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Original Article

Position Effect on Cerebral Oxygenation in Neonates During Transition After Birth

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ABSTRACT

Aim: According to delivery room guidelines, an optimal position is not specified for the stabilization of the baby. This study aimed to define the positions effects on postnatal adaptation parameters and cerebral oxygenation in non-resuscitated neonates.

Materials and Methods: A total of 60 neonates delivered by cesarean section stabilized randomly in the supine, right-side, left-side, or prone positions were enrolled. Apgar scores, heart rates (HR), arterial oxygen saturations via pulse oximetry, and perfusion indexes (PI) at the 2nd, 5th and 10th minutes were recorded. Cerebral regional oxygen saturation (SpO_2) of the patients was monitored by near-infrared spectroscopy.

Results: In the prone position, the 1st minute Apgar score was significantly lower than other groups, but no difference was observed at the 5th minute Apgar scores (1st min Apgarprone, p=0.05). Although there was no statistically significant difference, the prone position had the lowest HR at the 2nd minute, while the supine posture had the greatest HR at the 5th and 10th minutes. While the groups' SpO_2 values were similar, the left-side group's perfusion rates increased at the 5th and 10th minute marks (5th and 10th min PIleft-side, p=0.67, p=0.21, respectively). Regional cerebral oxygen saturation ($rScO_2$) and cerebral fractional oxygen extraction did not differ significantly between groups at the 5th and 10th minute time intervals. Although right and left $rScO_2$ were found to be higher in the first 5 minutes in the prone position, this elevation did not lead to a statistically significant difference, and right and left $rScO_2$ values were found to be similar in all groups at the 10th minute.

Conclusion: Adaptation parameters were not affected by position, except for lower 1st minute Apgar scores in the prone group and higher perfusion indices in the left lateral position. Cerebral perfusion was similar in all groups. The left-side position, which results in a higher PI, may be a good alternative. Studies with larger case series may provide further information.

Keywords: Apgar, cerebral oxygenation, delivery room, neonate, position

Introduction

For postnatal adaptation, the first "golden hour", and especially the first "golden minute", after birth are very important. In the delivery room, routine care and resuscitation of newborn infants should adhere to international management guidelines (1,2). Although these are very detailed, it is unclear which position is optimal for the baby immediately after birth. The 2000 Neonatal Resuscitation Program (NRP) guidelines suggested that a supine or lateral position was appropriate (3), but these recommendations were excluded from the updated guidelines (1,2,4,5).

In neonates, the position of the body may affect cardiopulmonary functions (6). Positions other than the

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supine position can provide a faster rising heart rate (HR), easier cleaning of airway secretion, and therefore possibly better cerebral oxygenation (7). Several papers on the newborn's cord clamping time and the necessity of non-invasive breathing have been published in the literature which look at how position affects cerebral regional oxygenation and hemodynamic changes (8,9). When delayed cord clamping occurred after birth, there was no discernible difference in hematocrit between the supine and prone positions at the 30-hour mark. However, prone positioning was observed to increase arterial and cerebral oxygenations in preterm babies undergoing nasal non-invasive ventilation (NIV) for mild-to-moderate respiratory distress.

The Apgar score, developed by Virgina Apgar in 1953, is the most widely used instrument for evaluating a neonate (10). This clinical score takes into account breathing, muscular tone, skin tone, HR, and reflex irritation. However, there are significant inter-observer fluctuations with this score (11). More cardio vascular monitoring could mitigate this restriction. The most recent guidelines for the assistance of baby transition and resuscitation from the European Resuscitation Council recommended employing electrocardiography (ECG) and/or pulse oximetry to check HR as the only cardio circulatory monitoring in the delivery room (12). To assess the neonate's cardio-circulatory state, HR may not be sufficient on its own. Furthermore, cardiac output (CO) may be an important variable in the first few weeks following birth. Thermodilution is the gold standard method for obtaining CO, however its utility and viability in the neonatal population are limited. Thus, the primary purpose of echocardiography in this population is to evaluate CO. However, during the immediate transition period, this is not a practical approach. When echocardiography is combined with cerebral-regional-oxygen-saturation, which may be measured using near-infrared spectroscopy (NIRS), it is useful in evaluating cardio-circulation as well as cerebral autoregulation (13). Delivery and consumption of oxygen are necessary for NIRS measurements. The arterial oxygen saturation (SpO_2), brain perfusion, and hemoglobin concentration of the blood all influence the amount of oxygen given. For cerebral perfusion, systemic vascular resistance and CO are required, as well as brain vascular resistance and cerebral perfusion pressure.

