 4, 2026

Accepted: September 7, 2026

Published: September 10, 2026

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Abstract

Background: Conjoined twins are a rare congenital anomaly arising from incomplete embryonic division, associated with high rates of stillbirth and early neonatal death, particularly in low-resource settings where specialized obstetric and neonatal services are limited. **Case:** We report a case of thoraco-omphalopagus conjoined twins diagnosed antenatally at 15 weeks of gestation in a 21-year-old multiparous woman with HIV infection on antiretroviral therapy, residing in a rural district of Cameroon. Although the diagnosis was confirmed by ultrasound at a regional hospital and the patient was referred for specialized follow-up at a tertiary institution, she was lost to follow-up and represented several weeks later in spontaneous labor at a peripheral health center. She was referred again as an obstetric emergency and delivered by cesarean section for obstructed labor, yielding live male conjoined twins sharing a single placenta, with ventral fusion of the thorax and abdomen. The neonates remained clinically stable for approximately 36 hours awaiting transfer, but referral was delayed by the absence of a functional neonatal transport system, and both infants died during an 11-hour transport to the tertiary center. **Conclusion:** This case illustrates how early antenatal diagnostic success can be undermined by fragmented referral pathways, loss to follow-up, and inadequate

neonatal transport infrastructure. Strengthening active follow-up of high-risk pregnancies, pre-emptive referral before delivery, and equipping neonatal transport systems are essential to improving outcomes for conjoined twin pregnancies in low-resource, remote settings.

Keywords

Conjoined Twins, Thoraco-Omphalopagus, Low-Resource Setting, Referral Delay, Cameroon

1. Case Presentation

1.1. Patient Information

A 21-year-old multiparous woman (G4P3013), an artisanal gold miner residing in a rural village, was referred to Ketté District Hospital in active labor. She had attended three antenatal care visits during the index pregnancy.

Her obstetric history was unremarkable. During the index pregnancy, baseline blood pressure was 124/81 mmHg. Her last menstrual period was estimated from the first trimester ultrasound to be on 27 November 2022.

At approximately 16 weeks of gestation, she was treated for a genitourinary tract infection with ceftriaxone, metronidazole, and amoxicillin.

The patient was diagnosed with HIV infection during antenatal screening at 11 weeks 4 days of amenorrhea and was initiated on tenofovir/lamivudine/dolutegravir (TLD). Adherence was reported as good throughout pregnancy. Viral load results were not available in the antenatal records reviewed.

She received intermittent preventive treatment for malaria during pregnancy, along with routine antenatal supplementation with iron and folic acid.

Routine antenatal laboratory investigations, including rapid diagnostic tests and Chlamydia screening, were unremarkable.

1.2. Antenatal Imaging

The first obstetric ultrasound, performed at the primary healthcare facility (Kette District Hospital) on 16 March 2023, revealed a monochorionic monoamniotic twin pregnancy with suspicion of conjoined twins at a gestational age of 15 weeks and 4 days. She was referred to the regional referral hospital for diagnostic confirmation. An ultrasound performed there 8 days later confirmed a viable conjoined twin pregnancy at a reported gestational age of 20 weeks and 5 days. On 18 May 2023, during a subsequent visit to Kette District Hospital, a second-trimester ultrasound revealed a conjoined twin pregnancy at 25 weeks and 4 days of gestation. A subsequent ultrasound assessment performed at a private clinic at the regional level yielded a further inconsistent gestational-age estimate and fetal description (it was reported as a normal twin gestation), likely reflecting variability in the sonographer's experience with this complex condition. No further imaging was performed to assess the extent of internal organ sharing between the twins.

1.3. Loss to Follow-Up and Re-Presentation

Following confirmation of the diagnosis at the regional referral facility, she was counselled about the need for specialized antenatal follow-up and delivery at a specialized obstetric facility capable of providing appropriate maternal and neonatal care. However, she returned to her village and represented approximately 6 weeks later at Kette District Hospital with the ultrasound results. At that visit, the aforementioned ultrasound examination was performed, and further counselling was provided regarding the need for specialized antenatal follow-up and delivery planning at the regional referral hospital, the main referral centre in the area. The patient and her husband were also counselled about the potential risks associated with the pregnancy, delivery, and postnatal period. However, no specialized transportation was arranged for transfer to the regional facility, and the costs of accommodation and living expenses in town were to be borne out-of-pocket by the patient. She left the facility but did not comply with the referral, and no further antenatal contact was documented until she presented several weeks later in spontaneous labour at a peripheral health centre in her hometown, Colomine. She was subsequently referred to Kette District Hospital as an obstetric emergency.

