

Complimentary Online 42 Videos (Duration 1 hour 6 minutes)

Decision Making in **VITREORETINAL SURGERIES**



Editor-in-Chief
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Foreword
Lingam Gopal



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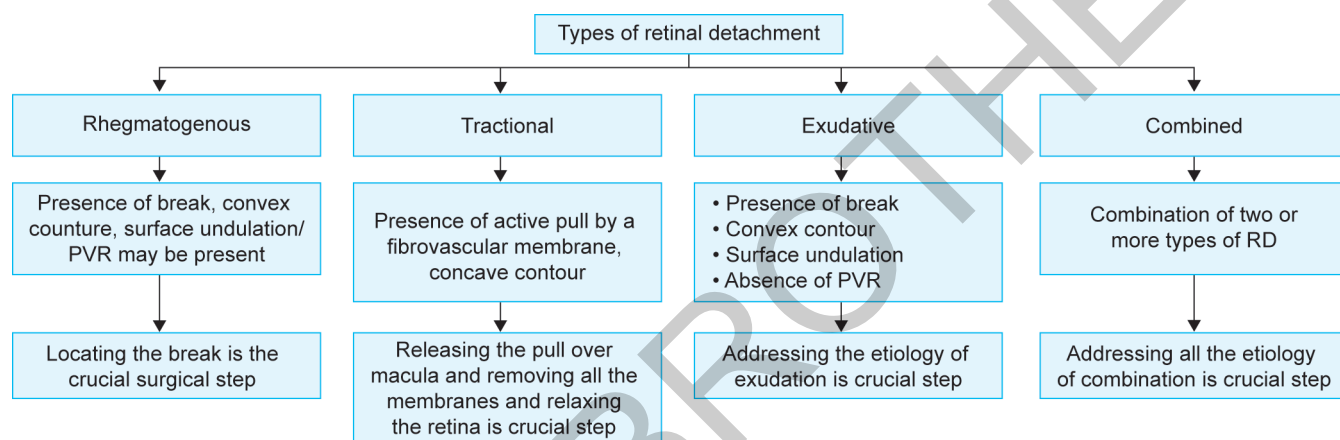
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PRINCIPLES OF RETINAL DETACHMENT



KEY POINTS

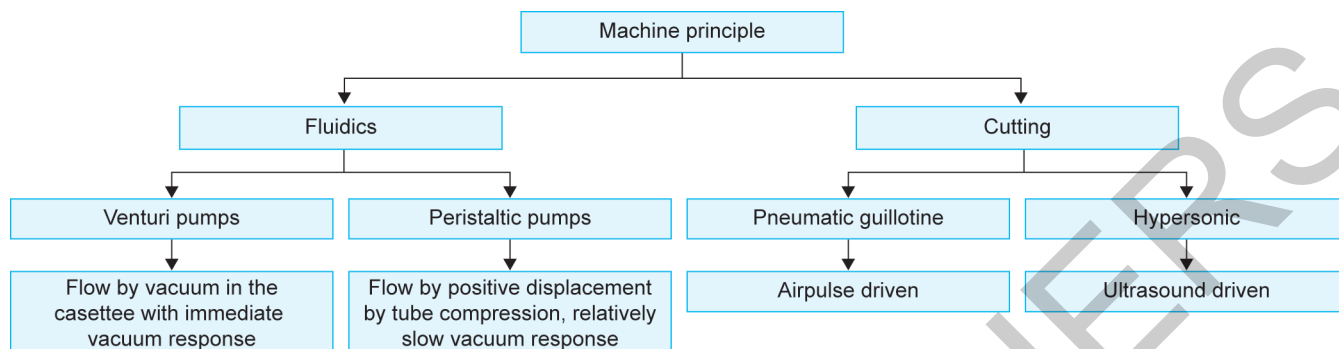
- Performing a detailed dynamic indirect ophthalmoscopic examination is vital step in management of retinal detachments.
- Recognizing the type of retinal detachment is crucial for selecting effective surgical approach.
- Simple imaging modalities such as ultrawide field color fundus photos such as OPTOS, ultrasound B-scans, and OCT are useful tools for distinguishing between the various forms of detachment.
- It is crucial to devote ample time to patient counseling so that patients can thoroughly grasp the details of their condition, the need for several surgeries,

positioning guidelines, travel limitations, and possible complications—including cataracts, elevated intraocular pressure, infection, bleeding, and the risk of redetachment—prior to intervention.