The present study assessed the impact of four different positions, namely supine, right-side, left-side, and prone, on cerebral oxygenation and postnatal adaptability while stabilizing newborns who did not require resuscitation.

Materials and Methods

This study, which lasted two months and was conducted in the delivery room of the department of obstetrics and gynecology by the newborn department, where about 3,500 babies are born every year, was prospective, randomized, and observational. Stabilization was carried out in compliance with NRP guidelines by three pediatric residents and a neonatologist who was certified by the NRP. The study participants were babies with Apgar scores greater than 7 and those who were single, term, and appropriate for gestational age (GA) and did not require resuscitation. Only infants delivered by cesarean section (CS) and who were unable to have early skin-to-skin contact were included, while vaginal births were excluded. Babies with major congenital anomalies, preterm infants, and those requiring positive pressure ventilation were excluded from this study.

The women who were about to undergo CS were placed under spinal anesthesia; oxygen therapy was not started before the baby was delivered. Written consent was acquired and the parents were informed about this study before the baby was born. After the inclusion criteria were met, randomization was performed, and closed-envelope randomization was applied. The infants (15 in each group) were positioned supine, on the right or left side, or prone after randomly opening envelopes with positional codes.

Infant Positioning

When the baby was born, the first care was carried out under a radiant heater. Those babies who required positive pressure ventilation were placed in a supine position and removed from the study population.

Medical Records and Vital Parameters

Thirty seconds after delivery, each evaluation began, and they ended after 10 minutes. The same individual scored each infant's Apgar scores at the first and fifth minutes. They also recorded the infant's HR, SpO_2, and perfusion index (PI) pulse oximetry at the second, fifth, and tenth minutes using a Masimo Radical-7 pulse co-oximeter. The difference in change between the mean values were assessed. After positioning the probe preductally (on the right wrist), the oximeter was attached to it. During every stabilization period, the fraction of inspired oxygen was only 0.21, or "room air". The NRP 2015 recommendation states that aspiration should not be carried out in the delivery room on a regular basis. The number of requirements and duration of tactile stimuli were recorded.

Cerebral Oxygenation

Cerebral oxygenation was assessed using noninvasive NIRS; a Covidien INVOS 5100C device was used to record the mean values at the five and ten-minute marks (14-16). The NIRS sensors were disposable and designed for single-use. Therefore, a separate NIRS probe was used for each patient, following the company's instructions. The NIRS probe was positioned on either side of the frontal lobe.

The baseline value was the first measured value. Regional cerebral oxygen saturation (rScO$_2$) variations were then collected for 60 seconds at 2-second intervals, and the mean value was computed. Normally, the rScO$_2$ ranges from 50 to 80%, but it can fluctuate by 10 to 20% at any time (17). Cerebral ischemia is indicated by a reduction of more than 20% in patients whose basal cerebral rScO$_2$ value is greater than 50%, and a decrease of more than 15% in patients whose basal cerebral rScO$_2$ value is less than 50% (18). After application, data were gathered for ten minutes at a rate of 0.1 Hz for each position. In an animal model, cerebral fractional oxygen extraction (cFOE), which represents the equilibrium between oxygen delivery and consumption in the tissue, was computed as (SpO$_2$-rScO$_2$)/SpO$_2$ for each position for the 5th and 10th minute averages (19).

No financial support was obtained for this study.

