



The Northwestern University Twin Study VII: The Mode of Delivery in Twin Pregnancy North American Considerations

R. Depp, L.G. Keith, J.J. Sciarra

Department of Obstetrics and Gynecology, Northwestern University Medical School and the Prentice Women's Hospital and Maternity Center, Chicago, Illinois, USA

Abstract. No consensus exists for the optimal mode of delivery for twin fetuses. Opinions vary by type of institution (university medical center vs community hospital), country or continent (North America vs Western Europe) and personal preference of individual physicians. This article lists clinical considerations in arriving at the decision and presents them in the form of a decision tree.

Key words: Twins, Mode of delivery, Cesarean section, Vaginal delivery, Risk factors

The intrapartum management of twin gestation has changed dramatically in the past decade. The major effect of this change has been the reduction in perinatal mortality [23], largely due to a reduction in the incidence of prematurity and low birth weight. To some extent, this change has been a function of the routine recognition of multifetal pregnancy prior to the onset of labor. Whereas Keith et al [17] reported only slightly more than 50% of cases in which the diagnosis of multiple gestation was made before the onset of labor in one study of twin deliveries conducted between 1971 and 1975, this number has been reported to be as high as 92% in a more recent publication [9].

A major consequence of the earlier recognition of multifetal pregnancy is that more is known about the status of Twin B prior to hospital admission and during labor. In particular, the cardiovascular status of Twin B is more likely to be managed appropriately during labor, and the estimated fetal weight of Twin B relative to Twin A can be considered prospectively in planning the conduct of labor and delivery [1,3].

As is the case with other advances, however, the increased availability of data per se is not without drawbacks. What was once easy now seems more complex. In particular, clinicians now must consider the following questions: 1) under what circumstances should labor be circumvented?; and 2) how should the second stage of Twin B be managed – actively or expectantly? If expectant management is chosen, it is also appropriate to ask, “What is an acceptable twin-twin delivery interval for the second twin if continuous fetal heart rate monitoring (FHR) is available”?

Logically, the intrapartum management of twin labor should follow the same principles that are applied to singleton gestation. Attention should be given to the following factors: 1) fetal health assessment as documented in the prenatal record; 2) fetal risk factors specifically noted upon admission; 3) assessment of risk-benefit considerations to determine if labor is a justifiable risk; 4) ongoing assessment of fetal cardiovascular integrity; 5) selective use of oxytocin; and finally, 6) rational indications for cesarean delivery of Twin A and B during labor, or Twin B after the vaginal delivery of Twin A (Table 1).

PRIMARY ANTENATAL RISK FACTORS

The most important primary antenatal risk factors for the fetus are the presence of *disparate fetal growth* and *preterm labor*. The former term not only implies risk for intra-uterine growth retardation but, in some cases, fetal-fetal transfusion syndrome as well. The presence of either risk factor implies potential fetal vulnerability and the need for increased vigilance of fetal heart rate during labor, as well as possibly more liberal intervention guidelines than if growth were appropriate and pregnancy at full term. Because any answer to the question of the mode of delivery of twin pregnancy is generally complex and without consensus, the discussion to follow will focus on management of the pregnancies in which the estimated fetal weight (EFW) is at least 2000 g (approximately 34 weeks).

Cesarean delivery may be required for fetal indications early in labor in the presence of disparate fetal growth, particularly when antenatal fetal heart rate testing is non-reassuring or there is sonographic evidence of twin-twin transfusion. In most other instances, however, labor can be allowed to progress. The major considerations that affect the mode of delivery then become fetal *presentation* (Twin A in particular), *relative size* of Twin B to Twin A, the normalcy of *FHR evaluation* and the decision to use active vs expectant management of Twin B in the second stage.

Fetal Presentation

Guidelines for intrapartum management based upon fetal presentation at best are controversial, particularly if one twin is non-vertex [5,21]. In the absence of other risk factors, however, vaginal delivery should be anticipated if the presentation is vertex-vertex. According to Chervenak et al [9], approximately 43% of twin gestations with birth weights of at least 500 g present in this manner and, of these, approximately 81% will deliver vaginally (Table 2). In contrast, the management of labor in which one or both twins are non-vertex should apply the limited controlled experience gained in management of singleton breech presentation [11,13,14].

