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Current Clinical Research Progress on Ocular Decompression Retinopathy

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Abstract

Ocular decompression retinopathy (ODR) is defined as a multifocal hemorrhagic retinopathy that results from acute lowering of intraocular pressure and is not explained by another process. Hemorrhages occur in all retinal layers, and most patients are asymptomatic. The pathogenesis of ODR remains controversial. In order to better understand and minimize the risk of this rare complication, we review the recent articles and address the pathogenesis, clinical features, management, and outcomes of ODR.

Keywords

Decompression Retinopathy, Retinal Hemorrhage, Glaucoma, Intraocular Pressure

眼减压性视网膜病变临床研究进展

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摘　要

眼减压性视网膜病变(ocular decompression retinopathy, ODR)是由眼压骤降引起的，且无法用其他病理机制解释的，多灶性视网膜出血性病变。ODR的出血可发生在视网膜各层，大部分患者无明显症状，

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发病机制目前不明。为进一步探讨ODR对青光眼患者视网膜结构和功能的影响，并在临床实践中尽量避免ODR的发生，本文对ODR的发病机制，临床表现，治疗与预后进行了论述。

关键词

眼减压性视网膜病变，视网膜出血，青光眼，眼压

1. 引言

1965 年 Paufique 等[1]首次描述了一例急性闭角型青光眼患者，大发作缓解后发现眼底散在视网膜出血的现象。1992 年 Fechtner 等[2]将这种由青光眼滤过手术后因眼压骤降引起眼底出血的并发症定义为眼减压性视网膜病变(ocular decompression retinopathy, ODR)。随后不断有类似的病例报道，但有的作者称其为减压性视网膜病变(decompression retinopathy)，为与潜水减压病引起的眼底出血相区别[3] [4]，2013 年 Mukkamala 等[5]推荐将这种由眼部减压引起的视网膜出血统称为眼减压性视网膜病变。有文献报道：接受抗青光眼手术治疗的成人 ODR 发病率约 3.05% [6]，儿童 ODR 发病率约为 5.24% [7]。

2. 发病机制

1) 关于 ODR 的报道开始主要集中于小梁切除术后[2] [8]-[13]，但随后发现其可发生于深层巩膜切除术[14]，虹膜激光根切[15]，前房穿刺[16]，青光眼减压阀及引流钉植入术[17] [18]，粘小管成形术后[19]甚至药物降眼压后[1] [20]等。并且可并发于各种类型青光眼：原发性闭角型青光眼[1] [20]，原发型开角型青光眼[13] [19]，青少年型青光眼[21]及继发性青光眼(激素性[18]、色素剥脱性[14]、新生血管性[9]、葡萄膜炎性[12] [16]、外伤性[17]等)。也有报道在白内障超声乳化术[22]，玻璃体切除术[23]，硅油取出术[24]和眶减压术[25]后发生与眼压降低相关的视网膜出血。报道的病例无性别，年龄差异，亚洲人居多，多单眼发病，共同特征是眼压骤降，眼压平均下降幅度高达 33.2 ± 15.8 mmHg [5]。

2) 目前 ODR 的确切病理机制尚未阐明，主要有机械和血管因素两种学说。

a) 机械因素：一种是直接的机械损伤：Gupta 等[26]认为：突然的低眼压导致巩膜变形，随后对脆弱的毛细血管网形成一个剪切力。Obana 等[27]则分析：瞳孔阻滞引起急性闭角性青光眼大发作时，房水在后房聚集，虹膜根切解除瞳孔阻滞后，后房容积下降，玻璃体前移，不仅可引起玻璃体后脱离，还可以造成出血和 ODR。因为儿童巩膜硬度低于成人，且玻璃体视网膜粘连紧密，有学者认为儿童青光眼患者对 ODR 易感性更高[7]。

另一种是间接的机械损伤：眼压急性下降可能导致巩膜筛板结构的前移和扭曲，阻碍了轴浆流，引起视盘水肿，间接压迫视网膜中央静脉，发生类似于静脉阻塞的视网膜出血性病变[7] [28]。

b) 血管因素：眼灌注压由平均动脉压与眼内压决定，血管自身调节功能正常的情况下，在平均动脉压和眼内压在一定范围波动时会保证眼灌注压的稳定。持续高眼压的青光眼患者，破坏了血－视网膜屏障，削弱了血管自身调节功能[29] [30]，眼压在短时间内大幅降低，导致视网膜灌注瞬时大幅增加，毛细血管及静脉压骤升，超过了自身调节能力，就会使本已脆弱的毛细血管发生多发性渗漏[5] [26]。