Statistical Analysis

The analysis of the variables was conducted using the programs PAST 3 (Hammer, Harper, D.A.T., Ryan, P.D. 2001. Paleontological Statistics) and SPSS 25.0 (IBM Corporation, Armonk, New York, United States). The Levene test was used to assess homogeneity of variance, while the Shapiro-Wilk-Francia test was used to assess conformance of univariate data to the normal distribution. The homogeneity of variance was assessed using the Box-M test, and the conformance of multivariate data to the normal distribution was assessed using the Mardia (Dornik and Hansen Omnibus) test. Post-hoc analyses were conducted using Dunn's test; the Kruskal-Wallis H test, a non-parametric parametric method, was applied to the Monte Carlo simulation results; and Fisher's Least Significant Difference tests were utilized for one-way ANOVA post-hoc analysis when comparing more than two groups based on quantitative data. The Fisher-Freeman-Holton test was used to compare categorical variables with one another using the Monte Carlo Simulation method. Categorical variables are given as n (%) in the tables, while quantitative variables are expressed as mean (standard deviation) and median (25th percentile/75th percentile). The variables were examined with a 95% confidence level, and a p-value of less than 0.05 was accepted as significant.

Results

We recorded 178 live births evaluated by the same delivery room team for 2 months. We included only cesarean-born infants. Totally, 118 infants were excluded from this study, of whom 87 were vaginally born, 22 were preterm, 3 had major congenital anomalies, and 6 required positive pressure ventilation (Figure 1). All other infants were placed in their assigned positions. All groups were similar in terms of gestational weeks and birth weight (Table I). There were no significant differences among the groups in terms of their requirements for aspiration or tactile stimulation (Table I). In the prone position group, the 1st min Apgar score, especially the grimace "reflex response" score, was significantly lower than those of the other groups [1st min Apgar score$_{\text{median}}$, supine: 9 (8/9), prone: 8 (8/9), right-side: 9 (8/9), left-side: 9 (9/9); p=0.05] (Table II). The 5th minute Apgar scores were similar in all groups (Table II). The 2nd minute HR was the lowest in the prone position; the 5th and 10th min HRs were highest in the supine position, but there was no statistically significant difference [2nd min

Table I. Characteristics of the study group

	Supine	**Prone**	**Right-side**	**Left-side**	**p value**
	(n=15)	**(n=15)**	**(n=15)**	**(n=15)**	
Gender (Female), n (%)	7 (46.7)	10 (66.7)	8 (53.3)	10 (66.7)	0.678[f]
Gestational age, median (q1/q3)	39 (39/39)	39 (38/39)	39 (39/40)	39 (38/39)	0.476[k] 0.476[k]
Birth weight (g), mean (SD)	3,304.0 (413.3)	3,174.7 (378.5)	3,295.3 (495.6)	3,307.3 (462.9)	0.813[a]
Aspiration, median (q1/q3)	1 (1/2)	1 (1/1)	1.5 (1/2)	1.5 (1/3)	0.327[k]
Aspiration (yes), n (%)	10 (66.7)	9 (60)	10 (66.7)	6 (40)	0.437[f]
Tactile stimulation (yes), n (%)	10 (66.7)	12 (80)	11 (73.3)	8 (53.3)	0.516[f]

[a]One-Way ANOVA (Robuts Statistic: Brown-Forsythe) - (Method: Bootsrap), [k]Kruskal-Wallis H test (Monte Carlo), [f] Fisher-Freeman-Halton test (Monte Carlo), SD: Standard deviation, q1: Percentile 25, q3: Percentile 75

