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光学相干断层成像术在近视眼视网膜神经纤维层厚度测量中的临床应用

李 博 章 剑△ 徐兴琛 叶小桂 方 晶

（武汉大学人民医院鄂州医院 / 鄂州市中心医院眼科 湖北 鄂州 436000）

摘要 目的：研究光学相干断层成像术（OCT）在近视眼视网膜神经纤维层（RNFL）厚度测量中的应用价值。**方法：**选择 2016 年 1 月到 2016 年 5 月在医院就诊的近视患者 73 例（138 眼）纳入此次研究，根据近视情况将患者分为低度近视组（-0.30D~-3.00D）共 26 例（48 眼）、中度近视组（-3.01~-6.00D）共 24 例（47 眼）及高度近视组（＞-6.00D）共 23 例（43 眼）。另选同期在医院体检（视力正常）的健康志愿者 25 例（45 眼）作为对照组，对比各组不同象限的 RNFL 厚度，屈光度及眼轴长度，分析近视眼各象限的 RNFL 厚度与患者屈光度和眼轴长度的相关性。**结果：**高度近视组的上方象限、下方象限以及鼻侧象限的 RNFL 厚度均明显低于对照组及中度近视组，中度近视组的下方象限及鼻侧象限的 RNFL 厚度均明显低于对照组，低度近视组鼻侧象限的 RNFL 厚度明显低于对照组，差异均有统计学意义（均 P<0.05）。近视组的屈光度及眼轴长度均明显大于对照组，且高度近视组均明显大于中度近视组与低度近视组，中度近视组均明显大于低度近视组，差异均有统计学意义（均 P<0.05）。根据 Pearson 法分析相关性可知，近视眼患者上象限、下象限、鼻侧象限的 RNFL 厚度与其屈光度及眼轴长度均呈负相关。**结论：**利用 OCT 技术检测近视眼 RNFL 厚度时，应考虑屈光度及眼轴长度可能造成的影响，综合进行分析判断，以获得最佳检测数值。

关键词：光学相干断层成像术；近视眼；视网膜神经纤维层；厚度；测量

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Clinical Application of Optical Coherence Tomography in the Measurement of Retinal Nerve Fiber Layer Thickness in Myopia

LI Bo, ZHANG Jian△, XU Xing-chen, YE Xiao-gui, FANG Jing

(Department of Ophthalmology, The People's Hospital of Wuhan University, Ezhou Hospital/Ezhou Central Hospital, Ezhou, Hubei, 436000, China)

ABSTRACT Objective: To study the clinical application value of optical coherence tomography(OCT)in the measurement of retinal nerve fiber layer(RNFL)thickness in myopia. **Methods:** 73 patients(138 eyes)with myopia who were treated in the hospital from January 2016 to May 2016 were included in this study,according to the condition of myopia, the patients were divided into low myopia group(-0.30~-3.00D)of 26 cases(48 eyes), moderate myopia group(-3.01~-6.00D)of 24 cases(47 eyes)high myopia group(>-6.00D)of 23 cases(43 eyes), selected 25 cases of healthy volunteers with normal eyes (45 eyes)as control group over the same period in hospital, RNFL thickness, refraction and axial length of different quadrant of each group were compared, analyzed the correlation between the RNFL thickness of each quadrant of myopia and the refractive index and the axial length of the eyes. **Results:** RNFL thickness of in the upper quadrant, lower quadrant and the nasal quadrant of the high myopia group were significantly lower than those of the control group and the moderate myopia group, which in lower quadrant and nasal quadrant of the moderate myopia group were significantly lower than that of the control group, and that in nasal quadrant of the low myopia group was significantly lower than that of the control group, the differences were statistically significant (P<0.05). The refractive degree and axial length of the myopia group were significantly higher than control group, and the high myopia group were significantly higher than moderate myopia group and the low myopia group, the moderate myopia group were significantly higher than low myopia group, the differences were statistically significant(P<0.05). According to the correlation analysis of the Pearson method, the RNFL thickness in upper, lower and nasal quadrant of the myopia patients were negatively correlated with the refractive degree and the axial length of the eyes. **Conclusion:** Using OCT technique to detect the RNFL thickness of myopia, we should consider the influence of refraction and axial length of the eye, and make a comprehensive analysis to get the best value.

