A REVIEW OF VITREORETINAL SURGERIES DONE AT KENYATTA NATIONAL HOSPITAL

A dissertation submitted in part fulfillment for the degree of master of medicine (Ophthalmology) at University of Nairobi.

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DECLARATION

This dissertation is my original work and has not been presented for a degree in any other university.

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DEDICATION

I dedicate this book to my father, Gitau Kimani and my mother, Felicina Wanjiru for their sacrifice and encouragement.

I also dedicate it to my wife Elizabeth and our son Kennedy Gitau, for their unconditional love and encouragement.

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LIST OF ABBREVIATIONS

IOFB – Intra-Ocular Foreign Body

IOL – Intra-Ocular Lens

IOP – Intra-Ocular Pressure

KNH – Kenyatta National Hospital

PVD – Posterior Vitreous Detachment

PVR – Proliferative Vitreoretinopathy

PPV – Pars Plana Vitrectomy

RD – Retinal Detachment

RRD – Rhegmatogenous Retina Detachment

VA – Visual Acuity

VR – Vitreoretinal

ABSTRACT

Objective: To review vitreoretinal surgeries done at Kenyatta national hospital (KNH) between 1st October 2000 to 30th September 2007.

Design: Retrospective case series.

Setting: Kenyatta National Hospital, the national referral hospital in Kenya.

Subjects: All cases of vitreoretinal surgery done from 1st October 2000 to 30th September 2007.

Main outcomes: The main indications for vitreoretinal surgery, procedures performed during vitreoretinal surgeries, visual outcomes and complications related to vitreoretinal surgeries at KNH.

Results: 297 cases were done within the study period, with 267(89.9%) medical records retrieved. Most eyes (79.8%) had a single operation. More right eyes (54.7%) were operated compared to left eyes.59.9% of the eyes operated had symptoms for more than 3 months. The mean age of presentation was 45.5 years, range was 3-82 years and peak age was 56-65 years. Vitreous hemorrhage was the main indication (43.8%) for vitreoretinal surgery with diabetic retinopathy contributing 47.0% of all the cases of vitreous hemorrhage, rhegmatogenous retinal detachment contributed 41.6% of all vitreoretinal cases done. Pars plana vitrectomy was the main procedure done, performed in 79.8% of all the cases. Visual acuity improved in 70.8% of all the operated cases. Those who presented late were less likely to have an improved visual acuity (p=0.040). Intra-operative complications were noted in 16.1% while immediate post-operative complications in 19.9% and late post-operative complications in 9.7% of all the cases done. .

Conclusion: Vitreous hemorrhage and rhegmatogenous retinal detachment were the main indications for vitreoretinal surgery, most patients presented late for surgery, pars plana vitrectomy was the main vitreoretinal procedure done, most patients had an improved visual acuity and duration of symptoms affected visual acuity.

1.0 BACKGROUND

1.1 INTRODUCTION

Vitreoretinal surgery encompasses surgical procedures done for primary pathology in the vitreous cavity or of the retina. There are varied indications and procedures done. In developed centres some procedures have been in practice for over 50 years, but in developing countries like Kenya they are recently introduced. This is due to lack of expertise and facilities. Various complications can occur during the operation or postoperatively.

1.2 INDICATIONS FOR VIREORETINAL SURGERY

1.2.1 Retinal detachments

They are classified as rhegmatogenous, tractional and exudative.[1]The most common type, rhegmatogenous retinal detachment (RRD) is caused by liquefied vitreous passing through a retinal break into sub-retinal space. Tractional retinal detachments are caused by proliferative membranes that contract and elevate the retina. Combinations of rhegmatogenous and tractional causes may lead to detachment. Exudative or secondary detachments are caused by retinal or choroidal diseases in which leakage of fluid accumulates beneath the sensory retina. With rhegmatogenous retinal detachment cellular membranes may form on either surface of the retina (proliferative vitreoretinopathy)

RRD affects approximately 1 in 10,000 patients annually, although the incidence is considerably higher in certain sub-Saharan groups of patients. Liquefaction of the vitreous causes the majority of retinal tears leading to retinal detachment (RD). There is

increased risk of RD with high myopia, hereditary and non-hereditary vitreo-retinal degenerative disorders, surgical and non-surgical trauma and ocular inflammation.[2]

1.2.2 Epiretinal Membrane

It is a translucent fibrocellular membrane which may be idiopathic and presumably related to an abnormality of the vitreoretinal interphase in conjunction with a posterior vitreous detachment or could be secondary to a wide variety of conditions, including retinal vascular occlusions, uveitis, trauma, intraocular surgery and retinal breaks. Idiopathic epiretinal membranes are most common in patients over the age of 50 years, and both sexes are equally affected. The incidence of bilaterality is approximately 20%.[3]

1.2.3 Vitreous hemorrhage

The cause could be traumatic or spontaneous. Spontaneous vitreous hemorrhage is frequently caused by diabetic retinopathy (39% - 54%), other major causes include retinal break without detachment (12% - 17%), posterior vitreous detachment (7.5% - 12.0%), Rhegmatogenous retinal detachment (7% - 10%) and retinal neovascularisation following branch vein and central vein occlusion (3.5% -10.0%).[4]

1.2.4 Macular hol

It develops in stages, including: foveal detachments (stage I), partial thickness holes (stage II), and full thickness holes (stage III). A stage IV macular hole has advanced full thickness with vitreous separation from optic disc and macular. Surgical management involves excision of macular adhesions in eyes at risk of full thickness holes. The

procedure involves pars plana vitrectomy, excision of attached cortical vitreous and gas/fluid exchange. Growth factors such as transforming growth factor-b2 have been used to induce regeneration of the macular tissue.

Idiopathic/senile macula hole are typically encountered in patients older than 60, and slightly in women than men.

1.2.5 Intra-vitreo foreign body

Intra-vitreo foreign body may traumatize the eye mechanically, introduce infection or exert other toxic effects on the intraocular structures. Notable mechanical effects include cataract formation secondary to capsular injury, vitreous liquefaction, and retinal hemorrhages and tears.

Other indications of vitrectomy include; non-resolving vitreous opacities, complicated RRD e.g. with vitreous hemorrhage, proliferative vitreoretinopathy, posterior tears, giant tears and combined tractional-hemorrhage, dislocated lens or intra-ocular lens, diagnostic vitrectomy, endophthalmitis and retinal detachment with associated retinopathy of prematurity.

