

Anesthesia Management of Premature Omphalopagus Conjoined Twins Undergoing Sedation for Abdominal-Pelvic Magnetic Resonance Imaging: A Case Report and Literature Review

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Case Report

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Abstract

Background

Conjoined twins represent one of the rarest and most physiologically complex presentations in pediatric patients, with omphalopagus fusion involving the anterior abdominal wall from the xiphisternum to the umbilicus occurring in approximately 18–28% of all conjoined twin cases. The perioperative management of such neonates, particularly in the setting of prematurity, demands an individualized approach that integrates shared anatomy, immature organ physiology, and specific challenges imposed by the magnetic resonance imaging (MRI) environment.

Case Presentation:

We report a case of premature female omphalopagus conjoined twins (Twins B and C) born at 34 weeks of gestation as part of a triplet pregnancy complicated by preterm premature rupture of membranes (PPROM). At 43 2/7 weeks post-conceptual age (PCA), two months and seven days of chronological life, the twins were referred to King Faisal Hospital, Kigali, Rwanda, for diagnostic abdominal-pelvic MRI under sedation before elective surgical separation.

Management:

Anesthesia management was conducted by a multidisciplinary team with one anesthesiologist assigned to each twin. Pre-procedural optimization included glycemic control with dextrose 10% infusion and a six-hour fasting period. An atropine circulation test confirmed a hemodynamically separate circulation. Induction was achieved using concurrent intravenous ketamine (0.5 mg/kg) and propofol (1 mg/kg) per twin, supplemented with 100% oxygen via a facial mask. Twin B developed post-induction apnea that required bag-mask ventilation for five minutes before spontaneous breathing resumed. A top-up dose of propofol (1 mg/kg) was required for the Twin C midway procedure, which precipitated a brief apneic episode that required bag-mask ventilation for two minutes.

Outcome:

Abdominal-pelvic MRI was completed within 15 minutes. Both twins were monitored in the recovery unit for six hours, tolerated oxygen weaning and uneventfully resumed trophic feeds. No further sedation-related complications were noted.

Conclusion

This case highlights the critical importance of individualized drug dosing, anticipation of apnea risk in premature post-conceptual neonates, confirmatory testing of a separate circulatory system, anesthesiologist allocation per twin during MRI sedation, and multidisciplinary collaboration for safe outcomes in such rare presentations.

INTRODUCTION

Conjoined twins are a rare and structurally heterogeneous congenital anomaly that arises from incomplete division of the embryonic disc between the 13th and 15th day of post-fertilization development. The estimated global incidence ranges from 1 in 50,000 to 1 in 100,000 live births, with a substantially higher rate among stillbirths and spontaneous abortions, highlighting the intrinsic vulnerability of this condition to perinatal mortality.¹ Female predominance has been consistently reported across large epidemiological series, with a female-to-male ratio approaching 3:1.²

Omphalopagus twins, which account for approximately 18–28% of all conjoined cases, share a ventral fusion extending from the xiphoid process to the umbilical region.^{3–6} This anatomical configuration characteristically involves a common liver and, variably, shared biliary ductal anatomy, contiguous bowel loops, and occasional involvement of the cardiac apex, features that have profound implications for both surgical planning and perioperative anesthetic care. Unlike thoracopagus twins, which almost invariably share cardiac structures, omphalopagus twins tend to have separate hearts, which makes surgical separation feasible in a greater proportion of cases.⁷

The anesthetic management of conjoined twins is inherently complex, requiring simultaneous individualization of pharmacotherapy, airway management, and hemodynamic monitoring for two physiologically interdependent patients with prematurity. These challenges are compounded by immature respiratory drive centers, risks for apnea of prematurity, reduced hepatic metabolic capacity, and increased susceptibility to hypothermia and hypoglycemia.^{8–10} Furthermore, the MRI environment introduces additional constraints. MRI-conditional monitoring equipment, limited physical access to the patient during scanning, and the absence of volatile anesthetic delivery systems within the scanner bore necessitate a TIVA (total intravenous anesthesia) or deep sedation paradigm with meticulous preparation.^{11,12}

Published literature on the anesthetic management of conjoined twins undergoing diagnostic imaging is rare. Most existing reports focus on surgical separation rather than the pre-separation diagnostic workup, leaving a significant knowledge gap regarding the sedation of premature conjoined twins, specifically for MRI. This report describes the successful management of premature omphalopagus conjoined twins, born as part of a triplet gestation complicated by PPRM, who underwent abdominal-pelvic MRI under intravenous sedation at 43 2/7 weeks PCA, and offers a framework for approach in similar future presentations.