2. Admission and Labor

The patient was admitted at gestational age of 38 weeks 6 days at 15:30 following referral from Colomine, with labor pain characterized by lumbar and pelvic contractions that had been ongoing for over six hours.

On admission, vital signs were blood pressure 105/60 mmHg, pulse rate 105 bpm, respiratory rate 26 breaths/min, and temperature 36.5°C. This gestational age was estimated from the first trimester ultrasound performed during her first contact visit to the Kette district hospital.

Uterine contractions occurred at a frequency of 3 per 10 minutes, lasting approximately 35 seconds. Fetal heart rates were 154 and 145 bpm.

Vaginal examination revealed a cervical dilation of 6 cm, a soft cervix in the mid-position, 60% effacement, and a high presenting part.

At 19:00, an emergency cesarean section was indicated due to suspected conjoined twins and obstructed labor.

2.1. Operative Findings and Delivery

A Pfannenstiel incision was performed under spinal anesthesia, followed by a lower segment cesarean section.

Extraction of the fetus was difficult due to abnormal presentation and fused fetal anatomy.

A live male pair of conjoined twins was delivered, consistent with thoraco-omphalopagus conjoined twins.

Intraoperative blood loss was estimated at approximately 600 mL. No maternal intraoperative complications were reported.

A single placenta and a single umbilical cord were observed.

2.2. Neonatal Findings

At birth, the conjoined twins presented with two heads, four upper limbs, two fused thoracic structures, one shared abdomen, two lower limbs, and a single set of external male genitalia with normally descended testes. Two separate cardiac activity were clinically auscultated; however, structural cardiac anatomy was not evaluated. Ventral fusion involved the whole thorax and abdomen, consistent with a thoraco-omphalopagus conjoined twin (**Figure 1(a)**, **Figure 1(b)**).



Figure 1. Ventral (a) and dorsal (b) views of the conjoined twins.

The twins breathed spontaneously at birth, with Apgar scores of 6, 8, and 10 at 1, 5, and 10 minutes, respectively. Their combined birth weight was 4.0 kg. Immediate neonatal care consisted of standard neonatal resuscitation including drying and warming, airway suctioning and administration of vitamin K. No advanced resuscitation or mechanical ventilation was required at birth. Neonates received prophylactic nevirapine for the prevention of mother-to-child transmission of HIV. Their respiratory rate was 40 breaths per minute, with heart rates of 125 bpm and 130 bpm. Oxygen saturation was oscillating between 96% and 97% on ambient air.

2.3. Postnatal Course

The twins were initially stable and were managed at the rural facility where they were delivered while awaiting transfer to a specialized centre at the capital city. Because of limited local resources, the transfer was delayed. Formula feeding was initiated, as the mother declined to breastfeed. Thermal care consisted of adequate clothing and warm-water bottles; however, a radiant warmer and incubator were unavailable. No stool was passed during this period, raising concern for an imperforate anus. Urine output was noted on four occasions, though volumes were not quantified. No intravenous access was established and no supplemental oxygen was available at the facility throughout the waiting period.

Approximately 34 hours after delivery, the twins developed progressive abdominal distension. Referral was initiated roughly 2 hours later, at approximately 36 hours of life, when the ambulance arrived. At the time of departure, oxygen

saturation was 98%, despite the presence of tachypnea. Neither oxygen therapy nor intravenous support was provided before transport. The neonates were transported in a non-medicalized ambulance without oxygen-delivery or resuscitation equipment, intravenous access, or a neonatal transport incubator. Thermal protection was limited to warm clothing and the kangaroo care (**Figure 2**).



Figure 2. Neonates at 36 hours after delivery.

2.4. Referral and Outcome

The journey was prolonged by poor road infrastructure, requiring approximately 5 hours to reach the first referral hospital at the regional level and approximately 11 hours to reach the tertiary care centre in the capital city, where a specialist team had already been mobilized.

Approximately 2.5 hours into the journey, the neonates developed acute respiratory distress that progressively worsened. No intervention could be provided during transport because oxygen and resuscitation equipment were unavailable. Oxygen therapy and resuscitation were initiated only upon arrival at a district hospital along the referral route but were unsuccessful. Both neonates subsequently died before arrival at the tertiary referral centre (**Figure 3**).



Figure 3. Referral to tertiary health facility.