1.3 OUTCOME OF VITREORETINAL SURGERY

During the past 70 years RD surgery has evolved from being virtually hopeless to being successful in almost all cases in which proliferative vitreoretinopathy does not develop. In contrast to anatomic outcomes visual results remain relatively poor and there's little evidence that they have improved significantly over the past 40 years.[5]

Surgical management of vitreoretinal disease continues to advance; with further refinements, move toward minimally invasive procedures and management of retinal vascular disease and Diabetic retinopathy rapidly moving toward pharmacotherapy, all aiming to improve outcome.[6]

Surgical therapy for Diabetic Retinopathy has been refined since 1960. Endophotocoagulation is the most single reason for vitrectomy e.g. in vitreous hemorrhage. Surgical prognosis is lagging behind patient's expectations especially in cases of advanced proliferative stages.[7]

There is increase in number of tertiary referrals and in number of conditions operated other than RRD, with a rise in the proportion of patients with RRD following cataract surgery (from 19.5% to 29.5%).But there is no proportionate improvement in visual and anatomic outcomes.[8]

Following posterior segment foreign body injuries proliferative vitreoretinopathy and retinal detachment are the most common postoperative complications. About half of patients recover long-term visual acuity function above 20/200 following vitreoretinal surgery. Initial visual function and intra-ocular foreign body impact site are predictive for visual prognosis. Development of proliferative vitreoretinopathy is the main postoperative risk factor for poor visual outcome.[9]

Visual acuity in selected cases of Familial Exudative Vitreoretinopathy (FEVR) following surgical intervention (peripheral Laser, photocoagulation, scleral buckling or vitrectomy) range from 20/25 to light perception at six months follow-up.[10]There is

improvement in the anatomic reattachment rate and visual outcome with FEVR following current techniques. Amblyopia, reproliferation and vitreous haemorrhage limit long-term improvement in vision.[11]

In most patients vitreoretinal surgery following branch retinal vein occlusion (BRVO) result in visual improvement, however visual outcome in presence of complications secondary to BRVO which require surgical intervention is limited especially if further postoperative complications occur.[12]

With modern vitreoretinal techniques, aphakic rehabilitation and aggressive amblyopia therapy, useful vision can be obtained in the majority of patients with combined anterior and posterior persistent hyperplastic primary vitreous.[13]

Despite advances in the techniques of vitreoretinal surgery, RRD continues to pose a serious threat to vision. The success rate in retinal detachment has improved from 71% (1991) to 85% (1999) over 1 year follow up. 70% of primary success patients can achieve Snellen acuity of 6/18 or better at discharge.[14]

While more sophiscated surgery has improved anatomical results there has been a concurrent increase in the proportion of RRDs in which macula is detached at the time of operation, this has a detrimental effect on visual outcome.[15]

1.4 VITREORETINAL SURGERY CLINICAL AUDITS

"Clinical audit involves systematic looking at the procedures used for diagnosis, care and treatment, examining how associated resources are used and investigating the effect care has on the outcome and quality of life for the patient" (Department of Health, London; 1993).

Audits need to be supported by the top levels of the hierarchy and should be integrated with the tasks of all the clinical teams involved. They should also be focused on improving care for patients.[16]

A review of vitreoretinal surgeries at Changi general hospital showed an age distribution peak of 45-54years, with 60.2% of patients presenting within 1 month while 26.5% sought treatment between 1-3 months after onset of symptoms. Procedures were done for 48% right eye and 52% left eye. 86.7% of patients were followed up for at least 6 months postoperatively while 13.5% defaulted from further treatment. 86.7% achieved anatomical attachment and another 9.2% had flat retina after 1 repeat operation bringing to a total of 95.9%. Reasons for failure for primary surgery included proliferative vitreoretinopathy, inadequate buckle and new/missed breaks. Post operative complications included cataract (15.3%), macular punches (7.1%), increased intraocular pressure (8.1%) and epiretinal membranes (2.0%).[17]

1.5 VITREORETINAL PROCEDURES

There are various techniques employed in management of vitreoretinal diseases, some of the techniques have been in practice for long while others are still in trial.

1.5.1 Vitrectomy

The goals of vitrectomy are to clear the media, relieve traction, re-attach retina, remove tissue or foreign materials and obtain a vitreous biopsy. According to the indication for surgery, the visual goal may be either maintenance of or improvement in visual acuity. Complications of vitrectomy range from specifically related to the procedure to those associated with any intraocular procedure.[18] Uveal infusion may occur if the infusion port fails to perforate the pars plana, pigment epithelium, and fluid is infused into the suprachoroidal space. Retinal tears and dialysis may occur at the entrance site or from traction exerted elsewhere during vitrectomy. Vitreous incarceration in the sclerotomy sites may lead to peripheral retinal breaks, which can lead to later intraocular fibrous proliferation. The degree of proliferative response may be related to the amount of vitreous incarcerated. [19]Lens damage may result from direct trauma, cataract formation is the most common complication.[20, 21] Because of the problem, combined vitrectomy and cataract surgery is becoming more common.[22]

Early complications include cornea erosions, filamentary Keratitis and bullous keratopathy. Elevated intraocular pressure due to hemorrhage, inflammation, choroidal oedema, orbital hemorrhage, pupillary block mechanisms, expansile gases, viscoelastic substances in the anterior chamber, silicone oil or neovascular glaucoma may occur. Post-

operative intraocular pressure elevation to 30mmHg or more occur in approximately 35% of eyes within 48hours of pars plana vitrectomy.[23] Post-operative hemorrhage may result from retained blood in the vitreous base, or due to continued haemorrhage from bleeding sites. Persistent vitreous hemorrhage is most common complication following vitrectomy in phakic diabetic eyes, occurring in up to 44% of eyes. Post-operative endophthalmitis is rare, with an incidence of approximately 0.07%.[24]

Late complications include focal or diffuse corneal opacities, late glaucoma which is usually related to pre-existing glaucoma which is usually related to the trabecular meshwork blockage following vitrectomy. Cataract formation occurs in approximately 70% -80% of eyes with nuclear sclerosis at 2years.[25]

Late vitreous hemorrhage mostly due to revascularization from sclerotomy sites may occur.[26] Retinal detachment may result from peripheral or posterior retinal breaks. Hypotony is primarily a complication found following vitrectomy for proliferative vitreoretinopathy, present in about 24% of eyes and related to diffuse anterior retinal contraction and preoperative hypotony.[27] Sympathetic ophthalmia is least common; eyes with severe ocular injuries are at greater risk.

