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Clinical Management and Public Health Implications of Multiple Birth Deliveries: An Interdisciplinary Approach Integrating Gynecology, Family Medicine, Radiology, and Anesthesia

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Abstract

Background: Multiple birth deliveries, particularly twin and higher-order gestations, are associated with substantially increased maternal and perinatal risks compared with singleton pregnancies. These risks necessitate specialized antenatal surveillance, individualized delivery planning, and coordinated intrapartum management. Despite advances in obstetric care, optimal timing and mode of delivery in multifetal pregnancies remain complex and dependent on several clinical factors.

Aim: This article aims to review and synthesize current evidence on the clinical management of multiple birth deliveries, with emphasis on delivery timing, mode of birth, multidisciplinary preparation, and intrapartum techniques to optimize maternal and neonatal outcomes.

Methods: A narrative, evidence-based review was conducted integrating data from randomized controlled trials, observational studies, and professional guidelines. The analysis focused on twin gestations stratified by chorionicity and amnionicity, as well as higher-order multiple pregnancies, addressing indications, preparation, personnel requirements, delivery techniques, and complications.

Results: Evidence supports a risk-stratified approach to multiple birth delivery. Planned vaginal delivery is safe in carefully selected twin pregnancies where the leading twin is cephalic and no contraindications exist, while cesarean delivery is generally favored for monochorionic monoamniotic and higher-order gestations. Intensive antenatal surveillance, intrapartum ultrasound, and multidisciplinary readiness are critical to favorable outcomes.

Conclusion: Individualized planning grounded in placental characteristics, fetal presentation, and institutional expertise is central to safe and effective multiple birth delivery.

Keywords: Multiple pregnancy, twin delivery, chorionicity, vaginal delivery, cesarean section, obstetric management.

Introduction

Multifetal gestations, particularly twin and higher-order pregnancies, confer substantially greater maternal and perinatal risks compared with singleton pregnancies, necessitating nuanced intrapartum planning and vigilant clinical oversight. Population data from 2021 indicate that twin births occurred at a rate of 21.3 per 1,000 live births, while triplet and higher-order gestations were recorded at 80 per 100,000 live births, underscoring both the epidemiologic significance and the clinical complexity of these pregnancies [1]. Against this backdrop, the optimal route of delivery for twin gestations has been a subject of sustained debate. Contemporary guidance from the American College of Obstetricians and Gynecologists (ACOG) emphasizes that the mere presence of a twin gestation does not, in and of itself, constitute an indication for cesarean delivery, thereby reinforcing the potential appropriateness of planned vaginal birth under specific conditions [2]. Even so, the determination of candidacy for vaginal delivery in twin pregnancies is multifactorial and must account for unique intrapartum risks, including the possibility of a

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change in presentation of the second twin after delivery of the first, acute placental abruption precipitated by rapid uterine decompression, cord prolapse, and alterations in cervical dilation dynamics that may complicate or delay the birth of the second twin [3]. The evidentiary landscape has been meaningfully shaped by the Twin Birth Study, the first large randomized controlled trial to directly compare outcomes between planned vaginal birth and planned cesarean delivery in twin gestations. Crucially, the trial demonstrated no increase in neonatal morbidity or mortality associated with planned vaginal delivery relative to cesarean section, provided that stringent selection criteria and intrapartum management protocols were observed [4]. This finding has lent support to a selective approach in which vaginal delivery is considered a safe and reasonable option for appropriately screened patients. Nonetheless, twin delivery presents persistent operational challenges for obstetric teams, particularly in the real-time monitoring of two fetuses during labor, the need for coordinated multidisciplinary readiness, and the technical facility required to perform maneuvers for the delivery of the second twin in scenarios such as non-vertex presentations or evolving fetal distress. These practical considerations underscore why decision-making for twin birth extends beyond theoretical safety profiles to encompass the resources, expertise, and timely responsiveness of the care environment.

Importantly, not all individuals with twin gestations should pursue a trial of labor. Patient preference is a foundational prerequisite; a planned vaginal birth presupposes an informed desire to attempt labor and a willingness to accept the contingencies of intrapartum management that may include operative assistance or emergent conversion to cesarean delivery if maternal or fetal conditions warrant it. Anatomical and fetal presentation criteria are equally central: the leading twin must be cephalic to render vaginal birth a clinically acceptable option, and significant intertwin growth discordance—generally defined as more than a 20% discrepancy in estimated fetal weight—contraindicates planned vaginal delivery due to the elevated risk profile in such pairings [2]. The framework for exclusion also mirrors that of singleton gestations, insofar as absolute contraindications to vaginal delivery in singletons carry over to twin pregnancies. These include, but are not limited to, umbilical cord prolapse, a vertical (classical) uterine incision from prior surgery, placenta previa or placenta accreta spectrum disorders, active genital herpes infection at the time of labor, and evidence of fetal intolerance to labor, each of which independently necessitates reconsideration of delivery route toward cesarean section to optimize maternal and neonatal outcomes [5][6][7]. Consequently, the delivery plan in twin gestations is inherently individualized, grounded in the chorionicity and amnionicity of the pregnancy, the fetal presentations, the presence or absence of growth discordance and other comorbidities, and the evolving maternal–fetal status proximal to delivery. Clinical judgment must integrate antenatal assessments with intrapartum developments, including continuous fetal heart rate surveillance for both twins and readiness for prompt intervention should complications arise after the birth of the first twin. The second stage of twin delivery, in particular, requires heightened preparedness for rapid re-evaluation of fetal lie, timely decision-making regarding internal podalic version or breech extraction where appropriate and within the operator's skill set, and clear thresholds for expediting delivery to preempt hypoxic injury. The capacity to execute these maneuvers safely depends on operator experience, institutional protocols, and immediate availability of anesthesia and surgical backup.