3. Discussion

3.1. Diagnostic Challenges of Conjoined Twins in a Low-Resource Setting

Conjoined twins are a rare congenital anomaly, traditionally considered to result from incomplete embryonic division of a single monochorionic monoamniotic zygote, although an alternative fusion hypothesis has also been proposed. They have a reported incidence of approximately 1 per 50,000 to 200,000 births and are associated with a high burden of stillbirth and early neonatal mortality; nearly half of affected pregnancies end in stillbirth, and up to a third of twins born alive die within the first 24 hours of life [1] [2]. First-trimester ultrasound is now recognized as the most reliable tool for early diagnosis, and cases have been documented as early as 8 to 12 weeks of gestation when performed by an experienced sonographer [1] [3]. In this case, the initial suspicion was appropriately raised at 15 weeks and 4 days at Ketté District Hospital and was subsequently confirmed at the regional hospital, demonstrating that first-line antenatal ultrasound services in rural Cameroon can detect this rare anomaly when performed and interpreted competently. However, the subsequent inconsistency in gestational-age estimates and fetal descriptions across facilities may reflect the challenges of diagnosing and characterizing complex fetal anomalies when access to specialized sonographic expertise is limited. The later interpretation as a normal twin pregnancy may have been particularly consequential, as this reassuring but inaccurate assessment could have reduced the perceived need for specialized referral and contributed to the patient not pursuing the recommended specialized care. Together with the absence of any imaging directed at internal organ sharing, these findings highlight an important limitation of antenatal ultrasound in low-resource settings: access to basic obstetric ultrasound does not equate to access to the detailed anatomical, cardiac, and organ-sharing assessment that is required to counsel a family and to plan delivery and neonatal management [1] [4]. Such assessment typically requires fetal echocardiography, and where available, fetal MRI, both of which were unavailable to this patient throughout her pregnancy.

3.2. The Referral Pathway and the Three-Delays Framework

The trajectory of this pregnancy, from antenatal diagnosis to eventual neonatal death, maps closely onto the classic three-delays framework used to analyze preventable maternal and perinatal mortality in low- and middle-income countries: delay in deciding to seek care, delay in reaching an appropriate facility, and delay in receiving adequate care once a facility is reached [5] [6]. After the diagnosis was confirmed at the regional referral hospital, the patient was directed to a tertiary institution for specialized follow-up and delivery planning but did not follow the referral recommendation; she re-entered the health system only when labor had already begun, at a peripheral health center without the capacity to manage a known complex fetal anomaly. This pattern of loss to follow-up after diagnosis, but before definitive management, is a distinct and under-recognized fourth vul-

nerability that may compound the classic three delays, particularly in settings where long travel distances, transport costs, competing livelihood demands (the patient was an artisanal gold miner), and limited active tracking of high-risk pregnancies make it easy for a woman to disengage from care between antenatal visits [6] [7]. Her second referral, this time from a health center to a district hospital in active obstructed labor, represents exactly the kind of second-phase delay described by Thaddeus and Maine: the eventual outcome depended on how quickly she could physically reach a facility capable of emergency cesarean delivery once labor had started [5]. Structural barriers well documented in the Cameroonian health system, including workforce shortages, inconsistent transport infrastructure, and fragmented communication between peripheral and referral facilities, plausibly contributed to both the initial loss to follow-up and the compressed decision-making window that followed [7] [8].

3.3. Intrapartum Management in Obstructed Labor

Cesarean delivery is the recommended mode of delivery for conjoined twins in the third trimester, given the high risk of dystocia, uterine rupture, and intrapartum death associated with attempted vaginal birth of fused fetal anatomy [1] [4]. The decision for emergency cesarean section in this case, made promptly once obstructed labor was suspected clinically, was therefore appropriate and consistent with published recommendations. The procedure was completed without maternal intraoperative complications, despite the absence of advanced surgical planning that a timely tertiary referral would have allowed. This is comparable to other reported cases from sub-Saharan Africa in which conjoined twins were unmasked only during labor, including a case from Sierra Leone in which thoracopagus twins were diagnosed intraoperatively in the context of eclampsia and obstructed labor without antenatal ultrasound availability [9]. These cases underscore that, even when antenatal diagnosis is achieved, as in the present case, the absence of continuity of care can leave the delivery team managing a rare anomaly under emergency conditions rather than as part of a planned, multidisciplinary approach.

