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Results of twenty three gauge pars Plana Vitrectomy for Endophthalmitis in a North Indian Tertiary Eye Care Institute

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Abstract

Introduction: To study the efficacy of 23 gauge pars plana vitrectomy (PPV) for endophthalmitis.

Methodology: Retrospective study of 16 cases of endophthalmitis subjected to 23 G PPV in a tertiary eye care centre from March 2012 to September 2013.

Results: Records were reviewed for cause and type of endophthalmitis, microbial spectrum and surgical details. Endophthalmitis was following cataract surgery (13), trauma (1), systemic infection (2). The cultures were positive in 5 eyes out of total 16 i.e 31.3% (3 staphylococcus aureus, 2 Aspergillus). Post-operative course was uneventful in majority. An abscess at active port was seen in one eye which resolved with subconjunctival antibiotics. Late complications included macular hole in 1 case, disc pallor in 1 eye, disc neovascularization in 1 case. Anatomical and functional success could be achieved in 12 cases (75%) and 10 eyes (62.5%) respectively.

Conclusions: 23 g PPV is an effective in the management of endophthalmitis. Rare complication like scleral abscess can be treated successfully.

Keywords: Endophthalmitis; Twenty Three gauge pars plana vitrectomy.

1. Introduction

Endophthalmitis can be classified as exogenous (after surgery or trauma) or endogenous (boils, intravenous catheters, drug abuse) in origin. It is one of the most serious and devastating inflammatory diseases of the eye. In the era of day care surgery and topical phacoemulsification, treatment of endophthalmitis has reached new paradigms. Intravitreal injections and primary vitrectomy are the real saviour in the initial management of endophthalmitis.

There is no linear algorithm in the management of endophthalmitis and case based approach is the rule. Endophthalmitis vitrectomy study^[1] was done about two decades back in which patients of acute post cataract surgery endophthalmitis were randomized to receive systemic antibiotics or no systemic antibiotics and immediate pars plana vitrectomy or vitreous tap and inject intravitreal antibiotics (Amikacin/Ceftazidime).

Twenty three gauge vitrectomy is a modern day surgical technique which removes vitreous/pus/exudates/membranes from the eye by three cannulated sclerotomies (inner diameter 0.75 mm). It is an effective and safe procedure in relation to postoperative comfort being sutureless. Risk of intraoperative and postoperative complications is less. With this basis, we have conducted a retrospective, non-randomized study in 16 endophthalmitis cases vitrectomized by 23 g transconjunctival sutureless vitrectomy system.

2. Methodology

The study followed the tenets of declaration of Helsinki. The protocol was approved by the hospital ethics committee and informed consent was taken from all patients.

The study was a retrospective analysis of 16 eyes conducted at a tertiary eye care institute from March 2012 to September 2013. Records were reviewed for the type of endophthalmitis, risk factors, microbiological spectrum and surgical details and ocular examination. Underlying systemic conditions such as diabetes mellitus, immunosuppression were included in the database. Inclusion criteria- Cases of endophthalmitis without corneal or scleral involvement who underwent 23 gauge vitrectomy with a minimum postoperative follow – up of 6 months. On B scan, retina was on in all the cases included in the study.

Exclusion criteria- Patients that had doubtful perception of light, retinal detachment, corneal and scleral involvement with infection at initial examination or follow up of <6 months.

Patient characteristics which were used for study were age, gender, previous ocular intervention such as cataract surgery; trauma or abscess were also considered as predisposing events. All cases received complete ocular examination including best corrected visual acuity, projection of rays, slit lamp examination of cornea, anterior chamber, lens status, posterior segment examination.

Intraocular pressure was measured by Goldmann applanation tonometry. B scan was done in all cases. Aqueous and vitreous tap were sent for Gram and Potassium Hydroxide wet mounts. Blood agar was used for bacterial culture and sensitivity and Sabouraud dextrose agar was used for fungal culture. After vitreous tap intravitreal Vancomycin (1 mcg / 0.1 ml), Ceftazidime (2.25 mcg/ 0.1 ml), Voriconazole (100 mcg in 0.1 ml) with or without Dexamethasone (400 µg) was given.

The total number of patients in the study were 16, out of which 7 were males and 9 were females. Acute endophthalmitis was diagnosed in 10 cases, 3 cases were delayed onset endophthalmitis, 2 cases were endogenous endophthalmitis and 1 case was post-traumatic endophthalmitis. Cataract surgery was a predisposing condition in 11 cases. One patient with endogenous endophthalmitis had boils on the chin which developed 1 week before ocular complaints. Traumatic endophthalmitis was post penetrating eye injury. Out of 16 cases, 5 patients were controlled diabetics.