CASE PRESENTATION

Obstetric and Perinatal History

Twins B and C were female omphalopagus conjoined twins born to a 22-year-old primigravida (G1P1) with no documented chronic comorbidities and no regular antenatal medications. Pregnancy was defined as spontaneously conceived triplet gestation. The antenatal course was complicated by PPRM, which precipitated preterm delivery at 34 weeks gestation. Cesarean section was performed under spinal anesthesia without intraoperative complications, and no maternal or operative risk factors for neonatal compromise were identified. Twin A, the Singleton co-triplet, was delivered separately and is not the subject of this report.

At delivery, Twins B and C were assigned Apgar scores of 7, 8, and 9 at one, five, and ten minutes of life, respectively, indicating a reassuring though not optimal, immediate postnatal transition. Their combined birth weight was 2.8 kg, consistent with the degree of prematurity and the expected size constraint of a shared intrauterine space in a triplet gestation. The crown-heel lengths (CRL) were 37 cm (Twin B) and 38 cm (Twin C). Both received intramuscular vitamin K prophylaxis at birth and were vaccinated according to the Rwanda National Immunization Program schedule.

Initial Neonatal Intensive Care Unit Admission

Within six hours of delivery (Fig. 1), both twins were transferred to the neonatal intensive care unit (NICU) at King Faisal Hospital, Kigali, Rwanda. On arrival, vital signs demonstrated an oxygen saturation (SpO_2) of 96% on room air, a heart rate of 124 beats per minute (bpm), and a temperature of 36.7°C, all within acceptable neonatal parameters. Intravenous (IV) access was secured via the left foot of Twin B, and baseline investigations were performed. Blood glucose was 51 mg/dL (2.8 mmol/L), indicating borderline neonatal hypoglycemia; IV dextrose 5% with quarter-normal saline (D5/0.25NS) was initiated at 5.8 mL/hour to maintain euglycemia. Prophylactic antimicrobial therapy with intravenous ampicillin (70 mg three times daily) and gentamicin (3 mg/kg/day) was initiated empirically in the context of PPRM-related infection risk.

Supplemental oxygen at 2 L/min via a nasal cannula was initiated, achieving an SpO_2 of 97% on both. By day two of admission, both twins demonstrated clinical stability; fluids were advanced to dextrose 10% at 80 mL/kg/day (4.6 mL/hour), and progressive oxygen weaning was instituted with sustained saturation of 98% at 1 L/min. On day three, trophic enteral feeds of 3–5 mL per feed were initiated via a nasogastric tube (NGT) alongside IV dextrose 10%/0.25NS at 100 mL/kg/day, a standard approach to support enteral adaptation.

By day four of admission, both twins were hemodynamically stable, euglycemic (blood glucose, 81 mg/dL), and successfully weaned from supplemental oxygen. Antibiotics were discontinued because of clinical improvement and stable inflammatory markers. Formula milk supplementation was initiated, as directed by the pediatric surgery team, in preparation for a weight target of 5 kg (combined), before

elective separation. The twins were referred to the district hospital (Kibagabaga Level Two Teaching Hospital) for outpatient growth monitoring and follow-up.

Pre-Imaging Presentation at Two Months, Seven Days of Life

At two months and seven days of chronological life, Twins B and C were again referred to King Faisal Hospital for diagnostic abdominal-pelvic MRI under anesthesia. This imaging was considered essential by the multidisciplinary surgical team to delineate the shared intra-abdominal organ anatomy, define vascular and biliary interconnections, and provide the roadmap necessary for safe surgical separation.

On pre-anesthetic assessment, both twins appeared alert, active, and crying. They were in a face-to-face (ventroventral) orientation with conjoining of the anterior abdominal walls at the midline, incorporating a single shared umbilicus. Physical examination of both twins revealed intact primitive reflexes, symmetrical, soft anterior fontanelles, and normotensive (bilaterally), cardiovascular examination with dual auscultation of regular S1 and S2 heart sounds, no murmurs, gallops, or rubs, and a capillary refill time of less than two seconds in all limbs. Respiratory assessment revealed no signs of distress, bilateral equal air entry, or symmetrical chest wall excursion. The abdomen was fused at the midline with audible bowel sounds in both twins, and both had passed the meconium. The spinal configuration was biconcave and symmetric in both children.