1.5.2 Scleral Buckling

Since 1950s, scleral buckling techniques have been employed by most vitreoretinal surgeons to repair the majority of retinal detachments.[28]Alternative techniques i.e. pneumatic retinopexy and primary vitrectomy were recently introduced. By 1951 this technique was anatomically successful in 70% of cases in which it was attempted.[29]

Segmental buckles or encircling buckles are employed or combination of the two if more extensive buckling is required. Segmental buckles provide focal support for a retinal tear and minimize the development of radial retinal folds. Circumferential (encircling) sclera buckles provide a zone of support oriented parallel to the region where vitreous traction is usually most severe and efficiently support multiple areas of vitreoretinal pathology.

90% of retinal detachments selected for scleral buckling can be repaired with a single operation.[30] Any preoperative signs of proliferative vitreoretinopathy (PVR) or features related to development of PVR are associated with reduced anatomic success rate.

Preoperative conditions associated with development of PVR include giant retinal tear, choroidal detachment, uveitis, hypotony, severe vitreous hemorrhage and total retinal detachment. Good preoperative visual acuity is the most important predictor of both anatomic and visual acuity outcomes.[31]

Macula-on detachments have a significantly better anatomic prognosis than macular-off cases.[32] 90% of macula-on cases maintains preoperative vision following surgery.

Duration and height of macular detachments are also related to post-operative visual acuity. Common complications of scleral buckling include choroidal detachment, altered refractive error (because of alterations in axial length, shape of sclera, and curvature of cornea and position of the crystalline lens), strabismus, cystoid macular edema, macular punches, recurrent/persistent retinal detachment and vitreoretinopathy.

1.5.3 Pneumatic Retinopexy

It was introduced in 1985 as an alternative to scleral buckling for repair of selected RDs. A gas bubble injected into the vitreous cavity is positioned so that the bubble closes the retinal break(s) allowing resorption of subretinal fluid (SRF). Laser photocoagulation and/or cryopexy are applied around the retinal break to form a permanent seal. Special indications include treatment of RD with multiple breaks and treatment of failed scleral buckle.

1.5.4 Vitreous Substitutes

Perfluorocarbon (PFC) liquids are used as intraoperative soft instrument to manipulate a torn and detached retina.[33] Post-operatively intravitreal gases and silicon oil are employed to maintain the neural retina in apposition to RPE. Common PFC liquids used are perfluoro -N- octane, perfluorodecalin and perfluorophenanthrene.

Air remains the most frequently used gas, but the use of long- acting gases such as sulfur hexafluoride (SF6), perfluoroethane, perfluoromethane and perfluoropropane (C3 F8), continue to increase. In use of the gas bubble the surface tension developed between it and aqueous fluid allows the gas bubble to tamponade (i.e. plug) a retinal break thereby preventing sub retinal accumulation of fluid. The gas bubble also applies a buoyant force against the retina thus flattening the retina and displacing sub retinal fluid through the retinal breaks anteriorly.

Silicon liquid (polydimethylsiloxane) is used intravitrealy when long term or permanent support and tamponade are needed to maintain the anatomical reattachment of retina e.g. in cases of PVR, PDR, Giant retinal tears or if a patient requires traveling by air.[34]

1.5.5 Air-Gas Exchange

It is the act of replacing air in the eye with a gas mixture. A gas that maintains a longer tamponade than air is preferred in cases of PVR, complicated RD, or macular holes. Commonly used gases are perfluoropropane (C3F8) and sulphur hexafluoride (SF6). Perfluoropropane provides tamponade of 1 month or more while sulphur hexafluoride provides approximately 10 days of effective tamponade. These gases expand when placed into the eye, non expansile concentrations are used to prevent increase in IOPs when the gas bubble expands, mixtures of 20%SF6 with 80% air and 14% C3F8 with 86% air are clinically non-expansile.[33]

1.5.6 Fluid-Air Exchange

After vitreous traction is relieved the next step is to remove the sub retinal fluid and flatten the retina so that retinal breaks can be treated with endophotocoagulation. Drainage can occur through a pre-existing anterior break using an extendible silicone-tipped cannula. Alternatively perfluorocarbon liquid is instilled over the nerve head and used to push the sub-retinal fluid anteriorly out through the breaks. The fluid can also be drained more posteriorly if posterior breaks are present or through a posterior drainage retinotomy, created with endodiathermy. Fogging of an intraocular lens may occur, and to improve visualization because of it, viscoelastic material maybe placed on the posterior lens surface or the infusion cannula maybe manipulated to direct the air infusion to the back of the lens (creating an air dryer).[34]

2.0 STUDY RATIONALE

Vitreoretinal (VR) surgery is one of the new advanced ophthalmic microsurgical procedures in Kenya with very few experts and inadequate facilities.

This study will document early experiences and form a baseline for future clinical audits to compare against.

The study will act like an evaluation for all surgeries done since the first VR surgeon trained and started practicing at Kenyatta National Hospital.

3.0 OBJECTIVES

3.1 Main Objective

The main objective was to review vitreoretinal surgeries done at Kenyatta national hospital (KNH) from 1st October 2000 to 30th September 2007.

3.2 Specific Objectives

1. To describe the main indications for vitreoretinal surgery at KNH.
2. To summarize the procedures performed during the vitreoretinal surgeries at KNH.
3. To describe visual outcomes at 2 weeks, 6 weeks, 3 months and 6 months after vitreoretinal surgery at KNH.
4. To describe complications related to vitreoretinal surgeries at KNH.

4.0 MATERIALS AND METHODS

4.1 Study design:

A Retrospective Case series

4.2 Case definition:

All vitreoretinal surgeries done at KNH from 1st October 2000 to 30th September 2007, where the primary pathology was in the vitreous cavity or retina (anterior vitrectomies were excluded because they were done during cataract surgery).

4.3 Materials:

The In-Patient Number (I.P.No.), name of the patient, age and date of surgery of all the patients who had vitreoretinal surgery at KNH during the study period were retrieved from the theatre record book in theatre 9 where all eye surgeries were recorded. Using the computer at medical records department the particular file location was traced within the filing library or hospital departments and retrieved. By using the theatre record book the cases whose files could not be located or retrieved were noted. The relevant data was entered into a structured questionnaire on perusal of the medical records. A pretest of the questionnaire had been done using three files. Data was analysed using statistical package for social scientist (SPSS).

4.4 Study time-frame:

The study was conducted between 15th January 2009 and 30th March 2009.

4.5 Setting (study Area):

The study was done at Kenyatta National Hospital, the national referral hospital in Kenya.

4.6 Subjects:

The subjects included all cases of vitreoretinal surgery done from 1st October 2000 to 30th September 2007.