In all cases, transconjunctival 23 guage pars plana vitrectomy was done. Surgical details which were looked were intraoperative events – whether the surgery was complicated or uncomplicated.

Operation Steps- All cases were done under peribulbar anaesthesia taking all aseptic precautions. Povidone Iodine (5 %) was used in the perioperative period. For performing 23 guage pars plana vitrectomy, DORC vitrectomy system was used. In case of anterior chamber exudates, membranectomy was done with vitreous cutter to clear the exudates. The exudates and fluid were sent for Gram staining and Potassium Hydroxide wet mounts. Culture and sensitivity was done in blood agar and Sabouraud Dextrose agar medium. Lensectomy was done in 1 case. Two plane approach was used for making vitrectomy ports by oblique trochar entry to construct a scleral tunnel and reduce wound leakage. Ports were made for infusion (8 o'clock), endolight (2 o'clock) and vitrectomy cutter (10 o'clock) at measured distance from the limbus (2.5 mm in all cases). Infusion port was observed before starting infusion to prevent suprachoroidal infusion and was fastened with adhesive tape to prevent inadvertent torque on the cannula during eyeball rotation, kinking and disconnection. Perioperative hypotony was prevented by keeping a check on infusion cannula.

Core Vitrectomy- Exudates and membranes behind intraocular lens were removed. Only core vitrectomy was done. The exudates and fluid first taken were sent for Gram staining and Potassium Hydroxide wet mount. Culture and sensitivity was done in blood agar and Sabouraud dextrose agar. Vitrectomy was completed, after visualising the disc and peripapillary vasculature. After vitrectomy, intravitreal Vancomycin (1 mcg / 0.1 ml), Ceftazidime (2.25 mcg/ 0.1 ml), Voriconazole (100 mcg in 0.1 ml) with or without Dexamethasone (400 µg) was given as in a case of acute postoperative endophthalmitis shown in Figure 1. Port closure- was done after removal of cutter, endolight and infusion port one at a time. Rubbing of conjunctiva around the ports was done for closure and ports were checked for any leakage.

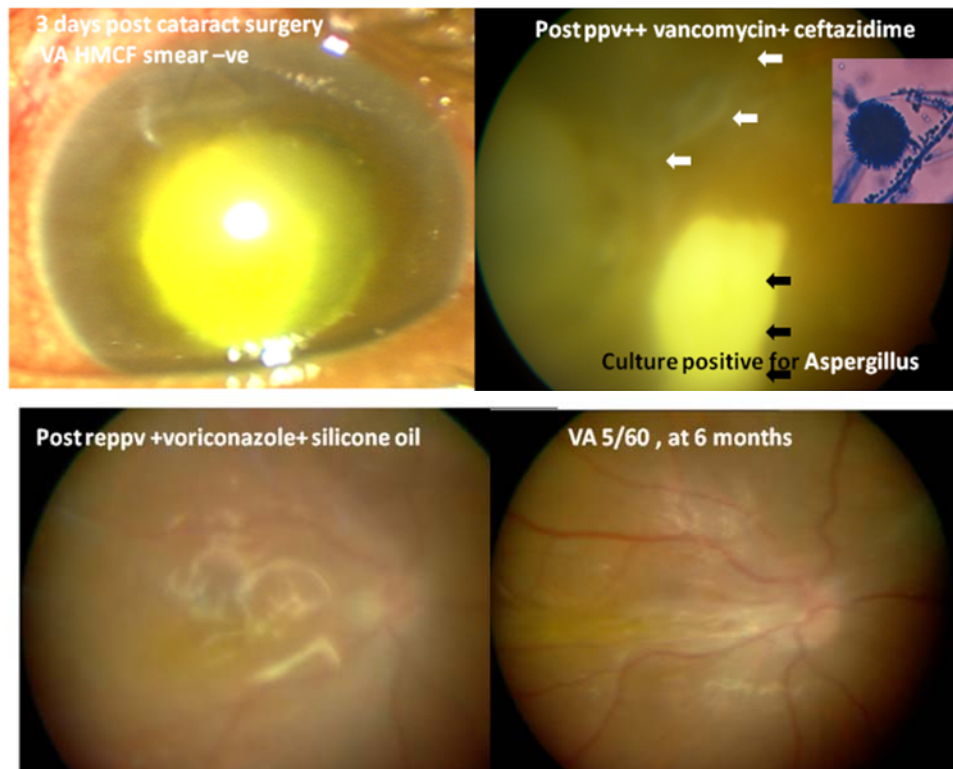


Fig 1: shows a case presenting 3 days post cataract surgery managed by 23 g pars plana vitrectomy and re pars plana vitrectomy done and finally shows a functional failure due to Epiretinal membrane with macular drag at 6 months after resurgery.

