

PERFLUOROCARBON LIQUIDS IN TREATMENT OF DIFFICULT CASES OF RETINAL DETACHMENT

Essay

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By

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بسم الله الرحمن الرحيم
الحمد لله الذي هدانا لهذا
ما كنا لنهتدي لولا أن هدانا الله

**TO MY MOTHER,
MY FATHER,
& MY HUSBAND**

**For Their Understanding
and Continuous Support**



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**INTRODUCTION
AND
AIM OF THE WORK**

INTRODUCTION

Perfluorocarbon liquids were initially introduced as oxygen carriers and plasma expanders in medicine in 1966. Haidt et al., used these substances for the first time as a vitreous substitute in 1982 (Blinder et al., 1991).

These substances are optically clear, have specific gravity greater than that of water, so exert an excellent flattening force on the retina, and low viscosity which facilitates easy introduction and aspiration from the eye by means of vitreous microsurgical instrumentation (Chang et al., 1988).

They allow easy intraoperative visualization, and photocoagulation can be applied without intraocular vaporization.

Perfluorocarbon liquids proved to be toxic materials as long-term vitreous substitutes but the emergence of a new member "perfluorophenanthrene or vitreon" which is less toxic, allowed the feasibility to leave it in the eye for up to 6 weeks postoperatively (Blinder et al., 1991).

The perfluorocarbon liquids group includes various members of which the most used are: perfluorodecalin, perfluorooctane, perfluorotributylamine, and perfluorophenanthrene.

In comparison to perfluorocarbons, silicone oil can be used as an intraocular tamponade for a longer time.

The clinical complications encountered with a permanent perfluorocarbon tamponade include cataract, glaucoma (pupillary block or trabecular clogging), band shaped keratopathy, and retinopathy.

AIM OF THE WORK

Our aim is to study the different forms of perfluorocarbon liquids as regards their physical & chemical properties, their use in vitreoretinal surgery, and their advantages and complications in comparison to other vitreous substitutes.

HISTORY OF RETINAL DETACHMENT SURGERY

DEVELOPMENT OF THERAPEUTIC EFFORTS TO REPAIR RETINAL DETACHMENT

As long as a correct understanding of the cause of retinal detachment was lacking, its therapy was varied but uniformly ineffective (Schepens, 1983).

Early Period (1805-1922):

The first recorded surgical attempt to repair a retinal detachment was release of subretinal fluid by Ware (1805). Intravitreal injections of various materials were started early. In 1874 Weber injected subretinal fluid; later others injected air, aqueous, saline, or cerebrospinal fluid. Rabbit vitreous was injected into humans by Deutschmann (1895), who felt that it tended to dissolve traction bands. He also advocated surgical sectioning of vitreoretinal adhesions.

Operations aimed at reducing the volume of the globe were the logical result of pathogenic theories of globe distension and vitreous traction. Excision of a full-thickness strip of sclera was first done by Alaimo (1893) and later by Muller (1903). The first lamellar resection with tucking of the scleral flap was performed by Blaskowics (1911). These resection operations were recommended exclusively for cases with high myopia.

The first attempts at reattaching the retina by the production of chorioretinal adhesions were not aimed at closing retinal breaks. In order to obtain these adhesions, many methods were proposed, such as galvanocautery (1882), electrolysis (1895), sutures in the retina (1895), and injection of tincture iodine into the vitreous (1889) and into the subretinal space (1895) .

In this period during which no special effort was made to close the retinal breaks, the rate of reattachment was estimated to be around 6%. The surgical techniques remained ineffective in reattaching the retina because they did not seal the retinal breaks (Schepens, 1983).

Modern Period (1923-1950):

The modern period of treatment was characterized by attempts to close the retinal breaks. Gonin (1923) was first to cause an intentional and localized chorioretinal reaction over the area of the breaks; for this purpose he used an actual cautery. Heim and then Weve (1930) each independently introduced the use of diathermy, which was less violent and produced more extensive reaction than cautery. Vogt (1936) modified electrolysis, a method originally described in 1895, and called it catholysis. In 1931 Guist improved Galezowski's method of chemical irritation by placing the irritant in the subchoroidal rather than the subretinal space and by using potassium hydroxide rather than tincture iodine. The barrage

method for walling off weak portions of the retina was described simultaneously and separately by Gonin and Lindner in 1931. The first use of cryoapplication to produce a chorioretinal reaction was in 1934 by Bietti.

In order to combat vitreous traction, procedures aimed at reducing the ocular volume without much regard for the location of the retinal breaks were revived separately by Lindner and by Hildesheimer (1933), who used a modification of Alaimo's technique. Similar attempts were first reported in the United States by Pischel and Miller (1939). Blaskowics' lamellar scleral resection was revived in 1951 by three surgeons independently, Dellaporta, Paufigue, and Shapland. Weve (1949) was the first to suggest infolding of full-thickness sclera under star-shaped retinal folds. Ocular volume was reduced by Strampelli with subchoroidal injections of blood plasma (1933), and later by subchoroidal implantation of gelatin sponge (1954). Smith (1952) used air in the subchoroidal space for the same purpose. The first scleral buckling operation was probably by Jess (1937) who temporarily sutured a gauze pad on the sclera overlying the retinal breaks.

Injections into the vitreous continued to be performed. Lenz (1922) suggested the possibility of injecting human vitreous, but it was Cutler (1946) who first actually used this substance to correct retinal detachment.

As soon as surgery was directed against the retinal breaks, results improved drastically from 6% to over 50%. For instance, Gonin was successful in 53% of the cases in his first series of 221 eyes (1931). From that time on, the percentage of success has improved slowly but steadily.

Two currents were apparent in the modern period: Gonin, and later Vogt, Arruga, and Weve, championed methods aimed at closing the retinal breaks; Lindner, Strampelli, and Cutler advocated methods in which less careful closure of the retinal breaks was combined with techniques that either reduced the total ocular volume or increased the vitreous volume. Success with the latter techniques depended heavily on a barrage of chorioretinal reaction that isolated the retinal breaks from the viable portions of the fundus (Schepens, 1983).

Contemporary Period:

The contemporary period in retinal detachment developments started at the end of the modern period, between 1942 and 1950. It is marked by keen interest and progress in the methods of examination, concepts of pathogenesis, and treatment.

In the contemporary period, the treatment of retinal detachment is characterized by three main tendencies: