

Spontaneous Version of Fetal Presentation in Twin Pregnancies During Third Trimester: Longitudinal Assessment

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Little is known about longitudinal changes of the first twin presentation in twin gestations. This is a retrospective cohort study including 411 women who were admitted consecutively and delivered live-born twins at 36 weeks of gestation or more. Longitudinal assessment of the first twin presentation was conducted during gestation and at birth in all cases. Gestational age at antenatal assessment was divided into two intervals: early-third trimester (28–31 weeks) and mid-third trimester (32–35 weeks). Fetal presentation was categorized as vertex or non-vertex. We analyzed change of fetal presentation between antepartum intervals and birth. First twin presentation at early-third trimester had the same presentation at birth in 87.6% (360/411) of the study population. In this 'no change' group, vertex presentation was seen in 95.6% (283/296) and non-vertex was seen in 67.0% (77/115) of cases. In total, 96.1% (395/411) of the study population maintained their presentation between mid-third trimester and birth. Vertex presentation was seen in 98.4% (310/315) and non-vertex was seen in 88.5% (85/96) of cases. When comparing vertex with non-vertex, vertex presentation during third trimester was a more reliable predictor of presentation at birth ($p < .001$). The only factor that contributed significantly to spontaneous version of the first twin during mid-third trimester and birth was a lower birth weight of the first twin compared with the second twin. In conclusion, first twin presentation with vertex during third trimester is not likely to change into non-vertex at birth. We concluded that vertex presentation in twin gestations at early- and mid-third trimester is very predictable. In contrast, a non-vertex first twin presentation is relatively unstable.

■ **Keywords:** spontaneous version, twin pregnancy, presentation, vertex, non-vertex

Vertex/non-vertex presentation of twin pregnancies accounts for approximately 34.8% of twins (Chasen et al., 2005). The general consensus is that a trial of labor with the goal of vaginal delivery of vertex/vertex twins is appropriate at any gestational age (Cruikshank, 2007). Vaginal delivery of a non-vertex presenting twin is not recommended (Dodd & Crowther, 2005). However, the optimal delivery route for vertex/non-vertex twins is controversial. Options for delivery of vertex/non-vertex twins include cesarean delivery of both twins, vaginal delivery with breech extraction of the second twin, and vaginal delivery with cephalic version of the second twin.

Several reports attest to the safety of vaginal delivery of second non-vertex twins who weigh more than 1,500 g (Blickstein et al., 1987; Chervenak et al., 1985; Gocke et al.,

1989). It was reported that vaginal delivery of the presenting twin followed by breech extraction of the second twin resulted in significantly shorter maternal and neonatal hospital stays, in part because vaginally extracted breech twins have less respiratory disease and fewer infections (Mauldin et al., 1998). Therefore, the first twin presentation is

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TABLE 1
Presenting Part of First Twin

Group	Early-third trimester (28–31 weeks)	Mid-third trimester (32–35 weeks)	At birth	N (total N = 411)
A	V	V	V	278 (67.6%)
B	V	V	NV	2 (0.5%)
C	V	NV	V	5 (1.2%)
D	V	NV	NV	11 (2.7%)
E	NV	V	V	32 (7.8%)
F	NV	V	NV	3 (0.7%)
G	NV	NV	V	6 (1.5%)
H	NV	NV	NV	74 (18.0%)

Note: V = vertex; NV = non-vertex.

important in choosing the mode of delivery, and it needs a practical and helpful study on longitudinal assessment of the first twin presentation to counsel the parents based on the data individually applicable. The aim of this study was to evaluate longitudinal changes of fetal presentation in twin pregnancies and to counsel parents based on this data.