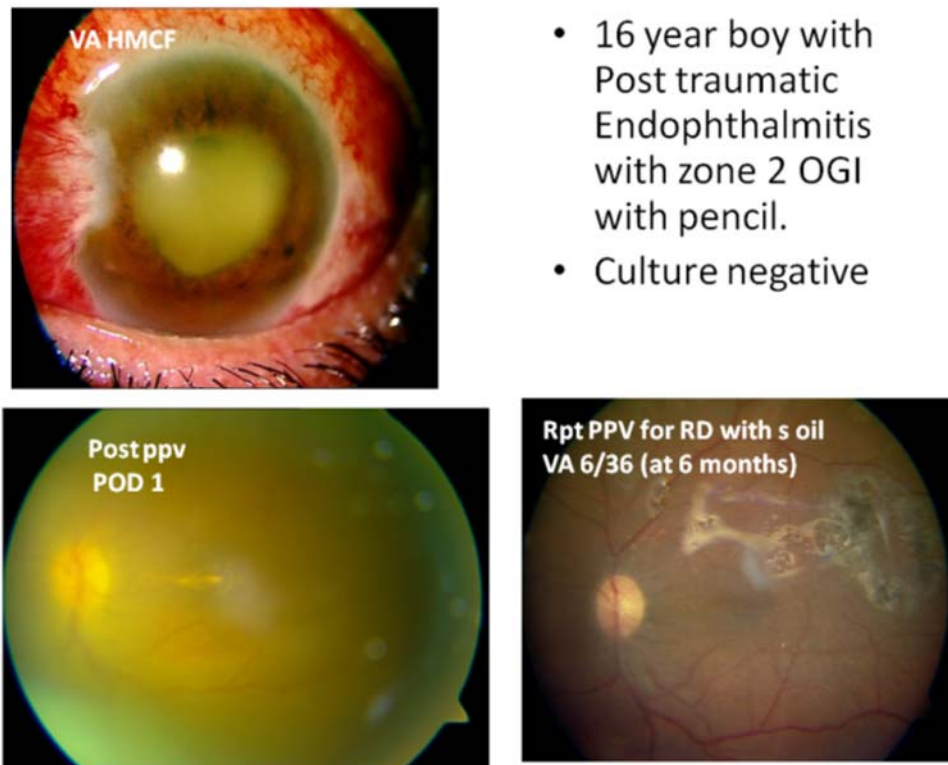
Re vitrectomy- was done in 3 cases for non-resolving exudates and no improvement in the best corrected visual acuity. In 2 cases, IOL explant was done for non-resolving exudates.

Anatomical success was achieved with cornea clear, normal intraocular pressure without medication and retina attached. Functional success was achieved with Best Corrected Visual Acuity $\geq 20/400$ in the vitrectomized eye.

Post-operative visual acuity was taken on day 1, 1 week, 1 month, 3 months and final visit. The parameters that were evaluated postoperatively were BCVA, projection of rays,

intraocular pressure, slit lamp examination for status of vitrectomy ports, cornea, anterior chamber details, lens status and fundus examination on each visit.

3. Results: Records were reviewed for cause and type of endophthalmitis, microbial spectrum and surgical details. Out of 16 cases, endophthalmitis was following cataract surgery in 13, trauma 1 (Figure 2), systemic infection in 2 cases. The cultures were positive in 5 eyes (31.25 %), 3 were found to be staphylococcus aureus, 2 were found to be Aspergillus (Figure 3, Table 1).



- 16 year boy with Post traumatic Endophthalmitis with zone 2 OGI with pencil.
- Culture negative

Fig 2: shows a 16 year old boy with post traumatic endophthalmitis, re pars plana vitrectomy done for non resolving exudates.