Taken together, the current evidence base and clinical guidelines support a pragmatic, risk-stratified approach to twin delivery. While twin gestation alone does not mandate cesarean birth, eligibility for a trial of labor is contingent on stringent selection criteria and the presence of a care team adept at the specialized surveillance and delivery techniques unique to multifetal intrapartum care [2][3][4]. The Twin Birth Study's findings provide reassurance about neonatal outcomes with planned vaginal delivery under controlled conditions, yet they do not obviate the need for individualized planning and robust intrapartum readiness [4]. Ultimately, safe and effective management hinges on aligning patient preferences with clinical indications, ensuring cephalic presentation of the leading twin, excluding contraindications common to all vaginal births, and calibrating the delivery strategy to twin type and maternal–fetal status at the time of labor and delivery [2][5][6][7]. This integrated, criterion-based model enables obstetricians to navigate the complexities of twin birth while striving to achieve optimal outcomes for both mother and infants.

Indications

Delivery planning for twin gestations must be individualized and is fundamentally informed by chorionicity and amnionicity, as these biological characteristics drive both antenatal surveillance requirements and intrapartum risk profiles. Specifically, clinical pathways diverge for monochorionic monoamniotic, monochorionic diamniotic, and dichorionic diamniotic twins, and an understanding of the underlying placentation and its attendant complications is essential to optimizing both fetal and maternal outcomes. For an expanded discussion of the mechanisms of twinning and the principles of prenatal care that precede delivery planning, the comprehensive overview in StatPearls "Twin Births" offers a foundational context that

complements the guidance summarized here [8]. Across all twin types, timing and mode of delivery are calibrated to balance the risks of prematurity against the hazards of continued gestation, including cord-related events, placental pathophysiology, and the evolving burden of maternal comorbidities. The resulting recommendations are thus not static prescriptions but carefully staged, evidence-informed plans that integrate antenatal findings, maternal–fetal status, facility capabilities, and patient-centered preferences. Monochorionic monoamniotic (mo–mo) twins represent the least common configuration of twin gestations and carry the highest perinatal risk. With an estimated incidence of approximately 8 per 100,000 pregnancies, mo–mo twins pose distinctive challenges that stem from sharing both a single placenta and a single amniotic sac, conditions that predispose to a spectrum of potentially catastrophic complications [9][10][11]. Reported perinatal mortality rates in this group range from 30% to 40%, reflecting cumulative risks that include major congenital anomalies, twin reversed arterial perfusion sequence (a-cardiac twinning), twin–twin transfusion syndrome, cord entanglement due to the absence of an intertwin membrane, and acute intertwin transfusion or vascular accidents that can occur without warning [9][10][11]. In this context, delivery timing and mode are guided by the central objective of mitigating these unique hazards while minimizing iatrogenic prematurity. Antenatal surveillance is deliberately intensive: serial ultrasonographic evaluations should begin at 16 weeks' gestation to monitor fetal growth patterns and assess amniotic fluid, expanding to weekly ultrasound assessments at 28 weeks as the pregnancy progresses toward the critical window of delivery planning [12][13]. This escalation in testing cadence recognizes the rising risk of acute events in the late second and third trimesters and may be carried out as either inpatient or closely monitored outpatient care, depending on local resources, maternal–fetal stability, and the risk–benefit calculus derived from clinical judgment [13]. For mo–mo gestations that remain uncomplicated under close observation, expert consensus supports delivery between 32 0/7 and 34 0/7 weeks, a window that attempts to preempt sudden intrapartum or late antepartum cord accidents while conferring the maturational advantages afforded by third-trimester gestation [12]. Mode of delivery for mo–mo twins remains an area of ongoing debate. Many centers prefer a planned cesarean section owing to the high perceived likelihood of cord entanglement and unpredictable fetal heart rate abnormalities during labor. Nevertheless, small, single-center studies—each with fewer than 50 participants—have documented selected cases of successful vaginal birth under stringent criteria and expert intrapartum management, suggesting that route of delivery may be individualized in highly controlled settings with experienced teams and continuous readiness for operative intervention [14][15]. The limited size and setting of these studies, however, preclude broad generalization, and the preponderance of practice continues to favor cesarean delivery for risk containment in mo–mo pregnancies.

Monochorionic diamniotic (mo–di) twins, who share a placenta but not an amniotic sac, constitute approximately one in five twin pregnancies and occupy an intermediate position on the risk spectrum [16]. The shared chorion creates vascular anastomoses within the placenta and thereby introduces a class of complications—most notably twin–twin transfusion syndrome and related hemodynamic imbalances—that collectively affect an estimated 15% of mo–di gestations [17]. Surveillance protocols for mo–di twins seek to detect these complications early and to track fetal growth trajectories and amniotic fluid profiles longitudinally. As with mo–mo twins, serial ultrasounds should commence at 16 weeks to evaluate growth and fluid discordance, with testing frequency modulated by evolving findings and maternal–fetal well-being [12]. For uncomplicated mo–di pregnancies, delivery is typically planned between 34 0/7 and 37 6/7 weeks in order to mitigate the rising risks of late gestational complications while avoiding unnecessary prematurity [18]. When isolated fetal growth restriction is identified—an indicator of placental insufficiency or discordant perfusion—earlier delivery between 32 0/7 and 34 6/7 weeks is warranted to balance fetal safety with developmental maturity [18]. If delivery is anticipated before 34 weeks, administration of a complete course of antenatal corticosteroids within seven days of the planned birth is recommended to enhance fetal lung maturity and reduce neonatal respiratory morbidity [19]. For deliveries after 34 weeks, evidence remains inconclusive regarding the net benefit of antenatal corticosteroids in twin gestations. Although the ALPS trial demonstrated clinically meaningful advantages of steroids for late preterm infants in general, data are insufficient to extrapolate these benefits uniformly to multifetal pregnancies, and practice is therefore individualized in this gestational interval [20]. Regarding route of delivery, mo–di twins are appropriate candidates for planned vaginal birth when the leading twin presents cephalically, estimated fetal weight discordance remains below 20%, and no independent contraindications to vaginal birth are present. The Twin Birth Study provides further reassurance by demonstrating comparable rates of neonatal morbidity and mortality between planned vaginal delivery and planned cesarean section under these selection criteria and with rigorous intrapartum monitoring, thereby validating a trial of labor in carefully chosen mo–di cases [3].