FURTHER READING

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2. Lin JB, Narayanan R, Philippakis E, Yonekawa Y, Apte RS. Retinal detachment. Nat Rev Dis Primers. 2024; 10(1):18.
3. Moisseiev E, Loewenstein A, Moshiri A, Yiu G. The Management of Retinal Detachment: Techniques and Perspectives 2018. J Ophthalmol. 2019;2019:8185619.

VITRECTOMY FLUIDICS



■ KEY POINTS

- Duty cycle is the proportion of time a cutter port remains open during a cut.
- Modern vitrectomy machines allow independent duty cycle control even at high cut rates. Dual pneumatic probes, such as Alcon Constellation, allow independent duty cycle control at high cut rates (5,000–7,500 cpm).
- Modern vitrectomy systems now achieve up to 30,000 cuts per minute and use real-time sensors to maintain stable intraocular pressure (IOP). This minimizes

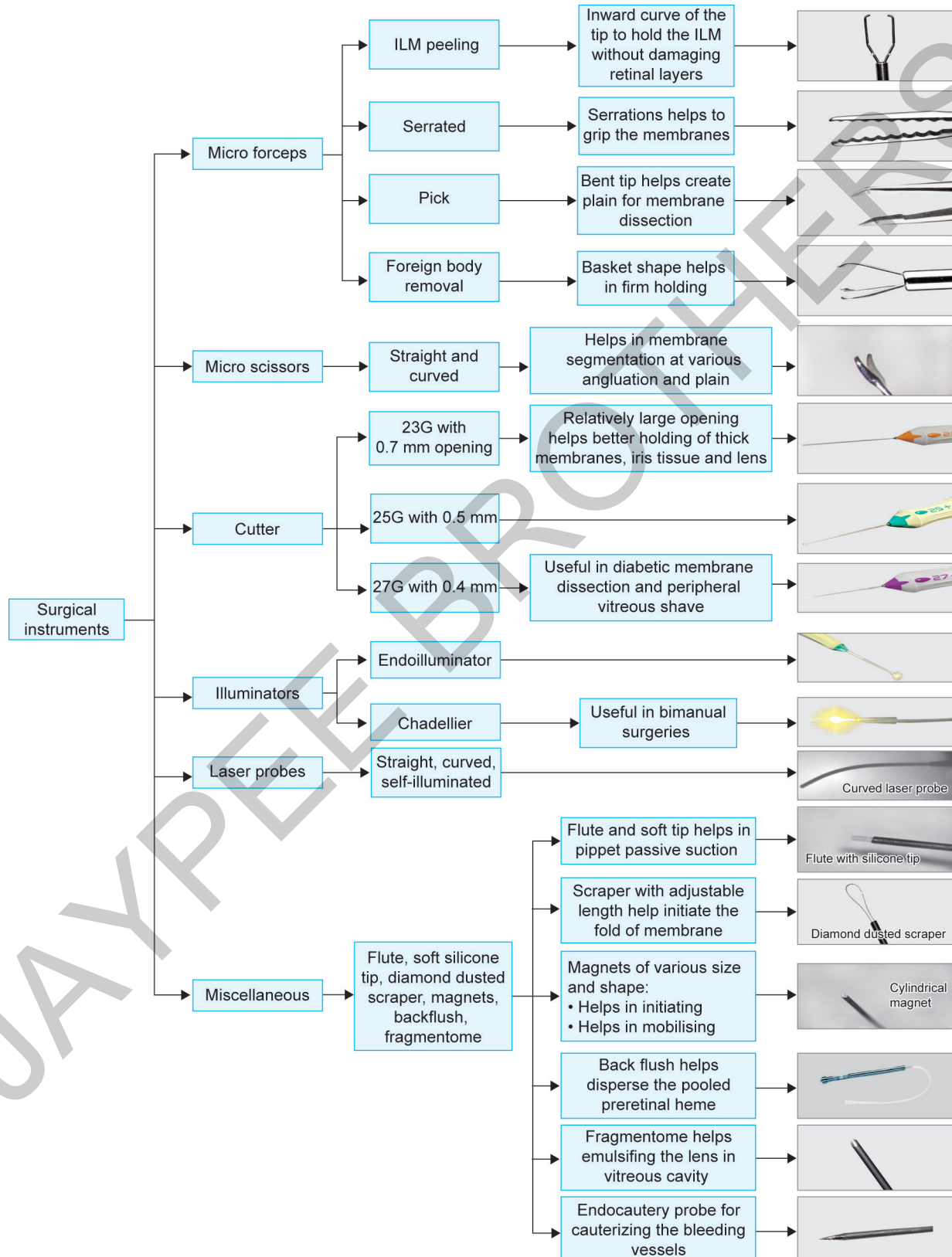
the risk of hypotony and related complications like choroidal hemorrhage.

