

Original

# Analysis of Ophthalmic Surgery Under General Anesthesia at Dokkyo Medical University Koshigaya Hospital

Tetsuya Muto, M.D., Ph.D., Makoto Chikuda, M.D., Ph.D.

*Department of Ophthalmology, Dokkyo Medical University Koshigaya Hospital*

## SUMMARY

To analyze ophthalmic surgeries performed under general anesthesia at Dokkyo Medical University Koshigaya Hospital. A total of 218 patients (226 cases) underwent ophthalmic surgery under general anesthesia. Records of ophthalmic surgery patients who received general anesthesia between November 2006 and February 2011 at Dokkyo Medical University Koshigaya Hospital were reviewed. Records were checked for general anesthesia complications, rate of general anesthesia, reasons underlying selection for general anesthesia, underlying ophthalmic diseases. Additionally, age, gender, and the rate of bilateral occurrence were documented.

General anesthesia was used in 2.6% of the cases without any complications. The majority (80%) of patients receiving general anesthesia were unable to follow instructions from the ophthalmologist. Most of these cases involved young patients (<15 years of age) and in some cases the patients had severe trauma. Underlying ophthalmic diseases included 82 cases (82 patients) of blowout fracture, 46 cases (45 patients) of strabismus, 29 cases (25 patients) of retinal detachment, and 19 cases (17 patients) of cataract. While mean age was 28.8 years old for blowout fractures, patients with other diseases tended to be teenagers. More than 85% of blowout fracture and retinal detachment cases were male. Bilateral case rates were 1.2% for blowout fracture and 47.1% for cataract.

Although most procedures used local anesthesia, general anesthesia is essential for certain ophthalmologic procedures. While there were differences with regard to age, gender and bilateral case rates in the underlying ophthalmic diseases, general anesthesia use at our hospital proved to be safe. To ensure continued patient safety during surgery, ophthalmologists need to have a solid understanding of the principles of general anesthesia.

**Key Words** : ophthalmic surgery, general anesthesia, blowout fracture

## INTRODUCTION

Use of local anesthesia during ophthalmic surgeries is both easy to perform and associated with a high suc-

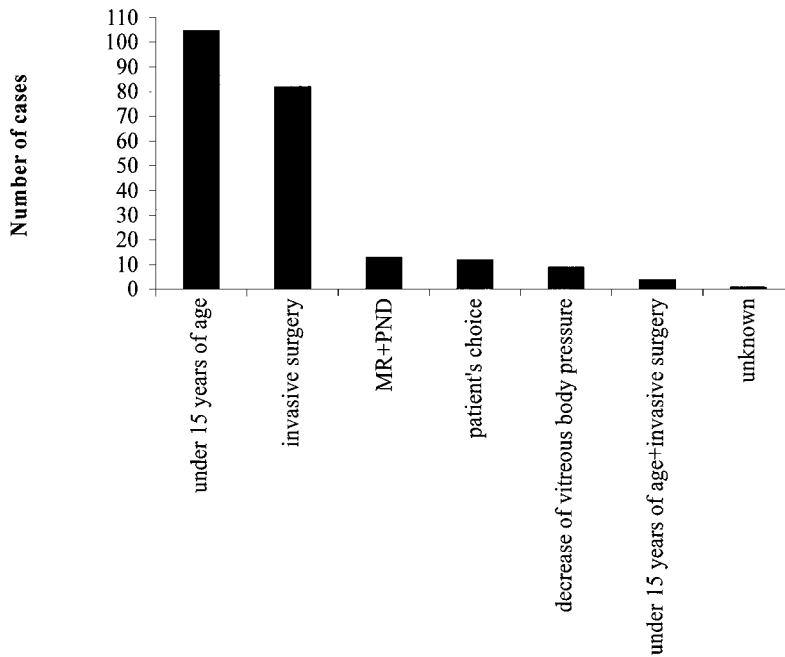
cess rate<sup>1</sup>. Moreover, local anesthesia is more cost effective and safer for the patient as compared to the use of general anesthesia<sup>2</sup>. As the majority of ophthalmic surgeries that are performed today can be done under local anesthesia<sup>1</sup>, ophthalmologists seldom use general anesthesia.