The genitalia were phenotypically female and normal in both the twins. The combined weight at presentation was 5.0 kg (2.5 kg per twin). The airway assessment was clinically unremarkable in both twins, with normal mouth opening, no craniofacial dysmorphism, and no current medications administered.

INVESTIGATIONS

Cranial Ultrasound

Trans-fontanelle neurosonography was performed within six hours of delivery in both twins (Fig. 2&3). The findings were within the normal limits in both neonates, with no evidence of intraventricular hemorrhage, periventricular leukomalacia, parenchymal echogenicity abnormalities, or structural midline anomalies.

Abdominal Ultrasound

Transabdominal ultrasonography performed shortly after birth revealed a shared common liver with apparent continuity of the hepatic parenchyma and biliary system across the conjoined midline. Each twin had a morphologically distinct spleen. Both twins had two kidneys each; however, crossed renal ectopia was identified in Twin C, a finding of embryological significance and surgical relevance, as an aberrant renal position may complicate retroperitoneal dissection during separation. No additional intra-

abdominal masses, urinary tract obstruction, or hydronephrosis was identified in either twin. Notably, echocardiographic assessments were not documented in the initial work-up records.

Laboratory Investigations at Re-Admission

Complete blood count (CBC) and liver function test (LFTs) results were obtained at pre-MRI admission. The results for both twins are summarized in Table 1, with the clinical interpretation below.

Table 1

Complete blood count and liver function parameters for Twins B and C at pre-MRI re-admission, with age-adjusted reference ranges. **AST** = aspartate aminotransferase; **ALT** = alanine aminotransferase; **WBC** = white blood cell count.

Laboratory Parameter	Twin B Result	Twin C Result	Reference Range
Haemoglobin (g/dL)	11.4	10.8	11.5–18.5
WBC (×10 ⁹ /L)	7.51	8.55	5.0–21.0
Platelets (×10 ⁹ /L)	464	510	150–400
Neutrophils (%)	17.4	17.7	30–60%
Lymphocytes (%)	70.8	70.1	30–60%
ALT (IU/L)	22.1	20.0	10.0–50.0
AST (IU/L)	70.1	65.1	10.0–50.0
Serum Creatinine (mg/dL)	0.32	0.26	0.1–0.5
Total Bilirubin (μmol/L)	55	59	0–24 (direct); <200 (total, treated)

The hemoglobin levels of 11.4 g/dL (Twin B) and 10.8 g/dL (Twin C) are consistent with physiological anemia of prematurity. While these values do not independently warrant packed red blood cell transfusion, they are a relevant perioperative consideration; any hemodynamic instability during sedation, including apnea-related hypoxia, would be less well tolerated in the context of reduced oxygen-carrying capacity.

The mildly elevated aspartate aminotransferase (AST) values (70.1 IU/L and 65.1 IU/L for Twins B and C, respectively) in the setting of normal ALT levels are clinically noteworthy. In isolation, moderate AST elevation in a premature neonate sharing a liver with a conjoined twin may reflect hepatocellular stress related to the anatomical peculiarities of shared hepatic blood flow, impaired biliary drainage through a potentially shared biliary system, or residual hepatic immaturity characteristic of preterm births.

Elevated total bilirubin (55 μmol/L in Twin B; 59 μmol/L in Twin C) suggests ongoing cholestasis or prolonged neonatal jaundice, a finding that is not unexpected given the anatomical configuration of a shared biliary system.

Preoperative MRI

Abdominal-pelvic MRI was the index procedure requiring sedation, performed without intravenous contrast, given the age and renal maturity considerations. MRI provided superior soft tissue resolution compared to ultrasound for delineating the extent of shared hepatic parenchyma, course of the portal and hepatic veins, biliary confluence, position of the shared bowel, and anomalous renal anatomy of Twin C. MRI confirmed a shared liver with apparent common biliary drainage, two morphologically separate spleens, and crossed renal ectopia in Twin C, consistent with ultrasound findings.

ANESTHESIA MANAGEMENT

Risk Stratification and Pre-procedural Planning

Anesthetic management of premature conjoined twins for MRI sedation requires structured risk stratification across several physiological domains. The key perioperative risks identified were as follows.