Dichorionic diamniotic (di–di) twins—each with their own placenta and amniotic sac—comprise the most common and least complicated category of twin pregnancies, yet they still require structured

surveillance and purposeful delivery timing to optimize outcomes. In otherwise uncomplicated di–di pregnancies, weekly antenatal testing is advised beginning at 36 0/7 weeks and continuing until delivery, a strategy aimed at early identification of late-gestation complications such as growth deceleration, oligohydramnios, or evolving hypertensive disease [21]. In the absence of complicating factors, delivery is generally scheduled between 38 0/7 and 38 6/7 weeks to minimize the risk of stillbirth and late complications while preserving neonatal maturity [18]. The presence of isolated fetal growth restriction shifts this calculus earlier, with delivery recommended between 36 0/7 and 37 6/7 weeks to reduce the hazards of prolonged intrauterine exposure to suboptimal placental function [18]. When di–di twins are complicated by fetal growth restriction accompanied by abnormal uterine artery Doppler studies—indicative of heightened placental vascular resistance—or by maternal conditions such as preeclampsia that meaningfully increase maternal–fetal risk, delivery is appropriately advanced to the interval between 34 0/7 and 36 6/7 weeks, balancing maternal stabilization, fetal well-being, and prematurity-related outcomes [18]. With respect to mode of birth, the American College of Obstetricians and Gynecologists supports vaginal delivery for di–di twins when no contraindications are present, aligning practice with evidence that morbidity profiles remain favorable under appropriate intrapartum management and monitoring [2]. This position underscores the principle that twin gestation alone does not mandate cesarean delivery; rather, the clinical context and standard obstetric contraindications guide decision-making.

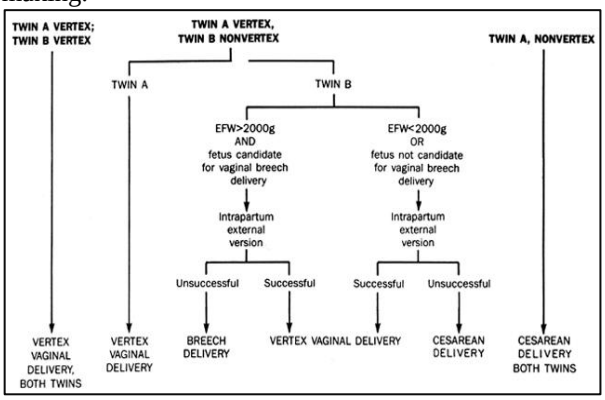

Fig. 1: Multiple Gestation.

Higher-order multiple gestations—triplets and beyond—are rare in contemporary obstetric practice but entail a markedly elevated complexity and risk burden, including amplified chances of prematurity, growth restriction, and intrapartum events related to cord entanglement and malpresentation [22]. In these pregnancies, the absence of a universally applicable antenatal testing protocol reflects the heterogeneity of clinical scenarios and the need for bespoke monitoring strategies tailored to chorionicity, amnionicity, maternal comorbidities, and fetal conditions. Accordingly, delivery timing and surveillance are individualized, with multidisciplinary teams calibrating intensity and frequency of assessments to the evolving risk landscape [2]. In contrast to many twin scenarios, the recommended mode of delivery for triplets and higher-order multiples is cesarean section, a strategy adopted to reduce the risk of acute intrapartum complications such as cord prolapse and intertwin cord accidents that are difficult to anticipate and manage safely during labor in the context of three or more fetuses [2]. This approach prioritizes intrapartum control and rapid access to the fetuses, acknowledging that the logistical and physiological complexities of higher-order births exceed the safe operating parameters of planned vaginal delivery in almost all settings. Across these categories, several cross-cutting principles shape indications for timing and route of birth. First, antenatal surveillance escalates with the degree of shared placentation and the presence of fetal or maternal complications, with earlier and more frequent evaluations in monochorionic gestations due to the risks inherent in shared chorionic vasculature [12][17]. Second, delivery timing seeks a developmental sweet spot—early enough to preempt sudden, placentation-driven events or deterioration in maternal status, yet late enough to confer maturity benefits that reduce neonatal morbidity. This delicate balance yields narrower delivery windows for mo–mo and complicated mo–di twins and later windows for otherwise uncomplicated di–di twins [12][18][21]. Third, the route of delivery is guided not by plurality alone but by a matrix of factors including leading twin presentation, intertwin growth relationships, the presence of obstetric contraindications to labor, and the availability of experienced intrapartum teams. Evidence from randomized and observational studies supports a trial of labor for selected mo–di and di–di pregnancies when criteria are met, while mo–mo and higher-order gestations typically warrant a planned cesarean to mitigate unique intrapartum hazards [2][3][14][15]. Finally, the administration of antenatal corticosteroids is tailored to gestational age and multiplicity, with strong support before 34 weeks and a more nuanced, case-specific approach thereafter in twin gestations due to the current evidence base [19][20].