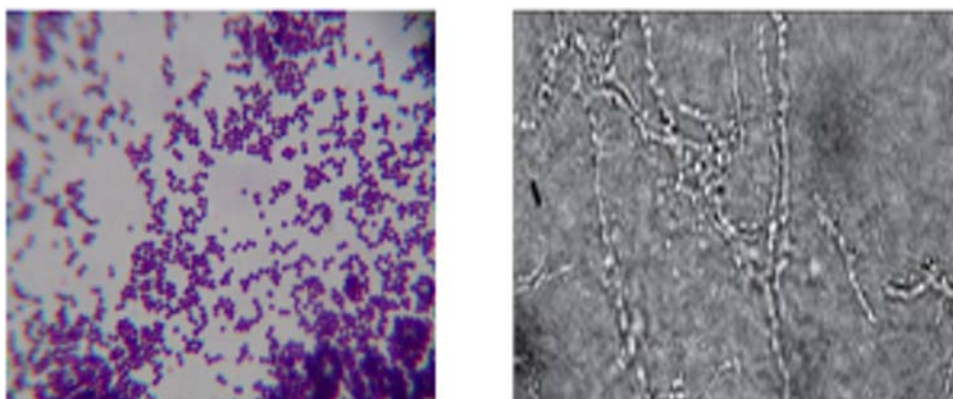


Fig 3: shows Gram positive Staphylococcus colonies and septate fungal hyphae on Potassium Hydroxide wet mount.

Table 1: Shows the details of aqueous and / or vitreous tap, pars plana vitrectomy, additional procedure and intravitreal injections.

S.N	Pt.	Aq/ Vitreoustap (preop)	23 g PPV (no. of times)	Additional procedure	I/ Vit injection
1	P S	-	1	-	V+C
2	K D	KOH-Septate Hyphae	2	-	V+C
3	Pv S	-	1	-	V+C+Vori
4	J D	-	1	-	V+C+D
5	L K	-	2	-	V+C+D
6	S	-	1	-	V+C+D
7	B K	Gram + Staphylococcus	3	-	V+C
8	M R	Gram + Staphylococcus	2	IOL explant	V+C+D
9	Sj	-	1	-	V+C+D
10	J C	-	1	-	V+C+D
11	S D	-	1	-	V+C+D
12	Tr	Gram + Staphylococcus	1	-	V+C+D
13	Sn	-	1	-	V+C+D
14	Aj	-	3	+ Si oil	V+C
15	N Jn	KOH- septate Hyphae	3	IOL + bag explant	V+C+Vori
16	R K	-	1	PP Lensectomy	V+C

IOL- Intraocular Lens

Si OIL- Silicon Oil

PP- Pars Plana

V, C, D, Vori- Vancomycin + Ceftazidime +Dexamethasone + Voriconazole

Intraocular pressure was raised in 2 cases which came to normal range after surgery. Post operative course was uneventful in majority. An abscess at active port was seen in one eye which resolved with subconjunctival antibiotics. Late complications include macular hole in 1 case, disc

pallor in 1 eye, disc neovascularization in 1 case, macular drag with epiretinal membrane in 1 eye as shown in Figure 4. Anatomical and functional success could be achieved in 12 cases (75%) and 10 eyes (62.5%) respectively (Figure 5) as shown in Table 2.

