Optic disc assessment in the emergency department: a comparative study between the PanOptic and direct ophthalmoscopes

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ABSTRACT

Optic disc assessment is an essential part of the neurological examination of acutely unwell patients. This study compares the PanOptic ophthalmoscope with the direct ophthalmoscope for accuracy of diagnosis and ease of use. Patient satisfaction was also compared for the two instruments. A single-masked prospective observational study was carried out. The authors showed that the PanOptic ophthalmoscope was more sensitive ($p=0.03$) and specific ($p=0.03$) than the direct ophthalmoscope. The PanOptic ophthalmoscope was preferred by both doctors ($p=0.001$) and patients ($p=0.04$) in terms of comfort and ease of use.

INTRODUCTION

Ophthalmoscopy is an essential but challenging skill for all doctors.[1 2] It is not usually necessary in the emergency department (ED) to examine the whole fundus; however, an accurate diagnosis of optic disc pathology is essential. The PanOptic ophthalmoscope (PO) is a commonly used instrument for visualising the fundus (Welch Allyn SKANEATELES, NEW YORK, USA). Owing to its optics, the field of view is five times that of the direct ophthalmoscope (DO), even through an undilated pupil. It also enables the doctor and patient to maintain a comfortable working distance during examination. Despite these advantages, there has been relatively little research comparing the PO and DO in the emergency setting.[3 4]

The objectives of this study were to assess whether the PO is a more useful instrument than the DO for diagnosing pathology of the optic disc in the ED and to assess how acceptable the PO and the DO are for both the doctor and the patient during ophthalmoscopy (figure 1).

METHODS

Thirty-six ED doctors in their first 2 years of training took part in this study (figure 2). The participants were randomised to examine the left eye of a patient with a normal disc as well as a pale, or a swollen, optic disc. A teaching and practice session for both instruments was carried out prior to the study and two matched-pair tests were carried out in order to determine the sensitivity and specificity of each instrument.[5]

Examination conditions were intended to mimic those in the ED: undilated pupils, brightly lit room, mains powered instruments and a 90-second examination time.

The participants then marked a diagrammatic representation of the fundus and both doctors and patients rated their satisfaction with the instrument.

RESULTS

A comparison of the true positive rate of both instruments produced a p value of 0.03, indicating that the PO was a significantly more sensitive instrument (results were considered significant at $p \leq 0.05$). The comparison of the false positive rate produced a p value of 0.03, indicating that the PO was significantly more specific (table 1).

The questionnaire results regarding doctor and patient satisfaction were compared using a two-tailed t test. The doctors displayed a preference for the PO over the DO ($p=0.001$). Patients found the PO more acceptable than the DO ($p=0.04$).

The doctors had used a DO a mean of 26.4 times prior to this study, whereas none had used a PO previously.

DISCUSSION

In the ED, many doctors are inexperienced at funduscopy;[6] however, the ability to recognise an optic disc abnormality and request more experienced help is vital.[7]

Patients were examined with an undilated pupil for the following reasons:

1. Time: Dilation takes 15–30 min. This is not always practical in the acute setting.
2. Resource: Dilating drops are not always available in the ED and doctors may be unsure which drops to use.
3. Safety: Dilating pupils prevents medical staff from carrying out thorough neurological observations, as pupils can remain unresponsive to light for over 4 h.[8]

Pale and swollen discs were chosen because they mimicked two potential medical emergencies, namely raised intracranial pressure[9] and giant cell arteritis.[10] These conditions must be dealt with urgently and treatment cannot afford to be delayed by poor or absent funduscopy.