Materials and Methods

Medical records of all twin pregnancies delivered between January 1999 and August 2009 were reviewed retrospectively. All patients were cared for from early-third trimester and delivered at the Seoul National University Hospital. Gestational age at assessment was divided into two intervals: early-third trimester (28–31 weeks) and mid-third trimester (32–35 weeks). Exclusion criteria were patients delivering prior to 36 weeks' gestation, monochorionic monoamniotic twins, and intrauterine demise of the first twin. The first or presenting twin was defined as the fetus that was closer to the internal os of uterine cervix. Polyhydramnios was defined as a single deepest pocket of 8 cm or more in the sac of the first twin. Fetal presentation was categorized as vertex or non-vertex. Transverse or oblique lie and breech presentation were considered non-vertex. Longitudinal assessment of the first twin presentation was conducted during gestation and birth in all cases. We analyzed change of fetal presentation between antepartum intervals and at birth. The study population was divided into eight groups (groups A to H) according to spontaneous version of the first twin presentation longitudinally assessed (Table 1). 'Version group' was defined as a group that underwent one or more spontaneous versions of the first twin throughout the whole third trimester and birth. Patients' information about maternal age, parity, chorionicity, prepregnancy body mass index (BMI), mode of conception, weight discordancy, fetal gender, amniotic fluid status, uterine fibroids, and birth weight was obtained from medical records. The protocol for the present study was approved by the Institutional Review Board of the Seoul National University Hospital.

Continuous data are presented as mean \pm standard deviation (SD), and dichotomous data as frequency and associ-

ated percentage. Comparison between the groups was performed by using the Mann–Whitey U test for continuous data and the chi-squared or Fisher exact test for categorical data. All statistical analyses were performed by using SPSS version 20.0 for Windows (IBM SPSS Statistics, Chicago, IL, USA), and *p* values of $<.05$ were considered statistically significant.

Results

A total of 411 live-born twin pregnancies were identified with a gestational age at birth ≥ 36 weeks. In total, 332 (80.8%) were nulliparas. The mean maternal age was 32.2 years. Of the 411 pregnancies, 350 (85.2%) were dichorionic diamniotic, 50 (12.1%) were monochorionic diamniotic, and 11 (2.7%) were unknown chorionicity. The chorionicity was decided by early trimester ultrasound image, fetal sex, and pathologic findings except for 11 patients with no early ultrasound image, same-sex twins, and no pathology report. In total, 120 (29.2%) pregnancies were conceived naturally and the remaining 291 (70.8%) were by assisted reproductive technology, including in vitro fertilization.

Longitudinally assessed presentation of the first twin is described in Table 1. Most twin pregnancies showed that the first twin presentation was vertex during third trimester and birth. The first twin presentation did not change in 87.6% of cases between early-third trimester and birth. Those with vertex presentation at early-third trimester had the same presentation at birth in 95.6% of cases. Those with non-vertex presentation at early-third trimester had the same presentation at birth in 67.0% of cases. In total, 96% of twin pregnancies did not undergo spontaneous version between mid-third trimester and birth. During this interval, vertex was 98.4% and non-vertex was 88.5% of cases. When comparing vertex with non-vertex, vertex-presenting twins were very unlikely to undergo spontaneous version compared to non-vertex ($p < .001$). In contrast, more non-vertex presenting twins underwent spontaneous version into vertex (Table 2). Of 115 twin pregnancies with non-vertex presentation at early-third trimester, 38 (33.0%) delivered with vertex presentation at birth. Of 96 twin gestations with non-vertex presentation at mid-third trimester,

TABLE 2
The Rate of No Change in the Presenting Part of First Twin at Birth According to Presentation During Third Trimester

	Early-third trimester (28–31 weeks)	Mid-third trimester (32–35 weeks)
Vertex to vertex	95.6% (283/296)	98.4% (310/315)
Non-vertex to non-vertex	67.0% (77/115)	88.5% (85/96)
Total rate of no change	87.6% (360/411)	96.1% (395/411)

only 11 (11.5%) delivered with vertex presentation at birth (Tables 1 and 2).