- Hypersonic vitrectomy, like Bausch + Lomb's Vitesse, liquefies vitreous with a hypersonic pen, reducing traction without a guillotine blade.

■ FURTHER READING

1. Steel DH, Charles S. Vitrectomy fluidics. *Ophthalmologica*. 2011;226 Suppl 1:27-35.
2. Teixeira Pinto AG, Diniz B. Vitrectomy Principles and Systems. In: Ferreira MA (Ed). *Diseases of the Retina and Vitreous*. Cham: Springer; 2025.

SURGICAL INSTRUMENTS: PRINCIPLES AND USES



KEY POINTS

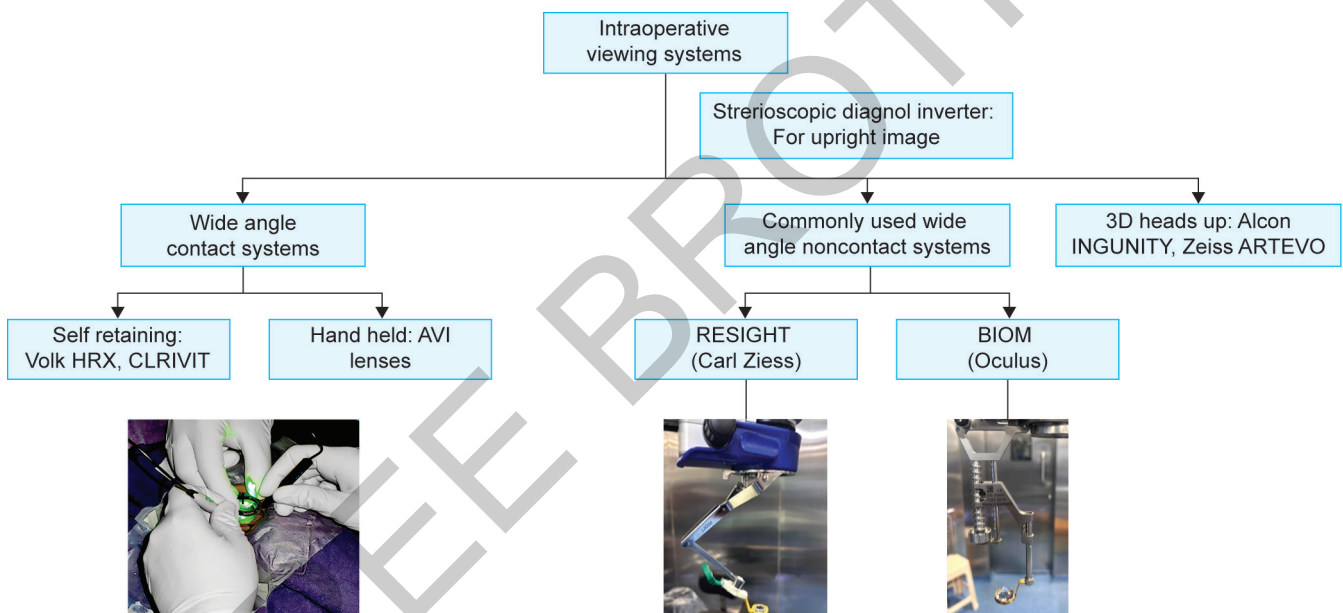
- Maintain instrument tips carefully to prevent damage and intraocular breakage.
- Inspect tip of the instrument for intactness before entering into the eye.
- Standard vitrectomy instruments (23-, 25-, 27-gauge) have 28.8–32.6 mm shafts and work through 4 mm microcannulas to ensure a closed, self-sealing system.
- Longer-shafted instruments are preferred for highly myopic eyes (axial length >28 mm) with 36-mm shafts.