In practice, these indications translate into dynamic, iterative care plans that are revisited at each antenatal assessment and adapted to new clinical information. For mo–mo twins, the high baseline risk necessitates vigilant monitoring beginning in mid-gestation and culminates in preterm delivery within a narrow window aimed at preventing catastrophic cord-related events [12][13]. For mo–di twins, surveillance is directed at early detection of placental

anastomosis–related complications, with delivery timing responsive to growth patterns and fluid assessments, and with mode of delivery determined by presentation and growth symmetry within well-defined thresholds [12][18]. For di–di twins, the relative physiologic independence of each fetus permits later delivery in uncomplicated scenarios, while common obstetric complications or growth restriction prompt earlier intervention to safeguard fetal outcomes [18][21]. In higher-order gestations, the decision matrix is shaped by the amplified risks of intrapartum events and prematurity, leading to individualized surveillance and a default to cesarean delivery to maximize intrapartum control and fetal safety [2][22]. Across all scenarios, multidisciplinary readiness—encompassing obstetrics, anesthesia, neonatology, and nursing—is indispensable, ensuring that when indications for delivery are met, the transition from surveillance to birth proceeds within a system prepared to address the distinctive demands of multifetal delivery safely and efficiently.

Personnel

The management of a multiple birth delivery requires a coordinated, multidisciplinary team to ensure maternal and neonatal safety. A physician must be present during the vaginal delivery of a twin pregnancy, as there is a significant risk of complications necessitating conversion to a cesarean section. Midwives may assist during vaginal delivery if the patient requests their involvement, providing direct support and monitoring throughout labor. Nursing staff play a critical role in maternal care, including monitoring vital signs, administering medications, and assisting with positioning and comfort measures. Neonatal care is essential, with a neonatologist responsible for the immediate assessment of each twin and separate NICU teams prepared to manage any complications. Surgical scrub technicians, anesthesiologists, and anesthesia technicians provide critical support during cesarean deliveries, ensuring sterile technique, safe anesthesia administration, and readiness for emergency interventions. Additional personnel, such as a family member or doula, may offer emotional support and coaching to the patient, following hospital policies and enhancing overall maternal satisfaction and safety during delivery.

Preparation

Comprehensive preparation for the delivery of twins begins at the time of admission and entails a systematic, multidisciplinary approach that aligns patient-centered preferences with rigorous clinical safeguards. A thorough history and physical examination should be completed upon presentation, with clinicians documenting in detail the patient's obstetric history, including prior pregnancies and deliveries, complications, and outcomes; medical comorbidities with potential obstetric implications; surgical and gynecologic histories that may influence intrapartum management; and relevant family and social histories that confer risk or require tailored counseling. This intake also provides the opportunity to review and confirm the patient's birth plan, fostering shared decision-making and ensuring that the care team understands the patient's preferences regarding anesthesia strategies, the timing and approach to umbilical cord clamping, the intended location of delivery within the facility, and the choice of support person(s) permitted to be present. A medication reconciliation must be conducted at admission to guarantee continuity of essential therapies and to identify agents that may interact with intrapartum medications or affect neonatal outcomes. Equally, a precise account of drug allergies and the nature of any prior reactions should be recorded to guide safe peripartum prescribing and prophylaxis. In parallel with this clinical assessment, informed consent processes should be completed with careful attention to the distinctive contingencies of twin birth. Hospital consent forms require a clear exposition of the benefits, alternatives, and risks associated with both vaginal delivery and cesarean section, as well as the potential need for blood transfusion. Patients should be counseled that even in a planned vaginal birth, the delivery of the second twin can necessitate maneuvers such as internal podalic version or breech extraction, and that operative vaginal delivery—using forceps or vacuum—may be indicated if maternal or fetal conditions warrant expedited birth. The discussion must also articulate the maternal and fetal indications for intrapartum conversion to cesarean section, framing this not as a failure of the initial plan but as a patient-safety–driven response to evolving conditions. The material risks of cesarean delivery, including surgical injury, hemorrhage, infection, thromboembolic events, and implications for future pregnancies, should be addressed candidly and in language suited to the patient's health literacy. Finally, clinicians should ascertain whether the patient is willing to accept blood products in an emergency, and the consent dialogue should explain the risks of transfusion, including immunologic reactions and the (low but nonzero) risk of transmissible infections, alongside the potentially life-saving benefits in the setting of obstetric hemorrhage.

Standard intrapartum preparation also involves ensuring reliable venous access and baseline laboratory evaluation. Intravenous access should be established at a minimum of one site, with consideration for a second line in patients at elevated risk of hemorrhage or operative intervention. Initial laboratory tests typically include a complete blood count (CBC) to assess hemoglobin concentration and platelet count, and a blood type and screen to expedite transfusion compatibility should the need arise. Prenatal laboratory results should be reviewed meticulously to confirm the status of infectious disease screening and immunohematologic factors;

where indicated, intrapartum prophylaxis for Group B Streptococcus should be initiated with penicillin according to established protocols. Point-of-care or bedside ultrasonography should be performed to confirm fetal presentations and to evaluate amniotic fluid volumes, as these findings directly inform delivery planning and sequencing. Given the heightened risk of postpartum hemorrhage in multifetal gestations, a dedicated postpartum hemorrhage kit should be available and verified in the delivery room prior to the onset of the second stage. The kit should contain uterotonic agents in ready-to-administer forms, including misoprostol 200 mcg tablets, oxytocin 10 U, methylergonovine 0.2 mg, and 15-methyl PGF 2α 0.25 mg ampules, with clear labeling and dosing guidance for rapid deployment in a hemorrhagic emergency. In addition, access should be assured to an intrauterine balloon tamponade device, such as a Bakri balloon or the Jada device, recognizing that mechanical tamponade can be pivotal when pharmacologic measures are insufficient to control bleeding. Ensuring the immediate availability of these resources—along with rapid-response pathways to blood bank services and interventional radiology where available—constitutes a core element of obstetric readiness for twin delivery.