Key words: Optical coherence tomography; Myopia; Retinal nerve fiber layer; Thickness; Measurement

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前言

近视眼作为全球范围中的一种十分常见的眼部异常性症状，其在全球的发病率超过 25%，而在我国 18 岁以上的人群中甚至具有超过 50%的发病率[1]。据统计，开角型青光眼疾病在近视人群中的发病率是非近视人群发病率的 7 倍左右[2]。光学相干断层成像术（optical coherence tomography, OCT）是一类客观、定量，且重复率和可靠性均较高的视网膜神经纤维层（reti-

作者简介：李博（1979-），男，硕士，主治医师，从事 OCT 光学相关断层成像方面的研究，E-mail：libo20201517@sina.com

△ 通讯作者：章剑（1968-），男，博士，主任医师，从事眼科临床医学方面的研究

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nal nerve fiber layer, RNFL）检测技术，大部分报道均证实由OCT 技术检测所得到的 RNFL 值与经组织学方法测定的结果基本一致[3]。加之诸多眼科疾病均可能伴有 RNFL 厚度变化,因此眼科临床上更加依赖于利用 OCT 进行诊断。然而,近年来的国外报道指出，近视等眼部变性型疾病可能导致 RNFL 减少，进而干扰临床诊断,可能会带来一定的误诊率[4]。鉴于此,本文通过分析 OCT 对于近视眼 RNFL 厚度的测量结果,探讨 OCT在近视眼患者中的应用价值，目的在于服务于临床诊断与治疗,现报道如下。

1 资料和方法

1.1 临床资料

选择 2016 年 1 月到 2016 年 5 月在医院就诊的近视患者73 例(138 眼)纳入此次研究。患者矫正视力均 >1.0,眼压 <21 mmHg,且眼前节检查显示正常,具有透明的屈光间质,视乳头边缘较清晰。眼杯盘比 <0.6,且双眼相差值 <0.2。患者除近视引起的眼底变化外无其他种类的眼部疾病。其中男 36 例(66眼),女 37 例(72 眼),年龄 21~36 岁,平均(25.73± 3.29)岁。屈光度 -0.30~-12.01D,眼轴 22.04~28.87 mm。根据近视情况将患者分为低度近视组(-0.30~-3.00D)共 26 例(48 眼),男 11 例(20眼),女 15 例(28 眼),年龄 21~32 岁,平均(25.86± 2.84)岁。中度近视组(-3.01~-6.00D)共 24 例(47 眼),男 13 例(24 眼),女11 例(23 眼),年龄 22~31 岁,平均(25.01± 2.79)岁。高度近视组(＞-6.00D)共 23 例(43 眼),男 12 例(22 眼),女 11 例(21眼),年龄 20~32 岁,平均(25.94± 2.71)岁。另选同期在医院体检的健康志愿者 25 例(45 眼)作为对照组,男 12 例(23 眼),女13 例(22 眼),年龄 20~33 岁,平均(21.98± 2.65)岁。屈光度 +0.5~0D,视力正常,不含视神经和视网膜病变以及其他种类的眼部疾病。各组性别与年龄比较,差异无统计学意义(P＞0.05)。

1.2 研究方法

1.2.1 **屈光度和眼轴长度的检测** 通过 OCULUS Keratograph-70670 型角膜地形分析仪及曲率仪对所有受试者进行验光 3 次之后将等效球镜度数（此度数 = 球镜度数 +1/2 柱镜度数)记为该眼屈光度。通过 Carl Zeiss IOL Master 眼底成像系统检测所有受试者的眼轴长度,并分别检测 3 次后取平均值。