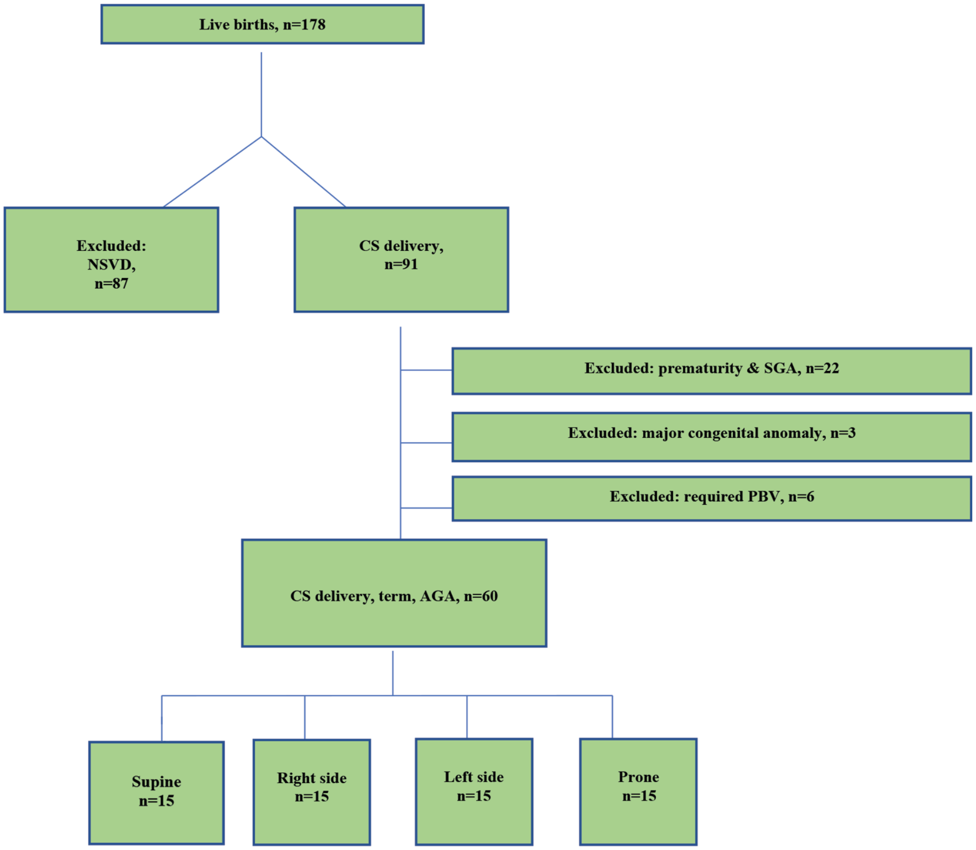

Figure 1. Flow chart of included and excluded term neonates who do not require resuscitation for the first lying position on postnatal adaptation and cerebral oxygenation

NSVD: CS: Cesarean section, SGA: Small for gestational age, AGA: Appropriate for gestational age

Table II. Adaptation parameters

	Supine	**Prone**	**Right-side**	**Left-side**	**p value**
	(n=15)	**(n=15)**	**(n=15)**	**(n=15)**	
APGAR, median (q1/q3)					
1st min.	9 (8/9)	8 (8/9)	9 (8/9)	9 (9/9)	**0.051**^{k}
5th min.	10 (9/10)	10 (9/10)	10 (9/10)	10 (10/10)	0.320^{k}
Difference (5th-1st) min.	1 (1/2)	1 (1/1)	1 (1/1)	1 (1/1)	0.419^{k}
p value for (1st vs 5th min.)	**<0.001**^{w}	**<0.001**^{w}	**<0.001**^{w}	**<0.001**^{w}	
Heart rate (/min.), median (q1/q3)					
2nd min.	138 (126/152)	131 (126/145)	139 (130/152)	144 (128/158)	0.539^{k}
5th min.	168 (153/176)	161 (147/165)	158 (138/168)	159 (149/165)	0.379^{k}
10th min.	170 (152/179)	166 (146/170)	167 (141/172)	169 (166/178)	0.172^{k}
p (Heart rate * group)					**<0.001**^{fr}
Difference (5th-2nd) min.	18 (14/40)	19 (9/35)	13 (3/24)	18 (5/25)	0.339^{k}
Difference (10th-2nd) min.	24 (16/41)	24 (12/36)	19 (7/27)	32 (18/38)	0.289^{k}
Difference (10th-5th) min.	4 (2/11)	8 (-2/10)	1 (-8/10)	8 (4/16)	0.100^{k}
p value for (2nd vs 5th vs 10th min.)	**<0.001**^{fr}	**<0.001**^{fr}	0.09^{fr}	**<0.001**^{fr}	