CONCLUSION

Doctors were more able to accurately diagnose optic disc pathology with the PO than the DO. They also found the PO more acceptable to use than the DO. This may be due to the increased working distance, but is more likely to be due to the optics of the PO, which gives an image analogous to a 25° retinal photograph. The DO only has

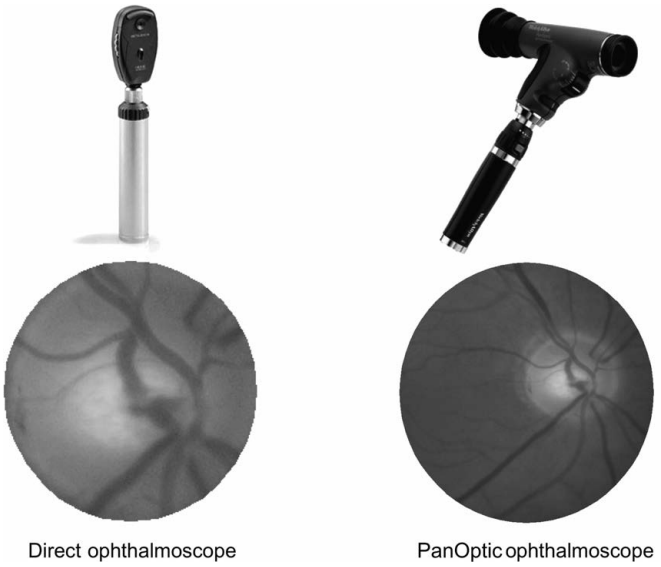

Figure 1 The direct and PanOptic ophthalmoscopes. The direct ophthalmoscope has a 5° field of view, whereas the PanOptic ophthalmoscope has a 25° field of view.

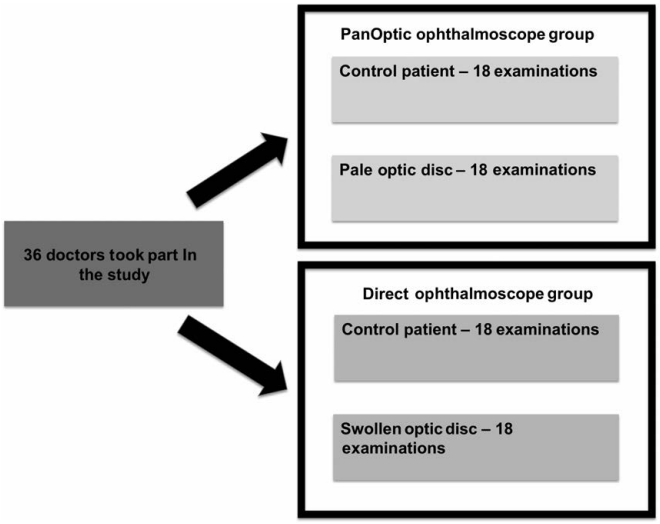

Figure 2 Illustration showing the splitting into two groups of the 36 who doctors participated in the study.

Table 1 Sensitivities, specificities and true/false positive rates for the direct and PanOptic ophthalmoscopes

	Diagnosis	Abnormal disc	Normal disc	Total		
PanOptic ophthalmoscope	Abnormal disc	10	9	19	Sensitivity	**0.63** (0.39 to 0.82)
	Normal disc	6	11	17	Specificity	**0.55** (0.34 to 0.74)
Total		16	20	36		
Direct ophthalmoscope	Abnormal disc	5	14	19	Sensitivity	**0.31** (0.14 to 0.56)
	Normal disc	11	6	17	Specificity	**0.30** (0.15 to 0.52)
Total		16	20	36		

True positive rate		False positive rate	
rTPR	2.00 (1.08 to 3.72)	rFPR	0.64 (0.44 to 0.95)
log(rTPR)	0.69 (0.07 to 1.31)	log(rFPR)	−0.44(−0.83 to −0.05)
SE(log(rTPR))	0.32	SE(log(rFPR))	0.20
p Value	**0.03**	p Value	**0.03**

DO, direct ophthalmoscope; FPR, false positive rate (1 − specificity); PO, PanOptic ophthalmoscope; rFPR, FPR ratio (ie, FPR(PO):FPR(DO)); rTPR, TPR ratio (ie, TPR(PO):TPR(DO)); TPR, true positive rate (sensitivity).

a 5° field of view and therefore it is more difficult to image the whole disc. Patients found the PO to be a more comfortable instrument to be examined with.

These findings show that the PO is a superior instrument for diagnosing disc pathology in the acute care setting.

Competing interests None.

Patient consent Obtained.

Contributors PJ and AB conceived the study. HP carried out the study with the help of PJ and AP. MM carried out statistical analysis. HP wrote the paper.

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