Immediately before delivery, a structured team "time-out" should be undertaken to synchronize clinical understanding and to minimize preventable errors. This pre-delivery pause should reconfirm the presentation of both fetuses and estimate their fetal weights, as these variables will shape intrapartum tactics and the sequence of interventions. Placentation should be verified to the extent possible, since chorionicity and amnionicity influence both monitoring strategies and the likelihood of complications. The plan for umbilical cord clamping—immediate versus delayed—should be affirmed in collaboration with the neonatal intensive care unit (NICU) team, harmonizing obstetric and neonatal priorities for the timing of transition. The team should also review any contraindications to specific uterotonics to prevent inadvertent administration. For example, in the presence of hypertensive disease of pregnancy, methylergonovine should be avoided due to its vasoconstrictive properties, whereas in patients with asthma, 15-methyl PGF 2α should be withheld because of its bronchoconstrictive potential [23]. This anticipatory review ensures that pharmacologic responses to atony are both prompt and safe. For patients pursuing vaginal birth, the logistics of twin delivery necessitate heightened environmental control and immediate access to surgical backup. A twin vaginal delivery is best conducted in an operating room (OR) setting rather than a standard labor room to facilitate a rapid transition to cesarean section if emergent indications arise. Once complete cervical dilation (10 centimeters) is achieved, the patient should be transported to the OR with intravenous fluids running and appropriate monitoring in place. Positioning should optimize both maternal comfort for effective pushing and physician access for potential assisted maneuvers; the modified dorsal lithotomy position commonly meets these goals by providing exposure while maintaining patient safety and dignity. Given that two neonates will deliver sequentially, two NICU teams should be present in the OR, each fully equipped for immediate neonatal resuscitation with dedicated equipment and personnel. This redundancy acknowledges the possibility that both infants may require simultaneous stabilization and ensures that neither is disadvantaged by resource constraints.

Preparation for cesarean delivery in twin gestation adheres to established surgical obstetric protocols with specific adaptations to mitigate infectious and anesthetic risks. To reduce the risk of gastric aspiration during anesthesia, patients should ideally have fasted for at least six hours prior to surgery [24]. Infection prevention begins with preoperative antibiotic prophylaxis administered intravenously within one hour of the incision time [25]. Weight-based dosing of cefazolin is recommended: 1 g for patients weighing less than 80 kg, 2 g for those between 80 kg and 120 kg, and 3 g for patients at or above 120 kg [25]. In patients with a history of anaphylaxis to penicillins or cephalosporins, clindamycin in combination with an aminoglycoside constitutes an appropriate alternative regimen [26]. Redosing should be planned if the operative time exceeds two hours or if the estimated blood loss surpasses 1500 cc, both of which increase the risk of surgical site infection through reduced tissue antibiotic concentration. In nonelective cesarean sections, evidence from the C-SOAP trial indicates that adjunctive azithromycin can lower postoperative infectious morbidity; thus, in urgent or emergent cases, the combination of azithromycin with a cephalosporin may be considered to further reduce the risk of endometritis and wound infections [27]. These measures integrate antimicrobial stewardship with patient-specific risk reduction, acknowledging the greater infectious burden associated with prolonged labor, ruptured membranes, or emergent operative deliveries. On transfer to the OR for cesarean delivery, continuous intravenous fluids should be maintained, and the anesthesia team must confirm adequate analgesia and anesthesia coverage appropriate to the clinical context. Patient positioning is performed with attention to maternal hemodynamics and venous return: a supine position with a slight left lateral tilt is employed to alleviate gravid uterine compression of the inferior vena cava and to preserve cardiac output. A Foley catheter is inserted to decompress the bladder, aiding operative exposure and reducing the risk of inadvertent injury. Preoperative skin

preparation with an alcohol-based solution such as chlorhexidine is recommended to decrease bacterial skin burden and reduce surgical site infection risk [28]. Some practices additionally adopt preoperative vaginal preparation, particularly in the context of ruptured membranes, to diminish postoperative fever and endometritis; the benefit of this measure has been demonstrated in select populations and may be integrated into local protocols where consistent with institutional guidelines [25][29]. After antiseptic preparation, the surgical field is draped in standard sterile fashion, ensuring wide exposure for efficient operative conduct and for the potential need to extend incisions or modify the approach in response to intraoperative findings.

Coordination with neonatal teams is an indispensable pillar of peridelivery readiness in multifetal gestations. Before the initiation of either vaginal or cesarean birth, NICU clinicians should be present in the OR with distinct teams and resuscitation stations prepared for each neonate. This arrangement reflects the practical reality that twin neonates may have divergent transition needs at birth, especially when gestational age, growth parameters, or intrapartum events differ between the first and second twin. Clear communication regarding the plan for cord clamping, anticipated resuscitation needs, and contingencies for neonatal transfer ensures a seamless handoff from obstetrics to neonatology. Moreover, postnatal assessments should be anticipated and organized to avoid delays in the evaluation of respiratory status, thermoregulation, glucose monitoring, and other early neonatal care processes that are especially salient in twins due to higher risks of late prematurity and size discordance. Taken together, these preparatory steps embody a holistic approach that spans preadmission counseling, intrapartum vigilance, environmental readiness, and neonatal coordination. The aim is not simply to manage the mechanics of twin birth but to create an integrated care pathway that anticipates predictable risks, embeds safeguards against preventable complications, and maintains the flexibility to adapt to the dynamic course of labor and delivery. By grounding preparation in thorough history-taking and consent, ensuring the availability of hemorrhage control measures and appropriate uterotonics, adopting evidence-based antibiotic prophylaxis with weight-adjusted dosing and redosing triggers, configuring the birthing environment to accommodate urgent transitions, and aligning obstetric and neonatal teams around a shared, explicit plan, clinicians can enhance the safety and quality of twin delivery across both vaginal and operative routes [23][24][25][26][27][28][29]. This level of readiness is particularly critical in multifetal gestations, where the margin for error is narrower and the tempo of clinical change can be rapid. Robust preparation thus serves as both a preventive strategy and a foundation for agile, high-reliability care when unanticipated challenges arise.

Technique or Treatment

For twin gestations, technique and treatment during delivery hinge on meticulous intrapartum assessment and a structured, team-based execution that anticipates the presence of two fetuses and the contingencies that can arise after the birth of the first twin. The overarching goals are to ensure maternal safety, maintain reassuring fetal status for both twins, and complete delivery efficiently, whether by vaginal or cesarean route. Vaginal delivery techniques prioritize continual reassessment of fetal presentation and well-being, seamless transition from the birth of Twin A to the safe delivery of Twin B, and readiness to perform operative maneuvers if malpresentation or delay occurs. Cesarean delivery techniques parallel those of singleton pregnancies but require heightened attention to intraoperative orientation, amniotomy sequencing, cord identification, and coordination with neonatal teams for two newborns. Across both modalities, readiness for immediate neonatal resuscitation, diligent management of the third stage, and thorough inspection and repair of any maternal trauma are essential for optimizing outcomes. In a planned vaginal birth, the second stage of labor begins only once complete cervical dilation to 10 centimeters is confirmed and the patient is properly positioned for pushing in a manner that balances maternal comfort with optimal access for the obstetrician. As long as the fetal heart tracing remains reassuring and maternal effort and fetal descent continue to demonstrate progress, pushing proceeds under close surveillance [30]. The biomechanics of delivery are governed by the seven cardinal movements of labor. Engagement marks the point at which the leading diameter of the fetal head crosses the pelvic inlet, indicating entry into the true pelvis [30]. Descent then continues as the fetus traverses the birth canal, a process facilitated by uterine contractions, maternal pushing, and alignment of fetal dimensions with the maternal pelvis [30]. Flexion of the fetal head ensures that the smallest suboccipitobregmatic diameter presents, improving the likelihood of atraumatic passage [30]. Internal rotation permits the widest transverse diameter of the fetal head to align with the anteroposterior diameter of the maternal pelvis, positioning the occiput anteriorly for delivery [30]. Extension follows as the head crowns at the introitus, sweeping beneath the pubic symphysis to deliver the brow, face, and chin [30]. After the head is born, external rotation, or restitution, restores the fetal head's orientation to the shoulders, which rotate to align with the anteroposterior pelvic diameter [30]. Finally, expulsion occurs as the anterior shoulder, posterior shoulder, and the remainder of the infant are delivered in sequence with controlled traction and maternal effort [30]. Immediately after delivery of Twin A, the umbilical cord is clamped and cut, and

the neonate is transitioned to the awaiting neonatal intensive care unit (NICU) team for prompt evaluation and stabilization.

Attention then promptly turns to Twin B. An ultrasound assessment is performed at the bedside to delineate presentation and position, as these inform the immediate delivery plan and the need for operative maneuvers [31]. When ultrasound confirms that Twin B is cephalic, with the head presenting and either engaged or easily engageable in the pelvis, the care team proceeds with artificial rupture of membranes for the second amniotic sac to augment labor and facilitate descent [31]. If the head is already well applied to the cervix, delivery often parallels that of Twin A, with controlled pushing and standard assistance as needed. Continuous fetal monitoring is maintained to detect any signs of distress that would mandate expedited delivery. The interval between births is managed judiciously: while unnecessary delays are avoided, undue haste without clear indication is also eschewed, as careful preparation and verification of position reduce the risk of complications. If ultrasound demonstrates that Twin B is breech or transverse, the obstetrical team proceeds with well-established breech delivery maneuvers that can safely accomplish birth when performed by experienced operators [32]. The sequence begins with unequivocal identification of the lower limbs to orient the provider and avoid inadvertent manipulation of the umbilical cord or upper extremities [31]. With the fetal feet located, both lower extremities are gently grasped, and the breech is guided into the maternal pelvis to achieve engagement and steady progression [31]. At this juncture, amniotomy is performed deliberately to release the remaining amniotic fluid while maintaining pelvic engagement, thereby reducing the risk of cord prolapse and facilitating controlled descent [31]. Delivery proceeds until the fetus is born to the level of the scapulae. This can occur through spontaneous descent or with assistance by placing one hand on each hip and using the thumbs along the sacrum to maintain alignment and traction as needed, thereby minimizing rotational instability and maximizing the vector of force [33]. To address extended or nuchal legs, the Pinard maneuver is employed, often with a blue towel placed on the fetal back for traction and visualization; the fetus is gently rotated to a prone position, and flexion at the knee is encouraged so the leg can be swept down and delivered with minimal force [33]. For delivery of the arms, the Lovset maneuver is used: the provider rotates the fetal trunk 90 degrees to bring the posterior arm anteriorly beneath the symphysis, allowing sequential sweeping and delivery of each arm while maintaining alignment and avoiding humeral fracture [33]. Finally, the Mauriceau–Smellie–Veit maneuver facilitates controlled delivery of the aftercoming head. One hand supports the fetal body while the other hand flexes the head by placing two fingers on the maxilla (without applying pressure to the soft tissues of the airway) and the other hand's palm on the occiput, thereby maintaining flexion and guiding the head through the pelvis in a smooth arc [33]. Upon delivery, Twin B's cord is clamped with two clamps and labeled distinctly to prevent misidentification; cord blood and gases may be obtained at this point for neonatal assessment [31]. After both infants are delivered and stabilized, attention turns to the third stage. The placenta or placentas are delivered according to standard vaginal delivery principles, with controlled cord traction and uterine massage to promote separation and minimize blood loss; provider technique follows established guidance as detailed in StatPearls "Vaginal Delivery" [34]. A careful inspection of the perineum, vagina, and cervix is then conducted to identify any lacerations, which are repaired promptly to restore anatomy, hemostasis, and function.