3.4. Neonatal Referral and Transport Failure

The postnatal course of this case illustrates a second, distinct referral failure. Once thoraco-omphalopagus fusion was confirmed at birth, survival depended on rapid transfer to a tertiary center equipped for further evaluation and assessment for potential surgical separation, as has been achieved in comparable low-resource case reports from Uganda and Tanzania where multidisciplinary teams were successfully mobilized after birth [10] [11]. In this case, however, referral was delayed for approximately 36 hours, and when an ambulance eventually arrived, it lacked a neonatal transport incubator or supplemental oxygen. This is consistent with systematic reviews of neonatal transport across sub-Saharan Africa, which describe a pattern of under-resourced referral facilities, absent or informal transport

systems, and neonates arriving at tertiary centers already hypothermic, hypoxic, or in shock as a direct consequence of unsupported transport over long distances [12] [13]. The prolonged transport time in this case, approximately 5 hours to the first referral hospital and 11 hours to the tertiary center, falls well within ranges associated with adverse outcomes in comparable studies, and the development of progressive respiratory distress during transit, without means of oxygen support or monitoring, is a recognized and largely preventable contributor to neonatal death during transfer [12] [13]. It is also notable that abdominal distension, a possible early sign of the suspected imperforate anus, was observed only shortly before referral was initiated. Closer clinical surveillance during the 36-hour waiting period, if combined with earlier access to appropriate transport, might have allowed earlier recognition and intervention.

3.5. Implications for Obstetric and Neonatal Care in Remote Settings

This case demonstrates that the primary diagnostic capability at the point of first contact was not the major limitation, since the anomaly was correctly suspected as early as 15 weeks. Rather, the major challenge was fragmentation of care across a referral chain spanning a district hospital, a regional hospital, a private clinic, a subsequent gap in follow-up, a peripheral health center, a second district hospital, and an ultimately unreachable tertiary center. As a single case, this report cannot establish the relative contribution of this fragmentation versus delayed transfer, uncharacterized shared anatomy, or other neonatal complications to the eventual outcome; the sequence is presented as an illustrative pathway rather than as evidence of a single attributable cause. Comparable analyses of the Cameroonian health system have identified precisely this combination of factors—workforce and equipment shortages, inconsistent availability of comprehensive emergency obstetric and neonatal care outside major towns, and weak inter-facility communication—as persistent drivers of preventable maternal and perinatal mortality [7] [8]. Addressing cases such as this one plausibly requires interventions at several points along the pathway: active tracking and community follow-up of pregnancies flagged with a major fetal anomaly to prevent loss to follow-up after diagnosis; pre-arranged and appropriately counseled transfer to a facility capable of comprehensive emergency obstetric care before labor onset whenever a complex fetal anomaly is suspected; and investment in a functional, adequately equipped neonatal transport system. Even basic measures such as effective thermal protection and battery-powered oxygen delivery, may be particularly important given the presence of available evidence that such low-cost interventions can measurably improve the survival of transported neonates in similar settings [12]. Mobile-health and provider-to-provider communication tools have also shown promise in strengthening the responsiveness of referral networks in rural Cameroon and comparable settings and may offer a pragmatic way to reduce the second and third delays without requiring immediate infrastructure investment [7] [14].

4. Conclusion

This case of thoraco-omphalopagus conjoined twins diagnosed antenatally but lost to follow-up before specialized care could be organized, and ultimately died postnatally during an unsupported neonatal transfer, illustrates how complex congenital anomalies expose the cumulative weaknesses of maternal and neonatal referral systems in remote areas of Cameroon. Early antenatal ultrasound diagnosis, while necessary, is not sufficient on its own to improve outcomes unless it is matched by reliable mechanisms to maintain high-risk pregnancies engaged in care, by pre-emptive referral to comprehensive obstetric and neonatal centers before delivery, and by a functioning, equipped neonatal transport system. Strengthening each link of this chain, rather than focusing on any single point of care, is likely to be the most effective approach to improving outcomes for similarly complex pregnancies managed in low-resource, remote settings.

Ethical Considerations

Written informed consent was obtained from the patient for publication of this case report and any accompanying clinical images. Institutional authorization was obtained from the hospital administration. Ethical review and approval were not required for this single case report in accordance with institutional policy and local regulations.

Author Contributions

MAAG and KEC contributed to the conception, data collection, manuscript preparation, literature review, and final revisions. NYC, contributed to manuscript development and revision. KKF, FNM, and TNN contributed to the literature review and critical revision. All authors approved the final manuscript and agree to be accountable for all aspects of the work. The corresponding author, MAAG, coordinated revisions and communication with the journal.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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