Predictors of Cranial Molding Deformities in Preterm Infants

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Introduction

- Infants are at a high risk of developing cranial molding deformities, due to low muscle tone, difficulty moving against gravity, and abnormal movement and postural patterns. Cranial molding deformities can contribute to development of asymmetry and delayed motor milestones later in infancy and into childhood.[1–6]
- Preterm infants are more likely to require respiratory interventions which limit movement and positioning options.[1] These devices may also contribute to cranial molding through the pressure created by the attachments and caps that CPAP devices use to maintain an appropriate seal.
- The purpose of this study is to determine if there is a correlation between days spent on CPAP and the severity of asymmetrical and symmetrical head deformities, among preterm infants.

Methods

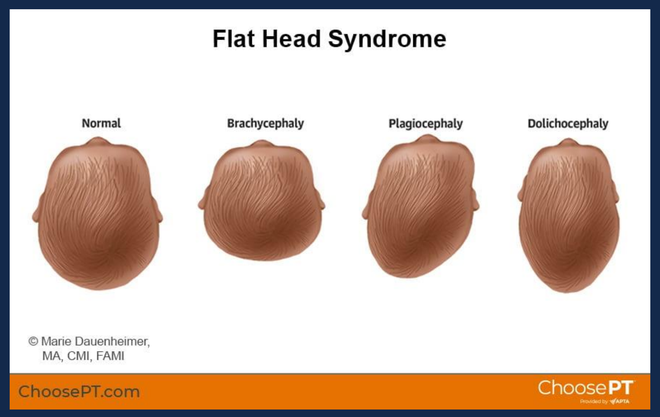
- Data was collected between August 2022 and February 2023 in the Neonatal Critical Care Unit at UNC Children's Hospital.
- Cranial Index (CI) and Cranial Vault Asymmetry Index (CVAI) measurements were taken at term-equivalent age (TEA), for infants with birth gestational age <32 weeks and respiratory support of nasal cannula or room air.
- Data regarding days spent on CPAP or mechanical ventilation, documentation of asymmetry by PT or OT, PT follow-up, and presence of IVH, BPD, and comorbidity count were collected via retrospective chart review.

Results

Infant Predictors		p-value
Is number of days on CPAP associated with CI?	no	0.1717
Is number of days on ventilator associated with CI?	no	0.7528
Is number of days on CPAP associated with CVAI?	no	0.2182
Is number of days on ventilator associated with CVAI?	no	0.7019
Is number of days on CPAP associated with development of dolichocephaly?	no	0.1594
Is number of days on ventilator associated with development of dolichocephaly?	no	0.4984
Is number of days on CPAP associated with development of head shape asymmetry?	no	0.2563
Is number of days on ventilator associated with development of head shape asymmetry?	no	0.3833
Is presence of IVH associated with CI?	no	0.4807
Is presence of IVH associated with CVAI?	**yes**	**0.0277**
Is CI different between infants diagnosed with IVH and those not diagnosed?	no	0.3251
Is CVAI different between infants diagnosed with IVH and those not diagnosed?	no	0.0561

Higher grades of IVH were significantly correlated with lower CVAIs (p=0.0277) or less asymmetry.

Infants without IVH were found to have higher CVAI, or more asymmetry, at TEA, although this association was not statistically significant (p=0.0561). There were no other significant findings between tested variables.



Conclusions and Clinical Relevance

- In a small cohort of preterm infants, respiratory support did not appear to have an impact on cranial molding. This likely indicates that infant positioning has a greater impact on infant head shape. We also observed an association between cranial molding and IVH that should be explored further in future studies.

- Future research would benefit from recording the positional preferences and positioning of the patient upon arrival at the bedside to determine if there is a correlation between positional preference and cranial deformities. Further research is also required to understand the implications of IVH and how cranial molding may be correlated with IVH. Abnormal cranial molding, including dolichocephaly and plagiocephaly are associated with abnormal motor development later in life.[7-9] It is important to understand factors which may increase the risk of abnormal cranial molding, in order to establish the best methods for prevention.

References

References can be accessed using the following QR code: