

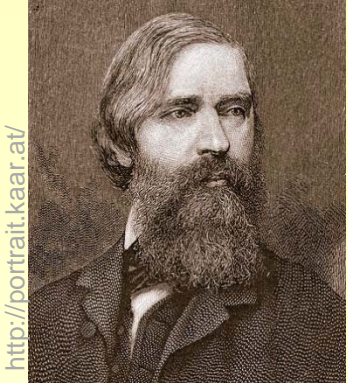


The Evolution of Retinal Detachment Surgery

Emil Kurniawan, David Kaufman
Department of Ophthalmology
Royal Melbourne Hospital

Pre-1920s

Early procedures for retinal detachment were aimed at draining subretinal fluid.



In 1863, **Von Graefe** attempted trans-scleral and trans-retinal drainage, with minimal success.



Argyll Robertson followed in 1876 with trephination for permanent drainage of subretinal fluid.

Overall, prior to the 1920s, the success rate of retinal detachment operations were **0.1%**.

1920s

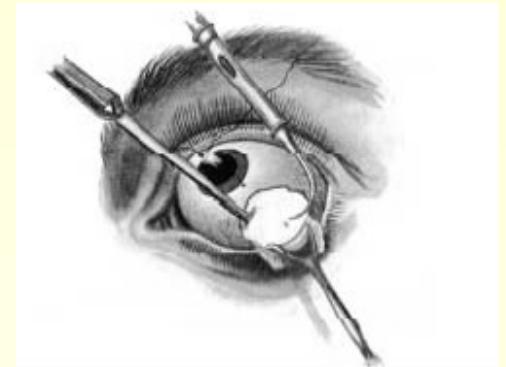


<http://oftalmo.com/>

In 1920, Swiss ophthalmologist **Jules Gonin** proposed a then-revolutionary idea:
Retinal detachments are caused by retinal breaks, and sealing of breaks are essential for successful reattachment.

Gonin pioneered ignipuncture - drainage of subretinal fluid followed by coagulation of retinal breaks using thermocautery.

With this new procedure, success rate of detachment repair increased to **20-40%**.



<http://www.clubjulesgonin.com/>

Guist & Lindner introduced chemical cauterisation with potassium hydroxide (caustic potash) as an alternative to thermocautery.

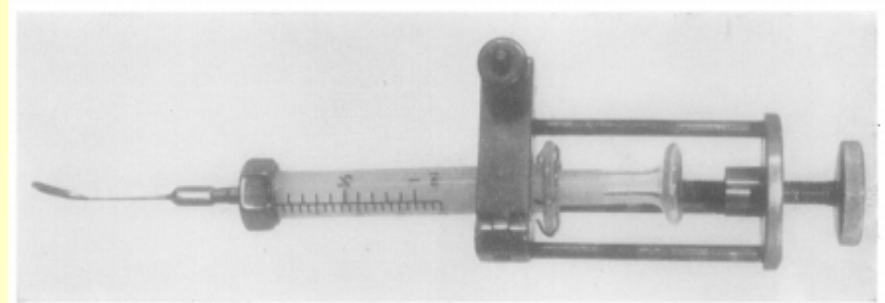


FIG. 10.—Apparatus for potash injection.

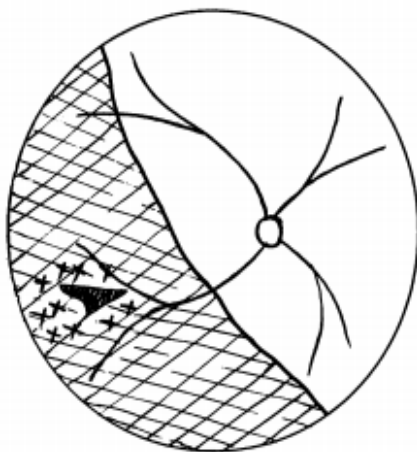


FIG. 8(a).—Case 5. Diagram of detachment.