Table II. Continued

	Supine **(n=15)**	**Prone** **(n=15)**	**Right-side** **(n=15)**	**Left-side** **(n=15)**	**p value**
Pairwise comparison for heart rate					
(2nd vs 5th) min.	**0.019**	**0.019**	**ns.**	0.085	
(2nd vs 10th) min.	**<0.001**	**<0.001**	**ns.**	**<0.001**	
(5th vs 10th) min.	0.301	0.820	**ns.**	**0.008**	
Pulse oximetry (SpO_2, %), median (q1/q3)					
2nd min.	70 (67/80)	70 (69/80)	72 (71/80)	75 (70/78)	0.634[k]
5th min.	88 (82/92)	86 (82/91)	86 (82/93)	88 (81/92)	0.948[k]
10th min.	96 (94/99)	95 (92/97)	95 (94/98)	96 (93/98)	0.680[k]
p (Pulse oximetry * group)					0.941[fr]
Difference (5th-2nd) min.	14 (10/18)	14 (6/18)	13 (9/16)	11 (8/15)	0.607[k]
Difference (10th-2nd) min.	25 (16/27)	23 (12/27)	23 (16/25)	21 (19/27)	0.824[k]
Difference (10th-5th) min.	8 (4/12)	8 (4/14)	9 (5/14)	8 (6/15)	0.980[k]
p value for (2nd vs 5th vs 10th min.)	**<0.001[fr]**	**0.001[fr]**	**<0.001[fr]**	**<0.001[fr]**	
Pairwise comparison for Pulse oximetry					
(2nd vs 5th) min.	**0.01**	**0.019**	**0.01**	**0.01**	
(2nd vs 10th) min.	**<0.001**	**<0.001**	**<0.001**	**<0.001**	
(5th vs 10th) min.	**0.032**	**0.019**	0.053	0.053	
Perfusion index, median (q1/q3)					
2nd min.	2.9 (1.8/5.4)	3 (2.1/3.6)	3.8 (2.1/6.1)	2.5 (2.1/3.1)	0.558[k]
5th min.	2.6 (2.4/4.8)	3.2 (2.6/4.2)	3.3 (2.4/5.2)	3.6 (2.6/4.7)	0.671[k]
10th min.	3.4 (2.3/4.6)	2.6 (1.9/6.4)	2.4 (2.1/4.4)	4.1 (3.5/5.6)	0.211[k]
Difference (5th-2nd) min.	-0.1 (-1.2/0.8)	0.5 (-0.8/1.6)	0.3 (-2.2/1)	0.9 (-0.2/2.1)	0.136[k]
Difference (10th-2nd) min.	1.3 (-1.8/1.9)	0.3 (-0.9/3.4)	0.3 (-4/1.3)	2 (-0.5/3.5)	0.083[k]
Difference (10th-5th) min.	0.8 (-0.7/1.3)	-0.2 (-1.1/1.9)	-0.2 (-0.6/0.4)	0.1 (-0.6/2.2)	0.307[k]
p value for (2nd vs 5th vs 10th min.)	**0.469[fr]**	**0.715[fr]**	**0.852[fr]**	**0.066[fr]**	

[k] Kruskal-Wallis H test (Monte Carlo), [w] Wilcoxon signed-rank test (Monte Carlo), [fr] Friedman test (Monte Carlo), q1: Percentile 25, q3: Percentile 75, [A] Expresses significance according to supine group, [B] Expresses significance according to prone group, [C] Expresses significance according to right-side group, [D] Expresses significance according to left-side group

HR, prone: 131 (126/145); p=0.53, 5th and 10th min HR, supine: 168 (153/176); p=0.37, 170 (152/179); p=0.17, respectively] (Table II). The SpO_2 values did not differ between the groups, the 5th and 10th minute perfusion rates were higher in the left-side group [5th and 10th min PI, left-side: 3.6 (2.6/4.7); p=0.67, 4.1 (3.5/5.6); p=0.21, respectively] (Table II). There was no significant difference between the groups in terms of cerebral oxygenation as measured by $rScO_2$ and cFOE at 5th and 10th min [left_{rScO2}, p=0.39, right_{rScO2}, p=0.13, left_{cFOE}, p=0.58, right_{cFOE}, p=0.68] (Table III). Although right and left $rScO_2$ in the prone position did not demonstrate a statistically significant difference, it was found to be higher at the 5th minute [5th min $rScO_2$ in the prone position, left frontal: 76.40 (8.80); p=0.75, right frontal: 77.27 (10.85); p=0.51, respectively], and the right and left $rScO_2$ values at the 10th minute were similar in all groups [10th min $rScO_2$ in all positions, left frontal; p=0.97, right frontal; p=0.84]. None of the study infants required further resuscitation. However, following stabilization, one infant in the supine position and one infant in the right-side position developed respiratory distress. The respiratory distress of the infant in the supine position regressed within 1 hour, and the baby was the given to the mother. However the other infant in the right-side position group had to be transported to the neonatal intensive care unit.

