

References PCO and CTR, Ingrid Allgoewer, VSOM, London, 2026

1. Davidson MG, Nasisse MP, Jamieson VE, et al. Phacoemulsification and intraocular lens implantation: a study of surgical results in 182 dogs. *Prog Vet Comp Ophthalmol* 1991;1:233–238.
2. Sigle KJ, Nasisse MP. Long-term complications after phacoemulsification for cataract removal in dogs: 172 cases (1995-2002). *J Am Vet Med Assoc*. 2006 Jan 1;228(1):74-9. doi: 10.2460/javma.228.1.74. Erratum in: *J Am Vet Med Assoc*. 2006 Feb 15;228(4):552. PMID: 16426170.
3. Bras, I.D., Colitz, C.M.H., Saville, W.J.A., Gemensky-Metzler, A.J. and Wilkie, D.A. (2006), Posterior capsular opacification in diabetic and nondiabetic canine patients following cataract surgery. *Veterinary Ophthalmology*, 9: 317- 327. <https://doi.org/10.1111/j.1463-5224.2006.00458.x>
4. Wang Y, Cao K, Li M, Wan XH. Posterior capsular Opacification: Pathogenesis, challenges, and innovative therapeutic strategies. *Exp Eye Res*. 2025 Oct;259:110585. doi: 10.1016/j.exer.2025.110585. Epub 2025 Aug 16. PMID: 40825390.
5. <https://www.kambalaggan.com/posterior-capsular-opacification/>
6. Wormstone, I.M., Wormstone, Y.M., Smith, A.J.O., Eldred, J.A., 2021. Posterior capsule opacification: what's in the bag? *Prog. Retin. Eye Res*. 82, 100905. <https://doi.org/10.1016/j.preteyeres.2020.100905>.
7. Singh Bhangra J. A Review of Posterior Capsular Opacification. *CRO Journal*. Published online June 23, 2023. doi.org/10.57204/001c.82056
8. Rakib-Uz-Zaman SM, Werner L and Duncan MK (2025) Unanswered questions regarding the pathogenesis of late onset posterior capsular opacification. *Front. Ophthalmol*. 5:1680042. doi: 10.3389/fopht.2025.1680042
9. Thompson, B., Davidson, E.A., Chen, Y., Orlicky, D.J., Thompson, D.C., Vasiliou, V., 2022. Oxidative stress induces inflammation of lens cells and triggers immune surveillance of ocular tissues. *Chem. Biol. Interact*. 355, 109804. <https://doi.org/10.1016/j.cbi.2022.109804>.
10. Zhao L, Wang P, Sun L et al. SP1/COL1A2/ZEB1 axis promotes TGF- β 2-induced lens epithelial cell proliferation, migration, invasion and EMT process. *Experimental Eye Research*. 2025; 251:110220.
11. Donachie, P.H.J., Barnes, B.L., Olaitan, M., Sparrow, J.M., Buchan, J.C., 2023. The royal college of ophthalmologists' national ophthalmology database study of cataract surgery: report 9, risk factors for posterior capsule opacification. *Eye (Lond)* 37 (8),1633–1639. <https://doi.org/10.1038/s41433-022-02204-1>.