1. **Apnea of prematurity:** At 43 2/7 weeks PCA, both twins remained within the clinically recognized high-risk window for post-anesthetic apnea. Published evidence consistently identifies a PCA of less than 44–46 weeks as a significant independent predictor of post-sedation apnea in former preterm infants.¹³ Immature central respiratory chemoreceptor sensitivity to CO₂ and hypoxia, combined with the respiratory depressant effects of propofol on both central and peripheral respiratory drives, is the most critical safety concern.
2. **Hypoglycemia risk:** Premature neonates have limited glycogen stores, immature counter-regulatory hormonal responses, and heightened glucose utilization during procedural stress. Fasting, while mandatory for airway safety, exacerbates this vulnerability.¹⁴ The borderline glycemia documented on initial NICU admission (51 mg/dL) reinforces the need for proactive perioperative glucose supplementation.
3. **Pharmacokinetic impairment from hepatic immaturity:** Both propofol and ketamine are predominantly metabolized hepatically, propofol via CYP2B6 and glucuronidation, and ketamine via CYP3A4 and CYP2B6. In premature neonates, these pathways are markedly underdeveloped, resulting in prolonged drug half-lives and increased susceptibility to cumulative sedation.¹⁵ The mildly elevated AST and hyperbilirubinemia in both twins further heightened this risk.
4. **Cardiovascular stability under sedative agents:** Propofol causes dose-dependent vasodilation and myocardial depression. In a premature neonate with a potentially narrow cardiac output reserve, even standard induction doses carry the risk of clinically significant hypotension and bradycardia. Ketamine was co-administered specifically for its sympathomimetic properties and stimulation of endogenous catecholamine release to maintain hemodynamic stability at induction.
5. **MRI-specific monitoring constraints:** The MRI environment prevents the use of conventional ferromagnetic monitoring equipment. MRI-compatible pulse oximetry, temperature probes, and capnography are required. Direct physical access to the patient is markedly limited once the scanner

bore is occupied, necessitating that all sedation-related interventions be completed before transferring to the scanner.

Multidisciplinary Team Configuration

A multidisciplinary team was assembled comprising two consultant anesthesiologists (one per twin), a consultant pediatric anesthesiologist providing senior oversight, a nurse anesthetist, and nurses allocated to monitoring, drug preparation, and emergency response. This one-to-one anesthesiologist-to-twin ratio is a cornerstone of safe practice in conjoined twin anesthesia and is consistent with the highest-level recommendations in the literature.⁶ Emergency airway equipment (appropriately sized facemasks, neonatal laryngoscopes, and uncuffed endotracheal tubes in the 2.5–3.5 mm range), emergency resuscitation drugs, and a defibrillator were present and immediately accessible in the induction room.

Preoperative Preparation and Fasting

Both twins fasted for six hours from breast or formula milk in accordance with current perioperative fasting guidelines for infants, which recommend a minimum two-hour fast from clear liquids and a four-to-six-hour fast from breast milk or formula.¹⁶ Written informed consent was obtained from the parents before sedation, with a thorough explanation of the risks specific to prematurity and shared anatomy. Dextrose 10% was infused at 80 mL/kg/day throughout the periprocedural period to maintain normoglycemia. Both twins were normothermic (36.7°C) at the time of assessment and maintained in a thermoneutral environment to prevent cold stress-induced metabolic demand and apnea. IV access was secured in the right foot of Twin B and left arm of Twin C to ensure independent venous access for each twin.

Circulatory Independence Testing

A critical pre-sedation step is the pharmacological assessment of circulatory independence using intravenous atropine. The rationale for this test is well-established: in conjoined twins with potential vascular interconnections, even when expected to be hemodynamically separate based on anatomical classification, a drug administered to one twin may cross via shared circulation and induce a pharmacological response (e.g., tachycardia) in the other.¹⁶ Atropine at 0.02 mg/kg IV was administered to Twin B. The absence of a corresponding heart rate response in Twin C confirmed that the twins had no significant hemodynamic circulation connection. This finding enabled independent drug dosing based on individual body weight (2.5 kg per twin) and informed the team that pharmacological interventions in one twin would not directly alter cardiovascular function in the other twin.

Induction of Sedation

Baseline vital signs immediately prior to induction recorded a heart rate of 159 bpm and SpO₂ of 98% on room air for Twin B, and a heart rate of 155 bpm and SpO₂ of 97% on room air for Twin C. These values were within the expected ranges for age and level of alertness.