Table III. Cerebral oxygenation measurements

	Supine	**Prone**	**Right-side**	**Left-side**	**p value**
	(n=15)	**(n=15)**	**(n=15)**	**(n=15)**	
Right frontal NIRS ($rScO_2$, %), mean (SD)					
5th min average	72.53 (10.59)	77.27 (10.85)	72.47 (9.51)	73.13 (9.56)	0.516[a]
10th min average	82.80 (8.26)	82.27 (8.61)	80.20 (8.25)	82.27 (8.73)	0.842[a]
Difference (10th-5th) average	10.27 (7.03)	5.00 (6.02)	7.73 (5.75)	9.13 (6.33)	0.132[ra]
p value for (5th vs 10th min)	**0.002[v]**	**0.009[v]**	**0.002[v]**	**0.001[v]**	
Left frontal NIRS ($rScO_2$, %), mean (SD)					
5th min average	72.87 (8.66)	76.40 (8.80)	75.67 (9.63)	74.47 (10.51)	0.752[a]
10th min average	83.20 (5.03)	83.00 (6.15)	82.53 (7.43)	83.53 (6.48)	0.978[a]
Difference (10th-5th) average	10.33 (5.75)	6.60 (6.21)	6.87 (7.75)	9.07 (7.57)	0.392[ra]
p value for (5th vs 10th min)	**0.001[v]**	**0.006[v]**	**0.006[v]**	**0.002[v]**	
Right FOE, mean (SD)					
5th min average	17.5 (9.7)	11.9 (6.1)	16.1 (7.8)	14.4 (6.9)	0.227[a]
10th min average	15.0 (8.2)	12.6 (7.5)	15.5 (8.3)	13.5 (7.6)	0.732[a]
Difference (10th-5th) average	-2.5 (9.6)	0.7 (4.0)	-0.6 (7.5)	-0.9 (7.2)	0.687[ra]
p value for (5th vs 10th min)	**0.316[v]**	**0.508[v]**	**0.769[v]**	**0.621[v]**	
Left FOE, mean (SD)					
5th min average	15.9 (8.9)	12.0 (5.8)	14.3 (9.2)	13.3 (8.5)	0.605[a]
10th min average	13.3 (3.5)	12.9 (4.8)	13.6 (7.0)	12.4 (4.9)	0.933[a]
Difference (10th-5th) average	-2.7 (7.1)	0.9 (5.1)	-0.7 (9.1)	-0.9 (6.1)	0.582[ra]
p value for (5th vs 10th min)	**0.168[v]**	**0.464[v]**	**0.751[v]**	**0.593[v]**	

[ra]General Linear Model Repeated Anova (Wilks' Lambda), post-hoc test: Fisher's least significant difference (LSD), [v]Paired Samples t-test (Bootstrap), [a]One-Way ANOVA (Robuts Statistic: Brown-Forsythe) - (Method: Bootsrap), SD: Standard deviation, [A]Expresses significance according to supine group, [B]Expresses significance according to prone group, [C]Expresses significance according to right-side group, [D]Expresses significance according to left-side group

Discussion

The international delivery room management guidelines do not give clear information on the initial lying position of those infants who do not require resuscitation. Although positioning may affect cerebral oxygenation in neonates, there are very few studies investigating the effect of positioning on cerebral oxygenation.

The mixed tissue saturation value that cerebral rSO_2 provides allows information on the equilibrium between brain oxygen delivery and oxygen usage. Cerebral rSO_2 is affected by cerebral blood flow, hemoglobin concentration, and SpO_2 (20-22). When contrasted with SpO_2 levels or HR, $rScO_2$ rises and achieves a plateau during the fetal-to-neonatal transition considerably more quickly, suggesting that the brain may receive preferential oxygen delivery (20). The burden of cerebral hypoxia was found to be reduced in the $rScO_2$+SpO_2 group when decisions about providing extra oxygen to newborns during the first 15 minutes after delivery were made based on $rScO_2$+SpO_2 rather than SpO_2 alone (23). Therefore, during immediate transition and resuscitation after birth, $rScO_2$ monitoring to guide respiratory and supplemental oxygen support is feasible.