12. Lee E, Kim HA, Seo K, Kang S. Hyperproliferation of Elschnig pearl-type posterior capsule opacification and spontaneous regression in two pseudophakic canine eyes. *Vet Ophthalmol.* 2024 Mar;27(2):170-176. doi: 10.1111/vop.13173. Epub 2023 Dec 9. PMID: 38071419.
13. Chandler HL, Barden CA, Lu P, Kusewitt DF, Colitz CM. Prevention of posterior capsular opacification through cyclooxygenase-2 inhibition. *Mol Vis.* 2007 Apr 30;13:677-91. PMID: 17563718; PMCID: PMC2765474.
14. Walker T. D., Pharmacological attempts to reduce posterior capsule opacification after cataract surgery-a review, *Clinical & Experimental Ophthalmology.* (2008) 36, no. 9, 883–890, <https://doi.org/10.1111/>
15. Yadav U. C. S., Ighani-Hosseiniabad F., van Kuijk F. J. G. M., Srivastava S. K., and Ramana K. V., Prevention of posterior capsular opacification through aldose reductase inhibition, *Investigative Ophthalmology & Visual Science.* (2009) 50, no. 2, 752–759, <https://doi.org/10.1167/iovs.08-2322>, 2-s2.0-59449089371.
16. Polat N., Tuncer İ., Karahan E., and Zengin M. Ö., The effect of Nd: YAG laser capsulotomy on visual acuity, intraocular pressure, central corneal thickness, and refractive status, *Türk Oftalmoloji Dergisi.* (2014) 44, no. 4, 275–279, <https://doi.org/10.4274/tjo.10337>, 2-s2.0-84907309525
17. Cao W., Cui H.-P., Ni S., and Gu H.-K., Influence of size of Nd:YAG capsulotomy on ocular biological parameters and refraction, *Guoji Yanke Zazhi.* (2018) 18, no. 10, 1847–1850.
18. Beale AB, Salmon J, Michau TM, Gilger BC. Effect of ophthalmic Nd:YAG laser energy on intraocular lenses after posterior capsulotomy in normal dog eyes. *Vet Ophthalmol.* 2006 Sep-Oct;9(5):335-40. doi: 10.1111/j.1463-5224.2006.00473.x. PMID: 16939462.
19. Clarke GA, Newcomb CW, Ying GS, Groth SL, Kothari S, Payal A, Begum H, Liesegang TL, Foster CS, Jabs DA, Nussenblatt R, Rosenbaum JT, Sen HN, Suhler EB, Thorne JE, Bhatt NP, Dreger KA, Buchanich JM, Kempen JH, Gangaputra S; Systemic Immunosuppressive Therapy for Eye Diseases Research Group. Posterior capsular opacification and YAG laser capsulotomy in uveitis patients following cataract surgery. *Can J Ophthalmol.* 2025 Feb;60(1):e124-e132. doi: 10.1016/j.cjco.2024.05.004. Epub 2024 May 27. PMID: 38815957; PMCID: PMC11599466.
20. Nasisse MP, Davidson MG. Laser therapy in veterinary ophthalmology: perspective and potential. In: MP Nasisse. ed. *Seminars in Veterinary Medicine and Surgery (Small Animal)* 1988; 52.
21. <https://fyi.rendia.com/HKDmA>
22. Garcia-Medina JJ, Del Rio-Vellosillo M, Zanon-Moreno V, Santos-Bueso E, Gallego-Pinazo R, Ferreras A, Pinazo-Duran MD. Does Posterior Capsule Opacification Affect the Results of Diagnostic Technologies to Evaluate the Retina and the Optic Disc? *Biomed Res Int.* 2015;2015:813242. doi: 10.1155/2015/813242. Epub 2015 Jun 8. PMID: 261674992 ; PMCID: PMC4475729.

23. Davidson MG, Morgan DK, McGahan MC. Effect of surgical technique on *in vitro* posterior capsule opacification. *Journal of Cataract and Refractive Surgery* 2000; 26: 1550–1554.
24. Lutz EA, Gemensky-Metzler AJ, Wilkie DA, Chandler HL. Effects of pulsed fluid lens capsule washing following phacoemulsification on lens epithelial cells and posterior capsule opacification formation ex vivo. *Vet Ophthalmol.* 2015 May;18(3):221-8. doi: 10.1111/vop.12143. Epub 2014 Jan 22. PMID: 24447772.
25. Huang F, Tong W, Wang D, Guan W, Zhang Z, Zhao YE. Impact of anterior capsule polishing on capsule opacification and capsule bend after age-related cataract surgery. *J Cataract Refract Surg.* 2024 Jun 1;50(6):599-604. doi: 10.1097/j.jcrs.0000000000001407. PMID: 38270489; PMCID: PMC11146178.
26. Goulle F. Intraoperative management of axial posterior capsular opacities during cataract surgery in six dogs. *Open Vet J.* 2023 Aug;13(8):977-982. doi: 10.5455/OVJ.2023.v13.i8.3. Epub 2023 Aug 31. PMID: 37701669; PMCID: PMC10495091.
27. Bantsykina I.V., Malov I.V., Shteyner I.I. Clinical case of visual axis opacification after primary posterior capsulorhexis // *Kazan medical journal.* - 2022. - Vol. 103. - N. 5. - P. 851-855. doi: [10.17816/KMJ2022-851](https://doi.org/10.17816/KMJ2022-851)
28. Kamushadze G, Shengelia D, Gorgadze G, Shengelia B, Ibragimova S. Posterior Capsulorhexis as a Preventive Strategy: A Case of Bilateral Congenital Cataract With Divergent Outcomes. *Cureus.* 2025 Aug 31;17(8):e91325. doi: 10.7759/cureus.91325. PMID: 41035590; PMCID: PMC12481467. (unilateral post capsulorhexis remained clear)
29. Kang S, Park S, Park E, Lim J, Seo K. Influence of an intentionally induced posterior lens capsule rupture on the real-time intraocular pressure during phacoemulsification in canine ex vivo eyes. *Vet Ophthalmol.* 2018 Jan;21(1):35-41. doi: 10.1111/vop.12475. Epub 2017 May 15. PMID: 28503796.:
30. Nasisse MP, Dykstra MJ, Cobo LM. Lens capsule opacification in aphakic and pseudophakic eyes. *Graefes Arch Clin Exp Ophthalmol.* 1995 Feb;233(2):63-70. doi: 10.1007/BF00241473. PMID: 7729705.
31. Gift BW, English RV, Nadelstein B, Weigt AK, Gilger BC. Comparison of capsular opacification and refractive status after placement of three different intraocular lens implants following phacoemulsification and aspiration of cataracts in dogs. *Vet Ophthalmol.* 2009 Jan-Feb;12(1):13-21. doi: 10.1111/j.1463-5224.2009.00667.x. PMID: 19152593.
32. Maedel S, Evans JR, Harrer-Seely A, Findl O. Intraocular lens optic edge design for the prevention of posterior capsule opacification after cataract surgery. *Cochrane Database Syst Rev.* 2021 Aug 16;8(8):CD012516. doi: 10.1002/14651858.CD012516.pub2. PMID: 34398965; PMCID: PMC8406949.