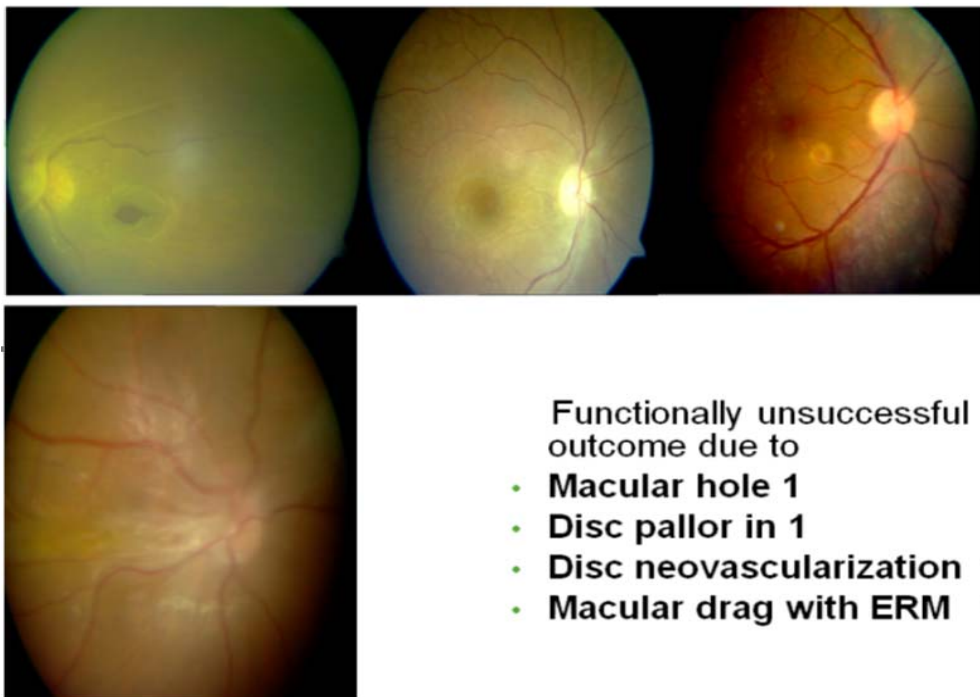


Fig 4: shows causes of anatomical failure after 23 g ppv which were macular hole, disc pallor, disc neovascularization and macular drag with epiretinal membrane.

FINAL OUTCOME

Final outcome	Eyes(n)
VA range 20/30-20/400	12
VA of $\geq 20/60$	7(43.75 %)

	Successful N(%)	Unsuccessful N (%)
Functional	10(62.5)	6(37.5)
Anatomical	12(75)	4(25)

Fig 5: shows the final outcome of the study showing anatomical and functional success.

Table 2: shows the preoperative and final visual acuity and anatomical and functional success.

S.N	Pt	Preop BCVA	Stable Final BCVA (≥ 6 months)	Anatomical Success	Functional Success $> 20/400$
1	P S	FCCF,1.85	20/60, 0.5	+	+
2	K D	FCCF,1.85	FC at 1 m,2.12	+	FC at 1 m
3	Pv S	HMCF,2.3	20/20,0.0	+	+
4	J D	PL +ve, 2.7	20/60,0.5	+	+
5	L K	HMCF,2.3	PL +ve,2.7	Disc Pale	PI + ve
6	S	20/80,0.6	20/40,0.3	+	+
7	B K	PL+ve,2.7	Fc at 2 m,1.82	+	FC at 2 m
8	M R	FC at 1 m,2.12	20/60,0.5	+	+
9	S j	HMCF,2.3	20/80,0.6	+	+
10	J C	PL +ve, 2.7	20/80,0.6	+	+
11	S D	HMCF, 2.3	20/60, 0.5	NVD	+
12	T r	FC at 1/2 m,2.3	20/80,0.6	+	+
13	S n	HMCF,2.3	20/60,0.5	+	+
14	A j	PL +ve, 2.7	HMCF,2.3	Macular Hole	HMCF
15	N Jn	HMCF, 2.3	HMCF, 2.3	+	HMCF
16	R K	FCCF, 1.85	HMCF, 2.3	Macular Hole with ERM	HMCF

BCVA- Best Corrected Visual Acuity

FCCF- Finger Counting Close to Face

FC- Finger Counting

HMCF- Hand Movement Close to Face

PL - Perception of Light

ERM- Epiretinal Membrane

4. Discussion

Twenty three gauge pars plana vitrectomy is a technique of removing pus and exudates from the vitreous cavity in

endophthalmitis eyes. It fulfills the goal of vitreous tap, vitrectomy as well as achieves good visual outcome which is guarded in endophthalmitis cases presenting at our tertiary

eye care centre of North India. The cannulated surgery is a potential means to reduce inflammation because it reduces the antigen load, inflammatory mediators or toxic elements from the vitreous. Moreover a clear vitreous cavity facilitates diffusion of intravitreally injected drugs although recurrences are possible. The postoperative visual recovery is faster and more comfortable to the patient. A study by Ahmed M. Almanjourni and colleagues [2] reported the safety and efficacy of 23 g transconjunctival vitrectomy in the surgical management of postoperative endophthalmitis. In this study, 10 consecutive patients underwent 23 g pars plana vitrectomy within a median delay of 1 day after diagnosis, after one or two intravitreal injections. Cultures were done for panbacterial PCR. No intraoperative complications were noted. Two patients developed retinal detachment postoperatively and were reoperated. The final vision was 20/ 400 for two patients and 20/ 50 or better for the other patients. In our study, 16 cases of endophthalmitis underwent 23 g pars plana vitrectomy within a median delay of 1 day after diagnosis, after 1 or 2 intravitreal injections. Aqueous and vitreous tap was sent for Gram stain, KOH wet mount as well as culture sensitivity. No intraoperative complications were noted. Revitrectomy was done in 3 cases for non-resolving exudates and no improvement in visual acuity. The final visual outcome was 20/30- 20/400 in 12 eyes and visual acuity of >20/60 in 7 eyes.

