



## ORIGINAL ARTICLE / ORIGINARNI RAD

# Peripapillary capillary vessel density in normal tension glaucoma and primary open-angle glaucoma

Nataša Čivčić-Kalinić<sup>1</sup>, Nada Čivčić<sup>1</sup>, Stefan Brunet<sup>2</sup>, Miroslav Stamenković<sup>3</sup>

<sup>1</sup>Family Čivčić Practice of Ophthalmology, Belgrade, Serbia;

<sup>2</sup>University of Novi Sad, Faculty of Medicine, Clinical Centre of Vojvodina, Eye Clinic, Novi Sad, Serbia;

<sup>3</sup>University of Belgrade, Faculty for Special Education and Rehabilitation, Zvezdara Clinical Hospital Centre, Eye Clinic, Belgrade, Serbia

## SUMMARY

**Introduction/Objective** Primary open angle glaucoma (POAG) is a chronic, progressive, optic neuropathy with possible blindness and irreversible changes in the optic nerve head (ONH). Optical coherence tomography (OCT) is non-invasive method that provides structural glaucoma damage evaluation. OCT angiography (OCTA) provides qualitative and quantitative assessment of peripapillary microvasculature. The objective of this study was to determine whether there is a difference in peripapillary capillary vessel density (VCD) in normal tension glaucoma (NTG), POAG and healthy subjects.

**Methods** This prospective study included 120 eyes: 40 healthy eyes, 30 eyes with NTG and 50 eyes with POAG. Ophthalmological examination, central corneal thickness, OCT, OCTA also visual field were performed.

**Results** Vessel capillary density total (VCD total) is significantly higher in healthy compared to NTG and POAG ( $39.25 \pm 0.94$  vs.  $36.79 \pm 2.50$  vs.  $37.58 \pm 1.53$ ;  $p < 0.001$ ). Peripapillary VCD (VCD perip.) is lower significantly in NTG and POAG in comparison with healthy subjects ( $39.21 \pm 2.62$  vs.  $40.18 \pm 1.35$  vs.  $41.29 \pm 0.81$ ;  $p < 0.001$ ). VCD total is significantly lower in NTG compared to POAG ( $36.79 \pm 2.50$  vs.  $37.58 \pm 1.53$ ;  $p < 0.001$ ). We found significantly positive correlation between OCT and OCTA parameters of ONH with mean deviation (MD) index in NTG between retinal nerve fiber layer average with MD ( $r = 0.370$ ,  $p < 0.05$ ) also between VCD perip. inf. with MD ( $r = 0.395$ ,  $p < 0.05$ ). In POAG, we obtained a significantly positive correlation between VCD inf. with MD ( $r = 0.277$ ,  $p < 0.05$ ) also VCD inside disc with MD ( $r = 0.395$ ,  $p < 0.01$ ).

**Conclusion** Glaucoma patients have a significantly lower vessel density ONH and VCD perip. compared to healthy subjects. VCD total of ONH is significantly lower in NTG compared to POAG. We obtained a positive correlation between OCT and OCTA parameters with MD in NTG and POAG.

**Keywords:** optical coherence tomography angiography; optic nerve head; intraocular pressure

## INTRODUCTION

Primary open angle glaucoma (POAG) is a chronic, progressive, optic neuropathy with possible blindness and irreversible changes in the optic nerve. It causes a reduction of the neuroretinal rim and retinal nerve fiber layer (RNFL) with relative visual field (VF) defects. Changes in the VF are prevented with early diagnosis and treatment of glaucoma [1].

There are morphologically optic nerve head (ONH) changes in glaucoma as well as RNFL thickness decrease [2, 3, 4].

Usually used non-invasive method that provides structural glaucoma damage evaluation is optical coherence tomography (OCT) [5].

OCT angiography (OCTA) is non-invasive and high-resolution method which provides peripapillary vessel density (angioflow vessel density) as well as superficial perifoveal vessel density quantification. Perfused area expressed as vessel density is a percentage of full examined of its limited sectors inside retinal layer [6, 7]. Peripapillary vessel capillary density (VCD perip.) is the most consistent OCTA parameter in the diagnosis and monitoring of glaucoma

progression [6], and a useful predictor of VF progression in intermediate and advanced glaucoma patients [8]. Jia et al. [9] were the first to describe vessel density reduced measurement by OCTA in glaucoma.