Induction was performed using concurrent IV ketamine 0.5 mg/kg and IV propofol (1 mg/kg) for each twin, administered simultaneously via their respective IV lines. Both twins received supplemental oxygen at 3 L/min via appropriately sized pediatric facial masks throughout induction and maintenance (Fig. 4). The rationale for this drug combination was deliberate: ketamine's dissociative analgesia and sympathomimetic effect counterbalance propofol's vasodepressant properties, while propofol's rapid onset and short context-sensitive half-life are advantageous for procedural sedation in an imaging environment requiring immobility without prolonged recovery.¹⁷ The doses employed were intentionally conservative relative to standard induction doses (propofol typically 2–3 mg/kg; ketamine 1–2 mg/kg IV), reflecting the anticipated pharmacokinetic prolongation at this PCA.

Intraoperative Events and Management

Approximately two minutes after induction, Twin B developed apnea associated with an SpO₂ decrease to 55%, a clinically critical desaturation. Immediate bag-mask ventilation was initiated by the designated anesthesiologist Twin B, achieving SpO₂ recovery of 98% within approximately five minutes, after which spontaneous respiratory effort resumed. Throughout this event, Twin C remained hemodynamically stable with normal vital signs, confirming the validity of the atropine circulation test and underscoring the importance of dedicated per twin anesthesia personnel. Both twins were then transferred to an MRI suite.

Midway through imaging, Twin C showed signs of lightening sedation (spontaneous movement causing motion artifacts) and interrupted imaging. A supplemental intravenous propofol bolus (1 mg/kg) was administered. This was followed within minutes by a brief apneic episode on Twin C, managed with bag-mask ventilation for approximately two minutes before spontaneous breathing resumed. The sequence of events in Twin C precisely recapitulated the pattern observed in Twin B at induction and was consistent with the pharmacokinetic profile of propofol in premature neonates, which undergoes significantly slower redistribution and clearance, leading to delayed but cumulative respiratory depression with repeated or top-up dosing.

4.7 Post-procedural Recovery

The MRI procedure was completed 15 minutes after the top-up dose. Both twins were transferred to the post-anesthesia care unit (PACU), where they were monitored for six hours with continuous SpO₂, heart rate, and temperature surveillance. Supplemental oxygen was gradually weaned, and both twins tolerated room air without desaturation or further apneic episodes. Trophic enteral feeds were resumed at the usual volume, without signs of feeding intolerance. No other sedation-related adverse events were observed during the observation period.

DISCUSSION

This case represents a rare intersection of several high-acuity clinical challenges: anesthetic management of premature conjoined twins, specific complexities of omphalopagus anatomy, MRI

environment, and compounding vulnerabilities of triplet gestation complicated by PPRM. To our knowledge, cases reporting the sedation of premature omphalopagus conjoined twins specifically for preoperative MRI rather than surgical separation itself are exceptionally uncommon in peer-reviewed literature, and this report contributes a detailed protocol to this sparse evidence base.

Classification of conjoined twins by fusion site has direct implications for anesthetic management. Thoracopagus twins share cardiac structures in up to 75% of cases, making separation frequently non-viable and anesthesia fraught with cardiovascular risk.³ Omphalopagus twins, by contrast, have a substantially better prognosis: the shared structures are predominantly abdominal, typically the liver, and variably the biliary system, with the heart and great vessels almost always anatomically separate.⁷ The clinical implication is that while cardiovascular collapse from direct cardiac involvement is unlikely in omphalopagus twins, shared hepatic blood flow introduces distinct pharmacokinetic complexity. Drug metabolism is not simply a matter of individual liver mass; it depends on the functional capacity of hepatocytes, which in this case are shared across a vascular boundary that may be asymmetric, creating unpredictable drug clearance profiles. The elevated AST values documented in both twins reflect this hepatic stress and support the conservative drug dosing strategy.

Both twins fulfilled the criteria for an elevated risk of postanesthetic apnea. The seminal work by Côté et al. demonstrated that the incidence of post-anesthetic apnea in former preterm infants decreases with increasing PCA, but remains clinically significant until at least 44 weeks PCA, and, in some studies, up to 60 weeks PCA when gestational age at birth was earlier than 32 weeks.¹³ At 43 2/7 weeks PCA with a gestational age at birth of 34 weeks, our patients were squarely within this window. Therefore, the occurrence of post-induction apnea in Twin B (SpO₂ 55%) and post-top-up apnea in Twin C is not an incidental finding, but rather a predictable physiological consequence of sedative exposure in premature neonates.

