

主論文（要約）

Effects of continued positioning pillow use until a corrected age of six months on cranial deformation and neurodevelopment in preterm infants: A prospective case-control study

1. Objective

Preterm infants have a high risk of cranial deformity resulting from external pressures. Such deformity is associated with delayed neurodevelopment. We aimed to clarify the effects of continuous use of positioning pillows on cranial deformity and neurodevelopment in preterm infants.

2. Methods

This prospective case-control study was conducted between November 2018 and August 2019. The continuous use of a pillow was initiated after discharge from the neonatal intensive care unit, up to a corrected age of six months. Preterm infants weighing less than 1,800 g without neurological abnormalities were included in the study. Patients were divided into two groups: non-pillow group (NP-group) and pillow group (P-group).

Cranial deformity was evaluated at the time of discharge and at the corrected age of six months. The evaluation items were classification of lateral plagiocephaly deformities and cephalic index (CI). The classification of lateral plagiocephaly deformities rated the degree of craniofacial deformity based on a classification scale devised by Argenta. The neurodevelopment was evaluated using the Bayley Scales of Infant Development III (BSID-III), and the asymmetric motor performance test was evaluated using the asymmetric clinical scale (ACS) at a corrected age of six months.

3. Results

There were 19 preterm infants (mean gestational age 32.5 ± 1.9 weeks, birth weight 1461.3 ± 244.7) eligible during the study period. Eight infants were assigned to the NP-group and eleven to the P-group. The corrected age at discharge was 41.6 ± 2.6 weeks and 40.8 ± 0.8 weeks in the NP- and P-group, respectively. In the results for cranial deformity, there were no significant differences between the groups in terms of classification of lateral plagiocephaly deformities and CI at the time of discharge. Compared to the NP-group, the P-group had a statistically significant lower classification of lateral plagiocephaly deformities at the corrected ages of six months ($p=0.001$). There were no statistically significant differences observed between the groups in terms of CI during follow-up at the corrected ages of six months. In the results for neurodevelopment and ACS, compared to the 86.9 ± 2.6 in the NP-group, the P-group obtained significantly higher BSID-III cognitive composite scores of 95.0 ± 8.4

($p=0.02$). There were no significant differences between the two groups in language and motor scores. The P-group obtained significantly higher fine motor scores of 8.6 ± 2.2 compared to the 6.6 ± 0.7 in the NP-group ($p=0.02$). There were no significant differences between the two groups in terms of gross motor scores. In addition, the ACS scores were significantly lower in the P-group than in the NP-group (0.5 ± 0.5 vs. 1.4 ± 0.7 , $p=0.01$).

4. Discussion

In this study, we assessed the effect of pillow use on the cranial deformation and neurodevelopment in preterm infants, starting from their discharge from the NICU to a corrected age of six months. We found that it is possible to prevent DP in preterm infants at the corrected age of six months. In addition, pillow use improved the cognitive and fine motor scores on the BSID-III and decreased asymmetrical motor performance.

We found no significant differences in the asymmetrical cranial deformity between the two groups at the time of discharge, which was approximately the TEA, although DP was significantly less frequent in the P-group than in the NP-group at the corrected age of six months. Our study showed a mean CI of 1.29 and classification of lateral plagiocephaly deformities of 0–I at the time of discharge in all infants, indicating no severe cranial deformity. DP is mostly affected by external pressures on the skull after birth, and most frequently occurs after one month after birth. When the external pressures on the sides of the cranium are distributed irregularly, this results in an asymmetrical head shape. It is considered that the pillow was able to evenly distribute the external pressure on the sides of the cranium. We believe that pillow use from a corrected age of one month onward, as described in this study, may decrease the incidence of DP.

Regarding fine motor skills and cognitive ability, we found that, compared to the NP-group, the P-group had a less asymmetrical cranial deformity and lower ACS scores at a corrected age of six months, indicating less asymmetrical motor function. The testing of cognitive and fine motor ability using the BSID-III at a corrected age of six months requires asymmetrical movements, such as bilateral hand movements or alternating between the left and right hand. We, therefore, believe that asymmetrical motor function may affect the results of the BSID-III.

5. Conclusions

Continuous pillow use in preterm infants is effective in reducing cranial deformity and improved cognitive and fine motor skills.