Visual Function and Ocular Morphology in Children with Surgically treated Hydrocephalus

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av

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Avhandlingen baseras på följande delarbeten:

I **Andersson S, Persson EK, Aring E, Lindquist B, Dutton GN, Hellström A**
Vision in children with hydrocephalus
Dev Med Child Neurol 2006;48:836-841

II **Andersson S, Hellström A**
Abnormal optic disc and retinal vessels in children with surgically treated hydrocephalus
British J Ophthalmol 2009 Apr;93(4):526-30. Epub 2008 Dec 23

III **Persson EK, Andersson S, Wiklund LM, Uvebrant P**
Hydrocephalus in children born in 1999-2002. Epidemiology, out come and ophthalmological findings
Childs Nerv Syst 2007 Oct;23(10):1111-8

IV **Andersson S, Hård AL, Dutton GN, Aring E, Persson EK, Hellström A**
Timing of interventions and for ophthalmological abnormalities in children with hydrocephalus
In manuscript

UNIVERSITY OF GOTHENBURG

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Aims

To investigate the frequency of ophthalmological abnormalities, the need and timing of eye-care interventions as well as incidence, aetiology and neurological/neuropsychological outcomes in children with hydrocephalus needing surgical treatment during the first year of life.

Patients and Methods

Papers I & II: Seventy-five school-aged children (34 girls and 41 boys) with surgically treated hydrocephalus and 140 age and sex matched control participants underwent a comprehensive ophthalmologic examination including structured history taking regarding visual perceptual problems and ocular fundus photography. In paper II, 55 of the children with hydrocephalus (27 girls and 28 boys) had fundus photographs of sufficient quality (correctly focused photographs with the optic disc centered) taken. These children's photographs were analyzed using digital image analysis.
Paper III & IV: These papers comprised a population-based ophthalmologic study of all the children with hydrocephalus born in western Sweden in 1999-2002 (n=54). Aetiological, neurological and neuroimaging information was collected from the case records. Forty of the 48 children available for the study underwent an ophthalmologic examination (paper IV).

Results

Papers I, III, IV: Visual function deficits were identified in more than 80% of the children with hydrocephalus. Common deficits were low visual acuity, refractive errors, strabismus and difficulties with visual processing. A majority of the children had one or more neurological impairments. Children born at term and those with associated myelomeningocele were least likely to be affected. Both aetiology to hydrocephalus and gestational age at birth were important factors for neurological outcome. No child with normal neuroimaging, after surgery, had any visual or neurological impairments. 74% of the children (paper IV) underwent at least one intervention from the ophthalmologic team, such as correction of refractive errors with glasses and/or patching and/or referral to the visual habilitation clinic. A decrease in the prevalence of hydrocephalus was noted but did not continue in 1999-2002, mainly due to increased survival of children born extremely preterm with post-haemorrhagic hydrocephalus.
Paper II: The median optic disc area was significantly smaller in children with hydrocephalus compared with the reference group. There was no difference in cup area and, consequently the rim area was significantly smaller in the hydrocephalic children. Children with hydrocephalus had an abnormal retinal vascular pattern with significantly straighter retinal arteries and fewer central vessel branching points than the controls.

Conclusions

A majority of children with surgically treated hydrocephalus, during the first year of life, regardless of aetiology, had abnormal ocular morphology and visual functions including a history of visual perceptual problems. Children with hydrocephalus born preterm were most commonly affected. The majority of the children with hydrocephalus had other associated neuroimpairments such as epilepsy, cerebral palsy and/or learning disabilities. A large proportion of children with hydrocephalus need some ophthalmological intervention. Using the current knowledge of the visual functions in children with hydrocephalus we present an "ophthalmological safety net" for these children. We suggest an ophthalmological examination soon after shunt surgery and every 4-6 months during the first two years of life, followed by at least a yearly examination to six years of age, in order to optimize vision and thereby enhance general development.

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