5.0 ETHICAL CONSIDERATIONS

5.1 Confidentiality:

Patient's identity appeared on the questionnaire but not in any data set or publication. Patient's files were not photocopied or names of clinicians/ surgeons recorded. The information on the questionnaires was accessible only to the investigators and the statistician. Consent was sought from KNH ethical committee.

6.0 RESULTS

A total of 297 vitreoretinal surgery cases were done from 1st October 2000 to 30th September 2007.

Flow-chart of operated cases

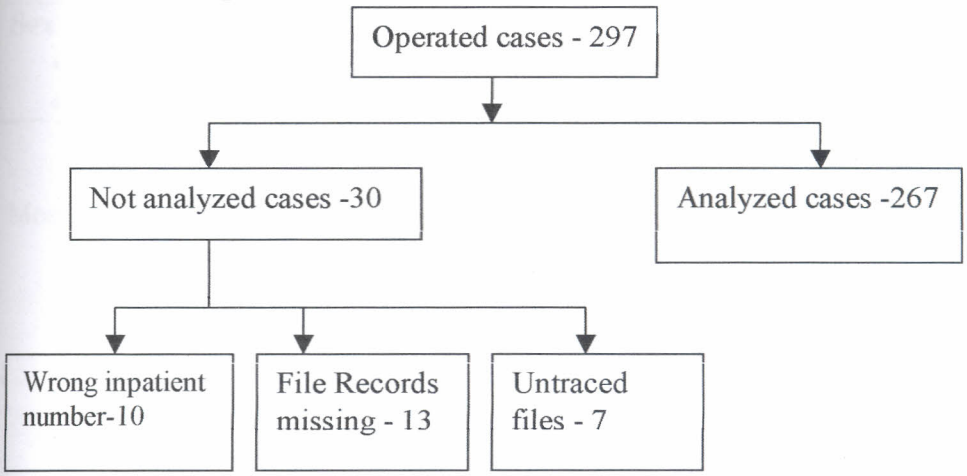
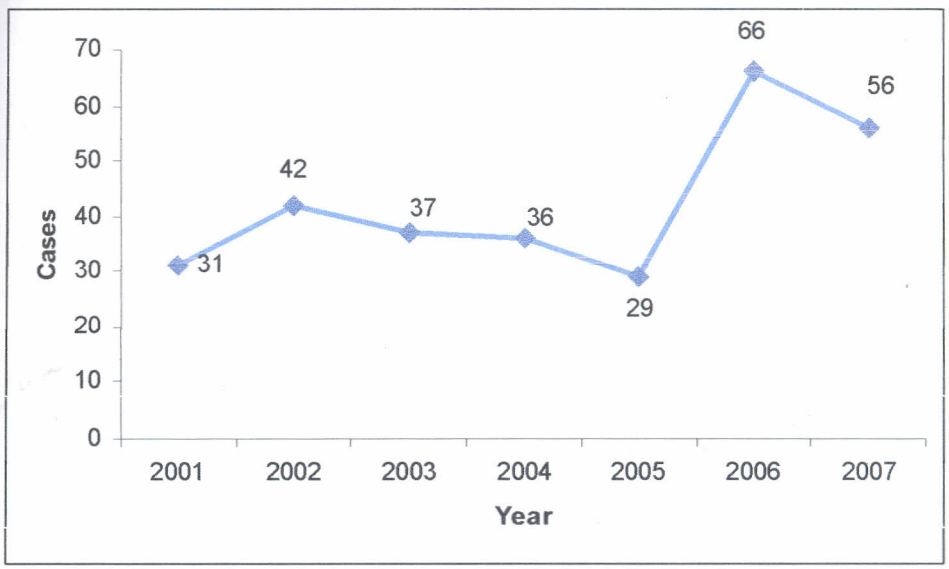


Figure 1: Number of operated cases (n=297)



The average number of cases done was 42 per year. The number of cases done increased from 29 in 2005 to 66 in 2006.

Table 1: Baseline Characteristics (n = 267)

Baseline Characteristic	Count	Per cent
Operation		
• 1	213	79.8
• 2	52	19.5
• 3	2	0.7
Sex		
• Male	189	70.8
• Female	78	29.2

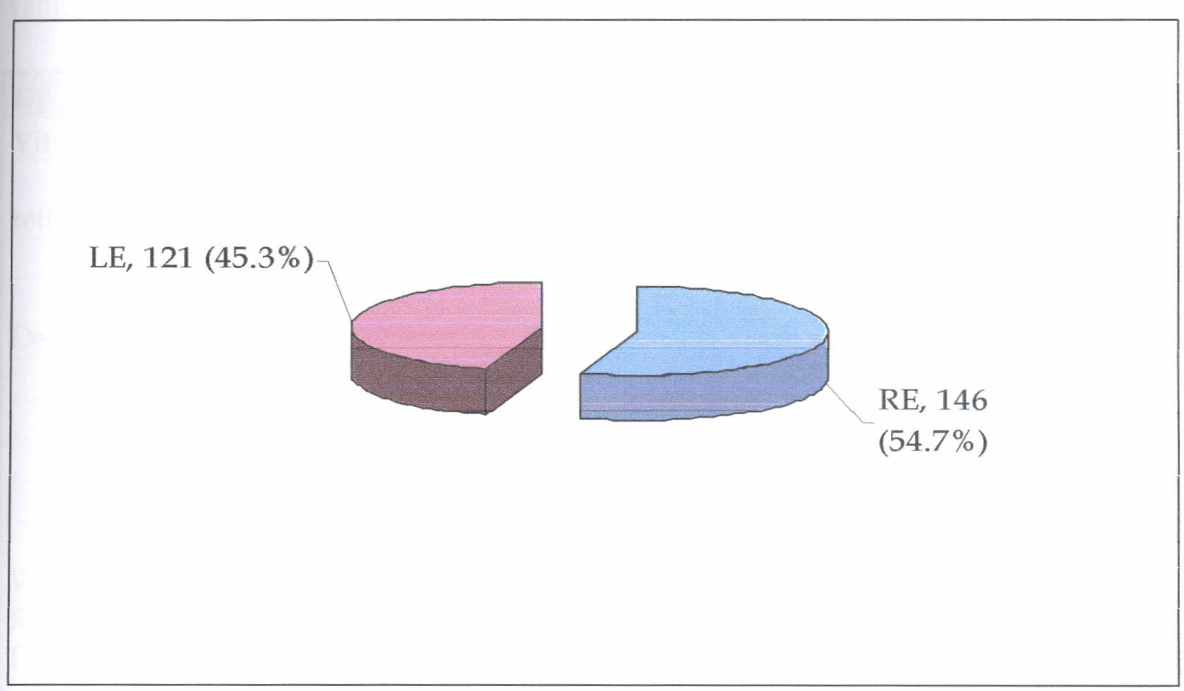
Most of eyes (213) had a single operation. More male patients were operated.