1.2.2 **OCT 检测 RNFL** 通过日本拓普康 3D-OCT 2000 检测仪对所有受试者实施检查。在检查前为受试者给予 0.5%复方托吡卡胺滴眼液进行散瞳,取其坐位。选取将视乳头作为中心的快速型 RNFL 厚度圆形扫描模式,给予环形扫描,再由相同检查者针对眼部实施相同的参数扫描,最终在计算机中存储 3幅稳定图像,通过图像分析系统实施 RNFL 厚度的检测。将 3幅图像所得的 RNFL 厚度均值记作受试者的 RNFL 厚度。

1.3 观察指标

对比各组不同象限(上方象限、下方象限、鼻侧象限及颞侧象限)的 RNFL 厚度,屈光度及眼轴长度,分析近视眼各象限的RNFL 厚度与患者屈光度和眼轴长度的相关性。

1.4 统计学方法

通过 SPSS20.0 统计软件分析,计量数据采用($\bar{x}$± s)表示,实施 t 检验,多组计量数据的比较采用方差分析,利用 Pearson法评价相关性,P<0.05 为差异有统计学意义。

2 结果

2.1 各组不同象限的 RNFL 厚度对比

高度近视组的上方象限、下方象限以及鼻侧象限的 RNFL厚度均明显低于对照组及中度近视组,中度近视组的下方象限及鼻侧象限的 RNFL 厚度均明显低于对照组,低度近视组鼻侧象限的 RNFL 厚度明显低于对照组,差异均有统计学意义(均P<0.05)。各组颞侧象限的 RNFL 厚度相比,差异无统计学意义(P>0.05),见下表 1。

表 1 各组不同象限的 RNFL 厚度对比(μm, $\bar{x}$± s)

Table 1 Comparison of RNFL thickness in different quadrant of each group(μm, $\bar{x}$± s)

Groups	Eyes	Upper quadrant	Lower quadrant	Nasal quadrant	Temporal quadrant
High myopia group	43	113.27± 14.29[a]	131.69± 29.67[a]	60.74± 15.49[a]	101.68± 28.78
Moderate myopia group	47	142.68± 17.74	141.69± 10.18[a]	72.04± 11.65[a]	97.58± 17.63
Low myopia group	48	141.54± 21.63	146.76± 18.85	78.77± 11.52[a]	98.66± 16.72
Control group	45	143.32± 18.74	145.15± 11.03	87.62± 10.58	93.96± 9.70
F	-	3.065	5.731	6.285	2.123
P	-	0.042	0.001	0.000	0.179

Note: Compared with the control group, [a]P<0.05; compared with the low myopia group, [b]P<0.05; compared with the moderate myopia group, [c]P<0.05.

2.2 各组屈光度及眼轴长度对比

近视组的屈光度及眼轴长度均明显大于对照组,高度近视组的屈光度及眼轴长度均明显大于中度近视组与低度近视组,中度近视组的屈光度及眼轴长度均明显大于低度近视组,差异均有统计学意义(均 P<0.05)。见下表 2：

2.3 近视眼各象限的 RNFL 厚度与患者屈光度和眼轴长度的相关性分析

根据 Pearson 法分析相关性可知,近视眼患者上方象限、下方象限、鼻侧象限的 RNFL 厚度与其屈光度及眼轴长度均呈负相关（r 屈光度 =-0.762、-0.664、-0.639,P 均 <0.05;r 眼轴长度=-0.708、-0.691、-0.702,P 均 <0.05），而颞侧象限 RNFL 厚度与其屈光度及眼轴长度均无相关性（r=-0.117、-0.024;P 均 >0.05)。

3 讨论

OCT 技术近年来在我国的应用较为广泛，其主要是通过近红外光的扫描断层成像原理衍生的一种新型眼病诊断技术。由于其具有安全性高、可重复性好,以及精确度高等诸多特点,

表 2 各组屈光度及眼轴长度对比($\bar{x}\pm s$)

Table 2 Comparison of refractive degree and axial length in each group($\bar{x}\pm s$)

Groups	Eyes	Refractive degree(D)	Axial length of eye
High myopia group	43	-7.48± 1.32[abc]	26.66± 0.93[abc]
Moderate myopia group	47	-4.21± 0.72[ab]	24.96± 0.77[ab]
Low myopia group	48	-1.75± 1.23[a]	24.21± 0.86[a]
Control group	45	0.36± 0.27	22.04± 0.39
F	-	9.274	11.369
P	-	0.000	0.000

Note: Compared with the control group, [a]P<0.05; compared with the low myopia group, [b]P<0.05; compared with the moderate myopia group, [c]P<0.05.