The aim of this study was to determine whether there is a difference in VCD perip. in normal tension glaucoma (NTG) and primary open-angle glaucoma (POAG) patients as well as healthy subjects.

## METHODS

This prospective research included 120 eyes: 40 healthy eyes, 30 eyes with NTG and 50 eyes with POAG. The study was performed in Family Čivčić Practice of Ophthalmology, Belgrade, from April 2022 to March 2023.

Inclusion criteria were: open angle under gonioscopy, early [mean deviation (MD)  $\leq 6$  dB] and middle (MD  $\leq 12$  dB) stage of glaucoma patients according to Hodapp's classification [1], age  $\geq 18$  years. Different inclusion criteria were specified in:

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### Correspondence to:

Nataša ČIVČIĆ-KALINIĆ  
Family Čivčić Practice of Ophthalmology  
Maksima Gorkog 23  
11000 Belgrade  
Serbia  
[ncivcic@gmail.com](mailto:ncivcic@gmail.com)

– healthy-control group: eyes without glaucoma with intraocular pressure (IOP) 10–21 mmHg, best corrected visual acuity (BCVA)  $\geq 0.9$ , normal cup/disc ratio, RNFL thickness and VCD perip;

– NTG group: eyes with early and middle stage (Hodapp's classification) NTG, with characteristic change of the ONH and RNFL and MD  $\leq 12$  dB without elevated IOP; BCVA  $\geq 0.5$ ;

– POAG group: eyes with early and middle stage (Hodapp's classification) POAG, with typical damage of RNFL and ONH and MD  $\leq 12$  dB with elevated IOP; BCVA  $\geq 0.5$ ;

Exclusion criteria: advanced POAG glaucoma stage, secondary glaucoma, myopia  $\geq -6$  D, ONH drusen and other ONH anomalies, trauma, other ocular diseases, previous laser treatment as well as ocular surgery (glaucoma or cataract), MD  $> 12$  dB, unreliable VF patients (false-positive errors  $> 15\%$ , false-negative errors  $> 15\%$ , and fixation losses  $> 20\%$ ).

All patients went through the following examination procedure: slit-lamp biomicroscopy, BCVA, Goldmann applanation tonometry, evaluation of dilated fundus, gonioscopy, central corneal thickness measurement using ultrasonic pachymeter SP-100 Tomey (Tomey, Nagoya, Japan) and 24-2 threshold test with standard automated perimetry AP-1000 Tomey (Tomey). Spectral domain OCT (SOCT REVO 60, software version 11.05, Optopol Technology, Zawiercie, Poland,) was performed in RNFL measurements and ONH analysis. OCTA examination was performed with SOCT REVO 60 with angio mode, software 11.05 (2021) axial resolution  $5\mu\text{m}$  and 60 000 scan per second. The quality of the obtained recordings was  $\text{QI} \geq 8$ .

VCD is defined as the percentage of area occupied by capillaries with flow in the scanned region. Measurements were made and analyzed in the radial peripapillary capillaries (RPC) plexus from the inner limiting membrane to the posterior boundary of the RNFL.

In research, certain statistical descriptive methods are considered: arithmetic mean, standard deviation, median, minimum, maximum and percentage. The difference between the mean values of variables with normal distribution was analyzed by one-way ANOVA parametric test. For variables without a normal distribution, the non-parametric Kruskal–Wallis test was used. Additional analyzes were performed with the parametric t-test. Correlation between the investigated parameters was done with the Pearson's correlation test and Spearman-R Order correlation test. Statistical analysis was done in IBM SPSS Statistics for Windows, Version 26.0. (IBM Corp., Armonk, NY, USA). Statistical significance is considered at level value of  $p < 0.05$ .

**Ethics:** The study has approval of the Local Ethics Committee and the Medical Faculty University of Novi Sad, Novi Sad, Serbia (Number 01-39/237/1).