No correlation was found between spontaneous version of the first twin presentation during early-third trimester and maternal age, parity, chorionicity, mode of conception, pre-pregnancy BMI, birth weight, fetal gender, amniotic fluid status, uterine fibroids, and weight discordancy (Table 3). However, there were two factors affecting the first twin version since the mid-third trimester. The factors that contributed significantly to spontaneous version of the first twin presentation were lower birth weight of the first twin and the paired birth-weight differences between the first and the second twins, especially when the first twin was smaller than the second twin (Table 4). Table 5 describes factors affecting spontaneous version throughout the whole third trimester and birth. As mentioned in the methods section, ‘version group’ was defined as the presence of one or more spontaneous versions of the first twin presentation throughout the whole third trimester and birth. In comparing the ‘no version’ and ‘version’ group, there were no affecting factors except lower birth weight of the first twin compared with the second twin in the rate of spontaneous version of the first twins.

Discussion

The present study provides longitudinally assessed presentation of the first twin and its spontaneous version between third trimester and birth. The data showing longitudinal change are useful for counseling patients about fetal presentation and mode of delivery in twin pregnancies. The results of this study, which are individually applicable to patients, make it possible for obstetricians to predict fetal presentation at birth of twin gestation using ultrasound during the third trimester. Based on our study, vertex-presenting twins are unlikely to change their presentation during the third trimester. In other words, vertex presentation in twins is stable and predictable, while in contrast, non-vertex presentation is relatively unstable.

As with our data, Chasen et al. (2005) and Divon et al. (1993) also reported that vertex presentation was most stable in twin gestations. In vertex-presenting first twins after 28 or 32 weeks of gestation, ultrasound can predict the first twin presentation at birth in 90% and 95% or more of cases respectively (Chasen et al., 2005; Divon et al., 1993; Fox et al., 2013; Melamed et al., 2015; Schwartz et al., 2012).

Although several studies have reported on the spontaneous version in twin gestations, their methods had one or more limitations, and their results were limited due to small sample sizes, inappropriate timing of enrollment, limited study population originating from secondary analysis of a previous large study, or cross-sectional analysis between only two time intervals (Chasen et al., 2005; Divon et al., 1993; Fox et al., 2013; Melamed et al., 2015; Santolaya et al., 1992; Schwartz et al., 2012). In 2015, Melamed et al. reported the secondary analysis of a previous large randomized controlled trial on the mode of delivery in twin pregnancies. The study enrolled only the women with vertex-presenting twins at the time of randomization and analyzed the spontaneous version of both of the first and second twins. Many women who had an estimated fetal weight less than 1,500 g, previous uterine scar by vertical uterine incision, two or more previous low-segment uterine incisions, presence of lethal fetal anomaly, or a second twin substantially larger than the first twin were also excluded. This point was an inherent weakness in the study design. Moreover, mean gestational age at randomization of 35 weeks was unfavorable for using the study results to predict fetal presentation at birth and to counsel the parents based on the data, because 35 weeks was the average timing of delivery in twin pregnancies (American College of Obstetricians and Gynecologists and Society for Maternal-Fetal Medicine, 2014).

In analyzing factors affecting spontaneous version of fetal presentation in twin pregnancies, the results of previous studies were controversial. Two studies found the correlation between the spontaneous version and specific factors (Fox et al., 2013; Melamed et al., 2015) and two other studies did not (Chasen et al., 2005; Divon et al., 1993). In contrast to the results by Fox et al. (2013) and Melamed et al. (2015), the present study showed that lower first twin birth weight and the paired birth-weight differences between the first and the second twins were associated with spontaneous version of the first twin presentation. Fox et al. (2013) found that higher estimation of fetal weight of the second twin was associated with the first twin version. Melamed et al. (2015), whose study included only vertex-presenting twins, identified several independent factors associated with spontaneous version of the first twin presentation, including non-vertex second twin, lower weight of the second twin, change in the second twin presentation, and an interval to delivery of more than 4 weeks. In contrast, the first twin version was not affected by the second twin’s size in our study. Moreover, Fox et al. (2013) found that prior term vaginal delivery and increased estimation of fetal weight in either twin were associated with spontaneous version of the first twin. The majority of the study population in our research was nulliparous (81%), and therefore we did not analyze factors associated with prior pregnancies. Interestingly, the paired birth-weight difference with a smaller first twin was associated with spontaneous version of the first twins

