

# Vitrectomy in patients over 90 years of age

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**Purpose:** The aim of this study was to evaluate vitrectomy procedures performed in patients over 90 years of age at the Dokkyo Medical University Koshigaya Hospital (Koshigaya, Japan).

**Patients and methods:** Vitrectomies were performed in nine eyes of nine patients who were over 90 years of age between May 2010 and March 2015. Factors such as the underlying vitreoretinal disease, preoperative and postoperative best-corrected visual acuity (BCVA), surgical time, postoperative body position, need for a second surgery, systemic disease, and intraoperative changes in systemic conditions have been evaluated.

**Results:** The most common cause of the underlying vitreoretinal disease was vitreous hemorrhage derived from age-related macular degeneration and posterior dislocation of the lens secondary to a posterior capsular rupture (two cases each). The mean values for the logarithm of the minimum angle of resolution BCVA were 2.15 preoperatively and 1.46 postoperatively ( $P=0.020$ , Wilcoxon signed-rank test). The mean surgical time was 109 minutes. Prone position was needed in two cases, and no second surgeries were needed. The most common cause of systemic disease was hypertension, which was found in six cases. Transient hypertension was found in two cases during surgery, and these patients were treated using intravenous calcium blocker injections.

**Conclusion:** Patients over 90 years of age who underwent vitrectomy procedures did not have serious problems, except transient hypertension during surgery. The BCVA significantly improved. These results indicated that vitrectomies could be performed successfully in patients over 90 years of age.

**Keywords:** vitrectomy, underlying vitreoretinal disease, transient hypertension

## Introduction

With advancement of vitrectomy procedures in recent years, the ability to adapt vitrectomy has increased; 1-day vitrectomy will be performed similar to cataract surgery.<sup>1</sup> Although surgeons have performed vitrectomy on difficult cases or very old patients, there have been few reports about procedures on very old patients, that is patients over 90 years of age,<sup>2-4</sup> and knowledge on this topic is generally lacking.

Very old patients sometimes cannot lie flat for long time because of neck or back problems.<sup>5</sup> Furthermore, they may be uncooperative or hard of hearing, which leads to complicated situations.<sup>5</sup> The surgical time for vitrectomies is typically longer than that for cataract surgery. Hence, it could be difficult for ophthalmologists to decide on adapting vitrectomy procedures for this population. Some cases require general anesthesia. There have been some surgical reports on the centenarian from the ophthalmological field or other fields.<sup>3,6</sup> As Japan has the highest proportion of older adults in the world,<sup>7</sup> the number of vitrectomy patients over 90 years will increase in the future. Recently, vitrectomy has been performed in some cases over 90 years of age at the Dokkyo Medical University Koshigaya Hospital in Japan and the findings from these procedures have been reported.

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## Materials and methods

We reviewed the medical records of nine patients (nine eyes: one male and eight females) who were over 90 years of age who underwent vitrectomy between May 2010 and March 2015. The mean age of these patients was  $93.0 \pm 3.3$  years. A 20 G or 25 G pars plana vitrectomy was performed under local anesthesia in each patient. All surgeries were performed by five experienced surgeons at the Dokkyo Medical University Koshigaya Hospital. The vitrectomy machine that was used was either the Accurus or Constellation (Alcon Laboratories, Inc., Fort Worth, TX, USA).

The factors such as underlying vitreoretinal disease, preoperative and postoperative best-corrected visual acuity (BCVA), surgical time, postoperative body position, need for a second surgery, preoperative systemic diseases, and intraoperative changes in systemic conditions were examined in all patients. BCVA was measured postoperatively at 1 month or more. The decimal visual acuity data were then converted to a logarithm of the minimum angle of resolution (log MAR) value. The visual acuities of hand motion and light perception were converted to log MAR values of 2.6 and 3.0, respectively.<sup>8</sup> Transient hypertension was defined as a systolic blood pressure  $>180$  mmHg and a diastolic blood pressure  $>90$  mmHg. The research adhered to the tenets of the Declaration of Helsinki and informed consent was obtained from each patient.

## Statistical analysis

A Wilcoxon signed-rank test was used to compare the preoperative and postoperative log MAR values of BCVA. A *P*-value  $<0.05$  was considered to be statistically significant.

## Results

### Underlying vitreoretinal disease

The underlying vitreoretinal diseases were vitreous hemorrhage from age-related macular degeneration ( $n=2$ ) and posterior dislocation of lens secondary to posterior capsular rupture ( $n=2$ ); sub-retinal hemorrhage from a macroaneurysm rupture ( $n=1$ ); vitreous hemorrhage from macroaneurysm rupture ( $n=2$ ); cystoid macular edema from branch retinal vein occlusion ( $n=1$ ); and endophthalmitis after cataract surgery ( $n=1$ ; Table 1).