Propofol exerts its respiratory depressant effect primarily through activation of GABA^A receptors in the pre-Bötzinger complex of the medullary respiratory rhythm generator, as well as through peripheral carotid body depression, a mechanism of particular relevance in premature neonates who rely more heavily on peripheral chemoreceptor drive.¹⁸ Ketamine, although generally considered less respiratory depressant than propofol, can still precipitate apnea at higher doses or when combined with other CNS depressants, particularly in neonates. The combined use of both agents, even at conservative doses, increases the risk. A strong case can be made for the use of dexmedetomidine as an alternative or adjunct in future cases: its sedative action through central alpha² agonism has a distinctly more favorable respiratory profile, and evidence for its use in neonatal procedural sedation is growing.¹⁹

The atropine circulation test, the pharmacological determination of circulatory independence, is a critical and frequently underreported step in conjoined twin anesthesia.¹⁰ Its importance is two fold: first, it allows confirmation that drug dosing can be truly individualized; second, it identifies the rare scenario in which significant circulatory mixing exists, which necessitates an entirely different dosing strategy,

potentially halving or otherwise modifying the dose, given that both twins would receive the drug from a single administration. In our case, a negative test (no heart rate response in Twin C to atropine administered to Twin B) enabled independent weight-based dosing at 2.5 kg per twin, which is essential given the narrow therapeutic window of both propofol and ketamine in premature neonates.

In the broader context of shared hepatic circulation and immature CYP enzyme systems, the decision to use doses at the low end of the recommended range (propofol 1 mg/kg vs. the standard 2–3 mg/kg; ketamine 0.5 mg/kg vs. 1–2 mg/kg) was both appropriate and evidence-based. Neonatal propofol pharmacokinetics are characterized by a larger volume of distribution, slower clearance, and prolonged terminal half-life compared with older infants and children, all of which favor accumulation and delayed awakening with standard dosing regimens.^{20,21}

The MRI suite presents unique challenges that are magnified in conjoined twin anesthesia. Conventional anesthesia workstations with vaporizers are incompatible with high magnetic fields. Total intravenous anesthesia (TIVA) with MRI-compatible infusion pumps is the standard of care, but even MRI-compatible equipment requires validation of safe function within the specific field strength of the scanner being used.¹¹ The limited physical access to patients once inside the scanner bore means that any respiratory compromise detected on remote monitoring will require immediate patient extraction before intervention, a maneuver that is more complex in conjoined twins given their combined size and the requirement for coordinated team movement. In our case, both apneic events occurred in the induction room and during the scanning phase and were managed promptly; however, this case highlights the absolute requirement for remote continuous capnography and pulse oximetry in this setting.

The obstetric context of triplet pregnancies with PPROM adds further concern to the clinical picture. PPROM before 34 weeks of gestation is associated with an increased risk of neonatal infection (from ascending chorioamnionitis), pulmonary hypoplasia from oligohydramnios-induced lung compression, and neurodevelopmental impairment from both hypoxic-ischemic and inflammatory mechanisms.²² Although our patients appeared clinically well without overt signs of sepsis at the time of MRI, the systemic inflammatory environment of PPROM may have contributed to the elevated AST values and the relative neutropenia observed on CBC, which are consistent with a recovering inflammatory response rather than active sepsis. Triplet gestations inherently carry an increased risk of intrauterine growth restriction, preterm birth, and low birth weight, all of which are evident in this case.²³

The absence of a documented echocardiogram during the initial and pre-sedation workups represents the most significant clinical gap in this case. While omphalopagus classification predicts cardiac separation, echocardiography remains mandatory for several reasons: to exclude a shared pericardial sac (which, if present, influences hemodynamic interdependence during sedation), to identify congenital heart defects that are more prevalent in conjoined twins than in the general population, and to assess biventricular function prior to pharmacological cardiac stress from sedative agents.^{24,25} We recommend that formal echocardiographic evaluation, ideally including color Doppler assessment of cross-

circulatory flow, be integrated into the standardized pre-sedation checklist for all conjoined twin presentations, regardless of classification.