3. 临床表现

3.1. 症状

ODR 一般发生在抗青光眼术后早期，由于原发疾病造成的视野缺损，角膜水肿，抗青光眼手术本身引起的前房出血，炎症反应等，尽管眼底已出现多发性视网膜出血，80%患者无新增不适主诉，少数患者有视力下降，中心暗点和飞蚊症[5] [19] [31] [32] [33]，因此常常造成 ODR 的漏诊。

3.2. 体征

大部分 ODR 患者眼底出血表现为从后极部到周边的，散在的，类圆形，斑样视网膜内出血，有些出血斑中心有一个白点，类似 Roth 斑[16] [19] [26] [34] (图 1)。视网膜内出血波及黄斑中心凹(图 2)，或出血量较多会突破内界膜进入玻璃体(图 3)时会明显影响患者视力[14] [21] [35]。除了眼底出血，个别患者还伴有视盘充血水肿，盘周出血，病例报道中还涉及一些不典型的眼底病变，比如脉络膜脱离，浆液性视网膜脱离和黄斑水肿等[19] [32] [36]。

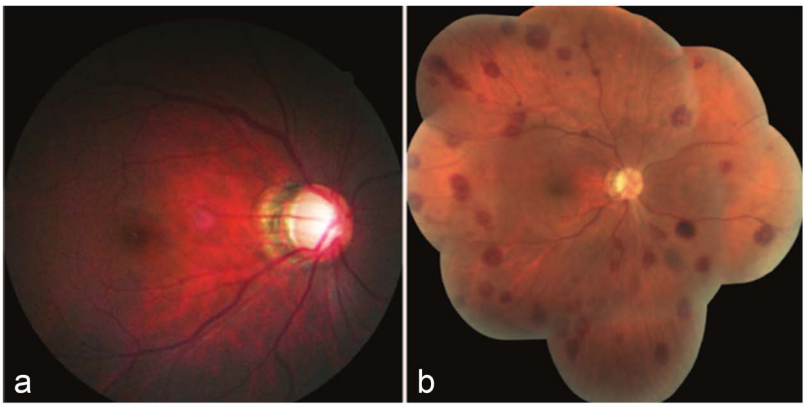

Figure 1. (a) Fundus photograph of the right eye before canaloplasty was performed. There was no sign of retinal hemorrhage; (b) Mosaic of retinal photograph taken 1 day following surgery. Multiple, diffuse, white-centered retinal hemorrhages are apparent

图 1. (a) 术前眼底彩照，显示没有任何眼底出血；(b) 粘小管成形术后 1 天的眼底彩照，显示多发的，散在的，出血斑中心有一个白点的视网膜出血

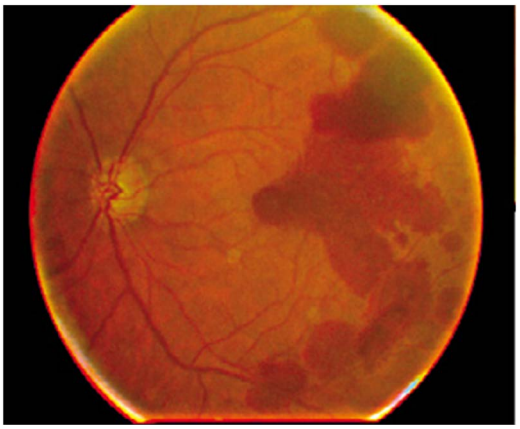

Figure 2. Fundus photograph shows extended retinal hemorrhages in the posterior pole involving the macula after deep sclerectomy