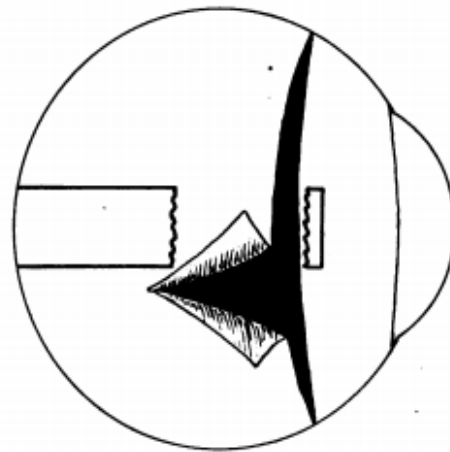


FIG. (8b).—Case 5. Diagram of scleral resection and "flap" Lindner-Guist operation.

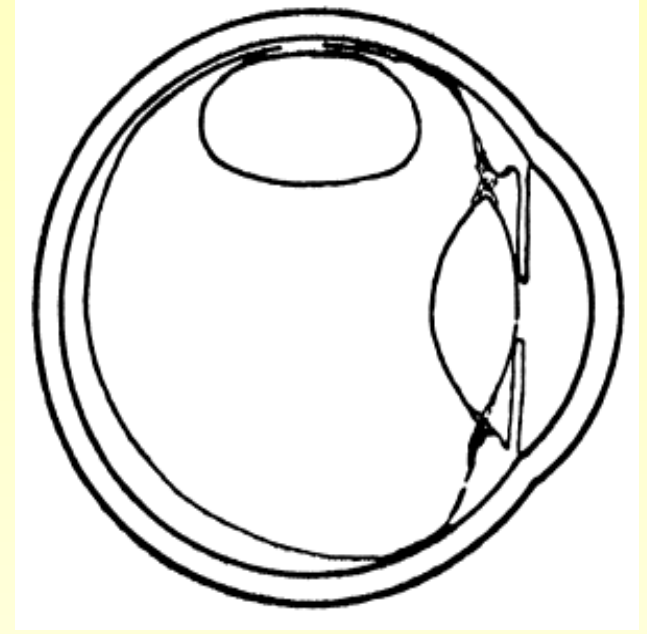
KOH was applied at the base of the scleral flap, exciting a sometimes violent reaction in the choroid and RPE to form a sterile adhesion.

1938

Rosengren in 1938 used an intraocular air bubble to tamponade the retinal hole after drainage of subretinal fluid.

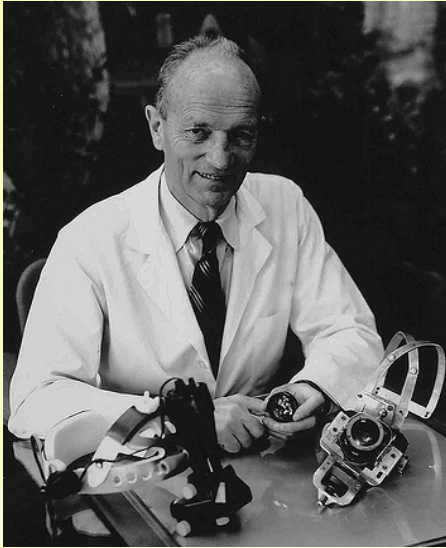
Rosengren's operation restored intraocular volume with gas, flattened the retina with gas, and tamponaded the diathermised break.

However, air tamponade did not last long enough to allow strong retinal adhesion.



Kressig, I. A Practical Guide to Minimal Surgery for Retinal Detachment, Vol. 2.

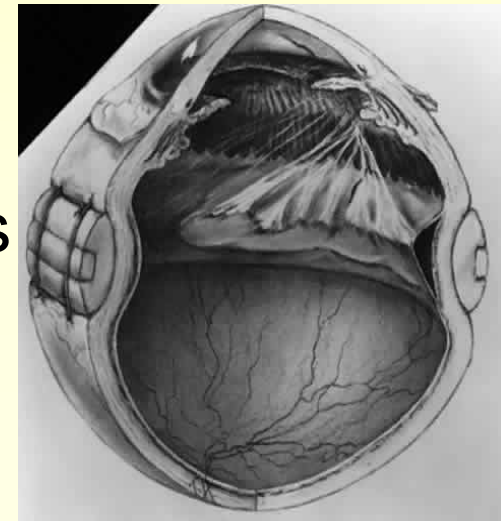
1945



Br J Ophthalmol 2011;95:306-307

Charles Schepens is known as the father of modern retinal detachment surgery. This Belgian-born American began his prolific career developing the binocular indirect ophthalmoscope.

