Comparative Study Of Two Methods Of Silicone Oil Evacuation Combined With Phacoemulsification

Thesis submitted for partial fulfillment of MD degree in ophthalmology

By
Mahmoud Salah Mostafa (M.Sc)

Under supervision of

Prof.Dr. Khaled Esmat El-Rakhawy
Professor of ophthalmology
Faculty of Medicine, Cairo University

Prof.Dr. Adel Mohammed Fathy
Professor of ophthalmology
Faculty of Medicine, Cairo University

Assist.Prof.Dr. Hatem Ahmed Saeed
Assistant professor of ophthalmology
Faculty of Medicine, Cairo University

Faculty of Medicine
Cairo University
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Abstract

The aim of this work is to compare between two methods of silicone oil evacuation as regards the effect on corneal endothelium, the rate of recurrence of retinal detachment after silicone oil evacuation as well as other posterior segment complications, and the presence of residual silicone oil droplets.

It was noted that the corneal endothelium was affected more in group B in which silicone oil comes in contact with the corneal endothelium.

The rate and the timing of retinal redetachment following surgery was not related to the method of silicone oil evacuation.

Key Words:

Cataract ,Silicone Oil ,Phacoemulsification , retinal detachment , Keratopathy,

Residaual oil droplets ..

ملخص الرسالة

ان وجود زيت السليكون داخل العين بعد عملية استئصال الجسم الزجاجى يؤدي الى حدوث الكثيرمن المضاعفات. و من أهم تلك المضاعفات حدوث مياه بيضاء مضاعفة لزيت السليكون. وتوجد هناك طرق عديدة لتفريغ زيت السليكون مع عملية ازالة المياه البيضاء. و تهدف هذه الدراسة الى المقارنة بين طريقتين من طرق تفريغ زيت السليكون مع ازالة المياه البيضاء باستخدام الموجات فوق الصوتية من حيث التأثير على قرنية العين، ونسب حدوث الانفصال الشبكي المرتجع و نزيف الجسم الزجاجي بعد ازالة زيت السليكون، و نسبة الحالات التي توجد بها بقايا قطرات من زيت السليكون، و نسب حدوث انخفاض ضغط العين.

Key words
:
Cataract, silicone oil, phacoemulsification, retinal detachment, keratopathy, residaual oil droplets.

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List of abbreviations

ACD: Anterior chamber depth

AIDS: Acquired immunodeficiency syndrome

BCVA: Best Corrected Visual Acuity.

BSS: Balanced salt solution

CMV: Cytomegalovirus

cSt: centistocks

D: Diopter

ECCE: Extracapsular cataract extraction.

I/A: Irrigation/Aspiration

ICCE: Intracapsular cataract extraction.

IOL: Intraocular lens

IOP: Intraocular pressure

L: Lens thickness

PDR: Proliferative diabetic retinopathy

PFC: Perfluorocarbon

PMMA: Polymethyl methacrylate

PRP: Panretinal photocoagulation

PSD: Posterior segment depth

PVR: Proliferative vitreoretinopathy

RD: Retinal detachment

RPE: Retinal pigment epithelium

tPA: Tissue plasminogen activator

UCVA: Uncorrected visual acuity

YAG: Yettrium-Aluminum-Garnit

Introduction & aim of work

Introduction

The use of silicone oil as a long acting retinal tamponade has improved the chances of reattaching the retina in complicated cases of retinal detachment. Unfortunately, the presence of intraocular silicone oil is associated with several complications, the commonest of which is cataract formation occurring in up to 100% of eyes which had silicone oil even if silicone oil is removed early (Larkin ,et al; 1998).

Removal of oil can be combined with phacoemulsification (Baer , et al; 1995)

There are various techniques of combined phacoemulsification and silicone oil removal (Tanner, et al; 1998)

One of these techniques is pars plana evacuation of silicone oil either before phacoemulsification or after its completion (Gonvers, et al; 1985).

Another technique is transpupillary passive floatation of silicone oil through planned posterior capsulorrhexis and corneal wound following phacoemulsification and before IOL implantation (Assi, et al; 2001).

Aim of work :

The aim of this work is to compare between two methods of silicone oil evacuation as regards the effect on corneal endothelium, the rate of

recurrence of retinal detachment after silicone oil evacuation as well as other posterior segment complications, and the presence of residual silicone oil droplets.

Chapter 1

Physicochemical properties & indications of silicone oil use

*Physico-chemical properties of silicone oil:

The term silicone is often used generally to designate all polymeric and monomeric organosilicone compounds containing silicone-oxygen bonds. In other instances, it designates all organosiloxane polymers, including silicone fluids and elastomers. Silicone fluids, commonly called silicone oils, are linear synthetic organic-inorganic polymers with a common macromolecular backbone made of siloxane (-Si-O-) repeating units. The major differences among silicone fluids reside in the chemical structure of radical side groups, radical end termination of the polymer chains, and in the size distribution of the chains. Thus, each type of fluid has a specific set of chemical and physical characteristics. Because of their viscosity and their ability to repel water, these fluids are commonly referred to as oils (Ryan, 2006).

Hydrocarbon radials (eg., methyl, phenyl, vinyl, trifluropropyl groups) can be used to form side chains of a particular polymer. For example, the most common silicone oil bears two methyl side groups, but other arrangements such as diphenyl- substituted polysiloxane are readily available. Two different groups can also be attached to the same silicone atom. For example, phenyl and methyl groups can be used to form a phenylmethyl-siloxane polymer, or a methyl and trifluropropyl can be used to form a trifluoropropylmethylsiloxane polymer, yielding the so-called heavier-than-water or fluorosilicone oils (Wolf, et al; 2003)

The silicone oil types most commonly used in ophthalmology are trimethyl-seloxy-terminated SiO, polytrifluropropylmethylsiloxan (FSiO) and, much less commonly used, polyphenylmethylsiloxan (Ryan, 2006).

The length of the polymer determines its viscosity, and the silicone oil in usage ranges from 1000 to 12500 cSt in viscosity. Silicone oil has a refractive index of 1.4035, which is slightly higher than that of the vitreous (1.33) (Gabel et al; 1987).

It has a density of 0.975 -less than water- and thus floats on water in the vitreous. It is always found at the top of vitreous cavity, so superior tears are easily and nearly always closed by silicone oil. Because it is difficult to fill the vitreous cavity completely with silicone oil inferior tears frequently require a scleral buckle to achieve permanent closure (De Juan et al; 1985)

The interfacial tension of silicone oil is high (40 dyne/cm2) but less than gas water interface (70dyne/cm2) for this reason, air often is used first to flatten the retina ; then air is replaced with silicone oil to provide a long term internal tamponade (Peyman et al; 1995)

Low viscosity silicone oils are preferred by some surgeons because of easier surgical handling and removal from the vitreous cavity. On the other hand, higher viscosity silicone oils are subject to decreased and delayed