### Preoperative and postoperative BCVA

The preoperative BCVAs ranged from light perception to 0.1, and the postoperative best-corrected decimal visual acuities ranged from light perception to 0.5. Table 2 lists the

**Table 1** Age, sex, and underlying diseases

Case number	Age (years)	Sex	Underlying disease
1	90	M	VH (AMD)
2	90	F	VH (AMD)
3	91	F	PCR, lens drop
4	91	F	PCR, lens drop
5	92	F	Macroaneurysm, SRH
6	93	F	VH (macroaneurysm)
7	94	F	BRVO, CME
8	98	F	VH (macroaneurysm)
9	98	F	Endophthalmitis (post cataract surgery)

**Abbreviations:** M, male; VH, vitreous hemorrhage; AMD, age-related macular degeneration; F, female; PCR, posterior capsular rupture; SRH, sub-retinal hemorrhage; BRVO, branch retinal vein occlusion; CME, cystoid macular edema.

preoperative and postoperative logMAR values of BCVA. The preoperative logMAR values of BCVA was  $2.15 \pm 1.05$  (range: 1–3), and the postoperative log MAR values of BCVA was  $1.46 \pm 0.18$  (range: 0.3–3). A significant difference in visual acuity was seen before and after surgery ( $P=0.020$ ; Wilcoxon signed-rank test).

## Surgical time

The surgical times ranged from 7 minutes to 180 minutes, and the mean surgical time was  $109 \pm 70$  minutes (Table 2).

## Postoperative body position

The prone position was required in two cases (22.2%): a sub-retinal hemorrhage from macroaneurysm rupture and endophthalmitis after cataract surgery.

## Second surgery

No second surgery was required in any of the nine cases.

## Preoperative systemic diseases and intraoperative changes in the systemic condition

Preoperative systemic diseases were found in seven cases (77.7%), which included six cases of hypertension (66.7%) and one case each of senile dementia (11.1%) and heart disease (11.1%). Intraoperative changes in the systemic conditions of the patients were found in two cases (22.2%). When transient hypertension occurred, it was treated with an intravenous injection of 0.5 mg nicardipine hydrochloride (Table 3).

## Discussion

To the best of our knowledge, there have been no reports that focused on vitrectomy procedures in patients who are over 90 years of age. Thus, this report is valuable from the

**Table 2** Preoperative and postoperative visual acuity and surgical time

Case number	Pre-VA (log MAR values)	Surgical time (minutes)	Post-VA (log MAR values)	20 G or 25 G
1	1.7	7	1.7	25
2	2.6	75	2	20
3	1	177	0.7	20
4	2.6	180	1.3	20
5	1.4	165	0.52	20
6	2	36	0.52	25
7	1	63	0.7	20
8	2.6	42	0.3	25
9	3	164	3	20

**Abbreviations:** pre, preoperative; VA, visual acuity; post, postoperative; log MAR, logarithm of the minimum angle of resolution.

viewpoint of age. We only found three cases on vitrectomy procedures for patients over 90 years of age; one case from Israel<sup>2</sup> and the other two from Japan.<sup>3,4</sup> The vitrectomy was performed to a 92-year-old patient from Israel to remove an epiretinal membrane.<sup>2</sup> The patient from Japan was the oldest with the age of 101 years with an underlying disease of rhegmatogenous retinal detachment.<sup>3</sup> The opposite eye had already lost light perception; therefore, the patient had to undergo rhegmatogenous retinal detachment surgery. However, the silicone oil could not be removed.<sup>3</sup> However, the two oldest patients reviewed in this report were 98 years old. One of them developed endophthalmitis after cataract surgery. To the best of our knowledge, this was the most elderly case in Japan who developed endophthalmitis after cataract surgery. The silicone oil used in the vitrectomy procedure was not removed in this patient similar to that reported by Nishi et al.<sup>3</sup> The silicone oil will not be removed if any complication occur.

Being pioneer, it is difficult for us to adapt the vitrectomy procedure for patients over 90 years of age. We have already showed that intraoperative restlessness significantly

occurred more frequently in patients over 90 years of age compared with those younger than 90 years of age.<sup>9</sup> Each of these restlessness cases had planned bilateral cataract surgery; however, with the occurrence of restlessness in one eye, the surgery in the other eye was canceled against the patients' wishes. As the surgical time for cataract surgery is generally shorter than that for vitrectomy, we have to manage any bouts of restlessness during vitrectomy. Vitrectomy adaptation should be considered carefully in cases over 90 years of age. The surgical time was more than 60 minutes in six cases from the current report, and the surgery was performed under local anesthesia in all these six cases. During vitrectomy surgery, maintaining a specific body position on the operation table appeared to be very painful for the patients over 90 years of age. Transient hypertension during vitrectomy was observed in two cases (22.2%). On the other hand, transient hypertension during cataract surgery was observed in 33.3% of the patients who were over 90 years of age.<sup>9</sup> Although the surgical time was longer in vitrectomy, transient hypertension during vitrectomy occurred less often than expected. The values of BCVA improved significantly after vitrectomy. These advantages and disadvantages should be considered carefully, and vitrectomy adaptation should be determined. Sometimes, vitrectomy may be canceled because of restlessness.

The prone position was required in two cases, which was very difficult for the patients over 90 years of age. Only a few cases of this type have been identified, and we will have to wait for the additional cases in the future.

To date, no case has required a second vitrectomy. These nine cases are uncommon on a worldwide level and their prognosis will be checked carefully.

## Disclosure

The authors report no conflicts of interest in this work.

**Table 3** Preoperative systemic diseases, changes in systemic condition, and treatment

Case number	Pre-systemic diseases	Changes in systemic condition	Treatment
1	HT	None	None
2	None	None	None
3	HT	None	None
4	SD	None	None
5	HT	None	None
6	None	TH	Nicardipine hydrochloride
7	HT	None	None
8	HT	None	None
9	HT, HD	TH	Nicardipine hydrochloride

**Abbreviations:** pre, preoperative; HT, hypertension; SD, senile dementia; HD, heart disease; TH, transient hypertension.

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