**Table 1.** Demographic and clinical characteristics of patients

Parameters	Health (n = 40) $\bar{x} \pm \text{SD}$	NTG (n = 30) $\bar{x} \pm \text{SD}$	POAG (n = 50) $\bar{x} \pm \text{SD}$	p
Age (years)	47 (18–74)	60.60 $\pm$ 14.16	62.36 $\pm$ 11.64	$< 0.001$
Gender (M/F), n	16/24	8/22	15/35	0.442
BCVA	0.98 $\pm$ 0.10	0.89 $\pm$ 0.18	0.94 $\pm$ 0.11	NS*
IOP (mmHg)	16.18 $\pm$ 2.73	15.47 $\pm$ 2.83	17.36 $\pm$ 3.74	$< 0.05^*$
CCT ( $\mu\text{m}$ )	561.75 $\pm$ 36.45	498.73 $\pm$ 19.09	565.28 $\pm$ 28.98	$< 0.0001^{**}$
MD (dB)	0.52 (-3.06–3.45)	-1.57 (-11-1.41)	-1.27 (-4.57–3.61)	$< 0.001^{**}$

M/F – male/female; BCVA – best corrected visual acuity; IOP – intraocular pressure; CCT – central corneal thickness; MD – mean deviation; NTG – normal tension glaucoma; POAG – primary open angle glaucoma;

\*One Way ANOVA;

\*\*Kruskal–Wallis

**Table 2.** OCT parameters of the optic nerve head

OCT parameters	Health (n = 40) $\bar{x} \pm \text{SD}$	NTG (n = 30) $\bar{x} \pm \text{SD}$	POAG (n = 50) $\bar{x} \pm \text{SD}$	p
RNFL aver. ( $\mu\text{m}$ )	123.45 $\pm$ 9.31	113.33 $\pm$ 18.42	114.26 $\pm$ 17.24	$< 0.01^*$
RNFL sup. ( $\mu\text{m}$ )	139.38 $\pm$ 13	130.21 $\pm$ 23.06	127.36 $\pm$ 20.53	$< 0.05^*$
RNFL inf. ( $\mu\text{m}$ )	144.58 $\pm$ 13.55	127 $\pm$ 26.54	129.42 $\pm$ 24.55	$< 0.001^*$
C/D area ratio	0.29 (0.13–0.47)	0.425 (0.2–0.96)	0.49 $\pm$ 0.13	$< 0.001^{**}$

OCT – optical coherence tomography; NTG – normal tension glaucoma; POAG – primary open angle glaucoma; RNFL – retinal nerve fiber layer; C/D – cup/disc area ratio;

\*One Way ANOVA;

\*\*Kruskal–Wallis

**Table 3.** OCTA parameters of the optic nerve head

OCTA parameters	Health (n = 40) $\bar{x} \pm \text{SD}$	NTG (n = 30) $\bar{x} \pm \text{SD}$	POAG (n = 50) $\bar{x} \pm \text{SD}$	p
VCD total	39.25 $\pm$ 0.94	36.79 $\pm$ 2.5	37.58 $\pm$ 1.55	$< 0.001^*$
VCD sup.	39 $\pm$ 1.92	36.64 $\pm$ 2.66	37.43 $\pm$ 1.91	$< 0.001^*$
VCD inf.	39.19 $\pm$ 1.09	36.68 $\pm$ 3.03	37.45 $\pm$ 2.18	$< 0.001^*$
VCD ins.d	31.53 $\pm$ 2.61	27.96 $\pm$ 4.17	27.33 $\pm$ 4.55	$< 0.001^*$
VCD perip.	41.29 $\pm$ 0.81	39.21 $\pm$ 2.62	40.18 $\pm$ 1.35	$< 0.001^*$
VCD perip.sup.	41.47 $\pm$ 1.1	39.62 $\pm$ 2.62	40.47 $\pm$ 1.31	$< 0.001^*$
VCD perip.inf.	41.13 $\pm$ 0.85	38.74 $\pm$ 3.01	39.82 $\pm$ 2.07	$< 0.001^*$

OCTA – optical coherence tomography angiography; VCD – vessel capillary density; VCD ins.d – vessel capillary density inside disc; VCD perip. – vessel capillary density peripapillary; NTG – normal tension glaucoma; POAG – primary open angle glaucoma;

\*One Way ANOVA

## RESULTS

This prospective research included 120 eyes: 40 healthy eyes, 30 eyes with NTG and 50 eyes with POAG. There were 39 (32.5%) male patients and 81 (67.5%) female patients. Demographic and clinical characteristics of patients are presented in Table 1. IOP values are significantly higher in POAG compared to NTG and healthy subjects ( $p < 0.05$ ). Central corneal thickness is significantly smaller in NTG compared to POAG and healthy eyes ( $p < 0.001$ ). MD index of VF is significantly higher in NTG and POAG patients compared to healthy eyes ( $p < 0.01$ ).