Table 2: Table 2: Duration of symptoms

Duration	Frequency	Percent
• ≤ 7 days	27	10.1
• >1 -≤ 4 wks	47	17.6
• >1 - ≤ 3 months	33	12.4
• >3 - ≤6 months	38	14.2
• >6- ≤12 months	70	26.2
• > 12 months	52	19.5

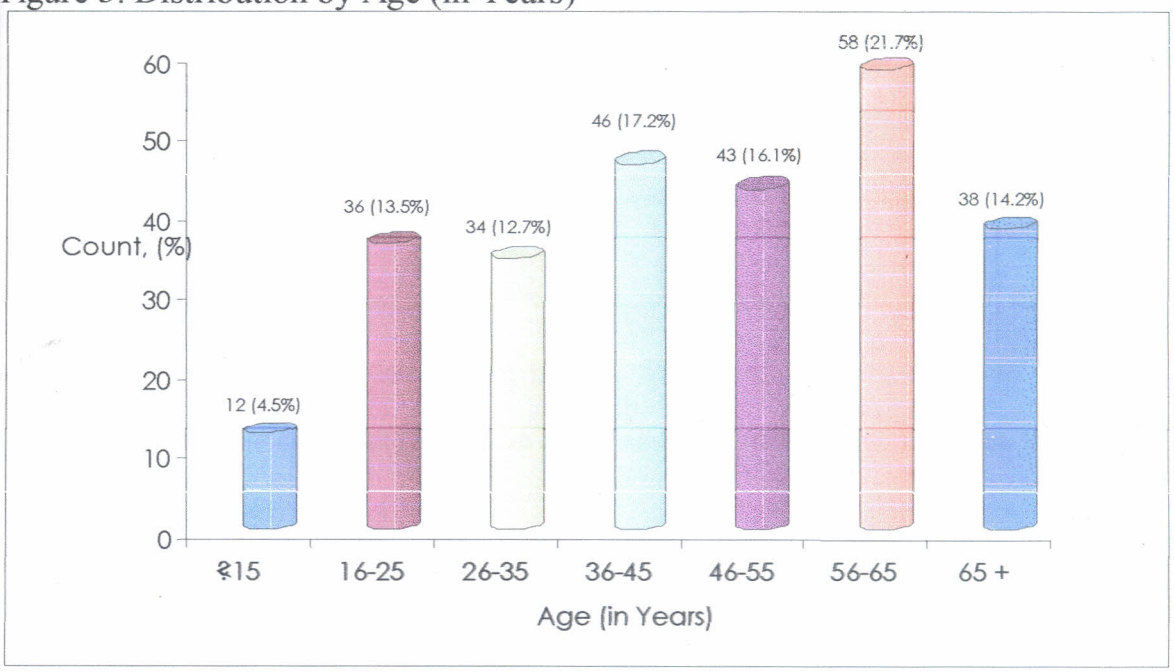
The mean duration of symptoms was 10.8 months, median duration was 6.0 months, and range was 2 days to 10 years.

Figure 2: Operated Eye (n=267)



More right eyes (54.7%) were operated compared to left eyes (45.3%), (p=0.857).

Figure 3: Distribution by Age (in Years)



The mean age was 45.5 years, median age was 46 years, and range was 3 to 82 years. Peak age was 56-65 years.

Table 3: Indications for vitreoretinal surgery (n = 267)

Diagnosis	Frequency	Per Cent
Vitreous Hemorrhage	**117**	**43.8**
Secondary Diabetic retinopathy	55	47.0
Post-Trauma	44	37.6
Posterior Vitreous Detachment	4	3.4
Presumed Eales disease	4	3.4
Sickle Cell Retinopathy	3	2.6
Retinitis	1	0.9
Bleeding Disorder	1	0.9
Proliferative Vitreoretinopathy	1	0.9
Rhegmatogenous Retinal Detachment	**111**	**41.6**
With PVR	17	15.3
Silicon Oil-Fill	**40**	**15.0**
Tractional RD	**37**	**13.9**
Retinal Tears	**15**	**5.6**
Dislocated Lens	**8**	**3**
Intraocular foreign body	**5**	**1.9**
Macular hole	**5**	**1.9**
Dislocated Intraocular Lens	**4**	**1.5**
Macular off	**2**	**0.7**
Exudative RD	**1**	**0.4**

Vitreous haemorrhage (VH) was the main indication for vitreoretinal surgery, followed by rhegmatogenous retinal detachment (RRD), Silicon oil fill and tractional retinal detachment. Diabetic retinopathy was the major cause of vitreous haemorrhage (47.0%) followed by trauma (37.6%).

Table 4: Type of Surgery performed (n = 267)

Type of Surgery	Frequency	Per Cent
Pars Plana Vitrectomy (PPV)	**213**	**79.8**
With Fluid-Air Exchange	129	60.6
With Epiretinal membrane peel	57	26.8
With Air Fluid Exchange	19	8.9
With Planned Retinotomy	8	3.8
With air-Gas Exchange	7	3.3
With Endo Laser	137	52.1
With Cryotherapy	58	21.7
Silicon Oil-Removal	**40**	**15**
Scleral Buckling	**32**	**12**

Pars plana vitrectomy was the commonest vitreoretinal procedure performed. Drainage of sub-retinal fluid was done in all cases of scleral buckling.

Silicon oil was used for tamponade in 126 cases while fluoromethane was used in 2 cases and sulphur hexafluoride in 15 cases.