图 2. 深层巩膜切除术后的眼底彩照，显示波及到黄斑区的后极部散在视网膜出血

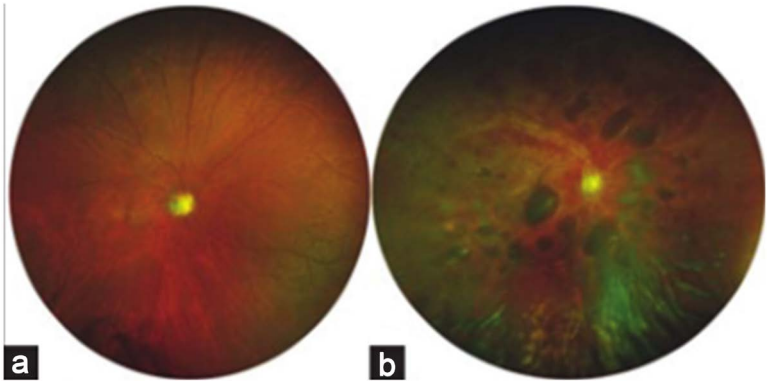

Figure 3. (a) Fundus photograph of the right eye before trabeculectomy (right eye); (b) Vitreous hemorrhagic turbidity and diffuse scattered intraretinal hemorrhage in the periphery and posterior pole after trabeculectomy
图 3. (a) 术前眼底彩照；(b) 小梁切除术后发生的玻璃体积血及分散在后极部和周边的散在视网膜出血

4. 治疗与预后

大部分 ODR 患者的眼底出血在 13 ± 12.4 周的时间内自行缓解，一般不会遗留视功能损伤，有报道黄斑区出血或轻度玻璃体积血的 ODR 患者出血吸收后恢复到术前视力[5] [14] [21]，甚至因高眼压的解除还会有轻度的视力提高[5] [19] [35]。大量玻璃体积血患者则接受玻璃体切除术，Alwitry 等[20]报道了一例因严重 ODR 接受玻璃体切除手术治疗的患者，术后视力恢复到 1.0。因此，正确评估 ODR 的病情和预后，及时有效的进行干预治疗，患者视力大多可以恢复。

5. 结语

ODR 是一种少见的抗青光眼治疗过程中的并发症，术前高眼压和术后眼压迅速下降是 ODR 发生的前提条件，但不是充分条件，血管自身调节异常以及巩膜，筛板变形在 ODR 发病机制中的作用还没有定论。虽然 ODR 大部分可以自行缓解，但仍有部分患者发病早期视力受损，甚至病情严重的还需手术治疗，所以，我们在手术或药物降眼压的过程中，应梯度降眼压，尽量预防 ODR 的发生。

参考文献

[1] Paufique, L., Ravault, M.P. and Malterre, M. (1965) Retinal Hemorrhage after Medical Sedation of an Attack of Acute Glaucoma. *Bulletin de la Société Mathématique de France*, **65**, 1105-1108.

[2] Fechtner, R.D., Minckler, D., Weinreb, R.N., Frangei, G. and Jampol, L.M. (1992) Complications of Glaucoma Surgery. Ocular Decompression Retinopathy. *Archives of Ophthalmology*, **110**, 965-968. https://doi.org/10.1001/archopht.1992.01080190071032

[3] Ostachowicz, M. (1968) Decompression Retinopathy in Rabbits after Caisson Disease. *Klinika Oczna*, **38**, 21-24.

[4] Ostachowicz, M. (1975) Decompression Retinopathy. *Klinika Oczna*, **45**, 1289-1291.

[5] Mukkamala, S.K., Patel, A., Dorairaj, S., McGlynn, R., Sidoti, P.A., Weinreb, R.N., Rusoff, J., Rao, S. and Gentile, R.C. (2013) Ocular Decompression Retinopathy: A Review. *Survey of Ophthalmology*, **58**, 505-512. https://doi.org/10.1016/j.survophthal.2012.11.001

[6] Jung, K.I., Lim, S.A., Lopilly, P.H. and Park, C.K. (2014) Risk Factors for Decompression Retinopathy after Glaucoma Surgery. *Journal of Glaucoma*, **23**, 638-643. https://doi.org/10.1097/IJG.0b013e318287aba0

[7] Fadel, A.M., Bessa, A.S., Bayoumi, N.H. and Gonnah, R.E. (2015) Decompression Retinopathy after Glaucoma Surgery in Children. *Journal of AAPOS*, **19**, 286-289. https://doi.org/10.1016/j.jaapos.2015.02.003

[8] Suzuki, R., Nakayama, M. and Satoh, N. (1999) Three Types of Retinal Bleeding as a Complication of Hypotony after Trabeculectomy. *Ophthalmologica*, **213**, 135-138. https://doi.org/10.1159/000027407

[9] Danias, J., Rosenbaum, J. and Podos, S.M. (2000) Diffuse Retinal Hemorrhages (Ocular Decompression Syndrome) after Trabeculectomy with Mitomycin C for Neovascular Glaucoma. *Acta Ophthalmologica Scandinavica*, **78**, 468-469.