- In pediatric eyes with short axial length and flexible sclera, use shorter trocars or silicone stoppers to adjust trocar length.

FURTHER READING

1. Arevalo JF, Berrocal MH, Arias JD, Banaee T. Minimally invasive vitreoretinal surgery: is sutureless vitrectomy the future of vitreoretinal surgery? *J Ophthalmic Vis Res.* 2011;6(2):136-44.
2. de Oliveira PR, Berger AR, Chow DR. Vitreoretinal instruments: vitrectomy cutters, endoillumination and wide-angle viewing systems. *Int J Retina Vitreous.* 2016;2:28.

VIEWING SYSTEMS IN RETINAL SURGERIES



KEY POINTS

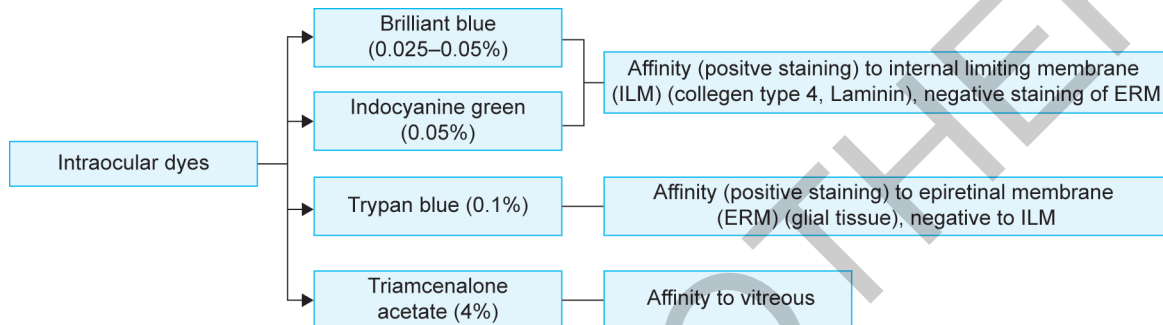
- Contact viewing systems enhance image resolution, contrast, and stereopsis by correcting corneal irregularities, without fogging, and allow fine focus via microscope control.
- Noncontact viewing systems are positioned above the eye for easy, rapid switching between wide-angle and conventional views, enabling assistant-independent operation and effective eye manipulation.

- Chandelier illumination allows bimanual surgery in complex rhegmatogenous retinal detachment (RRD) and tractional retinal detachment (TRD).
- 3D heads-up visualization system offers significant advantages in PPV by replacing traditional microscope oculars with a high-definition screen, improving surgeon comfort, visualization, improved field of depth, and teaching capabilities.
- Endoscopic vitrectomy uses intraocular endoscope to visualize and treat retinal pathologies when the view is hampered by corneal opacity.

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1. Agranat JS, Miller JB. 3D Surgical Viewing Systems in Vitreoretinal Surgery. *Int Ophthalmol Clin*. 2020;60(1):17-23.
2. Razavi P, Cakir B, Baldwin G, D'Amico DJ, Miller JB. Heads-Up Three-Dimensional Viewing Systems in Vitreoretinal Surgery: An Updated Perspective. *Clin Ophthalmol*. 2023;17:2539-52.
3. Tieger MG, Rodriguez M, Wang JC, Obeid A, Ryan C, Gao X, et al. Impact of contact versus non-contact wide-angle viewing systems on outcomes of primary retinal detachment repair (PRO study report number 5). *Br J Ophthalmol*. 2021;105(3):410-3.