TABLE 3**Comparison of No Change Group and Change Group Between Early-third Trimester and Birth**

Characteristics	No change (groups A, C, F, and H, n = 360)	Change (groups B, D, E, and G, n = 51)	p value
Maternal age (yrs)	32.3 ± 3.3	32.1 ± 3.7	.880
Nulliparity	81.7% (294/360)	74.5% (38/51)	.225
Pre-pregnancy BMI (kg/m ²)	21.4 ± 2.9	21.8 ± 2.9	.562
Birth weight, first twin (g)	2,621.5 ± 370.8	2,624.7 ± 362.0	.936
Birth weight, second twin (g)	2,511.6 ± 394.2	2,600.4 ± 370.0	.154
First twin's birth weight > second twin's birth weight	58.9% (212/360)	47.1% (24/51)	.110
First twin's gender, female	50.6% (182/360)	51.0% (26/51)	.955
In vitro fertilization	55.6% (200/360)	64.7% (33/51)	.217
Monochorionicity	13.1% (47/360)	5.9% (3/51)	.142
Weight discordancy (>20%)	18.6% (67/360)	13.7% (7/51)	.395
Polyhydramnios in the sac of the first twin	3.3% (12/360)	2.0% (1/51)	>.999
Uterine fibroids			
Presence of uterine fibroids	3.3% (12/360)	3.9% (2/51)	.688
Large fibroid (5 cm or more)	1.7% (6/360)	2.0% (1/51)	>.999
Multiple fibroids (two or more)	0.8% (3/360)	2.0% (1/51)	.413

Note: BMI = body mass index. Values are presented as % (n) or mean ± standard deviation.

TABLE 4**Comparison of No Change Group and Change Group Between Mid-third Trimester and Birth**

Characteristics	No change (groups A, D, E, and H, n = 395)	Change (groups B, C, F, and G, n = 16)	p value
Maternal age (yrs)	32.2 ± 3.4	32.6 ± 2.7	.333
Nulliparity	80.8% (319/395)	81.3% (13/16)	>.999
Pre-pregnancy BMI (kg/m ²)	21.4 ± 2.9	22.9 ± 3.2	.055
Birth weight, first twin (g)	2,630.1 ± 367.0	2,418.7 ± 378.6	.029
Birth weight, second twin (g)	2,521.1 ± 393.7	2,560.6 ± 355.4	.720
First twin birth weight > second twin birth weight	58.5% (231/395)	31.3% (5/16)	.031
First twin's gender, female	49.9% (197/395)	68.8% (11/16)	.139
In vitro fertilization	56.5% (223/395)	62.5% (10/16)	.632
Monochorionicity	12.7% (50/395)	0% (0/16)	.237
Weight discordancy (≥20%)	18.0% (71/395)	18.8% (3/16)	>.999
Polyhydramnios in the sac of the first twin	1.8% (7/395)	6.3% (1/16)	.274
Uterine fibroids			
Presence of uterine fibroids	3.5% (14/395)	0% (0/16)	>.999
Large fibroid (5 cm or more)	1.8% (7/395)	0% (0/16)	>.999
Multiple fibroids (two or more)	1.0% (4/395)	0% (0/16)	>.999

Note: BMI = body mass index. Values are presented as % (n) or mean ± standard deviation.