In 1951, Schepens modified **Ernst Custodis'** method of intrascleral buckling, initially with polyethylene, to relieve vitreous traction and maintain chorioretinal apposition. This increased the success rate of retinal detachment surgery to **70-80%**.



1949

Photocoagulation was introduced in Essen, Germany by **Meyer-Schwickerath** in 1949 using focused sunlight to create a chorioretinal scar.



<http://www.augenklinik.de/>

Later modification of the apparatus led to the development of Xenon arc photocoagulation, an alternative to diathermy and chemical cautery.

1958

Hermenegildo Arruga, a Spanish ophthalmologist, introduced the Arruga string operation.

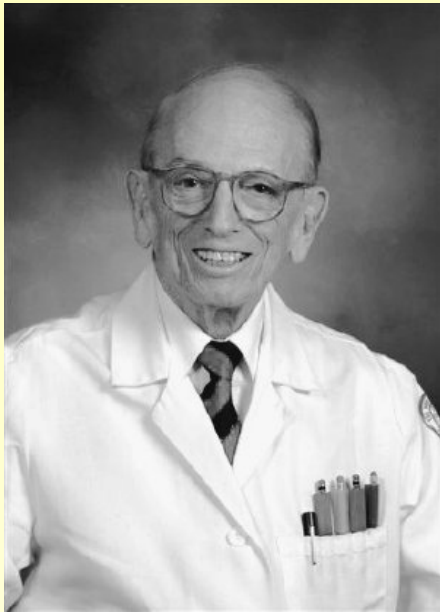


Brit J Ophthal. (1972) 56, 509

Equatorial cerclage is performed with a Supramid suture to isolate peripheral retinal breaks. As subretinal fluid is released, the string is tightened.

Unfortunately, there were some drawbacks: the string occasionally occluded the anterior ciliary arteries or cut through the sclera.

1965



<http://maculasociety.org/>

Harvey Lincoff further extended Schepens' work. He demonstrated that extrасcleral buckling had similar success rates to intrасcleral buckling. He also proved Custodis' theory that drainage of the subretinal fluid is not essential for successful retinal reattachment.

Lincoff was noted for advocating silicone materials for buckling (the Lincoff sponge). He also introduced cryotherapy, an alternate method of retinopexy with less scleral complications than diathermy.



<http://museumofvision.org/>

1970

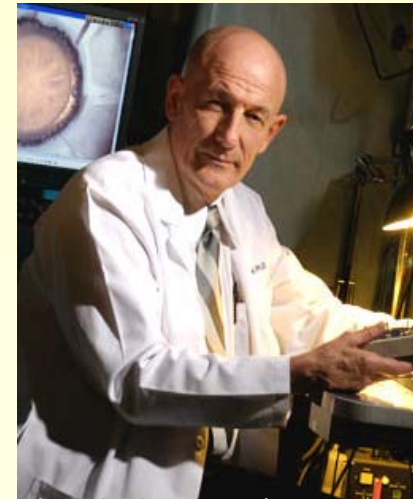


Br J Ophthalmol 2010;94:949

Robert Machemer, of Bascom Palmer Eye Institute, was the first to perform vitrectomy through the pars plana. He recognised the avascular and firmly-adherent pars plana as an ideal site for surgical ports.

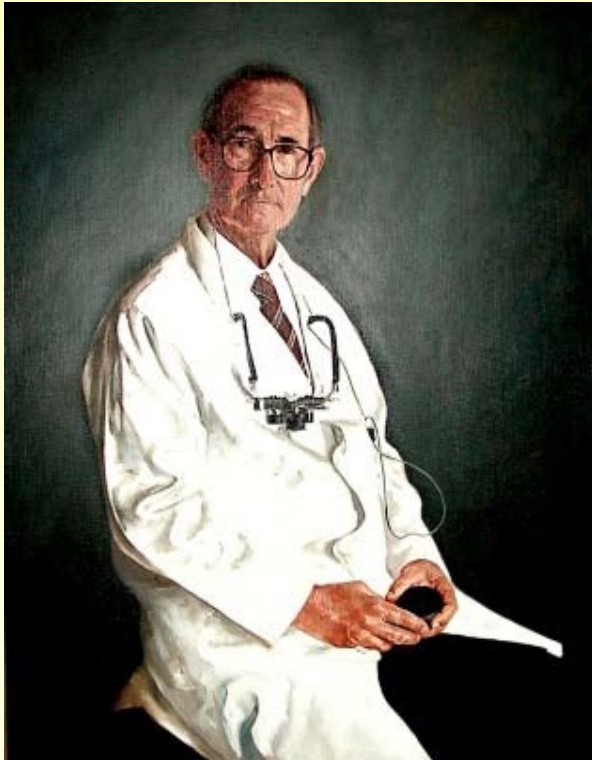
He initially tested his 18-gauge port to drain albumin through egg shells!