INTRAOPERATIVE DYES: TYPES AND PRINCIPLES



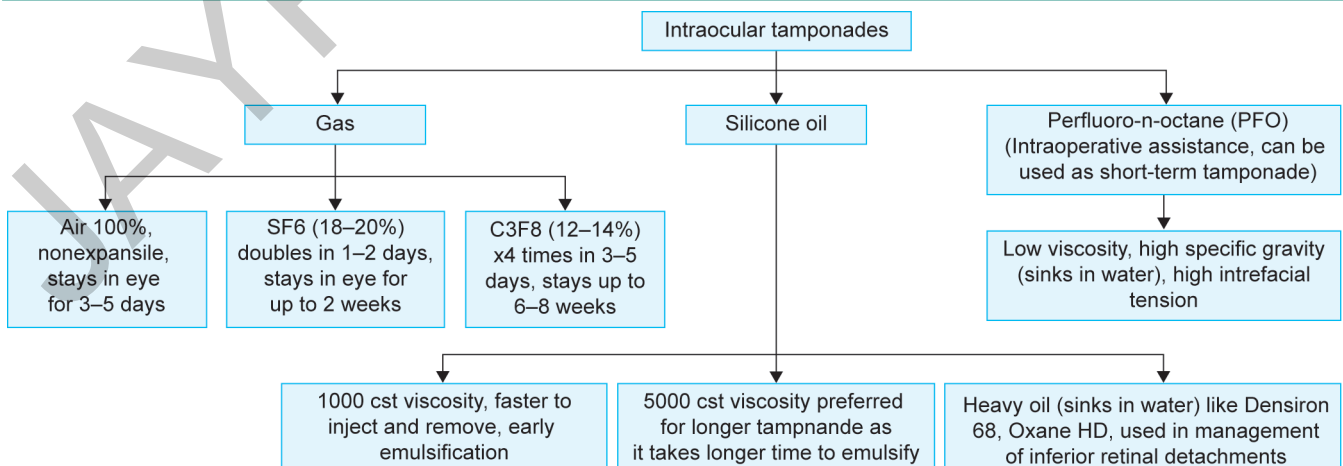
KEY POINTS

- Dyes can be injected using the “dry” technique (under air after fluid-air exchange for macular concentration but with higher exposure risk) or the “wet” technique (in a fluid-filled eye, often with “heavy” dyes that settle at the macula).
- Two dyes may be used sequentially or together (e.g., trypan blue for ERM, followed by Brilliant blue for ILM) to enable complete removal of multiple retinal layers (double staining).
- Certain dyes, like ICG, have absorption spectra that overlap with surgical light, increasing the risk of photochemical retinal damage.
- Prompt and thorough removal of dye after staining is essential to minimize retinal cell exposure and toxicity.

FURTHER READING

1. Bergamo VC, Caiado RR, Maia A, Magalhães O Jr, Moraes NSB, Rodrigues EB, et al. Role of Vital Dyes in Chromovitrectomy. *Asia Pac J Ophthalmol (Phila)*. 2020;10(1):26-38.
2. Farah ME, Maia M, Rodrigues EB. Dyes in ocular surgery: principles for use in chromovitrectomy. *Am J Ophthalmol*. 2009;148(3):332-40.

INTRAOCULAR TAMPONADES: PROPERTIES AND USES



■ KEY POINTS

- Choice of tamponade depends on location of the retinal break. Gases (SF₆ and C₃F₈) suit superior breaks due to buoyancy, while heavy silicone oil or strict positioning address inferior breaks.
- Nonexpansile gases are used for macular hole repair surgeries and simple retinal detachment (RD). Pure gas (100%) is used in pneumoretinopexy. Silicone oil is preferred in complex cases such as giant retinal tears or proliferative vitreoretinopathy (PVR), combined detachments, and RD secondary to viral retinitis.

- Complications include increased intraocular pressure (from gas expansion or oil overfill or oil emulsification) and cataract progression.
- Patients with intraocular gas must avoid air travel and nitrous oxide anesthesia due to the risk of rapid gas expansion.

■ FURTHER READING

1. Deobhakta A, Rosen R. Retinal Tamponades: Current Uses and Future Technologies. *Curr Ophthalmol Rep.* 2020;8(3):144-51.
2. Wilson DI, Te Water Naude AD, Snead MP. Refinements in the use of silicone oil as an intraocular tamponade. *Eye (Lond).* 2024;38(10):1810-5.

Salient Features