已被广泛地应用在临床眼病和眼部结构变化的相应检查及诊断过程中[5]。但国外有报道指出,OCT 检测结果涉及的参数较多,且近视性屈光对于测量值产生的影响也不甚清楚,可能会使检测结果出现假阳性率较高的现象[6]。RNFL 处于视神经的周围区域,其最厚值为 20~30μm,并逐渐向周边渐进性变薄,到锯齿缘附近时可同神经节细胞汇合成一层[7,8]。发生 RNFL 损害往往可作为视神经病变的一个重要特征,且据国外报道统计发现,平均 RNFL 厚度的降低可能会出现在近视眼患者群体中[9,10]。因此,利用 OCT 技术观察近视眼 RNFL 厚度的情况,对于降低临床误诊率具有十分必要的作用。

本文通过研究发现,各组颞侧象限的 RNFL 厚度相比,差异无统计学意义,但高度近视组的上方象限、下方象限以及鼻侧象限的 RNFL 厚度均明显低于对照组及中度近视组,中度近视组的下方象限及鼻侧象限的 RNFL 厚度均明显低于对照组,低度近视组鼻侧象限的 RNFL 厚度明显低于对照组(均 P<0.05)。符合国外 Goto 等人[11,12]的报道结果,提示除颞侧象限以外,近视眼患者各象限的 RNFL 厚度随着近视程度的加剧而逐渐变薄。原因可能和 RNFL 弓形纤维束的生理走形等因素有关,在颞侧象限中,伴随近视度数的不断增加,引起视盘形态不规则,致使视盘较浅而朝颞侧倾斜,加之视盘和黄斑位置相对较近,且相对固定,造成盘斑束更加稳定,而上方象限、下方象限以及鼻侧象限则未受到此类因素的影响,最终明显变薄[13,14]。同时,本文还显示,近视组的屈光度及眼轴长度均明显大于对照组,高度近视组的屈光度及眼轴长度均明显大于中度近视组与低度近视组,中度近视组的屈光度及眼轴长度均明显大于低度近视组(均 P<0.05)。这符合 Dogan 等人[15,16]的报道结果,提示近视眼程度的加剧可能导致患者屈光度和眼轴长度不断增大。原因可能是与近视弧和脉络膜萎缩弧引起的有关视网膜的神经纤维层变化等因素有关。国外 Malik 等人[17,18]报道证实,鼻侧 RNFL 明显变薄可能是由于屈光不正而引起的。换言之,近视眼患者的屈光度可能与 RNFL 之间存在密切联系。本文进一步根据 Pearson 法分析相关性可知,近视眼患者上方象限、下方象限、鼻侧象限的 RNFL 厚度与其屈光度及眼轴长度均呈负相关。这再次表明了近视眼患者的 RNFL 厚度与其屈光度及眼轴长度之间具有紧密关联。因此,在利用 OCT 技术进行临床诊断时,应该结合患者眼底变化以及 RNFL 走行实施相应的分析,以尽可能地减少误诊率,尤其是针对合并近视症状的早期青光眼患者,需考虑到近视眼自身 RNFL 厚度降低,再结合仪器中静态中心的视野和视觉诱发电位,以及 24 h 眼压和激发试验进行综合分析,从而尽可能准确地获得检测结果[19,20]。

综上所述,利用 OCT 技术检测近视眼 RNFL 厚度时,应考虑屈光度及眼轴长度可能造成的影响,综合进行分析判断,以获得最佳检测数值。

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