A case series by C S H Tan and colleagues [3] reviewed the outcomes of 23 g transconjunctival vitrectomy in patients with postoperative endophthalmitis. The study included 6 patients with no intraoperative and postoperative complications. Final visual acuity improved significantly with improvement in visual acuity of at least 20/40 in 5 patients (83.3%). Our study included 16 eyes with a diagnosis of endophthalmitis operated by 23 g pars plana vitrectomy. Functional success was achieved in 10 eyes (62.5%).

We need to stop here and think that the transconjunctival approach is in agreement with the day care surgery which our patients desire. From a surgeon point of view, transconjunctival approach is conservative for the conjunctiva and modern for the surgeon and excellent for the postoperative recovery. The chances of intraocular pressure variations, retinal breaks and postoperative inflammation are less with 23 g vitrectomy. Manish Nagpal and colleagues [4] compared the benefits, the risks and the dynamics of port closure in different gauge vitrectomy systems (20, 25 and 23 g) used in vitrectomy for uncomplicated vitreous hemorrhage. They concluded that small gauge systems are safe and equally effective than 20 g system for non-complicated vitreous hemorrhage with faster recovery and more comfort for the patient.

Twenty-three gauge vitrectomy involves making transconjunctival sutureless self-sealing angled cannulated sclerotomies. Throughout the surgery all instruments pass through the sleeve of the cannula. This minimizes tissue manipulation and microtrauma due to repeated insertion and removal of instruments [5, 6]. Increased flexibility of 25 g instruments may make complex surgeries more challenging since torsion of the eye is more difficult [7]. Our main aim of doing vitrectomy was to remove pus, non-resolving exudates and membranes. Only core vitrectomy was done. Endophthalmitis eyes are different from other posterior segment diseases in being infected, inflamed with exposure to another surgery is also a factor associated. Our firm belief

is that the fragile retino-choroidal tissue should not be aggressively handled to create breaks and thereby, jeopardizing the final visual outcome. Hence, endophthalmitis vitrectomy is a challenging surgery even in the most experienced hands. The longer the duration of vitrectomy of onset of symptoms, the poorer the prognosis.

Culture positivity in our study was 31.25 % (3 staphylococcus aureus, 2 Aspergillus). A study by Lalitha *et al.* [8] has culture positivity of 52.6 % (Table 3, most common organism *Nocardia* sp). A study from Singapore by T. Y. Wong [9] has shown positivity of 61.8 % (most common organism- Staphylococcus epidermidis). In Endophthalmitis Vitrectomy Study [1], the culture positivity rate was 69.3 % (and the most common organism was coagulase negative Staphylococcus). A study from Netherland done by B.J. Pijl and colleagues [10] showed culture positivity of 66.4 % as shown in Table 3. In Asian studies, the culture positive rate was lower than in the Caucasian studies.

Table 3: shows rates of culture positivity in cases of endophthalmitis in various studies.

Study	Culture positive (%)
EVS ¹	69.3
Netherland ²	66.4
Singapore ³	61.8
India ⁴	52.6
Korea ⁵	47.4
Our study	31.25

1-AJO 1996; 122: 1-17

2-AJO 2010; 149(3): 482-487

3-Ophthalmology 2004;111(4); 699-705

4-Ophthalmology 2005; 112(11); 1885-1890

5- Korean Journal of Ophthalmology 2008; 49, 1771–1778. EVS- Endophthalmitis Vitrectomy Study

5. Conclusion

We conclude that 23 gauge transconjunctival sutureless vitrectomy is effective in the management of endophthalmitis. Rare complication like scleral abscess can be treated. Endophthalmitis after intraocular surgery, endogenous agents or trauma can be treated by sutureless vitrectomy. These eyes are inflamed and operating on inflamed eyes is a difficult task even in the most experienced hands. The incidence of non-resolving exudates, retinal detachment and recurrence has to be addressed. Sutureless vitrectomy is ideal for conjunctiva and best for postoperative comfort of the patient.

6. Acknowledgements - None

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