

# Funduscopy in hypertensive emergencies: Detecting flames in the cotton fields

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A retinal examination is part of the evaluation of patients suspected of having a hypertensive emergency. Unless other signs of acute hypertension-mediated organ damage, such as encephalopathy or thrombotic microangiopathy, are present, management according to international guidelines depends on the results of funduscopy.<sup>1</sup> However, despite guideline recommendations, funduscopy is not always performed at presentation on the emergency department. Whether this affects treatment and outcome has not been previously studied. In their retrospective analysis, Nijskens et al<sup>2</sup> addressed this often ignored issue thereby providing valuable data about the frequency of retinal abnormalities in patients presenting with severe hypertension at the emergency department.

The presence of advanced ischemic retinal damage in patients with severe hypertension is ominous and life-threatening if left untreated. In 1939, when treatment of hypertension was not yet possible, Keith et al classified hypertensive retinopathy into four grades according to survival. More than 90% of patients with severe hypertension and bilateral optic nerve edema (grade IV) died within 1 year. Patients with retinal changes consisting of soft exudates or flame-shaped hemorrhages (grade III) had a slightly better prognosis with 65% of patients deceased after 1 year.<sup>3</sup> Survival drastically improved with the introduction of antihypertensive medication resulting in similar prognosis of patients with grade III and IV retinopathy since the 1980s.<sup>4,5</sup> Formerly referred to as having “malignant hypertension”, these patients still remain at increased risk of death, cardiovascular, and renal disease compared to patients with non-malignant hypertension.<sup>6</sup>

Guidelines recommend that patients with severe hypertension and grade III or IV retinopathy be treated with intravenous blood pressure-lowering agents, meaning that funduscopy should be

performed immediately at presentation. The main reason for this recommendation is that presence of grade III or IV hypertensive retinopathy signifies disruption of cerebral autoregulation and risk of cerebral hypoperfusion when blood pressure is lowered.<sup>7</sup> Indeed, uncontrolled blood pressure reduction with oral antihypertensives in patients with this type of emergency has been associated with ischemic stroke and death.<sup>8-10</sup> Nijskens et al show that adherence to this recommendation is poor in clinical practice. Less than half of patients referred to the emergency department with severe hypertension actually received a retinal examination. Differences in clinical characteristics between patients with and without funduscopy indicate that besides logistic barriers such as availability of an ophthalmologist, a clinical judgment was made whether or not to perform funduscopy. If the omission of retinal examination was only attributable to logistics, one would expect clinical characteristics to be more randomly divided. It seems that younger patients with higher blood pressure were more likely to receive funduscopic examination. From a Bayesian perspective, this approach is reasonable as the authors indeed demonstrate that patients with higher blood pressure were more likely to have grade III or IV retinopathy, while the younger age is consistent with other cohorts that show that this hypertensive emergency mostly occurs in patients in their 40s or 50s.<sup>11-13</sup> Moreover, short-term (two weeks) outcome of patients who were managed without retinal examination was not unfavorable compared to those who underwent funduscopy at presentation, providing support for this practice. Although underpowered to detect differences in outcome, this observation might be explained by the low-risk population included in the study: 86% of the patients who were suspected of a hypertensive emergency and actually received a funduscopy, turned out not to have grade III or

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IV retinopathy. This illustrates the heterogeneity of the population presenting at the emergency department with severe hypertension. Not all patients will be suspected of having a hypertensive emergency, but in the absence of clinical criteria that help differentiate, many low-risk patients will receive a needless diagnostic workup. Because the magnitude and swiftness of blood pressure elevation, rather than the absolute height of blood pressure leads to acute organ damage, guidelines usually refrain from absolute blood pressure thresholds. However, the retinal abnormalities associated with hypertensive emergency take time to develop, are often associated with other more chronic signs of hypertension-mediated organ damage, in particular left ventricular hypertrophy,<sup>14,15</sup> and may be lacking in emergencies that are characterized by a rapid blood pressure increase as observed in patients with hypertensive encephalopathy.<sup>16</sup> In this regard, it would be interesting to know what proportion of patients were asymptomatic at presentation as this category has previously been suggested not to benefit from extensive emergency department evaluation.<sup>17</sup> In addition, average blood pressure values were relatively low compared to previous studies in patients with "malignant hypertension." Although Nijskens et al aimed to include patients with a diastolic blood pressure of >120 mm Hg, average diastolic blood pressure was much less. Perhaps the diagnostic yield of funduscopy would be higher if performed only in symptomatic patients with higher blood pressure (at least 200/120 mm Hg) and not routinely in all patients referred to the emergency department.

Presence of grade III or IV hypertensive retinopathy in patients with a higher pre-test probability might be more useful in clinical decision making. In a low-risk population, Nijskens et al show that only 50% of patients with grade III or IV hypertensive retinopathy were subsequently admitted for controlled intravenous lowering of blood pressure. Retinal examination findings therefore did not seem to affect treatment choice as the remaining patients were treated with oral medication regardless of the presence of advanced hypertensive retinopathy. This apparent discrepancy between guideline recommendations and clinical practice is likely multifactorial. Both the lack of a clear definition that helps in discriminating high-risk from low-risk patients and randomized trials comparing oral and intravenous treatment strategies in patients with severe hypertension and advanced retinopathy contribute to the disparate management strategies. Although both oral and intravenous treatment can be effective, the main concern is the magnitude of the blood pressure-lowering response. Several case series and cohort studies, including the present study by Nijskens et al, have reported ischemic strokes following treatment with oral antihypertensives in hypertensive emergency patients with advanced hypertensive retinopathy and a large blood pressure drop. Whether this complication could have been prevented with intravenous blood pressure-lowering therapy remains unanswered, after all large reductions in blood pressure may also occur with intravenous treatment. However, the advantage of intravenous treatment is that these patients are usually continuously monitored and treatment can be rapidly adjusted. In the absence of comparative studies, this available anecdotal evidence is the principal guide to make treatment decisions.

Severe hypertension with advanced retinopathy is a rare hypertensive emergency that remains a cause of considerable morbidity and mortality. Funduscopy is an essential tool in the diagnostic workup of these patients, as grade III of IV can be the only evidence of acute hypertension-mediated organ damage. As again demonstrated by Nijskens et al, it is prudent to admit patients with advanced retinopathy for controlled blood pressure lowering in order to prevent cerebral ischemia. The other message born out of this study is that the majority of patients referred to the emergency department with severe hypertension do not have malignant hypertension, especially if blood pressure <200/120 mm Hg. This is important as it may allow a more efficient allocation of resources to those deemed at higher risk, thereby increasing the yield of funduscopy.

#### CONFLICT OF INTEREST

None.

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