Strengths and Limitations

This case report had several strengths. First, it documents a rare clinical scenario, premature omphalopagus conjoined twins from a triplet gestation undergoing MRI sedation in a resource-limited sub-Saharan African setting, thereby contributing a geographically and clinically underrepresented perspective to the global literature on conjoined twin management. Second, the report provides a longitudinal clinical narrative spanning delivery, NICU stabilization, and presurgical imaging, offering a comprehensive view of the multidisciplinary continuum of care rather than an isolated procedural snapshot. Third, explicit documentation of the atropine circulatory independence test is a critical but frequently under-reported step, adding procedural details that are directly reproducible and clinically instructive for practitioners facing similar cases. Fourth, individualized weight-based pharmacology with per-twin dedicated anesthesiologist coverage was rigorously applied, reflecting best practice standards and providing a replicable framework. Fifth, the transparent reporting of adverse intraoperative events (apnea in both twins) and their successful management enhances the educational value of the report and supports honest scientific communication in accordance with the CARE guidelines.

Conversely, several limitations of this report merit acknowledgement. First, formal continuous capnography was not documented during MRI scanning, representing a monitoring gap at the most vulnerable phase of the procedure; end-tidal CO₂ surveillance would have provided earlier detection of hypoventilation preceding overt apneic episodes. Second, post-procedural blood glucose values during the six-hour recovery period have not been reported, precluding the objective assessment of glycemic maintenance despite ongoing dextrose infusion. Third, post-procedure neurological surveillance beyond bedside clinical observation was not performed, leaving the neurodevelopmental implications of the two apneic events and the associated transient hypoxia in Twin B (SpO₂ nadir, 55%) incompletely characterized. Fourth, the absence of formal echocardiography limited the completeness of the cardiac risk profile. Finally, as a single-center case report, generalizability is inherently constrained; prospective multi-institutional registries of conjoined twin anesthesia cases would substantially advance the evidence base in this rare field.

CONCLUSION

The successful sedation of premature omphalopagus conjoined twins for preoperative abdominal-pelvic MRI is achievable with meticulous multidisciplinary planning, conservative and individualized pharmacology, and careful anticipation of physiological vulnerabilities due to prematurity. The predictable occurrence of post-sedation apnea in both twins managed promptly with bag-mask ventilation shows that this is not a complication, but an expected physiological response that should be prepared for routine use in this population. The pharmacological atropine test for circulatory independence is a mandatory and under-recognized step in conjoined twin anesthesia that enables safe

individualized dosing. Furthermore, shared hepatic anatomy and immature drug metabolism necessitate dosing at the conservative end of the published ranges, with a low threshold for prolonged post-procedural monitoring. This case serves as a useful clinical reference for anesthesiologists, neonatologists, and pediatric surgeons managing conjoined twin presentations in resource-limited settings.

Declarations

Ethics Statement

Ethical approval for the reporting and publication of this case was obtained from the Institutional Review Board of King Faisal Hospital, Kigali, Rwanda. Written informed consent was obtained from the parents of the patients before publication, including consent for the use of de-identified clinical data and photographs. This Case Report was prepared in accordance with the CARE (Case Report) guidelines.

Clinical Trial Number

Not Applicable

Data Availability

De-identified clinical data supporting the findings of this case report are available from the corresponding author upon reasonable request.

Author Contributions

UJB: Clinical management, Methodology, Project administration, patient consent coordination, and supervision. **RI:** Supervision, Investigation, Resources, Writing -review and editing **KE:** Methodology, Data curation, Literature review, formal analysis, and writing–original draft. **IM:** Data collection, Visualization, Investigation, and Writing of the original draft. **IS:** Literature review, investigation, resources, writing review, editing, supervision. **KNJ:** Conceptualization, Validation, and Supervision

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Conflicts of Interest

The authors declare no conflicts of interest.

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Figures



Figure 1

Clinical Photograph omphalopagus conjoined twins (Twin B and Twin C) at six hours of life, taken at initial neonatal intensive care unit (NICU) admission.



Figure 2

Trans-fontanelle neurosonography image of Twin B, which was performed within six hours of delivery. It demonstrates normal parenchymal echogenicity.



Figure 3

Trans-fontanelle neurosonography image of Twin C, which was performed within six hours of delivery. It demonstrates normal parenchymal echogenicity.



Figure 4

Twins B and C, following induction of sedation in the induction room, prior to transfer to the MRI suite. Note the face-to-face positioning, independently placed IV access sites, and supplemental oxygen delivery via individualized paediatric facemasks.