Table 2 shows the OCT parameters of ONH and the comparison between the groups. Cup/disc area ratio is significantly higher in NTG and POAG compared to healthy subjects ( $p < 0.001$ ). RNFL average thickness is significantly lower in NTG and POAG patients compared to healthy eyes ( $p < 0.01$ ).

**Table 4.** OCTA parameters of the optic nerve head in NTG and POAG

OCTA parameters	NTG (n = 30) $\bar{x} \pm SD$	POAG (n = 50) $\bar{x} \pm SD$	p
VCD total	36.79 ± 2.5	37.58 ± 1.55	< 0.001°
VCD sup.	36.64 ± 2.66	37.43 ± 1.91	< 0.05°
VCD inf.	36.68 ± 3.03	37.45 ± 2.18	< 0.01°
VCD ins.d	27.96 ± 4.17	27.33 ± 4.55	NS
VCD perip.	39.21 ± 2.62	40.18 ± 1.35	< 0.001°
VCD perip.sup.	39.62 ± 2.62	40.47 ± 1.31	< 0.001°
VCD perip.inf.	38.74 ± 3.01	39.82 ± 2.07	< 0.001°

OCTA – optical coherence tomography angiography; VCD – vessel capillary density; VCD ins.d – vessel capillary density inside disc; VCD perip. – vessel capillary density peripapillary; NTG – normal tension glaucoma; POAG – primary open angle glaucoma;

°t – Test

**Table 5.** Pearson's correlation coefficient between RNFL thickness and OCTA parameters of the optic nerve head

OCT parameters	OCTA parameters	Health (n = 40)	NTG (n = 30)	POAG (n = 50)
RNFL average	VCD total	0.2960	0.1227	0.0056
	VCD sup.	0.3915*	0.1315	-0.0637
	VCD inf.	0.1149	0.2314	0.0077
	VCD ins.d	0.2189	0.0200	-0.3468*
	VCD perip.	0.0260	0.0742	0.1973
RNFL superior	VCD total	0.2493	0.0130	-0.0123
	VCD sup.	0.2384	0.1820	-0.0397
	VCD inf.	0.0913	0.0651	-0.0332
	VCD ins.d	0.1208	-0.1586	-0.2669
	VCD perip.	0.1177	-0.0353	0.1723
RNFL inferior	VCD total	0.1029	0.2055	0.0321
	VCD sup.	0.3727*	0.0102	-0.1129
	VCD inf.	0.0312	0.2655	0.0727
	VCD ins.d	0.0450	0.0403	-0.3883**
	VCD perip.	0.1879	0.1255	0.2436
RNFL temporalis	VCD total	0.0552	0.1199	-0.1955
	VCD sup.	0.0629	0.2676	-0.2325
	VCD inf.	0.0768	0.3723*	-0.1442
	VCD ins.d	0.1420	0.2727	-0.2228
	VCD perip.	0.0955	0.1252	-0.1248
RNFL nasalis	VCD total	0.3378*	0.0975	-0.0192
	VCD sup.	0.2301	0.2077	0.1023
	VCD inf.	0.2836	0.2855	-0.1036
	VCD ins.d	0.3158*	0.0848	-0.2049
	VCD perip.	0.2343	0.0934	0.1021

OCT – optical coherence tomography; OCTA – optical coherence tomography angiography; RNFL – retinal nerve fiber layer; VCD – vessel capillary density; VCD ins.d – vessel capillary density inside disc; VCD perip. – vessel capillary density peripapillary; NTG – normal tension glaucoma; POAG – primary open angle glaucoma;

\* p < 0.05;

\*\* p < 0.01

OCTA parameters of ONH and comparison between groups are presented in Table 3. VCD total is significantly higher in healthy compared to NTG and POAG patients (39.25 ± 0.94 vs. 36.79 ± 2.50 vs. 37.58 ± 1.53; p < 0.001). VCD perip. is significantly lower in NTG and POAG compared to healthy subjects (39.21 ± 2.62 vs. 40.18 ± 1.35 vs. 41.29 ± 0.81; p < 0.001).