https://doi.org/10.1034/j.1600-0420.2000.078004468.x

[10] Jea, S.Y. and Jung, J.H. (2005) Decompression Retinopathy after Trabeculectomy. *Korean Journal of Ophthalmology*, **19**, 128-131. https://doi.org/10.3341/kjo.2005.19.2.128

[11] Wakita, M., Kawaji, T., Ando, E., Koga, T., Inatani, M., Tanihara, H. and Ando, Y. (2006) Ocular Decompression Retinopathy Following Trabeculectomy with Mitomycin C Associated with Familial Amyloidotic Polyneuropathy. *British Journal of Ophthalmology*, **90**, 515-516. https://doi.org/10.1136/bjo.2005.082735

[12] Arevalo, J.F., Mendoza, A.J., Millan, F.A. and Fuenmayor-Rivera, D. (2008) Simultaneous Bilateral Ocular Decompression Retinopathy after Trabeculectomy with Mitomycin C for Uveitic Glaucoma. *Graefe's Archive for Clinical and Experimental Ophthalmology*, **246**, 471-473. https://doi.org/10.1007/s00417-007-0696-0

[13] Bui, C.M., Recchia, F.M., Recchia, C.C. and Kammer, J.A. (2006) Optical Coherence Tomography Findings in Ocular Decompression Retinopathy. *Ophthalmic Surgery, Lasers & Imaging*, **37**, 333-335. https://doi.org/10.3928/15428877-20060701-15

[14] Kozobolis, V.P., Kalogianni, E., Katsanos, A., Dardabounis, D., Koukoula, S. and Labiris, G. (2011) Ocular Decompression Retinopathy after Deep Sclerectomy with Mitomycin C in an Eye with Exfoliation Glaucoma. *European Journal of Ophthalmology*, **21**, 324-327. https://doi.org/10.5301/EJO.2010.5731

[15] Waheeb, S.A., Birt, C.M. and Dixon, W.S. (2001) Decompression Retinopathy Following YAG Laser Iridotomy. *Canadian Journal of Ophthalmology*, **36**, 278-280. https://doi.org/10.1016/S0008-4182(01)80035-1

[16] Rao, S.K., Greenberg, P.B., Macintyre, R.B. and Ducharme, J.F. (2009) Ocular Decompression Retinopathy after Anterior Chamber Paracentesis for Uveitic Glaucoma. *Retina*, **29**, 280-281. https://doi.org/10.1097/IAE.0b013e318185ea54

[17] Hermann, C., Pillunat, K. and Pillunat, L.E. (2013) Retinal Hemorrhages after Ahmed Glaucoma Valve Implantation. *Ophthalmologe*, **110**, 978-981. https://doi.org/10.1007/s00347-012-2762-1

[18] Abu Samra, K., Fernando Sieminski, S. and Sarup, V. (2011) Decompression Retinopathy after ExPRESS Shunt Implantation for Steroid-Induced Ocular Hypertension: A Case Report. *Case Reports in Ophthalmological Medicine*, **2011**, Article ID: 303287. https://doi.org/10.1155/2011/303287

[19] Li, G.-Y., Alantaree, S., Wang, J.-M. and Zhang, H. (2016) Ocular Decompression Retinopathy Following Canaloplasty for Primary Open Angle Glaucoma: A Case Report. *Medicine* (*Baltimore*), **95**, e2907. https://doi.org/10.1097/MD.0000000000002907

[20] Alwitry, A., Khan, K., Rotchford, A., Zaman, A.G. and Vernon, S.A. (2007) Severe Decompression Retinopathy after Medical Treatment of Acute Primary Angle Closure. *British Journal of Ophthalmology*, **91**, 121. https://doi.org/10.1136/bjo.2006.100479

[21] Shao, L., Qiao, C.-Y., Su, Y.-F. and Zhang, J. (2018) One Eye Suffering from Ocular Decompression Retinopathy after Trabeculectomy in a Patient with Juvenile Open-Angle Glaucoma. *Chinese Medical Journal*, **131**, 366-367. https://doi.org/10.4103/0366-6999.223861

[22] Castejón, M.A., Fagúndez, M.A., Pérez, P., Calvo, M.A. and Teus, M.A. (2001) Retinal Hemorrhages Following Phacotrabeculectomy. Differential Diagnosis. *Archivos de la Sociedad Española de Oftalmología*, **76**, 509-510.