TABLE 5**Comparison of No Version Group and Version Group Throughout Third Trimester and Birth**

Characteristics	No version group (group A and H, n = 352)	Version group (group B, C, D, E, F, and G, n = 59)	p value
Maternal age (yrs)	32.3 ± 3.3	32.2 ± 3.7	.828
Nulliparity	81.5% (287/352)	76.3% (45/59)	.342
Pre-pregnancy BMI (kg/m ²)	21.4 ± 2.9	21.8 ± 2.9	.351
Birth weight, first twin (g)	2,628.1 ± 367.0	2,584.6 ± 384.1	.337
Birth weight, second twin (g)	2,509.4 ± 394.0	2,601.4 ± 373.4	.124
First twin's birth weight > second twin's birth weight	59.7% (210/352)	44.1% (26/59)	.025
First twin's gender, female	50.0% (176/352)	54.2% (32/59)	.547
In vitro fertilization	55.7% (196/352)	62.7% (37/59)	.313
Monochorionicity	13.4% (47/352)	5.1% (3/59)	.072
Weight discordancy (≥20%)	18.5% (65/352)	15.3% (9/59)	.552
Polyhydramnios in the sac of the first twin during third trimester	2.0% (7/352)	5.1% (3/59)	.161
Uterine fibroids			
Presence of uterine fibroids	3.4% (12/352)	3.4% (2/59)	>.999
Large fibroid (5 cm or more)	1.7% (6/352)	1.7% (1/59)	>.999
Multiple fibroids (two or more)	0.9% (3/352)	1.7% (1/59)	.463

Note: BMI = body mass index. 'Version group' was defined as one or more spontaneous versions of the first twin's presentation throughout third trimester and birth. Values are presented as % (n) or mean ± standard deviation.

between mid-third trimester and birth, but not between early-third trimester and birth. This factor was also correlated to the first twin version of one or more times throughout the whole third trimester and birth. It is supposed that spontaneous version of twin presentation is not affected by fetal size until the early-third trimester, when the intrauterine space is relatively ample for fetal movement, compared with the mid-third trimester or later. It is thought that paired birth-weight differences are not likely to be a critical factor for spontaneous version of the first twins because the fetuses move or rotate their position relatively freely at the earlier gestational period. However, it seems that paired birth-weight differences accompanied by increased fetal size may affect spontaneous version of twin presentation in the condition of a relatively confined space at the later gestational period. Several studies, mainly including singleton gestations, have mentioned uterine fibroids as a risk factor for fetal malpresentation and the rate of cesarean delivery (Ciavattini et al., 2015; Vitale et al., 2015). Therefore, we first analyzed and evaluated the relationship between the first twin's presentation and presence, size, or number of uterine fibroids. In our twin cohort, however, uterine fibroids were not related to fetal presentation in twin gestations.

The strength of the present study was the relatively large sample size and longitudinal assessment of the first twin presentation from early-third trimester to mid-third trimester to birth. The simple data model shown in Tables 1 and 2 may be useful for clinicians when counseling parents with twin gestations to determine the probability of final presentation and choose the mode of delivery. Moreover, the timing of enrollment of patients in this study was an appropriate period when clinicians usually discuss the route of delivery with their patients who have conceived twins.

The limitations of our study were to evaluate the first twin presentation only and that various types of non-vertex presentation, such as breech and transverse or oblique lie, were not distinguished. It may be found that different types of non-vertex first twin presentation are different in the rate of spontaneous version. For those with vertex/non-vertex twin pregnancies, the mode of delivery remains controversial. Although several studies have reported successful vaginal delivery of both twins using internal or external version of second twin or breech extraction of the second twin (Chauhan et al., 1995; Chervenak et al., 1985; Davison et al., 1992), these require obstetricians experienced in intrauterine fetal manipulation. Nevertheless, longitudinally assessed data of spontaneous version of the first twins may be useful in informing patients of expected fetal presentation and to determine the mode of delivery in twin gestations when they want to attempt vaginal delivery. Future studies with a prospective design and much larger sample size using detailed affecting and confounding factors are needed.

In summary, twin gestations undergo spontaneous version during the third trimester. Based on our study, vertex-presenting first twins are unlikely to change their presentation during the third trimester. In contrast, non-vertex presentation of the first twin is relatively unstable.