33. Nguyen J, Werner L. Intraocular Lenses for Cataract Surgery. 2017 Aug 5. In: Kolb H, Fernandez E, Jones B, et al., editors. Webvision: The Organization of the Retina and Visual System [Internet]. Salt Lake City (UT): University of Utah Health Sciences Center; 1995-. Figure 6: [Scanning electron photomicrographs of two...]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK481726/figure/intraocular_lenses.F6/
34. Izuagbe S, Roy J, Chatila A, Hoang LQ, Ea V, Vaish B, Co CM, Ly A, Wu H, Tang L. A 3D in vitro model for assessing the influence of intraocular lens: Posterior lens capsule interactions on lens epithelial cell responses. *Exp Eye Res*. 2024 Jul;244:109940. doi: 10.1016/j.exer.2024.109940. Epub 2024 May 22. PMID: 38782178; PMCID: PMC11246700.
35. Chatila A, Ea V, Izuagbe S, Hoang LQ, Vaish B, Co CM, Luong TM, Tang L. Influence of Lens Power on IOL/Posterior Lens Capsule Interactions and IOL's PCO Potential. *Invest Ophthalmol Vis Sci*. 2025 Jan 2;66(1):41. doi: 10.1167/iov.66.1.41. PMID: 39820279; PMCID: PMC11753477.
36. Hara T, Hara T, Sakanishi K, Yamada Y. Efficacy of equator rings in an experimental rabbit study. *Arch Ophthalmol*. 1995 Aug;113(8):1060-5. doi: 10.1001/archoph.1995.01100080112038. PMID: 7639659.
37. Hashizoe M, Hara T, Ogura Y, Sakanishi K, Honda T, Hara T. Equator ring efficacy in maintaining capsular bag integrity and transparency after cataract removal in monkey eyes. *Graefes Arch Clin Exp Ophthalmol*. 1998 May;236(5):375-9. doi: 10.1007/s004170050093. PMID: 9602322.
38. Nishi O, Nishi K, Menapace R. Capsule-Bending Ring for the Prevention of Capsular Opacification: A Preliminary Report. *Ophthalmic Surg Lasers* 1998;29:749-753. <https://doi.org/10.3928/1542-8877-19980901-0>
39. Menapace R, Sacu S, Georgopoulos M, Findl O, Rainer G, Nishi O, 2008: Efficacy and safety of capsular bending ring implantation to prevent posterior capsule opacification: Three-year results of a randomized clinical trial. *J Cataract Refract Surg*, 34, 1318-1328.
40. Alon R, Assia EI, Kleinmann G. Prevention of posterior capsule opacification by an intracapsular open capsule device. *Invest Ophthalmol Vis Sci*. 2014 May 20;55(7):4005-13. doi: 10.1167/iov.14-14364. PMID: 24845633.
41. Morales, A, da Costa PF, da Conceicao LF, Andrade A L, Padua IRM, Marinho FA, Brito FL, Laus JL. Capsular tension rings alone and associated with acrylic foldable intraocular lens in posterior capsular opacification after phacoemulsification in dogs. *Cienca Rural, Santa Maria*, 2015, **45**(3), 540–545.
42. Zhang K., Dong Y., Zhao M., Nie L., Ding X., Zhu C. (2021). The effect of capsule tension ring on posterior capsule opacification: a meta-analysis. *PLoS One* 16 (3), e0246316. 10.1371/journal.pone.0246316