[23] Rezende, F.A., Regis, L.G., Kickinger, M. and Alcântara, S. (2007) Decompression Retinopathy after 25-Gauge Transconjunctival Sutureless Vitrectomy: Report of 2 Cases. *Acta Ophthalmologica*, **125**, 699-700. https://doi.org/10.1001/archopht.125.5.699

[24] Arévalo, J.F., Mendoza, A.J., Fernández, C.F., Yépez, J.B., Krivoy, D. and Millán, F.A. (2007) Decompression Retinopathy after Intraocular Surgery. *Archivos de la Sociedad Española de Oftalmología*, **82**, 629-634. https://doi.org/10.4321/S0365-66912007001000007

[25] Ben Simon, G.J., Goldberg, R.A. and McCann, J.D. (2004) Bilateral Decompression Retinopathy after Orbital Decompression Surgery. *British Journal of Ophthalmology*, **88**, 1605-1606. https://doi.org/10.1136/bjo.2004.049767

[26] Gupta, R., Browning, A.C. and Amoaku, W.M. (2005) Multiple Retinal Haemorrhages (Decompression Retinopathy) Following Paracentesis for Macular Branch Artery Occlusion. *Eye*, **19**, 592-593. https://doi.org/10.1038/sj.eye.6701530

[27] Obana, A., Gohto, Y., Ueda, N., Miki, T., Cho, A. and Suzuki, Y. (2000) Retinal and Subhyaloid Hemorrhage as a Complication of Laser Iridectomy for Primary Angle-Closure Glaucoma. *Acta Ophthalmologica*, **118**, 1449-1451.

[28] Saricaoglu, M.S., Kalayci, D., Guven, D., Karakurt, A. and Hasiripi, H. (2009) Decompression Retinopathy and Possible Risk Factors. *Acta Ophthalmologica*, **87**, 94-95. https://doi.org/10.1111/j.1600-0420.2007.01083.x

[29] Pournaras, C.J., Rungger-Brändle, E., Riva, C.E., Hardarson, S.H. and Stefansson, E. (2008) Regulation of Retinal Blood Flow in Health and Disease. *Progress in Retinal and Eye Research*, **27**, 284-330. https://doi.org/10.1016/j.preteyeres.2008.02.002

[30] 何维铭. 急性闭角型青光眼术后眼底出血临床探讨[J]. 国际眼科杂志, 2012, 12(4): 774-775.

[31] Bansal, A. and Ramanathan, U.S. (2009) Ocular Decompression Retinopathy after Trabeculectomy with Mitomycin-C for Angle Recession Glaucoma. *Indian Journal of Ophthalmology*, **57**, 153-154. https://doi.org/10.4103/0301-4738.45510

[32] Singh, K.S., Bhattacharyya, M., Wali, K., Rana, K. and Jain, D. (2017) Ocular Decompression Retinopathy: A Case Series. *Nepal Journal of Glaucoma*, **9**, 194-198. https://doi.org/10.3126/nepjoph.v9i2.19269

[33] Burstein, E.S. and Netland, P.A. (2017) Decompression Retinopathy after Goniotomy in a Child: A Case Report. *Journal of Glaucoma*, **26**, 747-748. https://doi.org/10.1097/IJG.0000000000000681

[34] Dudley, D.F., Leen, M.M., Kinyoun, J.L. and Mills, R.P. (1996) Retinal Hemorrhages Associated with Ocular Decompression after Glaucoma Surgery. *Ophthalmic Surgery & Lasers*, **27**, 147-150.

[35] Tyagi, P. and Hashim, A.A. (2011) Ocular Decompression Retinopathy Following Post-Trabeculectomy Suture Lysis and Management with Tramcinolone Acetonide. *International Ophthalmology*, **31**, 425-428. https://doi.org/10.1007/s10792-011-9472-6

[36] Muñoz-Negrete, F.J., Díez-Álvarez, L., Garcia, C.F. and Rebolleda, G. (2019) Bilateral Decompression Retinopathy after Deep Sclerectomy with Mitomycin C in a Child with Tubulointerstitial Nephritis and Uveitis Syndrome. *European Journal of Ophthalmology*. https://doi.org/10.1177/1120672119832177