Early spectacle intervention for babies with delayed visual maturation

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INTRODUCTION

A blind baby is a neurodevelopmental emergency as all early milestones are prompted by vision.

Babies are universally hypermetropic and must learn to accommodate in order to view the world. A 2-month-old infant who is unable to fix and follow, but who subsequently improves by 6 months, may be described as having delayed visual maturation (DVM).

There are no current guidelines on the management of infants with presumed DVM.

We propose that intervening with a spectacle overcorrection for near may help improve visual attention by bringing the infant's world into focus and thereby encourage further visual development.

Why is it important?



40% of the brain is involved in vision



60% of communication is non-verbal



80% of learning is visual

METHOD

Retrospective study of all babies under 6 months identified as being visually impaired (VI), either through VINCYP (the Visual Impairment Network for Children and Young People) notification or referral to vision support services, in NHS Highland between dates 2015-2022 .

Of these infants, those with a retrospective diagnosis of DVM were identified and divided into types 1,2 or 3.

Data extracted included general demographics, socioeconomic status (SES) based on postcode, primary condition and other co-morbidities.

Children were issued with a near overcorrection of +3.00 and parents were provided with guidance on visual stimulation using high-contrast objects or lights. Those who were initially intolerant of glasses were suggested to try short periods of daily near visual stimulation with the glasses on. Comments from parents regarding visual recovery with these interventions were recorded.



RESULTS

37 babies were identified as being visually impaired before 6 months of age in a 7 year period. 24 (65%) were male. SES was not normally distributed (p=0.006) and skewed towards more affluent areas, median 6 [1 being most and 10 least deprived]. 5 (14%) babies were looked after by either a foster or kinship carer. Month born was not related to any increased prevalence of visual impairment (p=0.816).

The majority of those with a significant visual impairment had neurological co-morbidity (see table 1). In our population, 16% of the blind babies seen were retrospectively diagnosed at having isolated DVM (type 1). Most of the pre-natal drug exposure consisted of prescribed opiates and miscellaneous drug misuse.

20 had a secondary diagnosis of global developmental delay, 5 were premature and 12 had seizures.

Category	N=37
Neurological -including structural brain abnormalities and seizures	16 (43%)
Ocular -including cataract, ON hypoplasia, albinism, congenital nystagmus, ROP	8 (22%)
DVM type 1 (isolated)	6 (16%)
Intrauterine drug exposure	5 (14%)
Genetic -including Vici syn, Down syn	2 (5%)

Table 1. Summary of babies (<6 months) identified as being significantly visually impaired.

Of those with a diagnosis of DVM, the majority of children under the age of 6 months were given a near overcorrection (see table 2). Spectacles were more likely to be issued for those in type 1 or 3 DVM. 13/19 (68%) of those with DVM were boys.

DVM type	n=19 with DVM	+3.00 spectacle overcorrection	Comments from parent/guardian
1 Isolated	6 • Note: 1 had nystagmoid movements which quickly resolved 5/6 (83%) male	Issued to 5/6 • Not issued to 1 as vision reassuring on contrast sensitivity testing (Hiding Heidi test)	• Vision appeared to "click" overnight • Lovely to see an improvement in visual behavior • Vision improved soon after wearing glasses • Took a few weeks before seeing an improvement • Small improvement but poor glasses fit
2 Systemic disease	8 • 4x Structural brain abnormality • 2x intrauterine drug exposure - Methadone, Na valproate • Down's syndrome • West syn 3/8 (38%) male	Issued to 6/8 • 1 not issued as see by a non-paediatric ophthalmologist. Once referred vision had improved • 1 not issued as resolved when seen in clinic at 6m	• Now visually interested in surroundings • Vision improved shortly after getting glasses • Poor fitting glasses. Not noticed any difference with or without glasses • Making progress in vision • Marked improvement noticed • Appears to be happy wearing glass with some progress
3 Early onset ocular disease	5 • 3x albinism • ROP + myopia • Congenital nystagmus 5/5 (100%) male	Issued 5/5	• Quick improvement in vision since glasses and Ipad stimulation • Glasses helped vision considerably • Vision improved soon after glasses but then stopped as not able to tolerate them

Table 2. Summary of babies (<6 months) as having DVM



CONCLUSION

The findings support that active intervention with a near overcorrection, of +3.00, and visual stimulation could be used to "kick start" vision in infants presumed to have DVM. The feedback from parents was generally positive.

There was a male preponderance, highlighting the increased vulnerability of the male neonatal brain[1]. Visual impairment is usually associated with deprivation[2], but here, the results suggest that infants were born into more socioeconomically advantaged areas. This may be partly attributed to some infants being looked after or accommodated children.

The authors accept that given time vision may spontaneously improve anyway. However, as vision is paramount to global development, we advocate taking advantage of early neuroplasticity in order to improve long-term neurodevelopmental outcome.

References: 1. Rosenkrantz TS, Hussain Z, Fitch RH. Sex Differences in Brain Injury and Repair in Newborn Infants: Clinical Evidence and Biological Mechanisms. Front Pediatr. 2019 Jun 26;7:211. 2. Rahi JS, Cable N; British Childhood Visual Impairment Study Group. Severe visual impairment and blindness in children in the UK. Lancet. 2003 Oct 25;362(9393):1359-65.

Images are stock photos from pexels.com. The authors have no conflicts of interest.