Table 1 - Weighted clinical data to consider in intrapartum selection of delivery route of multiple gestations

	Vaginal				Cesarean
	1*	2	3**	4	5***
PRENATAL					
Fetal growth					
IUGR			X		
AGA	X				
Fetal health					
Fetal Transf Synd				X	
Nonreact-NST			X		
NST with Decel				X	
(+) CST/OCT					X
INTRAPARTUM					
Fetal weight (g)					
< 1500			X		
1500-1999		X			
> 2000	X				
Fetal presentation					
Vtx-Vtx	X				
Vtx Br/Trvs		X			
Br-V/B/Trvs			X		
(1) "A" Frank		X	X		
(2) "A" Footling				X	
Labor factors					
"B" Larger				X	
FHR/Normal	X				
FHR/Abnormal				X	
Oxytocin			X		
SECOND STAGE					
Twin interval					
> 60 min			X		
> 120 min				X	

Note: Arbitrarily scoring of fetal assessment and intrapartum risk factors commonly employed in selecting route of delivery. A score of 1 implies safety of vaginal delivery in absence of other overriding factors; A score of 5 provide near independent indication for cesarean route.

* 1. Vaginal delivery highly desirable.

** 3. Alone this factor does not determine management, however added risk is evident.

***5. C/S delivery highly desirable.

At present, there is no consensus that all patients with breech presentation should be delivered by cesarean section, particularly if maternal consequence are taken into account. Among the factor which favor vaginal delivery are: 1) frank breech position; 2) weight > 2000 g; 3) flexed head-neck; 4) adequate gynecoid pelvis; 5) normal twin labor curve; and 6) reassuring initial and ongoing fetal heart rate monitoring strips. On the other hand, cesarean delivery could be easily justified if the breech is footling and the fetus has an ultrasound-predicted birth weight < 1500 g. Moreover, a suspicion of abnormal FHR on admission to the labor unit would tend to tip the balance toward cesarean delivery. Of

Table 2 - Intrapartum outcome in 362 multiple gestations with birth weights > 500 g according to fetal presentation

	Vertex-Vertex	Vertex-non-vertex	Non-vertex	Total
Cases	154 (42.5)	139 (38.4)	69 (19.1)	362 (100)
C/S A & B	27 (17.5)	35 (25.2)	61 (88.4)	123 (34)
Expect Mgmt	127 (82.5)	104 (74.8)	8 (11.6)	239 (66)
a) Vag A & B	119 (93.7)	76 (73.0)	8 (100)	203 (84.9)
b) Vag/IPV	6 (4.7)	0	0	6 (2.5)
c) Vag/EPV	0	23 (22.1)	0	23 (11.3)
d) C/S "B" Baby	2 (1.6)	5 (4.8)	0	7 (3.4)

Modified from Chervenak [9].

IPV: Internal podalic version; EPV: External podalic version.

course, these considerations may be academic in that many clinicians advocate cesarean for all breech deliveries in the belief that selective management is not practical or that medical-legal considerations limit any in-depth consideration of a logical approach, particularly in retrospect. Further, should the *initial twin present as a breech*, many practitioners who routinely favor cesarean delivery for all singleton breeches would not hesitate to select this route with twins. In fact, one recent study has reported a cesarean section rate of 88% (Table 2) when the initial twin was non-vertex [9].

Similar thought processes ideally should apply when the second twin is non-vertex [19]. Some degree of increased optimism is warranted in this circumstance, however, particularly if the second twin is of a similar or lower estimated fetal weight [10]. Cesarean delivery has been advocated in some early reports [6] on the basis of statistical associations between such presentation and increased perinatal mortality [4,16,18] and depressed Apgar scores [15,18,20,25]. However, since approximately 58% of twin gestations with birth weights of at least 500 g present with Twin B as non-vertex [9], it is important to examine the validity of any consideration of routine operative delivery. More recently, this issue has been reevaluated and outcomes have been more favorable to the validity of the concept of a selective approach [1,7-9].