Table 5: Visual acuity trend with follow-up Time (n = 267)

Visual acuity	Before	2 Weeks	6 Weeks	3 Months	6 Months
No light perception	2	4	0	0	2
Perception of light	61	23	10	5	3
Hand Movement	81	61	22	13	4
0.25/60	1	0	0	1	0
0.5/60	7	5	2	0	0
1/60	65	86	40	17	19
2/60	13	23	15	10	10
3/60	9	15	22	16	8
4/60	3	9	11	8	4
5/60	7	6	8	10	7
6/60	5	17	27	17	17
6/36	4	8	19	16	12
6/24	2	5	10	11	11
6/18	3	1	3	2	3
6/12	2	0	6	6	3
6/9	1	0	2	1	2
6/6	0	0	2	2	5
Not Recorded	1	1	1	0	0
No Appointment	0	0	14	9	0
Loss to Follow-up	0	0	53	123	157
Total	**267**	**267**	**267**	**267**	**267**

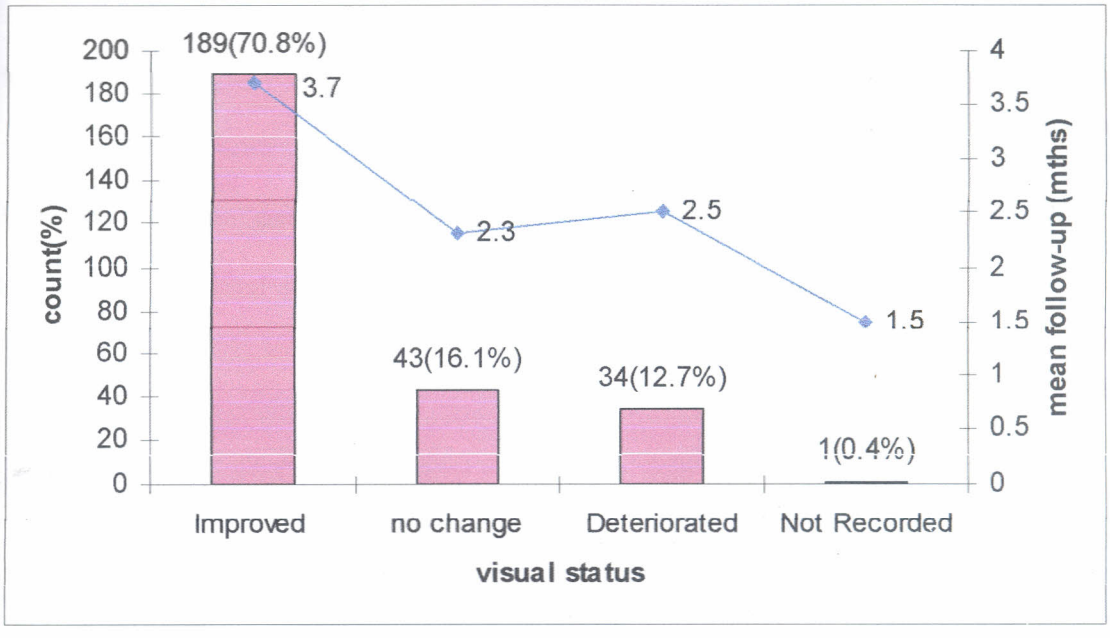
Visual acuity was taken in all the cases except one pre-operatively and within two weeks post-operatively. Most patients had an appointment within 6 months post-operatively. The rate of loss to follow-up was high after 2 weeks.

Table 6: Final visual acuity status for the main indications of vitreoretinal surgery

Diagnosis	Final visual acuity							
	Improved		No Change		Deteriorated		Not Recorded	
	n	%	n	%	n	%	n	%
VH secondary to diabetic retinopathy	35	63.6	10	18.2	10	18.2	-	
RRD	82	73.9	18	16.2	10	9.0	1	0.9
Tractional RD	23	62.1	5	13.5	9	24.3	-	
Total	140		33		29		1	

Most patients had an improved visual acuity with tractional retinal detachment (RD) having the highest rate of visual acuity deterioration.

Figure 4: Final visual acuity status with follow-up time



Visual acuity improved in most of the eyes operated 189(70.8%) from their pre-operative visual acuity .Those who improved were followed up for a longer period (3.7 months) on average.

Table 7: Complications from all the procedures

Complication	n (%)
Intra-Operative	43 (16.1)
• Vitreous Hemorrhage (VH)	26
• Retinal-Tear	13
• Retinal Detachment (RD)	5
• Corneal Damage	1
• Choroidal Detachment	1
Immediate Post-Operative	53 (19.9)
• Elevated Intraocular pressure (IOP)	37
• Keratitis	12
• VH	5
• Cataract	1
Late Post-Operative	29 (9.7)
• RD	15
• Glaucoma	5
• Cataract	5
• Macular Hole	1
• Proliferative vitreoretinopathy (PVR)	1

More complications were noted in the immediate post-operative period (19.9%). VH was the commonest intra-operative complication while elevated intraocular pressure and keratitis were the commonest complications in the immediate post-operative. Re-detachment or retinal detachment was the commonest late post-operative complication.

Table 8: Complications in pars plana vitrectomy (PPV) and Scleral buckling

Complication	PPV	Scleral buckle	total
Intra-Operative			
• Vitreous hemorrhage (VH)	26	0	26
• Retinal-Tear	11	2	13
• Retinal detachment (RD)	4	0	5
• Corneal Damage	0	1	1
• Choroidal Detachment	1	0	1
Immediate Post-Operative			
• Elevated intraocular pressure	35	2	37
• Keratitis	6	5	12
• VH	4	0	5
• Cataract	4	0	1
Late Post-Operative			
• RD	11	4	15
• Glaucoma	5	0	5
• Cataract	4	0	5
• Macular Hole	0	1	1
• Proliferative vitreoretinopathy (PVR)	1	0	1

There were more intra-operative complications associated with PPV while Scleral buckling was associated with more immediate complications.

Table 9: Association between duration of symptoms and visual acuity improvement

Duration	Improved, n (%)	Not Improved, n (%)	OR (95%CI)	p-value
≤7 days	19 (10.1)	8 (10.4)	1.6 (0.5 – 4.6)	0.531
>1 – ≤4 wks	35 (18.5)	12 (15.6)	2.4 (0.6 – 10.0)	0.299
>1 – ≤3 months	28 (14.8)	5 (6.5)	Reference	
>3 –≤ 6 months	28 (14.8)	9 (11.7)	1.6 (0.4 – 6.5)	0.658
>6 – ≤12 months	47 (24.9)	23 (29.9)	2.7 (0.9 – 9.3)	0.099
> 12 months	32 (16.9)	20 (26.0)	3.5 (1.1 – 12.3)	***0.040***

Those who had symptoms for more than 12 months were less likely to have an improved visual acuity (p=0.040).

Table 10: Association between complications and type of surgery

Complications	PPV, n (%)	Scleral Buckling, n (%)	OR (95%CI)	p-value
Intra-operative Complications	39 (18.3)	3 (9.4)	2.2 (0.6 – 9.4)	0.211
Immediate Complications	44 (20.7)	7 (21.9)	0.9 (0.4 – 2.5)	0.940
Late Complications	20 (9.4)	5 (15.6)	0.6 (0.2 – 1.9)	0.342

There was no statistical difference in complications related to PPV and scleral buckling.

