

Effect of rolling over pattern and caregiver perception on plagiocephaly in Korean infants

To the editor

The Back to Sleep campaign, launched in 1992 following the recommendations of the American Academy of Pediatrics,¹⁾ was a well-known groundbreaking movement that decreased the rate of sudden infant death syndrome (SIDS) by >40%.²⁾ As the campaign caused negative perceptions of the prone sleeping position, parents kept their infants in the supine position even while awake, eliminating their opportunities to be in the prone position. Previous studies demonstrated that this campaign increased the incidence of nonsynostotic plagiocephaly by up to 600%.³⁻⁵⁾ Moreover, although the order of developmental normal milestones for rolling over is prone-to-supine (PTS) followed by supine-to-prone (STP), the concept of rolling over has been misrecognized by many caregivers. In fact, because of the risk of SIDS, many caregivers erroneously believe that STP rolling should occur first and avoid placing their babies in the prone position. A consistent supine position can reduce the opportunity to initiate PTS rolling at the appropriate time, which can delay the achievement of normal milestones.

Here, we aimed to confirm the incidence of the reverse rolling sequence in Korean infants using surveys of primary caregivers and analyze caregiver awareness of the developmental milestone of rolling over. A questionnaire was administered to 120 primary caregivers (Supplementary Fig. 1). Most of the infants in question had visited the hospital for the confirmation of a plagiocephaly diagnosis. The study also included children who visited the hospital with illnesses unrelated to skull development, such as upper respiratory or urinary tract infections.

The participants were divided into 2 groups based on the presence of deformational plagiocephaly (DP) and the first rolling over direction achieved. One group included those with plagiocephaly (group P), while the other included those who were normocephalic (group N). In terms of direction of rolling over, the children who rolled STP first (STP group) were separated from those who rolled PTS first (PTS group). Of the 120 infants who met the inclusion criteria, 23 with poorly reliable data were excluded; therefore, data collected from 97 caregivers (37 [38.1%] in group P, 60 [61.9%] in group N) were analyzed.

There were 82 and 15 patients in the STP and PTS groups, respectively. The mean participant age was 28.75 months (range, 5–90 months) at the time of the survey. Rolling over STP first was

reported by 84.5% of respondents versus PTS first by 15.5%. The mean age at rolling over PTS (4.88 months) was later than that at rolling STP (4.51 months). Only 10 caregivers (10.3%) knew that rolling PTS should occur first. The proportion of caregivers who answered that the child rolled over STP first differed significantly between groups P and N ($P=0.008$).

The mean ages of the infants in the STP (27.20 months) and PTS (37.27 months) groups were not significantly different ($P=0.138$). The mean ages at rolling STP and PTS were 4.50 and 4.99 months in the STP group versus 4.53 and 4.27 months in the PTS group, respectively. The proportion of caregivers (37.1% and 1.0% in the STP and PTS groups, respectively) who answered that their children had DP differed significantly ($P=0.004$). Moreover, caregiver awareness of the normal developmental sequence of rolling over differed significantly between the 2 groups ($P=0.045$) (Table 1).

In this study, reversal of the order of rolling was associated with an increased prevalence of DP, which is characterized by flattening of one side of the skull that, if severe, can lead to asymmetry of the face or mandible, thus requiring medical attention.⁶⁾

Table 1. Patient characteristics by study group

Parameter	First direction of rolling over		
	Group STP	Group PTS	<i>P</i> value
No. of infants	82	15	-
Age (mo)	27.20	37.27	0.138
Mean age of rolling over STP (mo)	4.50	4.53	-
Mean age of rolling over PTS (mo)	4.99	4.27	-
Sex (%)			0.576
Female	40	9	
Male	42	6	
Diagnosis of DP			0.004
Yes	36	1	
No	46	14	
Caregiver's awareness about the normal developmental sequence of rolling over			0.045
Present	6	4	
Absent	76	11	

DP, deformational plagiocephaly; PTS, prone-to-supine; STP, supine-to-prone.

Boldface indicates a statistically significant difference with $P<0.05$.

The cranial bones of infants younger than 6 months are soft, as younger individuals have softer and more malleable bones. Therefore, uneven pressure can lead to skull deformation within a few weeks. However, cranial deformation can be treated.^{7,8)} Therefore, infants must be placed in the prone position as early as possible to avoid cranial deformities.²⁾ The mean age in group P was significantly lower than that in group N because DP accounted for the highest percentage of indications for hospital visits. This may be due to a lack of caregiver knowledge regarding the need for prone positioning in early infancy.

The results of intergroup comparisons of the STP and PTS groups are important because the correct order of developmental milestones is PTS followed by STP rolling. Those in the STP group could already perform STP rolling, whereas PTS rolling over was delayed owing to the lack of time spent in the prone position. Infants in the STP group were diagnosed with DP significantly more often than those in the PTS group. This could be attributed to the unequal pressure on the skull due to inadequate prone positioning (“tummy time”). Furthermore, the caregiver’s perception of the order of rolling over was significantly related to the infant’s actual rolling development. This suggests that the caregivers did not provide the children with the opportunity to be in the prone position because they were unaware of the proper order of rolling development.

Furthermore, Korean cultural characteristics may have exacerbated this phenomenon. In Korea, rolling over is expressed by the words “flipping” and “reverse rolling,” which indicate only a change in the body’s position, rather than by directional words such as “prone” and “supine” as in English. This may have confused the primary caregivers, leading to misunderstanding and widespread misconceptions.

Therefore, pediatric and rehabilitation medicine practitioners should instruct caregivers to provide infants with adequate tummy time as early in life as possible. In addition, since language ambiguity could have influenced caregiver awareness, it is necessary to establish standardized terms such as “face down to face up” and “face up to face down.”

Jin A Yoon, MD, PhD, Soo-Yeon Kim, MD, PhD, Yong Beom Shin, MD, PhD

Department of Rehabilitation Medicine, Pusan National University School of Medicine and Biomedical Research Institute, Pusan National University Hospital, Busan, Korea

Corresponding author: Yong Beom Shin, MD, PhD.
Department of Rehabilitation Medicine, Pusan National University School of Medicine and Biomedical Research Institute, Pusan National University Hospital, 179 Gudeok-ro, Seo-gu, Busan 49241, Korea
✉Email: yi0314@gmail.com
<https://orcid.org/0000-0001-5026-1696>

Footnotes

Supplementary material: Supplementary Fig. 1 can be found via <https://doi.org/10.3345/cep.2023.00108>.


Conflicts of interest: No potential conflict of interest relevant to this article was reported.

Funding: This work was supported by clinical research grant from Pusan National University Hospital in 2023.

Ethics statement: This study was approved by the Institutional Review Board (IRB) of Pusan National University Hospital (IRB No. 2202-002-11).

ORCID:

Jin A Yoon  <https://orcid.org/0000-0001-5762-0559>

Soo-Yeon Kim  <https://orcid.org/0000-0001-5679-0126>

Yong Beom Shin  <https://orcid.org/0000-0001-5026-1696>

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How to cite this article: Yoon JA, Kim SY, Shin YB. Effect of rolling over pattern and caregiver perception on plagiocephaly in Korean infants. *Clin Exp Pediatr* 2023;66:272-3.