Exploring Neurodevelopmental Outcomes: A Prospective Study on Intraventricular Hemorrhage (IVH) among Ugandan infants.

Okalany Noella; Rachael Macleod; Francis Okello; Kathy Burgoine

University of Bergen, Mbale Regional Referral Hospital; Born On The Edge; Varimetrics Group

Neonatal mortality represents 46% of child mortality under the age of five worldwide and is largely influenced by prematurity, which accounts for 16% of neonatal fatalities. This impact is notable in low-resource regions in sub-Saharan Africa (1). Intraventricular hemorrhage (IVH) significantly impacts both mortality and long-term morbidity among preterm and low birth weight infants, especially those born before 32 weeks gestation (2). However, our understanding of IVH's effects on neurodevelopmental outcomes remains limited, in low-resource settings (3). To address this gap, this prospective study investigates the neurodevelopmental challenges faced by vulnerable very low birth weight infants aiming to assess the neurodevelopmental outcomes of surviving neonates from the IVHU cohort(4) to quantify the risk of death or disability at 24 months, including assessing the impact of IVH.

OBJECTIVES

- Assess developmental delay at specific time points.
- Evaluate motor skills, cognition, language, and social-emotional development domains and neurological assessment outcomes.
- Compare neurological function and developmental status based on cranial ultrasound findings.
- Inform targeted early intervention strategies for VLBW infants affected by IVH.

METHODS

We conducted a two-year prospective study at Mbale Regional Referral Hospital (MRRH) involving very low birthweight neonates (≤2000 grams) at risk of intraventricular hemorrhage. Cranial ultrasounds were performed at specific intervals: on the day of recruitment, then on days 3, 7, and 28 after birth, encompassing the neonatal period. Developmental assessments occurred at 6, 18, and 24 months using the following tools; the Malawi Development Assessment Tool (MDAT) and the Hammersmith Infant Neurological Examination (HINE) tools. Poor neurodevelopment, as assessed by the MDAT, was characterized by a development-for-age Z score of less than -2, using the full model from the original validation in the Malawi population. Scoring was as follows for the HINE; suboptimal results for neurological outcomes were defined as scores equal to or less than 70 at 6 months and 73 at 18 and 24 months, respectively. Statistical analyses were performed using Stata 17.0.

RESULTS

Among the 120 infants in the study, survival rates at various time points were as follows: 67.5% at 28 days, 55.8% at 6 months, 51.7% at 18 months, and 44.2% at 24 months accounting for follow-up losses of 5%, 9.2%, and 15.8% at the various time points. Mortality in non-IVH and IVH groups at 24 months was 38.0% and 43.9% respectively.

In the follow-up cohort, 27.8%, 2.8%, 1.4% had neurodevelopmental delay at 6, 18 and 24months respectively while with the HINE assessment, 65.2%, 8.3% and 1.4% had neurodevelopmental delay at 6. 18 and 24 months, irrespective of IVH status.

The impact of neurodevelopmental disability on participants, regardless of IVH, was evaluated using logistic regression. At 6, 18, and 24 months, neurodevelopmental disability incidence was similar in IVH and non-IVH infants ($p > 0.05$). No significant differences in mortality or disability were observed ($p > 0.05$), however three IVH infants developed moderate to severe cerebral palsy, one of whom did not survive.

CONCULSION

The neurodevelopmental outcomes of VLBW infants did not differ between the groups classified based on the presence or absence of IVH. Nevertheless, it is important to acknowledge that our study faced challenges with significant attrition and mortality rates. Further research is needed to follow-up a larger cohort of high-risk infants over an extended duration to gain a more comprehensive understanding of the potential impact of intraventricular hemorrhage as a significant risk factor for adverse neurodevelopmental outcomes.

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