When using local anesthesia during ophthalmic surgeries, patients need to have an understanding of the overall process and be able to willingly cooperate during the procedure. If either of these is not possible in the patient, then surgeries using local anesthesia can-

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Reprint requests to : Tetsuya Muto

Department of Ophthalmology, Dokkyo Medical University Koshigaya Hospital 2-1-50 Minamikoshiagya, Koshigaya, Saitama 343-8555, Japan

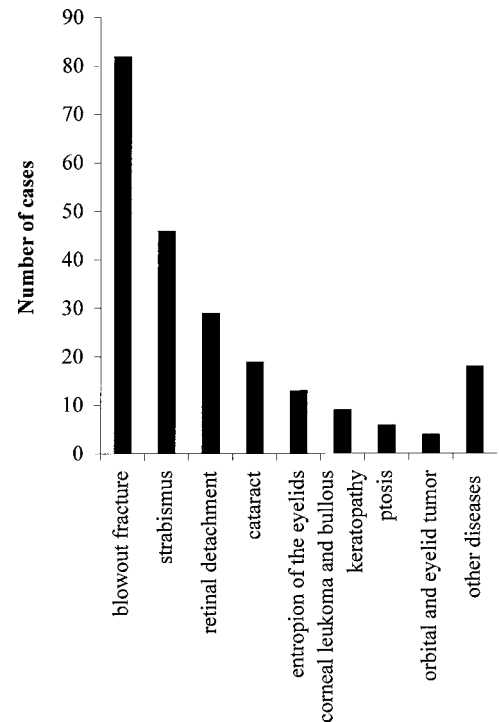


**Fig. 1** Reasons underlying general anesthesia selection

Infant under 15 years of age is the most common cause of underlying general anesthesia selection. As many as 105 cases of it were found and they were next to invasive surgery, mental retardation (MR) plus psycho-neurologic disease (PND) and patient's choice in number.

not be performed. Moreover, if the required procedure involves large and invasive surgical manipulations, general anesthesia then becomes the method of choice. Therefore, ophthalmologists need to have a comprehensive understanding of the principles of general anesthesia.

Recently there has been an increased interest along with new discussions on the utilization of general anesthesia during ophthalmic surgery by both anesthesiologists and ophthalmologists<sup>3</sup>. However, the scope of these reports tend to be somewhat limited, as they are written from either the specific viewpoint of an anesthesiologist or of an ophthalmologist, with little or no consideration of factors that may be relevant to the other discipline. In addition, these reports are generally limited to surgeries that involve cataract<sup>4</sup> or ocular enucleation<sup>5</sup>, or they may only target a specific patient group, such as infants<sup>6</sup>. In other cases, these reports may only contain very general remarks on the subject<sup>7</sup>. Thus, although these reports are examining specific details of these ophthalmic surgical procedures, unfortunately they are not taking into consider-



**Fig. 2** The underlying ophthalmic diseases. Blowout fracture is the most common cause of underlying disease. As many as 82 cases of it were found and they were next to strabismus, retinal detachment and cataract in number.

ation the overall aspects of the procedure or any of the factors that could be interrelated and potentially have an impact on the practice of both scientific disciplines. In the past, ophthalmologists reported on the use of general anesthesia in surgical cases based on an ophthalmic point of view<sup>8</sup>. Presently, however, there are very few ophthalmic-based reports being submitted on the current use of general anesthesia during surgery, and those that are, tend to be very poorly distributed.

This paper reports on the use of general anesthesia in 226 cases of surgeries that were performed between November 2006 and February 2011 at the Dokkyo Medical University Koshigaya Hospital by ophthalmologists from the Department of Ophthalmology.

