

Phenylephrine Added to Tropicamide Eye Drops Does Not Influence Oxygen Saturation or Vessel Diameter in Oximetry.

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ABSTRACT

PURPOSE:

To test whether adding topical phenylephrine 5% to tropicamide 0.5% eye drops in the protocol for pupil dilation affects the retinal vessel oximeter measurements in glaucoma patients. To test whether phenylephrine has an influence as a vasoconstrictor on the retinal vessel width and on the quality of the obtained retinal images in glaucoma patients.

METHODS:

Retinal images of 25 primary open-angle glaucoma (POAG) and 26 normal tension glaucoma (NTG) patients were obtained before and after the administration of phenylephrine 5% eyedrops of patients already dilated with tropicamide 0.5% with the Oxymap Retinal Oximeter (Oxymap ehf. Reykjavik, Iceland). Specialized software, Oxymap Analyzer, analyzed the images and measured the oxygen saturation and vessel diameter. Oxygen saturation was measured in first and second degree vessels. A Mann-Whitney U test was used to compare both groups. Quality of the pictures was assessed and a Fisher exact test was used.

RESULTS:

There was no significant difference in arterial and venous oxygen saturation in glaucoma patients whether dilated by tropicamide alone or a combination of tropicamide and phenylephrine (99±5% vs 97±4%, p=0.27 and 95±8% vs 95±5%, p=0.77 for arterial saturation and 65±5% vs 65±7%, p=0.86 and 65±5% vs 65±6%, p=0.73 for venous saturation in POAG and NTG, respectively). There was no significant difference in vessel diameter between both protocols for the different vessels (p=0.98 and p=0.27 for arterial saturation and p=0.68 and p=0.20 for venous saturation in respectively POAG and NTG). The quality of the pictures was significant better in the group that received the combination (p=0.0006 and p=0.0001 in respectively POAG and NTG).

CONCLUSIONS:

The combination of topical phenylephrine 5% and tropicamide 0.5% improved the quality of retinal oximetry images without influencing the oxygen saturation or vessel diameter.

BACKGROUND

In previous retinal oximetry reports, different protocols for pupil dilation are used: dilation with tropicamide 1% supplemented with phenylephrine hydrochloride 10% when needed (Hardarson et al. 2009; Hardarson & Stefánsson 2010; Hardarson & Stefánsson 2011; Hardarson & Stefánsson 2012; Olafsdóttir et al. 2011), tropicamide 1% alone (Hardarson et al. 2009), or the combination of tropicamide and phenylephrine (Blondal et al. 2011).

Reference

Hardarson et al. 2009: Invest Ophthalmol Vis Sci **50**: 5247-5250.
Hardarson & Stefánsson 2010: Am J Ophthalmol **150**: 871-875.
Hardarson & Stefánsson 2011: Acta ophthalmologica (epub ahead of print).

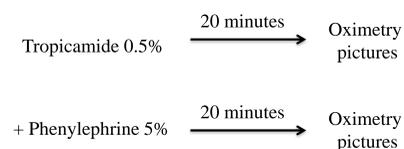
OBJECTIVE

The aim of this study was to evaluate whether the addition of phenylephrine 5% to tropicamide 0.5% in the protocol for dilation affected the retinal vessel oximeter measurements, and to test whether phenylephrine 5% had an influence as a vasoconstrictor on the retinal vessel width and on the quality of the obtained images.

METHODS

- POAG and NTG patients were included
- Non-invasive oximetry pictures were taken with Oxymap ehf (Reykjavik, Iceland)

► Dilation protocol



- retinal oxygen saturation was measured
- The quality was assessed on four criteria:
 - focus/ contrast/glare/shadow
- Statistical analysis
 - Mann-Whitney U test was used to compare both treatment regimens
 - Fisher Exact test was used to assess the quality of the oximetry pictures

RESULTS

Table 1: Baseline characteristics

No. patients	51
NTG	26
POAG	25
Gender	22 men, 29 women
Age, mean ± SD, y	62 ± 13
Intraocular pressure, mean ± SD, mmHg	14 ± 4
Systolic blood pressure, mean ± SD, mmHg	150 ± 27*
Diastolic blood pressure, mean ± SD, mmHg	83 ± 13*
No. of glaucoma medications	1.8 ± 1.4
Trabeculectomy	7

POAG: primary open angle glaucoma, NTG: normotensive glaucoma, No: number of patients, SD: standard deviation, y: years, * blood pressure measurements from 8 patients were unavailable.

Hardarson & Stefánsson 2012: Br J Ophthalmol **96**: 560-563.
Olafsdóttir et al. 2011: Invest Ophthalmol Vis Sci **52**: 6409-6413.
Hardarson et al. 2009: Invest Ophthalmol Vis Sci **50**: 2308-2311.
Blondal et al. 2011: Graefes Arch Clin Exp Ophthalmol **249**: 1311-1317.