7.0 DISCUSSION

The 297 cases were performed by both the visiting (foreign) and the local vitreoretinal surgeons. The cases consisted of emergency and elective cases. Medical records of 267 (89.9%) cases were retrieved and analyzed. 30 (10.1%) cases were not analyzed because their medical records could not be retrieved from the medical records department; 10 cases had their in-patient numbers wrongly recorded, 13 cases had papers from the files missing and in 7 cases files could not be traced despite correct in patient numbers (Flow-chart 1). This was a limitation in this study.

The cases were not analyzed as per the surgeon. From 2000 to 2004 there was only one resident vitreoretinal surgeon at Kenyatta national hospital (KNH) but from 2005 they were two thus contributing to the increased number of cases performed (figure 1).

Most eyes; 213 (79.8%) had one operation with only 2 eyes (0.7%) undergoing 3 operations (Table 1). Most of the second operations were for removal of Silicon oil used for tamponade during the first operation (pars plana vitrectomy; PPV). Other indications for the second operation included PPV where the first operation was scleral buckling and had failed or re-detachment had occurred. Third operations were performed also for removal of Silicon oil used for tamponade in the 2nd operation.

More male patients (70.8%) were operated compared to females (29.2%) (Figure 2) but the difference was not statistically significant (p=0.056). Most of the patients (59.9%) were operated after 3 months from the time the symptoms had started with only 27.7% operated within one month (Table 2). This is unlike a study done at Chinga hospital where most of the patients (60.2%) were operated within 1 month.[17]This could be attributed to the poor referral system and few eye specialists in the peripheral hospitals in

Kenya. Lack of funds also may hinder patients traveling promptly when referred. Patients are mostly seen in other smaller health facilities where there are no vitreoretinal surgeons then referred to KNH. Most of those who were operated within a few days were post-traumatic or with vitreous hemorrhage both conditions of which cause an acute reduction in visual acuity.

The peak age of presentation was 56-65 years (21.7%) with the range being 3 to 81 years (Figure 3). This depicts an older peak age compared to the study done at Chinga hospital which showed a peak age of 45-54 years.[17] The loss to follow-up at 6 months in this study was also high (58.8%) compared with 13.3% at Chinga hospital.[17]

Vitreous hemorrhage was the highest indication for vitreoretinal surgery (43.8%) with Diabetic retinopathy contributing majority of these cases (47.0%) (Table 3).This compares with a study done by Winslow et al which reported that Diabetic retinopathy contributed 39-54% of the causes of vitreous haemorrhage.[4] One case of vitreous hemorrhage was only indicated as caused by retinitis but the cause of retinitis was not indicated. Rhegmatogenous retinal detachment (RRD) contributed the highest (41.6%) of all retinal detachments, which could be because it is also the commonest.[1] All the cases of tractional retinal detachment were secondary to diabetic retinopathy. There was one case of vitreous hemorrhage secondary to a bleeding disorder which was not identified. The number of cases done to remove Silicon-oil (40) was low compared to cases in which it was used as vitreous substitute (126) meaning many patients were staying with it or was being removed elsewhere. The other indications of vitreretinal surgery included dislocated lens/intraocular lens, intraocular foreign body, presumed Eales disease and

Sickle cell retinopathy which compares with a study done by Ah-Fat et al which noted an increase in number of conditions operated other than RRD and vitreous hemorrhage.[8]

Pars plana vitrectomy (PPV) was the commonest vitreoretinal procedure performed (79.8%) in this study, it was performed as the first operation and during second operations such as removal of silicon oil where part of the vitreous had remained especially at the vitreous base during the first operation. Although PPV is indicated for complicated Rhegmatogenous retinal detachment (RRD) e.g. with vitreous hemorrhage, proliferative vitreoretinopathy (PVR), posterior tears, giant tears and combined tractional- hemorrhage, in this study it was performed in 72.8% of all cases of RRD even where the above indications are not given. Scleral buckling was only performed in 27.2% of RRD cases. PVR was only reported in 15.3% of RRD cases and thus could not account for the high number of PPV done.

Visual acuity (VA) was taken in all the cases using except one patient aged 3years pre-operatively and within 2 weeks post-operatively. 2 eyes were operated while they had no vision (no perception of light). 2 eyes lost vision within 2 weeks of follow-up and overall 4 eyes lost vision within the 6 months follow-up. Most eyes had a vision of <3/60 with only 1 with 6/18 and none with >6/18 within the 2 weeks follow-up but with time the VA improved with 13 eyes attaining VA > 6/18. The rate of loss to follow-up was high; 19.9% at 6 weeks, 46.1% at 3 months and 58.8% at 6 months.

VA improved in most of the eyes operated (70.8%) from their pre-operative VA with the range being between PL and 6/6 on the Snellen chart. Of those who improved 75.1% improved with at least 1 interval between PL and 6/60 (intervals were PL, HM, 0.25/60, 0.5/60, 1/60, 2/60, 3/60, 4/60, 5/60 and 6/60). 14.3% cases had VA < 6/60 pre-

operatively and improved to VA between 6/60 and ≤ 6/24, while 9.5% had VA < 6/60 and improved to VA of 6/18 and above. Two eyes were operated with VA of 6/60 and improved with 2 lines on the Snellen chart to 6/24 (Table 5).

Pre-operative visual acuity for the 55 cases of vitreous hemorrhage secondary to Diabetic retinopathy was between light perception and 3/60. Post-operatively 35 (63.6%) had improved visual acuity, 10 (18.2%) had their VA remaining the same while 10 (18.2%) had their vision deteriorating. Only 3 (5.5%) had their VA improving to 6/60 on the Snellen chart at 6 months follow-up.

Patients with improved VA were followed-up for longer period (average 3.7 months) compared to those whose VA deteriorated or remained the same (average 2.3 and 2.5 months respectively) (Figure 4). This could be because those with improved VA were motivated to continue with follow-up.

Patients who were operated between 1-3 months from onset of symptoms were more likely to have an improved VA post-operatively compared with those who presented late (after 12 months) from the onset of symptoms (p=0.040) (Table 10). This is because late presentation is associated with more complications and poor outcome. 1- 3 months duration was used because most patients presented within that duration in other places[17] and also for persistent vitreous hemorrhage duration of 6 weeks is given before surgical intervention.