In scenarios where cesarean delivery is indicated or selected, the principles largely mirror singleton cesarean procedures, with adaptations for twin-specific considerations. There is no universally superior skin incision for multifetal cesarean delivery; the choice of incision (e.g., Pfannenstiel or vertical midline) should be individualized based on patient factors, urgency, and surgeon preference, as detailed comprehensively in StatPearls "Cesarean Delivery" [35]. After the skin incision is made, dissection proceeds through subcutaneous tissue to the fascia, which is incised and separated to expose the rectus muscles. The rectus muscles are parted bluntly to enter the preperitoneal space, and the peritoneum is opened to access the gravid uterus [35]. Before uterine incision, the surgeon assesses the degree of dextrorotation—a physiologic rightward rotation of the gravid uterus—to select the safest and most accessible site for hysterotomy [36]. The decision between a low transverse uterine incision and a classical (vertical) incision is then made based on the accessibility and thickness of the lower uterine segment and, importantly, the gestational age of the fetuses; a poorly developed lower segment, as in earlier gestations, or complex intraoperative anatomy may favor a classical approach to optimize exposure and reduce the risk of inadvertent extension [36]. When twins occupy two distinct amniotic sacs, each sac is opened sequentially with amniotomy immediately prior to extraction of each fetus, maintaining control over fluid release and cord status. After delivery of each infant, the umbilical cord is promptly clamped and cut, and cords are tagged or otherwise differentiated to ensure accurate identification of which cord and placenta correspond to which neonate. In monochorionic monoamniotic twins, where a single sac is shared, a single amniotomy allows access to both fetuses, and the same principles of deliberate delivery and immediate

cord management apply, with explicit tagging to preserve identity. For a fetus in cephalic presentation, the head is gently elevated to the level of the hysterotomy with the surgeon's hand supporting the occiput and maxilla as needed, followed by gentle fundal pressure to deliver the anterior shoulder, then the posterior shoulder, and finally the remainder of the body in a controlled, stepwise fashion that minimizes uterine incision extension and neonatal traction forces. If a fetus presents breech, the same repertoire of breech maneuvers used in vaginal delivery is available and appropriate within the operative field. The provider identifies the feet and brings them to the hysterotomy, then uses the Pinard maneuver to flex and deliver the legs, the Lovset maneuver to free and deliver the arms through careful rotation and sweeping, and the Mauriceau–Smellie–Veit maneuver to maintain flexion and deliver the aftercoming head safely [33]. Operative conditions, including anesthesia and controlled exposure, can facilitate these maneuvers, but the same principles of gentle, directional traction and avoidance of undue force apply.

After both twins are delivered, placental management depends on chorionicity and clinical circumstances. In many cases, placentas deliver readily with gentle traction on the umbilical cords and manual support of the uterus; where separation is incomplete or the placental bed requires inspection, manual extraction is performed with attention to completeness and hemostasis. Hemorrhage prevention measures are deployed proactively, including uterotonic agents and uterine massage, and the surgical field is examined for bleeding points or extension of the uterine incision. The remainder of the cesarean procedure follows standard protocols outlined in StatPearls "Cesarean Delivery," including uterine repair, hemostasis verification, peritoneal and fascial closure, and skin approximation [35]. Throughout the operation, coordination with NICU teams is maintained to ensure that each neonate receives individualized resuscitation and stabilization, aided by the preoperative plan for cord clamping, thermal regulation, and transition care. Across both vaginal and cesarean approaches, several principles ensure the safe conduct of twin delivery. First, continuous real-time reassessment is vital; after Twin A's birth in vaginal deliveries, ultrasound confirmation of Twin B's presentation and station directs the next steps, with an agile transition to breech extraction maneuvers if necessary [31][32]. Second, technique relies on preserving physiologic alignment and employing maneuvers in their canonical sequence. For breech births, the deliberate application of Pinard, Lovset, and Mauriceau–Smellie–Veit maneuvers protects the fetus from traction injury while promoting efficient delivery of the aftercoming parts [33]. Third, cord management must be scrupulous. Clear labeling and differentiation of cords, whether after vaginal or cesarean births, prevent downstream confusion in neonatal and placental analyses, which is critical for clinical care and documentation. Fourth, third-stage management and maternal repair demand the same rigor as in singleton deliveries, with the added awareness that uterine overdistension from multifetal gestation elevates postpartum hemorrhage risk, necessitating readiness for uterotonics and adjuncts such as balloon tamponade if atony persists. Ultimately, the technique and treatment paradigms for twin deliveries are extensions of fundamental obstetric principles, adapted for the presence of two fetuses and the dynamic conditions that can arise between the first and second birth. A well-prepared team, skilled in both vertex and breech delivery techniques, adept at operative obstetrics, and closely integrated with neonatal colleagues, is crucial to translating these techniques into consistently safe outcomes. By adhering to evidence-supported steps during the second stage, employing ultrasound-guided decision-making for Twin B, and executing cesarean deliveries with the same disciplined attention to orientation, incision choice, and controlled extraction as in singleton cases, clinicians can navigate the complexities of twin birth with confidence and precision [30][31][32][33][34][35][36].