RESULTS

Table 2: Retinal oxygen saturation values (%) and retinal vessel width (pixels) after pupil dilation with tropicamide 0.5% alone and the combination of tropicamide 0.5% and phenylephrine 5%.

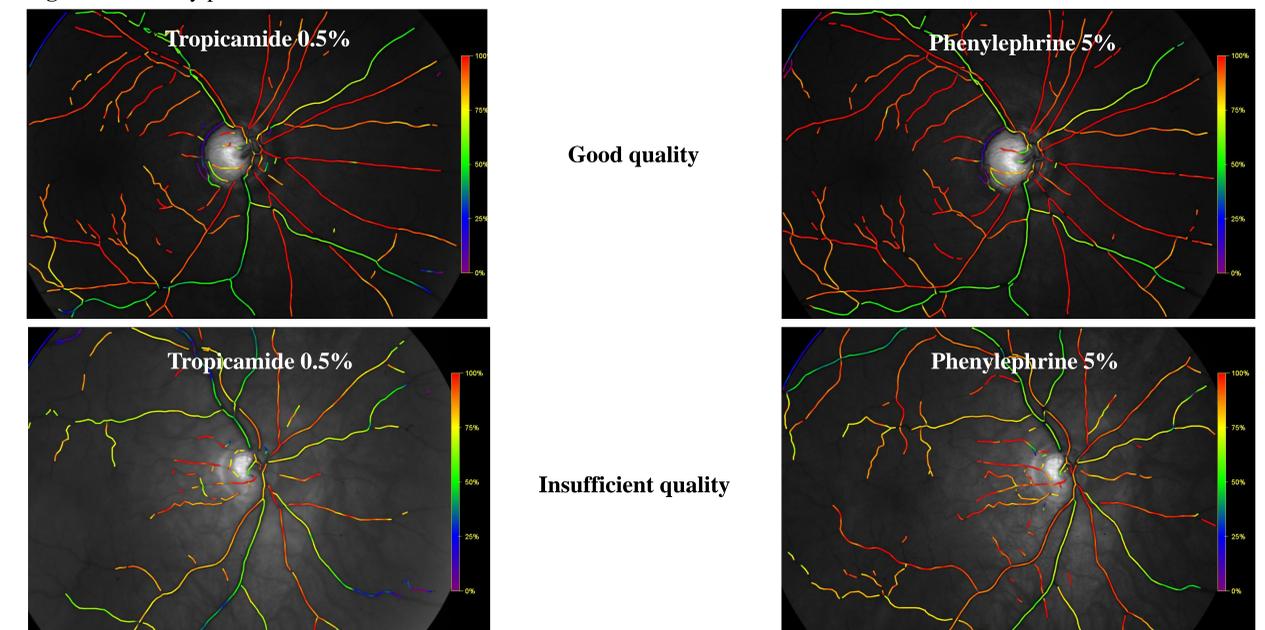
		Good quality	Good quality	p-value	Tropicamide + phenylephrine (n=51)	p-value Tropicamide vs total group	p-value Tropicamide + phenylephrine vs total group
		Tropicamide (n=27)	Tropicamide + phenylephrine (n=27)				
Arterioles	Sat O ₂	97±6	96±5	0.88	96±4	0.30	0.35
	Width	10±1	10±1	0.61	10±1	0.44	0.83
Venules	Sat O ₂	66±6	67±6	0.78	66±7	0.83	0.60
	Width	14±2	14±2	0.51	14±2	0.43	0.96
AV difference	Sat O ₂	31±7	30±7	0.71	30±7	0.57	0.89

n= amount of patients, Sat: saturation, O₂: oxygen, AV: arterio-venous difference denotes the differences in oxygen saturation between arterioles and venules. Data are presented as mean ± standard deviation.

Table 3: Quality of the obtained oximetry pictures

	Tropicamide	Tropicamide + phenylephrine
Good	27 (53%)	51 (77%)
Insufficient	24 (47%)	15 (23%)
Insufficient	Focus	23 (96%)
	Contrast	12 (50%)
	Glare	4 (17%)
	Shadows	12 (50%)
Insufficient	Focus	12 (80%)
	Contrast	1 (7%)
	Glare	1 (7%)
	Shadows	1 (7%)

Figure: Oximetry pictures



CONCLUSIONS

The addition of topical phenylephrine 5% after tropicamide 0.5% improved the quality of retinal oximetry images without influencing the retinal oxygen saturation values or the retinal vessel diameter in glaucoma patients.

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