Intra-operative complications were more with PPV compared with scleral buckling mainly because PPV is intra-ocular procedure thus prone to more complications. Elevation of intraocular pressure (IOP) (>21mmhg) was noted at a lower rate (13.8%)

compared with a study done by Han et al where 35% of operated eyes had elevated IOP in the immediate post-operative period.[23] In this study some patients were put on prophylactic beta-blockers immediately post-operatively which could explain the lower rate. Cataract formation was not a significant post-operative complication in this study compared to others [17, 18] mainly because cataract surgery was done primarily in most of the cases where PPV was performed. Vitreous hemorrhage was noted in 12.2% of all cases of PPV in this study which is lower compared to a study done by Aeberg et al where it was noted in up to 44% of cases.[24]

8.0 CONCLUSIONS

1. Vitreous hemorrhage and RRD are the major indications for vitreoretinal surgery at Kenyatta national hospital (KNH)
2. Most patients with conditions which require vitreoretinal surgery presented late
3. Duration of symptoms affected the visual outcome
4. Pars plana vitrectomy is the main vitreoretinal procedure done at KNH
5. Most patients had improved Visual acuity
6. There was high rate of loss to follow-up

9.0 RECOMMENDATIONS

1. Awareness campaign on presentation of vitreoretinal conditions should be done to enhance early presentation
2. A study to investigate reasons for high loss to follow-up should be carried out

10.0 APPENDICES

10.1 QUESTIONNAIRE

1. Patient numbers: IP No..... Study No: _____
2. Operation 1 ..... Operation 2 .....Operation 3.....
3. Eye Operated: 1. Right Eye 2. Left Eye
4. Sex: 1. Male ☐ 2. Female ☐
5. Age (at admission) in years: ☐ Year of birth: ☐☐☐☐
6. Duration of symptoms at time of surgery (months) .....
7. Indications for surgery
   a) Vitreous hemorrhage 1. Yes ☐ 2. No ☐
      i. Post traumatic 1. Yes ☐ 2. No ☐
      ii. Secondary to Diabetic Retinopathy 1. Yes ☐ 2. No ☐
      iii. Other .....
      - Presumed Eales disease 1. Yes ☐ 2. No ☐
      - PVD 1. Yes ☐ 2. No ☐
      - PVR related 1. Yes ☐ 2. No ☐

   b) RRD 1. Yes ☐ 2. No ☐
      i. With PVR 1. Yes ☐ 2. No ☐
      ii. No PVR 1. Yes ☐ 2. No ☐

   c) Tractional RD 1. Yes ☐ 2. No ☐

   d) Exudative retinal detachment 1. Yes ☐ 2. No ☐

   e) Macular off 1. Yes ☐ 2. No ☐

   f) Intravitreo-foreign body 1. Yes ☐ 2. No ☐

g) Retinal tear/s 1. Yes ☐ 2. No ☐

h) Others.....

- Dislocated IOL 1. Yes ☐ 2. No ☐
- Retained Lens matter 1. Yes ☐ 2. No ☐

8. Surgery /Procedures done:

a) Scleral buckling 1. Yes ☐ 2. No ☐

i. Encircling 1. Yes ☐ 2. No ☐

ii. Segmental 1. Yes ☐ 2. No ☐

b) Drainage of SRF 1. Yes ☐ 2. No ☐

c) PPV 1. Yes ☐ 2. No ☐

i. With Epiretinal membrane remova 1. Yes ☐ 2. No ☐

ii. With planned retinotomy 1. Yes ☐ 2. No ☐

iii. With air-gas exchange 1. Yes ☐ 2. No ☐

iv. With air-fluid exchange 1. Yes ☐ 2. No ☐

d) Laser done 1. Yes ☐ 2. No ☐

i. Endolaser 1. Yes ☐ 2. No ☐

ii. External laser 1. Yes ☐ 2. No ☐

e) Cryotherapy done 1. Yes ☐ 2. No ☐

f) Removal of silicon oil 1. Yes ☐ 2. No ☐

9. Vitreous substitute used

a) Air 1. Yes ☐ 2. No ☐

b) Silicon oil 1. Yes ☐ 2. No ☐

c) Perfluorocarbon liquids 1. Yes ☐ 2. No ☐

d) Expanding gases 1. Yes ☐ 2. No ☐

- C3F8 1. Yes ☐ 2. No ☐
- SF6 1. Yes ☐ 2. No ☐

e) Pneumatic retinopexy (Gas bubble) 1. Yes ☐ 2. No ☐

10. Visual acuity (best corrected)

a) Before surgery (at admission) _____

b) After surgery -2weeks..... 6weeks..... 3months..... 6months.....

11. Complications

a) Intraoperative

i. Choroidal detachment 1. Yes ☐ 2. No ☐

ii. Vitreous hemorrhage 1. Yes ☐ 2. No ☐

iii. RD 1. Yes ☐ 2. No ☐

iv. Uveal infusion 1. Yes ☐ 2. No ☐

v. Vitreous incarceration 1. Yes ☐ 2. No ☐

vi. Retinal tear 1. Yes ☐ 2. No ☐

vii. Macula punches 1. Yes ☐ 2. No ☐

viii. Cornea damage 1. Yes ☐ 2. No ☐

ix. Lens damage 1. Yes ☐ 2. No ☐

b) Immediate Post-operative (48-72hours post-operative)

i. Keratitis 1. Yes ☐ 2. No ☐

ii. Endophthalmitis 1. Yes ☐ 2. No ☐

iii. Exposure of Explant 1. Yes ☐ 2. No ☐

iv. Infection of Explant 1. Yes ☐ 2. No ☐

v. Elevated IOP 1. Yes ☐ 2. No ☐

vi. Cataract formation 1. Yes ☐ 2. No ☐

vii. Lens damage 1. Yes ☐ 2. No ☐

viii. Muscle entrapment 1. Yes ☐ 2. No ☐

ix. Vitreous hemorrhage 1. Yes ☐ 2. No ☐

x. RD/redetachment 1. Yes ☐ 2. No ☐

c) Late complications (6 weeks/thereafter during review post-operatively)

i. Cataract formation 1. Yes ☐ 2. No ☐

ii. Glaucoma 1. Yes ☐ 2. No ☐

iii. Maculopathy 1. Yes ☐ 2. No ☐

- Premacular gliosis 1. Yes ☐ 2. No ☐
- Atrophic maculopathy 1. Yes ☐ 2. No ☐
- Cystoid maculopathy 1. Yes ☐ 2. No ☐

iv. Total RD/redetachment 1. Yes ☐ 2. No ☐

v. Proliferative vitreoretinopathy 1. Yes ☐ 2. No ☐

vi. Late buckle failure 1. Yes ☐ 2. No ☐

vii. Reopening of retinal break 1. Yes ☐ 2. No ☐

viii. New break formation 1. Yes ☐ 2. No ☐

ix. Strabismus 1. Yes ☐ 2. No ☐

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