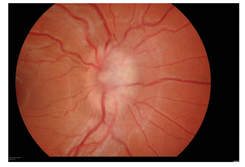
Evaluation of an Orthoptic-led Paediatric Papilloedema Screening Service in the East Midlands

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Introduction

In 2016, Honey Rose, was convicted of gross negligence manslaughter for failing to detect papilloedema in an 8 year old child. This decision was later overturned in the court of appeal[1]. Nonetheless, this has led to a spike in referral and neuro-imaging of children with suspected disc swelling[2,3]. There is further evidence of significant false-positive referrals into emergency eye clinics for patients with suspected disc swelling[4,5], after visiting their optometrist.

Papilloedema is a clinical sign warranting urgent investigation as the cause for this sign may be life and/or sight threatening[6]. There is no agreed standard of assessment for children presenting with suspected papilloedema and it has been shown that reliance on basic fundus imaging alone is insufficient[7].

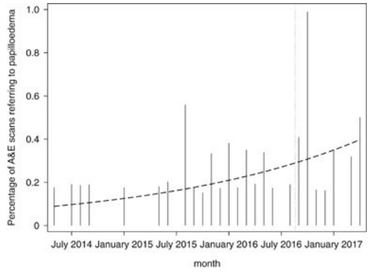


Figure 1: Bar chart showing the proportion of referrals from A&E at NUH referencing papilloedema over time. The dashed line represents postestimation probabilities from a logistic regression model that showed a significant increase (P=0.005) over the study period. The dotted line indicates the date of the original trial.[3]

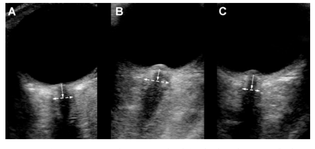
Methods

A literature search identified evidence-based objective criteria for the following clinical tests and investigations: Red flags in ophthalmic history, presence of mechanical and vascular ophthalmoscopic signs, Retinal Nerve Fibre Layer Analysis (RNFL-A) Bruch's Membrane Opening (BMO) and Optic Nerve Sheath Diameter using ultrasonography (ONSD). These cut-offs were validated against a cohort of paediatric patients with proven papilloedema. A proforma was created and an orthoptic-led clinic imaging-based pathway was established. Referrals over a 6 month period were audited and reported. Objective imaging parameters were combined with history, vision, colour vision, ocular motility and mechanical and vascular optic disc features using reference imaging. Clinics were run alongside consultant clinics with input for each patient reviewed in the pathway.

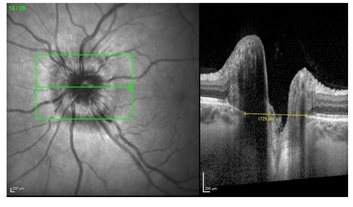
Table 1: Objective parameters for suspected disc swelling to be used in combination with clinical assessment

Test	Red flags
RNFL (global average)	>131 microns
Bruch's Membrane Opening	>1718 microns
Optic Nerve Sheath Diameter	>4.1mm if age 4-10 years, >4.4mm age >10 years

Figure 2: and 3: Descriptions demonstrating how optic nerve sheath diameter and Bruch's Membrane Opening were calculated



ONSD is measured 3 mm behind the base of the papilla (dotted arrow) in an axial plane showing the optic nerve in its longitudinal course.



Results

48 patients were reviewed and 43 were discharged at the first visit (First Visit Discharge Rate 90%). 1 child was unable to be seen due to lack of co-operation with the tests. 2 patients were investigated with MRI for suspected swelling. 2 children were referred to a consultant clinic for other ophthalmic pathology.

36 (73%) patients were asymptomatic and 13 (27%) experienced headaches. The mean visual acuity was 0.03 (right) and 0.02 (left) eyes. The mean RNFL was 111.0 (right eye) and 107.6 (left eye). The mean BMO was 1512.4 (right eye) and 1494.3 (left eye). The mean ONSD was 4.10mm (right eye) and 3.41mm (left eye). The most common cause for pseudo-papilloedema was tilted discs (65%).

Table 2: Patient outcomes

Outcome	Patients (n=48)
Discharged at the first visit	43
Consultation incomplete due to lack of co-operation	2
Further investigation with MRI	2
Referral to consultant clinic	2

Table 3: Clinical tests performed with respective mean values

Clinical Test	Means
Visual Acuity (Right eye)	0.03
Visual Acuity (Left eye)	0.02
RNFL (Right eye)	111.0
RNFL (Left eye)	107.6
BMO (Right eye)	1512.4
BMO (Left eye)	1494.3
ONSD (Right eye)	4.10 mm
ONSD (Left eye)	3.41 mm

Conclusion

An allied health professional run clinic with objective criteria for further investigation is a safe and effective way of screening referrals for suspected papilloedema, in children. Some of the parameters identified could be used to justify referral criteria in asymptomatic children with normal visual function. This could potentially result in reduced false-positive referrals and reduced neuro-imaging alongside a reduction in parental anxiety and worry.

A larger trial is needed to validate the criteria identified.

Figure 4 and 5: Optic disc images of patients referred to consultant clinic





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