## METHODS

We reviewed the medical records of 226 cases of 218 patients who underwent ophthalmic surgery under general anesthesia between November 2006 and February 2011. Records were checked for cardiac arrest and fatal cases as general anesthesia complica-

**Table 1** Cases of blowout fracture, strabismus, retinal detachment and cataract according to age

Age	Blowout fracture	Strabismus	Retinal detachment	Cataract
0–10	1	26	1	9
11–20	28	14	21	6
21–30	17	2	4	1
31–40	18	1	2	3
41–50	9	2	0	0
51–60	6	0	1	0
61–70	3	0	0	0
71–80	0	1	0	0
Total cases	82	46	29	19

**Table 2** Cases of blowout fracture, strabismus, retinal detachment and cataract according to gender

Gender	Blowout fracture	Strabismus	Retinal detachment	Cataract
Male	71 (86.6%)	20 (43.5%)	25 (86.2%)	10 (52.6%)
Female	11 (13.4%)	26 (56.5%)	4 (13.8%)	9 (47.4%)
Total cases (%)	82 (100.0%)	46 (100.0%)	29 (100.0%)	19 (100.0%)

tions, rate of general anesthesia, reason why general anesthesia was performed, underlying ophthalmic diseases. We also examined records for blowout fracture cases, strabismus, retinal detachment and cataract, in addition to determining the age and gender. In addition, we checked for bilateral occurrence of the blowout fractures, retinal detachments and cataracts in these patients. Patients with overaction of the inferior oblique muscle were included in the strabismus group, while patients with proliferative vitreoretinopathy were included in the retinal detachment group. Bilateral cases were defined as any patient who underwent bilateral surgery between November 2006 and February 2011, regardless of the number of times general anesthesia was used. Bilateral case rates were determined based on the number of patients.

## RESULTS

Out of a total of 8654 cases that underwent ophthalmic surgery, 2.6% of the patients were given general anesthesia. None of the patients receiving general anesthesia developed any cardiac arrest or fatalities.

The reason why general anesthesia was performed included 105 cases (46.4%) of noncooperation because the patient was under 15 years of age, 82 cases (36.3%) of invasive surgery, 13 cases (5.8%) of mental retardation (MR) and psycho-neurologic disease (PND),

12 cases (5.3%) of patient's choice, 9 cases (4.0%) of decrease of vitreous body pressure, 4 cases (1.8%) of non-cooperation because the patient was under 15 years of age and invasive surgery and 1 case (0.4%) of unknown cause (Fig. 1). We examined 12 cases of patient's choice, 4 cases had a past history of cancellation of surgery due to fear.

The underlying ophthalmic diseases included 82 cases (36.3%) of blowout fracture, 46 cases (20.3%) of strabismus, 29 cases (12.8%) of retinal detachment, 19 cases (8.4%) of cataract, 13 cases (5.7%) of entropion of the eyelids, 9 cases (4.0%) of corneal leukoma and bullous keratopathy, 6 cases (2.7%) of ptosis, 4 cases (1.8%) of orbital and eyelid tumor, and 18 cases (8.0%) of other diseases (Fig. 2).

Ages of patients ranged from 10 to 68 years (mean  $\pm$  standard deviation ;  $28.8 \pm 13.5$ ) for blowout fracture, 1 to 74 years ( $12.5 \pm 14.0$ ) for strabismus, 6 to 53 years ( $16.3 \pm 5.2$ ) for retinal detachment, and 0 to 37 years ( $10.1 \pm 11.3$ ) for cataract (Table 1).

With regard to gender, there were 71 males (86.6%) and 11 females (13.4%) with blowout fractures, 20 males (43.5%) and 26 females (56.5%) with strabismus, 25 males (86.2%) and 4 females (13.8%) with retinal detachment, and 10 males (52.6%) and 9 females (47.4%) with cataracts (Table 2).

