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## Twin Umbilical Cord Blood Gas Values

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**Abstract.** In vaginally delivered births (including a few cases where the mothers were under epidural anesthesia), differences between first and second born twins were compared according to presentation at delivery. Of twins with vertex/vertex presentation in 15 primipara cases and in 14 multipara cases,  $pO_2$  levels for the second born were significantly lower (both being  $p < 0.05$ ) than for the first born. Of twins vertex/non-vertex presentation, the second born in 9 primipara cases showed significantly lower pH,  $pO_2$  and  $HCO_3$  levels ( $p < 0.05$ ). Also for multipara twins, the second born had significantly lower pH ( $p < 0.05$ ) and significantly higher  $pCO_2$  ( $p < 0.05$ ) values. Umbilical cord blood gas value findings indicate unfavourable conditions for second born twins.

**Key words:** Umbilical cord gas value, PH,  $pCO_2$ ,  $pO_2$ , Bicarbonate, Presentation at delivery, Difference between first- and second-born

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### INTRODUCTION

There is a long-standing clinical belief that the second born twin is at a disadvantage. In this study, we investigated differences in first- and second-born twin pH,  $pO_2$ ,  $pCO_2$ , bicarbonate and base excess levels. We also studied labor management in twin pregnancies through assessment of umbilical cord gas values in different primipara and multipara presentations.

### MATERIALS AND METHODS

Over a 17-year period, we drew separate umbilical cord arterial and venous blood gas samples for immediate analysis from each neonate of 57 sets of twins. Differences be-

tween first- and second-born in vaginal deliveries were compared according to presentation. Subjects included several cases wherein the mothers were under epidural anaesthesia. The paired *t* test was used in statistical analysis.

## RESULTS

In 15 primipara vertex/vertex presentations, a comparison of umbilical *venous* gas measurements showed that the second born  $pO_2$  levels were significantly lower than in the first born (Table 1). Furthermore, as shown in Table 2, second born  $pO_2$  umbilical arterial gas levels were also significantly lower.

**Table 1 - Comparison of umbilical venous gas measurements in vertex/vertex presentation of primipara (n = 15)**

	First born		Second born		P
	Mean	SEm	Mean	SEm	
PH	7.33	0.01	7.33	0.01	ns
Pco <sub>2</sub> (mmHg)	38.27	1.93	38.65	2.01	ns
Po <sub>2</sub> (mmHg)	27.77	1.91	23.11	1.85	<0.05
Hco <sub>3</sub> (mEq/l)	19.23	0.59	19.45	0.55	ns
Tco <sub>2</sub> (mM/l)	20.41	0.65	20.59	0.61	ns
BE (mEq/l)	-6.28	0.42	-5.93	0.43	ns

**Table 2 - Comparison of umbilical arterial gas measurements in vertex/vertex presentation of primipara (n = 15)**

	First born		Second born		P
	Mean	SEm	Mean	SEm	
PH	7.29	0.01	7.27	0.01	<0.1
Pco <sub>2</sub> (mmHg)	43.94	2.22	45.76	2.06	ns
Po <sub>2</sub> (mmHg)	20.01	1.82	15.50	1.64	<0.05
Hco <sub>3</sub> (mEq/l)	20.53	0.61	20.24	0.63	ns
Tco <sub>2</sub> (mM/l)	21.82	0.67	21.57	0.68	ns
BE (mEq/l)	-5.78	0.41	-6.43	0.53	ns

A comparison of umbilical *venous* gas measurements in 14 multipara vertex/vertex presentations is given in Table 3. Here, both pH and  $pO_2$  levels in the second born were lower than in the first born. Finally, as shown in Table 4 which lists umbilical *ar-*

**Table 3 - Comparison of umbilical venous gas measurements in vertex/vertex presentation of multipara (n = 14)**

	First born		Second born		P
	Mean	SEm	Mean	SEm	
PH	7.33	0.01	7.28	0.01	<0.05
Pco <sub>2</sub> (mmHg)	39.27	1.55	43.80	2.37	<0.1
Po <sub>2</sub> (mmHg)	28.87	1.66	22.95	1.44	<0.05
Hco <sub>3</sub> <sup>-</sup> (mEq/l)	20.58	0.53	20.34	0.56	ns
Tco <sub>2</sub> (mM/l)	21.74	0.55	21.62	0.59	ns
BE (mEq/l)	-4.60	0.59	-6.01	0.71	<0.1

terial gas measurements, pCO<sub>2</sub> levels in the second born were significantly higher than in the first born, while pO<sub>2</sub> levels in the second born were significantly lower.

Table 5 shows a comparison of 9 primipara, vertex/non-vertex umbilical *venous* gas measurements. The second born pH levels are significantly lower than those for the first born, while second born pCO<sub>2</sub> levels are significantly higher. A comparison of umbilical *arterial* gas measurements for 9 primipara, vertex/non-vertex presentations, is shown in Table 6. The second born pH, pO<sub>2</sub> and bicarbonate (HCO<sub>3</sub>) levels are significantly lower in comparison to those of the first born.

In Table 7 the comparison of umbilical *venous* gas measurements for 9 multipara, vertex/non-vertex presentations, shows pH levels for the second born to be significantly lower than for the first born. At the same time, the second born pCO<sub>2</sub> levels are significantly higher. Finally, Table 8 compares umbilical *arterial* gas measurements for 9 multipara, vertex/non-vertex presentations. Here, the pH, pO<sub>2</sub>, and base excess levels for the second born are significantly lower than for the first born.