Fortunately, there may be a middle ground. Recently, some authors have advocated external version of the second twin as a means of obviating the risk of breech labor and delivery [7,9]. Combining external version with more traditional approaches, vaginal delivery can be achieved in approximately 96% of cases with birth weights greater than 500 g [9]. It should be emphasized that to some extent the high rate of cesarean sections in the published literature has been a function of inclusion of a significant number of cases with birth weights in the 500-2000 g range category.

INTRAPARTUM RISK FACTORS

Once it is determined that vaginal delivery is a reasonable option, the issues to consider are: 1) should oxytocin be used for prolonged active phase secondary to "inadequate" uterine activity, and 2) how should fetal health status be assessed? Since cephalopelvic disproportion is seldom a problem and uterine activity can be accurately monitored by

electronic means, oxytocin can be safely administered. In our opinion, continuous electronic FHR monitoring is desirable in all twin gestations. When necessary, intrauterine pressure levels can be recorded simultaneously on two monitors by sequencing the uterine cavity lead to the leads of monitor 1 and monitor 2. State-of-the-art FHR monitors simultaneously record the doppler signal of Twin B and the direct signal of Twin A on one monitoring strip. Once Twin A has been delivered, all monitor activity should turn to Twin B. Prominent fetal indications for cesarean delivery of Twin B are the same as with singleton gestation and include: 1) "significant" variable decelerations associated with progressive loss of variability; 2) increasing baseline FHR rate or prolonged decelerations below 80 beats per minute [22]; and, 3) nonremedial recurring late decelerations.

Delivery of Twin B-Vertex

If Twin B is vertex, the primary issue is to determine the limits of a safe second stage interval after delivery of Twin A. If the vertex is descending into the pelvis, the membranes may be ruptured, a FHR electrode applied and spontaneous descent awaited. There is no urgency to delivery and, in fact, once the physician has decided upon expectant management and membranes have been ruptured, the temptation to intervene must be resisted until vaginal delivery occurs spontaneously or the prerequisites for forceps delivery or vacuum extraction are met. Although internal version and extraction of Twin B shortly after delivery of Twin A (preferably with intact membranes) is still practiced on occasion, virtually no one would favor such a procedure if considerable time has elapsed since the delivery of Twin A, particularly if membranes have been ruptured and the uterine cavity dimensions have been reduced [2,24]. Should fetal indications for delivery of Twin B arise before vaginal intervention is possible, cesarean delivery is appropriate [2,12]. Because this eventuality is always present, preparation for cesarean delivery must be completed and the delivery of Twin A performed in close proximity to an operating suite in order to facilitate rapid delivery of Twin B should it be deemed advisable.

Delivery of Twin B as a Breech

Once again, there is no consensus regarding proper management. The choice lies between *extraction* within a *short* interval of the delivery of Twin A and *expectant management* with the anticipation of a spontaneous vaginal delivery. Unfortunately, no prospective studies have as yet determined definite advantage to either approach, and either approach eventually must face the risk of head entrapment.

If active management (extraction) is chosen, anesthesia should be of an adequate nature, preferably general or epidural, Twin B should be similar in size or smaller than Twin A, and the obstetrician should have prior experience in breech delivery. The advantage to such an approach is the elimination of the consequence of abruption and fetal heart rate abnormalities, both of which may occur in association with expectant management of Twin B and reduced use of cesarean delivery. The inherent risk of this approach are those attendant to breech extraction, primarily head entrapment and trauma. If the clinician adheres to the generally accepted guidelines for breech delivery, however, these risks should be minimal.

If, on the other hand, expectant management of Twin B is deemed desirable, an FHR electrode should be applied directly to the presenting part after amniorhexis or, alternatively, external monitoring should be used if the membranes remain intact. Although

some advantages accrue to the artificial rupture of membranes in order to apply an electrode to the presenting buttocks, an advantage also accrues to leaving the membranes intact. In this latter situation, the amniotic sac presents as a dilating wedge and minimizes the risk of cord compression. Should immediate delivery be required for fetal indications, extraction can be accomplished more easily with less fear of head entrapment and trauma if the volume of the uterine cavity is maintained by the intact amnion.

Otherwise, management is according to standard guidelines for breech delivery. Cesarean delivery may be required if fetal indications arise. Although extraction is possible in such cases, when membranes are ruptured the risk of fetal injury increases markedly and the advisability of extraction diminishes as the interval following delivery of Twin A is extended, when the fetal station is high, and if the cervix is no longer completely dilated.

Expectant Management Outcome

It is likely that some of the recent improvement in the outcome of Twin B is a function of a higher prenatal detection rate [17]. It is also plausible that some of the unfavorable outcomes in the past have been improved by proper fetal surveillance both prenatally, upon admission, and during labor. In most cases, the spontaneous delivery of Twin B can be anticipated within 20-30 minutes. As this interval increases, however, there is some increase in the need for cesarean delivery of Twin B, either for fetal indications or failure of descent of the presenting part.

In one recent review of 362 twin deliveries, approximately 34% of all multiple gestations with birth weights of at least 500 g required cesarean delivery for both Twin A and B [9]. Of the remaining 66%, only 3.4% required cesarean delivery of Twin B alone. Five of 7 cases in which only Twin B was sectioned were cases in which Twin B was non-vertex. The relative increase in need for cesarean section when Twin B is non-vertex is evidenced by the observation that non-vertex Twin B cases constitute only 45% of Vertex A-Twin B combinations [9]. Despite the slightly increased risk of cesarean section for the non-vertex Twin B, the overall vaginal delivery rate approaches 97% [9].

In our hospital during the past 10 years, we have allowed extended intervals to elapse between the delivery of Twin A and Twin B employing the above guidelines. When Twin B infants were continuously monitored, we have noted no increase in adverse fetal outcomes [27].

CONCLUSIONS

Many factors influence the management decision process. Despite recent access to better understanding of multifetal pregnancy through the use of prenatal ultrasound and continuous intrapartum FHR monitoring, management remains in large part medical center dependent, arbitrary and influenced by anecdotal experience and medico-legal considerations. At present, only partial consensus exists on the North American continent.

Academically, the time is ripe to develop a multicenter, prospective randomized trial to address this issue, particularly in vertex-vertex and vertex-non-vertex twin combinations. Prominent factors to consider prospectively include: 1) presentation and position of Twin B, 2) estimated fetal weights, 3) fetal growth patterns, 4) subsequent

intrapartum FHR patterns, 5) admission FHR pattern, 6) labor curves, 7) use of oxytocin, 8) Twin A-TwinB delivery interval, and basis for active vs expectant management of Twin B.

To test the hypothesis that there is no advantage to routine cesarean delivery, ie, selective management is reasonable, cases with one or more of the following should be excluded from randomization: 1) EFW < 1500 g; 2) IUGR or fetal transfusion syndrome; 3) suspicious or abnormal NST/CTS or admission FHR; 4) Twin B breech significantly larger than Twin A; 5) any obstetric factor which upon admission would ordinarily require cesarean delivery; 6) any case not managed according to the predetermined consensus protocol and 7) failure to detect twin gestation prior to admission.

Outcome measures would include: 1) cesarean incidence and indications, 2) subsequent maternal morbidity and mortality; 3) Apgar scores and cord gases [26]; and 4) neonatal morbidity and mortality.

If we can progress beyond the point of arbitrary action in the near future, it may be possible to develop a more scientific selective risk-benefit approach to the intrapartum management of twin gestation. In this way we may avoid the development of a deeply rooted medical "religion" which mandates cesarean delivery of all or any major subset of specific twin presentation combinations without objective proof derived from well planned prospective series.

Acknowledgement: Supported in part by the Center for the Study of Multiple Birth, Chicago, Illinois.