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References

- American College of Obstetricians and Gynecologists and Society for Maternal-Fetal Medicine (2014). ACOG practice bulletin no. 144: Multifetal gestations: Twin, triplet, and higher-order multifetal pregnancies. *Obstetrics & Gynecology*, 123, 1118–1132.
- Blickstein, I., Schwartz-Shoham, Z., Lancet, M., & Borenstein, R. (1987). Vaginal delivery of the second twin in breech presentation. *Obstetrics & Gynecology*, 69, 774–776.
- Chasen, S. T., Spiro, S. J., Kalish, R. B., & Chervenak, F. A. (2005). Changes in fetal presentation in twin pregnancies. *The Journal of Maternal-Fetal & Neonatal Medicine*, 17, 45–48.
- Chauhan, S. P., Roberts, W. E., McLaren, R. A., Roach, H., Morrison, J. C. & Martin, J. N. Jr. (1995). Delivery of the nonvertex second twin: Breech extraction versus external cephalic version. *American Journal of Obstetrics and Gynecology*, 173, 1015–1020.
- Chervenak, F. A., Johnson, R. E., Youcha, S., Hobbins, J. C., & Berkowitz, R. L. (1985). Intrapartum management of twin gestation. *Obstetrics & Gynecology*, 65, 119–124.
- Ciavattini, A., Clemente, N., Carpinì, G. D., Giuseppe, J. D., Giannubilo, S. R., & Tranquilli, A. L. (2015). Number and size of uterine fibroids and obstetric outcomes. *The Journal of Maternal-Fetal & Neonatal Medicine*, 28, 484–488.
- Cruikshank, D. P. (2007). Intrapartum management of twin gestations. *Obstetrics & Gynecology*, 109, 1167–1176.
- Davison, L., Easterling, T. R., Jackson, J. C., & Benedetti, T. J. (1992). Breech extraction of low-birth-weight second twins: Can cesarean section be justified? *American Journal of Obstetrics and Gynecology*, 166, 497–502.
- Divon, M. Y., Marin, M. J., Pollack, R. N., Katz, N. T., Henderson, C., Aboulafla, Y., & Merkat, I. R. (1993). Twin gestation: Fetal presentation as a function of gestational age. *American Journal of Obstetrics and Gynecology*, 168, 1500–1502.
- Dodd, J., & Crowther, C. (2005). Evidence-based care of women with a multiple pregnancy. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 19, 131–153.
- Fox, N. S., Rebarber, A., Lesser, H. N., Roman, A. S., Klauser, C. K., & Saltzman, D. H. (2013). Factors affecting fetal presentation in twin pregnancies across gestation. *The Journal of Maternal-Fetal & Neonatal Medicine*, 26, 1658–1661.
- Gocke, S. E., Nageotte, M. P., Garite, T., Towers, C. V., & Dorchester, W. (1989). Management of the nonvertex

- second twin: Primary cesarean section, external version, or primary breech extraction. *American Journal of Obstetrics and Gynecology*, 161, 111–114.
- Mauldin, J. G., Newman, R. B., & Mauldin, P. D. (1998). Cost-effective delivery management of the vertex and nonvertex twin gestation. *American Journal of Obstetrics and Gynecology*, 179, 864–869.
- Melamed, N., Wong, J., Asztalos, E., Rosen, H., Okby, R., & Barrett, J. (2015). The likelihood of change in fetal presentation during the third trimester in twin pregnancies. *Obstetrics & Gynecology*, 126, 1231–1236.
- Santolaya, J., Sampson, M., Abramowicz, J. S., & Warsof, S. L. (1992). Twin pregnancy. Ultrasonographically observed changes in fetal presentation. *Journal of Reproductive Medicine*, 37, 328–330.
- Schwartz, R., Fuchs, A., & Rosenn, B. (2012). Can third trimester ultrasound predict the presentation of the first twin at delivery? *The Journal of Maternal-Fetal & Neonatal Medicine*, 25, 2432–2434.
- Vitale, S. G., Padula, F., & Gulino, F. A. (2015). Management of uterine fibroids in pregnancy: Recent trends. *Current Opinion in Obstetrics and Gynecology*, 27, 432–437.
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