OCTA parameters of ONH and comparison between NTG and POAG groups are shown in Table 4. VCD total is significantly lower in NTG compared to POAG

**Table 6.** Spearman-R correlation OCT and OCTA parameters of the optic nerve head with mean deviation index visual field

OCT and OCTA parameters	Health (n = 40)	NTG (n = 30)	POAG (n = 50)
RNFL average	-0.132	0.370*	-0.124
RNFL superior	-0.089	0.320	-0.155
RNFL inferior	-0.215	0.301	-0.110
VCD total	-0.024	0.357	0.235
VCD superior	-0.040	0.155	0.122
VCD inferior	0.049	0.316	0.277*
VCD ins.d	-0.125	-0.013	0.395**
VCD perip.	0.016	0.295	-0.015
VCD perip.sup.	-0.036	0.103	-0.092
VCD perip.inf.	0.033	0.395*	0.044

OCT – optical coherence tomography; OCTA – optical coherence tomography angiography; RNFL – retinal nerve fiber layer; VCD – vessel capillary density; VCD ins.d – vessel capillary density inside disc; VCD perip. – vessel capillary density peripapillary; NTG – normal tension glaucoma; POAG – primary open angle glaucoma;

\* p < 0.05;

\*\* p < 0.01

(36.79 ± 2.50 vs. 37.58 ± 1.55; p < 0.001). VCD perip. is highly statistically significantly lower in NTG compared to POAG (39.21 ± 2.62 vs. 40.18 ± 1.35; p < 0.001).

Pearson's correlation coefficient between RNFL thickness and OCTA parameters of ONH are presented in Table 5. We obtained a positive correlation between RNFL average and RNFL inf. with VCD sup. (p < 0.05) and RNFL nasalis with VCD total and VCD ins.d (p < 0.05) in healthy subjects. We found significantly positive correlation in NTG between RNFL temp. and VCD inf. (r = 0.372, p < 0.05). In POAG, we obtained a significant negative correlation between RNFL average and VCD ins.d (r = -0.347, p < 0.05) and RNFL inf. with VCD ins.d (r = -0.388, p < 0.01).

Spearman R correlation OCT and OCTA parameters ONH with MD index VF are shown in Table 6. We found significantly positive correlation between OCT and OCTA parameters of ONH with MD index in NTG among RNFL average and MD (r = 0.370, p < 0.05) and among VCD perip.inf. and MD (r = 0.375, p < 0.05). In POAG we obtained a significantly positive correlation between VCD inf. and MD (r = 0.277, p < 0.05) as well as VCD ins.d and MD (r = 0.395, p < 0.01).

## DISCUSSION

OCTA provide qualitative and quantitative analysis of VCD of ONH and peripapillary region in glaucoma patients [6].

During aging, in normal eyes there is a decrease in RNFL thickness, Ganglion Cell Complex thickness, VCD perip., and superficial macular vessel density. Changes that occur with aging should be considered during diagnosis and follow-up of glaucoma patients [10].

Bojikian et al. [11] analyzed 26 healthy, 30 POAG, and 31 NTG subjects. Healthy eyes showed significantly higher RNFL thickness average compared to POAG and NTG (p < 0.0001). Eyes with NTG also had significantly lower flux and vessel area density compared to normal eyes (p < 0.0001).

In our study, we found that VCD total is significantly higher in healthy compared to NTG and POAG patients ( $39.25 \pm 0.94$  vs.  $36.79 \pm 2.50$  vs.  $37.58 \pm 1.53$ ;  $p < 0.001$ ). VCD perip. is significantly lower in NTG and POAG compared to healthy subjects ( $39.21 \pm 2.62$  vs.  $40.18 \pm 1.35$  vs.  $41.29 \pm 0.81$ ;  $p < 0.001$ ). Lee et al. [12] shows the results of VCD perip. between patients with NTG and POAG compared to glaucoma suspect and control groups. Full VCD is significantly lower in NTG and POAG compared to control group ( $p < 0.001$ ). They did not find statistically significant VCD between NTG and POAG.