**Table 4 - Comparison of umbilical arterial gas measurements in vertex/vertex presentation of multipara (n = 14)**

	First born		Second born		P
	Mean	SEm	Mean	SEm	
PH	7.28	0.02	7.25	0.02	ns
Pco <sub>2</sub> (mmHg)	40.73	2.04	50.59	2.66	<0.05
Po <sub>2</sub> (mmHg)	23.29	1.47	16.13	1.12	<0.01
Hco <sub>3</sub> <sup>-</sup> (mEq/l)	19.56	1.00	21.46	0.66	<0.1
Tco <sub>2</sub> (mM/l)	20.78	1.04	22.99	0.69	<0.1
BE (mEq/l)	-6.65	1.15	-6.02	0.91	ns

**Table 5 - Comparison of umbilical venous gas measurements in vertex/non-vertex presentation of primipara (n = 9)**

	First born		Second born		P
	Mean	SEm	Mean	SEm	
PH	7.33	0.02	7.28	0.01	<0.05
Pco <sub>2</sub> (mmHg)	38.09	2.19	43.93	2.75	<0.05
Po <sub>2</sub> (mmHg)	24.67	1.95	21.57	1.51	ns
Hco <sub>3</sub> <sup>-</sup> (mEq/l)	19.74	0.70	20.18	0.69	ns
Tco <sub>2</sub> (mM/l)	20.84	0.72	21.44	0.74	ns
BE (mEq/l)	-5.33	0.89	-6.22	0.73	ns

**Table 6 - Comparison of umbilical arterial gas measurements in vertex/vertex presentation of primipara (n = 9)**

	First born		Second born		P
	Mean	SEm	Mean	SEm	
PH	7.30	0.02	7.21	0.04	<0.05
Pco <sub>2</sub> (mmHg)	43.37	2.62	50.46	4.75	ns
Po <sub>2</sub> (mmHg)	20.66	1.47	13.59	2.23	<0.05
Hco <sub>3</sub> <sup>-</sup> (mEq/l)	20.78	0.81	19.06	1.06	<0.05
Tco <sub>2</sub> (mM/l)	21.99	0.85	20.58	1.09	<0.1
BE (mEq/l)	-5.37	0.91	-7.97	1.86	<0.1

**Table 7 - Comparison of umbilical venous gas measurements in vertex/non-vertex presentation of multipara (n = 9)**

	First born		Second born		P
	Mean	SEm	Mean	SEm	
PH	7.32	0.01	7.24	0.03	<0.05
Pco <sub>2</sub> (mmHg)	39.10	1.96	49.62	3.74	<0.05
Po <sub>2</sub> (mmHg)	28.10	2.78	19.57	2.73	<0.01
Hco <sub>3</sub> <sup>-</sup> (mEq/l)	19.95	0.55	20.35	0.34	ns
Tco <sub>2</sub> (mM/l)	21.08	0.60	21.80	0.41	ns
BE (mEq/l)	-5.37	0.46	-7.17	0.78	ns

**Table 8 - Comparison of umbilical arterial gas measurement in vertex/non-vertex presentation of multipara (n = 9)**

	First born		Second born		P
	Mean	SEm	Mean	SEm	
PH	7.29	0.01	7.187	0.04	<0.05
Pco <sub>2</sub> (mmHg)	42.97	2.32	56.77	7.39	<0.1
Po <sub>2</sub> (mmHg)	23.30	2.44	12.82	2.30	<0.01
Hco <sub>3</sub> <sup>-</sup> (mEq/l)	20.35	0.52	19.93	0.68	ns
Tco <sub>2</sub> (mM/l)	21.60	0.57	21.62	0.90	ns
BE (mEq/l)	-5.78	0.40	-9.03	0.72	<0.01

## DISCUSSION

There is a wide variety of opinions regarding how to treat vertex/non-vertex presentations in twins [3,4]. Some [5] believe that cesarean section should be performed for vertex/non-vertex presentations. Others [1] hold that following the birth of the first born, external version under ultrasonic guidance should be performed for the second born and, if successful, vaginal delivery should proceed. However, in non-vertex presentation, vaginal delivery is also carried out unless there are indications that such should not be conducted. Otherwise, cesarean section is usually performed.

Our findings show that, compared to the first born, in both primipara and multipara cases, the second born have lower pH and pO<sub>2</sub> values. This would indicate that cesarean section is safer for the second born in non-vertex presentation deliveries.

However, we believe that if a skilled obstetrician and a neonatology specialist are in attendance, vaginal delivery is possible except in those cases involving premature delivery prior to the 33rd week of pregnancy, or when immature infants with estimated body weights of 1,500g or less are involved.

In line with the criterion that vaginal delivery is possible for single breech (non-vertex presentations), it has been suggested that vaginal delivery be performed for single breech presentations only. We find it difficult to draw any related conclusions from our data because only a few of our subjects experienced vaginal delivery. However, for those cases involving either non-vertex/vertex or non-vertex/non-vertex presentations delivered by cesarean section, the pH and pO<sub>2</sub> levels for the second born were lower than for the first, though not significantly so, and second born Apgar scores were 8 or more. Taking into account the various, and often sudden, risk factors involved during labor and/or delivery of these cases, it is, perhaps, true to say that cesarean section is safer.

## CONCLUSION

The umbilical cord blood gas value findings indicate conditions to be unfavourable for the second born in twin pregnancies. However, safe delivery is of course possible when

skilled obstetricians and neonatology specialists are in attendance and when the following criteria is borne in mind: *a*) that vaginal delivery may be conducted in vertex/non-vertex presentations except when the estimated bodyweight of the second born twin is 1500g or less, or when delivery takes place prior to the 33rd week of pregnancy; and *b*) that cesarean section should be performed when the first born is a non-vertex presentation.

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