In our study, there were no differences between the groups in terms of $rScO_2$, cFOE, and SpO_2 in different lying positions in healthy newborns who did not need resuscitation. In certain studies where infants requiring resuscitation were included, differences in NIRS values according to position were observed.

Stabilization in the lateral or prone positions allows for the easy removal of secretions and better oxygenation (24). In both animal studies and adult intensive care patients, arterial blood oxygenation was better when infants were placed prone (25-28). In premature infants receiving NIV, Barsan Kaya et al. (29) showed that prone positions improved arterial and cerebral oxygenations more than supine positions. In severely preterm newborns (GA 24-28 weeks) at one week of age, Shepherd et al. (30) found increased cerebral FOE but no change in $rScO_2$ and higher SPO_2 values in the prone position during active and calm sleep, suggesting lower cerebral blood flow. Despite the fact that the prone position may increase oxygenation by enhancing the ventilation/perfusion ratio, it is difficult to evaluate the baby's color, HR, reflex response, muscle tone, and respiration rate in this position.

There were no differences in the HR and SpO_2 parameters between the positions in our study. In the prone position, the grimacing reflex response and the 1st minute Apgar score was lower, and the need for tactile stimulation was non-significantly higher, but the statistical difference in Apgar scores between the groups disappeared by the 5th minute. O'Donnell et al. (11) compared the supine and left lateral positions during postnatal adaptation in 82 preterm infants born <32 gestational weeks, and those in the left lateral position respired more effectively as measured by 5th minute pulse oximetry (11). Konstantelos et al. (7) found that babies stabilized in the lateral position were less agitated than those in the supine position as SpO_2 and HR increased more rapidly in these infants.

The pulsatile-to-static blood flow ratio in peripheral tissue, known as PI, is largely based on the volume of blood present at the monitoring point and significantly correlates with left ventricular output in healthy infants (31). Another study conducted in the Republic of Korea evaluated the association between hemodynamic parameters and left ventricle position in a pig model during cardiopulmonary resuscitation. Their results showed that there were substantial relationships between the two (32). In our study, the 5th and 10th minute PI values were insignificantly higher in the left-side lying group. This finding may be related to increased left ventricular CO in the left-sided position. These effects of left- or right-side positioning need to be confirmed by further studies with larger series.

Study Limitations

To date, this was the first study evaluating the effects of position on cerebral oxygenation in healthy-term infants who did not need resuscitation during the transition period in the delivery room. The limitations of this study were its small number of study patients and the use of pulse oximetry instead of ECG in the delivery room. We preferred pulse oximeter measurements to enable a comparison with cerebral oxygenation measurements with NIRS. The third limitation was the impossibility of performing a blind intervention due to the nature of this study.

Conclusion

We found no significant major effects of the initial lying position on postnatal adaptation parameters or cerebral oxygenation during the first 10 minutes of life in term newborns who did not require resuscitation. Only the 1st minute Apgar score was lower in the prone position, but no difference was observed for 5th minute Apgar scores between the groups. The left-side position, which resulted in a higher PI, may be a good alternative. Studies with larger case series may provide further information on this issue.

Ethics

Ethics Committee Approval: This study was approved by the University of Health Sciences Turkey, Dr. Behçet Uz Children's Diseases Training and Research Hospital, Clinical Research Ethics Committee (approval no.: 2018/04-03, date: 22.02.2018).

Informed Consent: Written consent was acquired and the parents were informed about this study before the baby was born.

Authorship Contributions

Surgical and Medical Practices: E.Y.E., R.Ç., Concept: Ö.A.K., Ş.Ç., M.Y., N.K., Design: E.Y.E., R.Ç., Ö.A.K., Ş.Ç., M.Y., N.K., Data Collection and/or Processing: E.Y.E., R.Ç., D.T., Analysis and/or Interpretation: R.Ç., Literature Search: E.Y.E., R.Ç., Writing: E.Y.E., R.Ç.

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