REFERENCES

1. Acker D, Lieberman M, Holbrook RH, James O, Phillippe M, Edelin KC (1982): Delivery of the second twin. *Obstet Gynecol* 59:710-711.
2. Berglund L, Axelsson O (1984): Combined vaginal-abdominal delivery of twins. *Ann Chir Gynaecol* 73:232-235.
3. Barret JM, Staggs SM, Van Hooydonk JE, Growdon JH, Killam AP, Boehm FH (1982): The effect of type of delivery upon neonatal outcome in premature twins. *Am J Obstet Gynecol* 143: 360-367.
4. Brown EJ, Dixon HG (1963): Twin pregnancy. *J Obstet Gynaecol Br Commonw* 70:251.
5. Buekens P, Lagasse R, Puissant F, Leroy F (1985): Do breech presentations in twins and singletons run different risk. *Acta Genet Med Gemellol* 34:207-211.
6. Certrulo CL, Ingardia CJ, Sbarra AJ (1980): Management of multiple gestation. *Clin Obstet Gynecol* 23:533-548.
7. Chervenak FA, Johnson RE, Berkowitz RL, Hobbins JC (1983): Intrapartum external version of the second twin. *Obstet Gynecol* 62:160-165.
8. Chervenak FA, Johnson RE, Berkowitz RL, Grannum P, Hobbins JC (1984): Is routine cesarean section necessary for vertex-breech and vertex-transverse twin gestations? *Am J Obstet Gynecol* 148:1-5.
9. Chevernak FA, Johnson RE, Youcha S, Hobbins JC, Berkowitz RL (1985): Intrapartum management of twin gestation. *Obstet Gynecol* 65:119-124.
10. Cohen HM (1982): Delivery of second twin. *Obstet Gynecol* 59: 667-668.
11. Collea JV, Chein C, Quilligan EJ (1980): The randomized management of term frank breech presentation: A study of 208 cases. *Am J Obstet Gynecol* 137:240-241.

18 R. Depp et al.

12. Evrard JR, Gold EM (1981): Cesarean section for delivery of the second twin. *Obstet Gynecol* 57:581-583.
13. Gimovsky ML, Petrie RH, Todd WD (1980): Neonatal performance of the selected term vaginal breech delivery. *Obstet Gynecol* 56:687-691.
14. Green JE, McLean F, Smith LP, Usher R (1982): Has an increased cesarean section rate for term breech delivery reduced the incidence of birth asphyxia, trauma, and death? *Am J Obstet Gynecol* 142:643-648.
15. Ho SK, Wu PYK (1975): Perinatal factors and neonatal morbidity in twin pregnancy. *Am J Obstet Gynecol* 122:979-987.
16. Kauppila A, Jouppila P, Koivisto M, et al (1975): Twin pregnancy: A clinical study of 335 cases. *Acta Obstet Gynecol Scand (uppl)* 54:5-12.
17. Keith L, Ellis R, Berger G, Depp R (1980): The northwestern University multihospital twin study. I: A description of 588 twin pregnancies and associated pregnancy loss, 1971-1975. *Am J Obstet Gynecol* 138:781-789.
18. Kelsick F, Minkoff H (1982): Management of the breech second twin. *Am J Obstet Gynecol* 144: 783-786.
19. Kelsick F, Minkoff H (1984): Letter to the editor – Reply to Dr. Borgatta. *Am J Obstet Gynecol* 148:120-121.
20. Koivisto M, Jouppila P, Kaupila A, et al (1985): Twin pregnancy: Neonatal morbidity and mortality. *Acta Obstet Gynecol Scand (Suppl)* 54:21-29.
21. Olofsson P, Rydhstrom H (1985): Twin delivery: How should the second twin be delivered? *Am J Obstet Gynecol* 153:479-481.
22. Olofsson P, Rydhstrom H (1985): Management of second stage of labour in term twin delivery. *Acta Genet Med Gemellol* 34:213-216.
23. Osbourne GK, Patel NB (1985): An assessment of perinatal mortality in twin pregnancies in Dundee. *Acta Genet Med Gemellol* 34:193-199.
24. Rayburn WF, Lavin JP, Miodovnik M, Varner MW (1984): Time intervals in multiple gestation. *Obstet Gynecol* 63:502-506.
25. Ware HH (1971): The second twin. *Am J Obstet Gynecol* 110:865-873.
26. Young BK, Suidan J, Antoine C, Silverman F, Lustig I, Wasserman J (1985): Differences in twins: The importance of birth order. *Am J Obstet Gynecol* 151:915-921.
27. Wittman R, Keith L, Method M, Depp R (1986) The Northwestern Multi-hospital Twin Study. VI: Factors relating to low apgar scores in twin delivery. Abstract. Fifth International Congress on Twin Studies, Amsterdam, September 15-19, p 41.

Correspondence: Dr. Louis Keith, 333 East Superior Street, Suite 476, Chicago, IL 60611, USA.