Onishi et al. [13] compared VCD perip. in healthy eyes ( $49.12 \pm 2.80$ ) to POAG ( $37.63 \pm 7.19$ ),  $p < 0.001$ ; but not statistically significant in NTG eyes ( $45.33 \pm 7.66$ ;  $p = 0.692$ ). In this study, there was a significantly difference among VCD perip. in POAG and NTG eyes ( $p = 0.030$ ). Scripsema et al. [14] reported global perfused capillary density in POAG, NTG, and healthy eyes ( $33.13 \pm 6.23$ ;  $36.49 \pm 3.18$ ;  $41.32 \pm 1.96$ ). A statistically significant difference between the groups was obtained ( $p < 0.01$ ).

Chen et al. [15] compared VCD perip. in glaucoma to healthy eyes. In the present study, VCD perip. total was significantly lower in glaucoma eyes than in healthy eyes ( $43.8\% \pm 5.7\%$  vs.  $53.3\% \pm 3\%$ ;  $p < 0.001$ ). Pearson's correlation coefficient showed that VCD perip. total ( $r = 0.74$ ) and RNFL thickness ( $r = 0.65$ ) had strong positive correlation with MD ( $p < 0.001$ ).

In our study, there is a significantly positive correlation in NTG among RNFL average and MD ( $r = 0.370$ ,  $p < 0.05$ ) and among VCD perip. inf. and MD ( $r = 0.375$ ,  $p < 0.05$ ). In POAG patients there are a significantly positive correlation between VCD inf. and MD ( $r = 0.277$ ,  $p < 0.05$ ) as well as VCD ins.d and MD ( $r = 0.395$ ,  $p < 0.01$ ). Kim et al. [16] analyzed peripapillary perfusion in NTG (71 eyes) and control group (71 eyes). Average RNFL thickness were significantly lower in NTG ( $78.45 \pm 12.66\mu\text{m}$ ,  $p < 0.001$ ) compared to control group ( $92.39 \pm 9.40\mu\text{m}$ ). MD index VF was significantly lower in NTG compared to control group ( $-4.84 \pm 5.34\text{dB}$  vs.  $-0.51 \pm 1.40\text{dB}$ ;  $p < 0.001$ ). VCD perip. average decreased significantly in NTG compared to control group ( $42.77 \pm 2.67$  vs.  $45.15 \pm 1.74$ ;  $p < 0.001$ ). The RNFL thickness average correlated positively with average perfusion density ( $r = 0.610$ ;  $p < 0.001$ ).

Petrović et al. [17] compared results of VCD and VCD perip. in healthy eyes and different stages of POAG. They

discovered that all OCTA parameters are significantly higher in healthy eyes.

Ozturk et al. [18] compared VCD perip. in a control group with different stages of POAG (early, moderate, and severe stages). VCD perip. parameters had the highest diagnostic performance in all POAG patients. VCD perip. helps identify early-stage glaucoma.

Lin et al. [19] analyzed VCD perip. in NTG (74 eyes) and healthy eyes (24 eyes). They found that VCD total is statistically significantly lower in NTG ( $43.9 \pm 6.14$ ) than in healthy eyes ( $48.41 \pm 3.03$ ),  $p < 0.001$ . VCD perip. were significantly lower in NTG ( $45.46 \pm 7.87$ ) than in healthy eyes ( $50.73 \pm 3.31$ ),  $p < 0.002$ . RNFL thickness significant lower in NTG compared to healthy eyes ( $85.34 \pm 15.22$  vs.  $99.75 \pm 6.78$ ;  $p < 0.001$ ).

Belbase et al. [20] reported on OCTA vessel density in healthy, glaucoma-suspected and POAG eyes. They found significantly lower peripapillary VD in glaucoma compared to glaucoma suspected and healthy eyes ( $47.42 \pm 7.73$  vs.  $52.62 \pm 2.4$  vs.  $56.07 \pm 2.71$ ,  $p < 0.001$ ). They obtained a significant positive correlation between peripapillary VD and MD of VF ( $R^2 = 0.32$ ,  $p < 0.001$ ).

Elsalhy et al. [21] analyzed glaucoma suspected patients and discovered significantly lower value of the mean RPC plexus compared to healthy individuals ( $46.6 \pm 2$  vs.  $48.8 \pm 1.7$ ,  $p < 0.001$ ).