Machemer quickly developed the VISC (Vitreous Infusion Suction Cutter) system with **Jean-Marie Parel**, which used a single port to infuse, cut, aspirate, and replace vitreous with BSS. Parel came up with the idea of fibreoptic endoillumination.



<http://50.bascompalmer.org/>

1973



<http://cera.org.au/>

In Australia, **Prof GW Crock** was a pioneering microsurgeon who invented a range of instruments, including the Schultz-Crock binocular indirect ophthalmoscope and the stereo-retinal camera.

He collaborated with Parel and Machemer to develop the VISC system further.

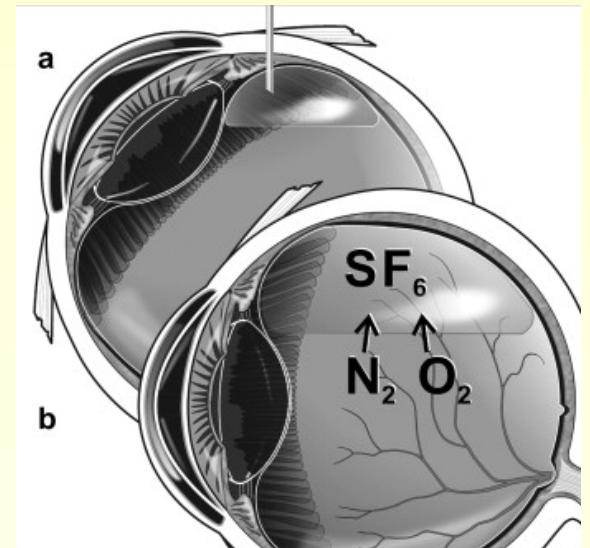
1975 –



<http://50.bascompalmer.org/>

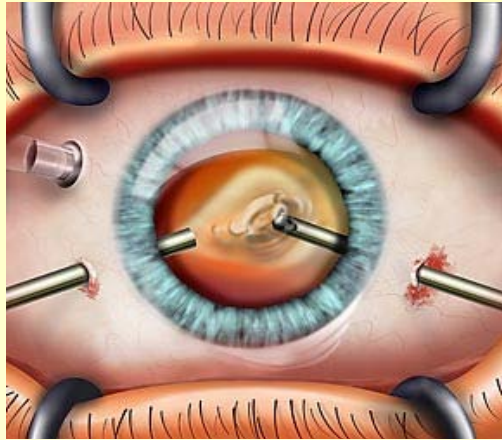
Ed Norton introduced sulphur hexafluoride (SF_6) gas for pneumatic retinopexy in 1975. SF_6 expanded intraocularly and created a longer-lasting tamponade, allowing enough time for chorioretinal scarring. Other perfluorocarbons were introduced later.

In 1980, American ophthalmologist **Paul Cibis** was the first to use silicone oil for tamponade. **John Scott** at Cambridge developed his idea further. Silicone oil counteracts vitreous traction and creates a more permanent intraocular tamponade.



Surv Ophthalmol 53(5):443-478

1976 –



<http://www.wecareindia.com/>

In 1976, **O'Malley** and **Heintz** introduced three-port vitrectomy using 20-gauge ports for infusion, illumination, and suction/cutting respectively. This Ocutome system had hand-controlled infusion and suction! Mechanised versions were developed later.

In the 1990s, vitrectomy using 25-gauge ports were initially developed for paediatric use. It was later adopted for adult vitrectomy with sutureless, self-sealing wounds.

With modern vitrectomy techniques, success of retinal detachment surgery approaches **95%**.