43. Ameku KA, Berggren CC, Pedrigi RM. Implantation of a capsular tension ring during cataract surgery attenuates predicted remodeling of the post-surgical lens capsule along the visual axis. *Front Bioeng Biotechnol.* 2024 Jan 19;11:1300830. doi: 10.3389/fbioe.2023.1300830. PMID: 38312508; PMCID: PMC10834774.
44. M. Gokilavani, C. Ramani, Mohamed Shafiuzama, & S. Ramesh. (2025). Evaluation of posterior Capsular opacification in Dogs – a review of 12 Cases. *Indian Journal of Veterinary and Animal Sciences Research*, 46(6), 1178-1179.
45. Nagamoto T. The capsular bag supporting ring, ASCRS & ESCRS 1991.
46. Nagamoto T, Bissen-Miyajima H. A ring to support the capsular bag after continuous curvilinear capsulorhexis. *J Cataract Refract Surg* 1994; 20:417-420.
47. Nagamoto T. Origin of the Capsular Tension Ring. *Journal of Cataract & Refractive Surgery* 27(11):p 1710-1711, November 2001. | DOI: 10.1016/S0886-3350(01)01202-0
48. Hara T, Hara T, Yamada Y. "Equator ring" for maintenance of the completely circular contour of the capsular bag equator after cataract removal. *Ophthalmic Surg.* 1991 Jun;22(6):358-9. PMID: 1896178.
49. Morales A, Conceição L F , Andrade A L, Padua I M, Laus J L, Abreu P B. Effect of capsular tension ring alone and associated to acylic foldable intraocular lens in posterior capsular opacification after phacoemulsification in dogs. Abstracts: Annual Meeting of the European College of Veterinary Ophthalmologists, Trieste, Italy, May 24 - 27, 2012, ABSTRACT NO.: 47. *Vet Ophthalmol.* 2012 15(6):p E8
50. Wilkie DA, Stone Hoy S, Gemensky-Metzler A, Colitz CM. Safety study of capsular tension ring use in canine phacoemulsification and IOL implantation. *Vet Ophthalmol.* 2015 Sep;18(5):409-15. doi: 10.1111/vop.12232. Epub 2014 Oct 17. PMID: 25323424.
51. Santosh HK, Ranganath L, Nagaraja BN, Satyanarayana ML, Narayanaswamy M. Studies on influence of capsular tension ring (CTR) on intraocular lens (IOL) implantation following phacoemulsification in cataractous dogs. *Journal of Entomology and Zoology Studies* 2019; 7(4): 1071-1078.
52. Fukumoto S, Minamoto T. Traction suture fixation technique using a capsular tension ring fragment for severe lens displacement during cataract surgery in dogs. *Vet Ophthalmol.* 2025 Mar;28(2):197-206. doi: 10.1111/vop.13167. Epub 2023 Nov 28. PMID: 38018339; PMCID: PMC11911957.
53. Menapace R, Findl O, Georgopoulos M, Rainer G, Vass C, Schmetterer K. The capsular tension ring: designs, applications, and techniques. *J Cataract Refract Surg.* 2000 Jun;26(6):898-912. doi: 10.1016/s0886-3350(00)00446-6. PMID: 10889438.
54. <https://entokey.com/capsular-tension-ring-implantation-and-rationale/>

55. Pereira FA, Werner L, Milverton EJ, Coroneo MT. Miyake-Apple posterior video analysis/photographic technique. *J Cataract Refract Surg*. 2009 Mar;35(3):577-87. doi: 10.1016/j.jcrs.2008.11.059. PMID: 19251153.
56. Price F, Mackool R, Miller K, Koch. P, Oetting TA, Johnson AT. Interim results of the United States investigational device study of the Ophtec capsular tension ring. *Ophthalmology*, 2005; 112, 460-465
57. Liu CS, Wormstone IM, Duncan G, Marcantonio JM, Webb SF, Davies PD. A study of human lens cell growth in vitro. A model for posterior capsule opacification. *Invest Ophthalmol Vis Sci*. 1996 Apr;37(5):906-14. PMID: 8603875.
58. <https://www.jaypeedigital.com/eReader/chapter/9788180615160/ch2>
59. Allgoewer I, Soukup P. Capsular tension rings in canine cataract surgery: feasibility and glaucoma risk. Preliminary results. Annual Meeting of the European College of Veterinary Ophthalmologists, Madrid, Spain, 2026.
60. Zhou Y, Xiang J, Xu F, Jiang Z, Liu F. Objective quantification of posterior capsule opacification after cataract surgery with swept-source optical coherence tomography. *BMC Ophthalmol*. 2023 Jul 5;23(1):299. doi: 10.1186/s12886-023-03064-3. PMID: 37407917; PMCID: PMC10324270.
61. Yoshida G, Umeda Y. Comparison of the incidence of postoperative ocular hypertension after pars plana vitrectomy and phacoemulsification and aspiration in dogs. *J Am Vet Med Assoc*. 2026 Apr 3:1-7. doi: 10.2460/javma.26.01.0030. Epub ahead of print. PMID: 41932354.