The finding of VCD perip. reduction clearly separates healthy eyes from eyes with NTG and POAG, which is important for clinical practice [12, 18].

## CONCLUSION

Glaucoma patients have a significantly lower vessel density ONH and VCD perip. compared to healthy subjects. VCD total of ONH is significantly lower in NTG compared to POAG. We obtained a positive correlation between OCT and OCTA parameters with MD in NTG and POAG. OCTA is an important imaging method in the diagnosis and monitoring of glaucoma progression.

**Note:** The paper is part of a doctoral dissertation.

**Conflicts of interest:** None declared.

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## Перипапиларни капиларни проток код нормотензивног и примарног глаукома отвореног угла

Наташа Чивчић Калинић<sup>1</sup>, Нада Чивчић<sup>1</sup>, Стефан Брунет<sup>2</sup>, Мирослав Стаменковић<sup>3</sup>

<sup>1</sup>Офталмолошка ординација „Family Čivčić“, Београд, Србија;

<sup>2</sup>Универзитет у Новом Саду, Медицински факултет, Клинички центар Војводине, Очна клиника, Нови Сад, Србија;

<sup>3</sup>Универзитет у Београду, Факултет за специјалну едукацију и рехабилитацију, Клиничко-болнички центар „Звездара“, Очна клиника, Београд, Србија

### САЖЕТАК

**Увод/Циљ** Примарни глауком отвореног угла (ПГОУ) је хронична, прогресивна, оптичка неуропатија са могућим слепилом и иреверзибилним променама главе оптичког нерва (ГОН). Оптичка кохерентна томографија (ОКТ) је неинвазивна метода која пружа процену структурног оштећења код глаукома. ОКТ ангиографија (ОКТА) пружа квалитативну и квантитативну процену перипапиларне микроваскулатуре. Циљ ове студије је био да утврди да ли постоји разлика у капиларном протоку перипапиларне регије код нормотензивног глаукома (НТГ), ПГОУ и здравих особа.

**Метод** Овом проспективном студијом обухваћено је 120 очију: 40 здравих очију, 30 очију са НТГ и 50 очију са ПГОУ. Спроведени су офталмолошки преглед, мерење централне дебљине рожњаче, ОКТ, ОКТА и тестирање компјутеризованог видног поља.

**Резултати** Укупна густина капиларних крвних судова (ГККС) била је значајно већа код здравих у поређењу са НТГ и ПГОУ (39,25 ± 0,94; 36,79 ± 2,50; 37,58 ± 1,53;  $p < 0,001$ ). Густина укупног перипапиларног капиларног плексуса

(ПКП) значајно је мања код НТГ и ПГОУ у односу на здраве (39,21 ± 2,62; 40,18 ± 1,35; 41,29 ± 0,81;  $p < 0,001$ ). Укупна ГККС ГОН је значајно мања код НТГ у односу на ПГОУ (36,79 ± 2,50; 37,58 ± 1,55;  $p < 0,001$ ). Укупни ПКП је значајно мањи код НТГ у поређењу са ПГОУ (39,21 ± 2,62; 40,18 ± 1,35;  $p < 0,001$ ). Значајну позитивну корелацију између ОКТ и ОКТА параметара ГОН са средњом девијацијом индекса видног поља (СДИВП) добили смо код НТГ између слоја нервних влакана ретине и СДИВП ( $r = 0,370$ ,  $p < 0,05$ ) и код перипапиларног капиларног плексуса у доњем сектору и СДИВП ( $r = 0,395$ ,  $p < 0,05$ ). Код ПГОУ значајну позитивну корелацију добили смо између ГККС у доњем сектору и СДИВП ( $r = 0,277$ ,  $p < 0,05$ ) и ГККС унутар диска са СДИВП ( $r = 0,395$ ,  $p < 0,01$ ).

**Закључак** Болесници са глаукомом имају значајно мању ГККС ГОН и ПКП у односу на здраве особе. Укупна ГККС ГОН значајно је мања код НТГ у односу на ПГОУ. Позитивну корелацију добили смо између ОКТ и ОКТА параметара са средњом девијацијом индекса видног поља код НТГ и ПГОУ. **Кључне речи:** оптичка кохерентна томографија – ангиографија; глава оптичког нерва; интраокуларни притисак