Complications

Multifetal gestations carry significant maternal and neonatal risks, which contribute to increased rates of morbidity and mortality. Women carrying multiple fetuses are at higher risk of developing gestational diabetes, hypertensive disorders, and anemia, conditions that can complicate the pregnancy and require close monitoring and management [2][37][38]. Additionally, multifetal pregnancies are more frequently associated with cesarean delivery and postpartum hemorrhage, further emphasizing the importance of preparedness and risk assessment [39]. Clinical guidelines recommend that the management of these complications largely follows the same principles as for singleton pregnancies, though vigilance is heightened due to the increased physiological demands and potential for rapid deterioration. Timing between the delivery of twins is clinically important, though no absolute limit exists. Recent studies suggest that the median interval between the birth of twin A and twin B is approximately 30 minutes, with longer intervals linked to higher cesarean delivery rates [40]. Delays can result from cord prolapse, non-reassuring fetal status, or an unengaged vertex of twin B. Uterine hypertonicity after delivery of twin A may complicate the birth of twin B, particularly if the second twin is in a breech or transverse position. In such cases, uterine relaxants like nitroglycerin or terbutaline may be administered to facilitate obstetric maneuvers [41][42]. If unsuccessful, cesarean delivery becomes necessary.

When twin B is vertex but unengaged, clinicians may allow time for descent while

confirming fetal positioning via ultrasound to rule out malpresentation or cord prolapse [40]. Operative vaginal delivery may be indicated for prolonged labor, suspected fetal compromise, or maternal benefit [43]. Proper assessment is crucial, including evaluation of cervical dilation, fetal station and head position, maternal pelvis, estimated fetal weight, and anesthesia adequacy. Operative vaginal delivery employs various forceps depending on fetal position and circumstances: Piper forceps for breech, Simpson and Wrigley forceps for vertex delivery, Luikart for asynclitic rotation, and Kielland for occiput posterior rotation [44][48]. Breech delivery carries the risk of head entrapment, especially in preterm infants with incomplete cervical dilation [49]. Techniques to address this include Piper forceps, Mauriceau-Smellie-Veit maneuver, McRoberts maneuver, suprapubic pressure, or administration of terbutaline/nitroglycerin to relax the uterus [50]. In refractory cases with fetal distress, Duhrssen's cervical incisions can be performed, avoiding critical cervical and pelvic structures [51]. These interventions underscore the need for experienced obstetric care in multifetal deliveries.

Clinical Significance

The incidence of multifetal gestations has risen due to assisted reproductive technologies, creating higher maternal and fetal risk profiles [2]. The most prominent neonatal risk is prematurity, which is associated with complications such as respiratory distress, feeding difficulties, and long-term developmental challenges. Maternal risks during delivery can be severe, including postpartum hemorrhage, preeclampsia, and, in rare cases, mortality [2]. While some twin pregnancies are candidates for vaginal delivery, this route carries specific risks, including the need for operative vaginal delivery, fetal head entrapment, or emergency cesarean section. Understanding the relative risks and benefits of vaginal versus cesarean delivery is crucial for informed decision-making. Evidence-based guidelines help clinicians and patients navigate these complex decisions, ensuring both maternal and neonatal safety. Prenatal counseling should outline criteria for safe vaginal delivery, anticipated challenges, and potential interventions to mitigate complications. This proactive planning supports optimal clinical outcomes and enhances patient-centered care.

Enhancing Healthcare Team Outcomes

Optimal outcomes in multifetal deliveries depend on coordinated, interprofessional care. Prenatal planning involves obstetricians, nurse midwives, maternal-fetal medicine specialists, and sonographers, who collectively assess fetal growth, presentation, and maternal health. Patients are educated on signs of preterm labor and develop individualized birth plans identifying desired support personnel. During labor and delivery, a multidisciplinary team is essential, including obstetricians, midwives, maternal-fetal medicine physicians, anesthesiologists, neonatologists, pediatricians, labor and delivery nurses, surgical scrub technicians, and NICU personnel. The team reviews ultrasounds and lab results, confirms fetal positions, obtains informed consent, and prepares for potential complications. Effective communication and clearly defined roles among team members are critical to ensure patient safety, facilitate timely interventions, and support smooth delivery processes. From admission to postpartum discharge, the interprofessional team ensures continuous monitoring, rapid response to complications, and adherence to evidence-based protocols. Collaboration across specialties promotes patient-centered care, improves maternal and neonatal outcomes, reduces preventable adverse events, and strengthens overall healthcare team performance, emphasizing the importance of teamwork in complex multifetal deliveries.

Conclusion:

Multiple birth deliveries represent one of the most complex scenarios in obstetric practice, requiring meticulous planning, advanced technical skills, and seamless interprofessional collaboration. Current evidence demonstrates that twin gestation alone does not mandate cesarean delivery; rather, the decision regarding timing and mode of birth must be guided by chorionicity, fetal presentation, growth patterns, maternal comorbidities, and patient preferences. Carefully selected monochorionic diamniotic and dichorionic diamniotic twin pregnancies can achieve safe vaginal birth when managed by experienced teams with immediate surgical and neonatal support. In contrast, monochorionic monoamniotic and higher-order multiple gestations typically warrant planned cesarean delivery due to elevated intrapartum risks. Ultimately, optimal outcomes depend on individualized, dynamic care plans supported by rigorous antenatal surveillance, real-time intrapartum assessment, and coordinated obstetric, anesthetic, and neonatal care. This integrated approach ensures safety while respecting patient-centered decision-making in multifetal delivery.

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