Bilaterality rates included 1 patient (1.2%) with bi-

lateral blowout fractures, 3 patients (12.0%) with bilateral retinal detachments, and 8 patients (47.1%) with bilateral cataracts.

## DISCUSSION

To the best of our knowledge, over the past 15 years there have been no ophthalmologist-reported studies that have evaluated the overall use of general anesthesia during ophthalmic surgical procedures. Therefore, the present data provides an important overview of the field from an ophthalmologic point of view. The present study found that there were no complications associated with the use of general anesthesia. However, Badrinath et al. have previously reported finding 5 deaths (0.09%) in a group of ophthalmology patients who underwent general anesthesia<sup>9</sup>. Additionally, Murakawa et al. reported finding a case where severe bradycardia occurred after the induction of general anesthesia, although the patient recovered once temporary cardiac pacing was initiated<sup>10</sup>. In addition, it has also been reported that oculo-cardiac reflex often occurs during pediatric strabismus surgery, which can lead to cardiac arrest<sup>11</sup>. These previous findings underscore the need to take extreme care when dealing with these types of patients.

More than 80% of the cases when general anesthesia was performed were either due to noncooperation because the patient was under 15 years of age or invasive surgery. These are proper reasons for selecting general anesthesia. In the current report, it seemed the proper selection because 4 cases out of 12 had a past history of cancellation of surgery due to fear under local anesthetic surgery.

When performing retinal detachment surgeries, it is standard practice to use either general or local anesthesia with retrobulbar or peribulbar blocks as a method of anesthesia<sup>12</sup>. Most of retinal detachment surgeries were performed under local anesthesia in our hospital. Badrinath et al. have reported finding a high incidence of mortality in patients who were given local anesthesia during their scleral buckling surgeries<sup>9</sup>. However, the authors speculated that this higher mortality might have been due to the patient's underlying medical problems and not the type of anesthesia that was used during the procedure<sup>9</sup>.

Pun et al. examined the use of general anesthesia

during pediatric ophthalmic surgeries and found high utilization rates for cataract (35.3%) and keratoplasty (10.9%) procedures<sup>6</sup>. Condon et al. also reported finding high general anesthesia use during ophthalmic surgeries performed for strabismus (25.0%) and cataract (20.5%) in patients that ranged in age from 9 weeks to 90 years old<sup>8</sup>. Our present findings also showed that the use of general anesthesia in blowout fracture cases was especially high.

When the underlying diseases were analyzed, variations in ages were noted between the groups (Table 1). Although blowout fractures frequently occurred between 11 to 40 years of age, strabismus was almost always observed in patients who were less than 20 years old. Chi et al. reported that out of a total of 733 surgically treated blowout fractures, those cases most frequently occurred in subjects between 20 to 29 years of age, with a mean age of 30.7 years<sup>13</sup>. Similarly, underlying diseases also show great variation according to gender. For example, more than 85% of the blowout fractures and retinal detachments occurred in males. Chi et al. reported that 549 out of 733 (74.9%) blowout fracture cases were found in males<sup>13</sup>, while Kwon et al. reported that 21 out of 24 blowout fracture patients were males<sup>14</sup>. Moreover, Haug et al. reported that men had a higher risk of retinal detachment following cataract surgery<sup>15</sup>. Although bilateral blowout fracture cases are rare, the rate of occurrence is almost the same as seen for unilateral cases. Chi et al. reported finding 24 bilateral cases out of a total of 733 patients (3.3%), which was similar to the findings of our present study<sup>13</sup>.

Overall, even though we found the use of general anesthesia during ophthalmic surgical procedures to be low, our present findings did show that the use of general anesthesia was very safe. Furthermore, the characteristics of the differences noted for the underlying diseases proved to be very different in our present study. Since general anesthesia still has an essential role in current surgical procedures, ophthalmologists need to carefully consider both the benefits and disadvantages of using general anesthesia during ophthalmologic surgery.

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