Annals of Clinical Epidemiology

ORIGINAL ARTICLE

One-year costs of incisional glaucoma surgery and laser therapy

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ABSTRACT

BACKGROUND

This study aimed to calculate one-year total costs of incisional glaucoma surgery and laser therapy in a real-world clinical setting.

METHODS

We conducted a retrospective cohort study from July 2010 to March 2021 using the Diagnosis Procedure Combination database. We included patients hospitalized for incisional glaucoma surgery (trabeculectomy, trabeculotomy, tube shunt surgery, Ex-PRESS surgery, or iStent implantation) or laser therapy (laser peripheral iridotomy, surgical iridectomy, laser trabeculoplasty, cyclocryotherapy, or cyclophotocoagulation). The outcomes were total costs, including costs of hospitalization, re-admissions, antiglaucoma drugs, ophthalmic examinations, and outpatient visits for incisional glaucoma surgery and laser therapy within one year.

RESULTS

We identified 49,202 eligible hospitalizations. The one-year median total cost was 707,497 yen [interquartile range: 546,887–944,664 yen]. The median total cost was the highest in patients undergoing tube shunt surgery, followed by Ex-PRESS surgery, iStent implantation, and trabeculectomy. The number and cost of postoperative outpatient visits and length of hospital stay were higher in patients who underwent trabeculectomy and Ex-PRESS surgery than in those after tube shunt surgery. The total costs of laser therapies were lower than those of incisional glaucoma surgeries. The total cost was the highest in the 0–19 age group (856,398 [649,419–1,258,844] yen).

CONCLUSIONS

Tube shunt surgery was the costliest in terms of total one-year costs. Trabeculectomy and Ex-PRESS surgery were associated with long hospital stays and incurred high postoperative costs. The costs of laser therapies were relatively low. However, cost-effectiveness of laser therapies compared with incisional surgeries needs to be analyzed in future research.

KEY WORDS

incisional glaucoma surgery, laser therapy, cost, one year

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Received: July 1, 2022
Accepted: October 4, 2022
J-STAGE Advance published date: October 26, 2022

No. 23007

INTRODUCTION

Glaucoma is the leading cause of irreversible blindness, affecting more than 70 million people worldwide [1]. The only effective treatment of glaucoma is intraocular pressure–lowering therapy. However, surgery is considered when medical treatment is ineffective [2]. The number of glaucoma surgeries has been reported to have increased by more than 200% from 2011 to 2019 in Japan [3]. This increase has been attributed to an increase in the number of advanced stage patients in the Japanese aging society and reductions in invasiveness due to advancements in surgical techniques. Since the number of patients with glaucoma is expected to increase worldwide by 74% in 2040 compared with that in 2013 [4], the number of incisional glaucoma surgeries and laser therapies will continue to increase in the near future.

Since glaucoma-related procedures (incisional glaucoma surgery and laser therapy) are generally costlier than medical treatment with antiglaucoma eyedrops [5], estimating their costs is essential for appropriate distribution of medical expenses. However, accurate data on the cost of these procedures are lacking. A previous study has roughly estimated the costs of various incisional surgeries based on expected daily practices [6]. However, the costs of most laser therapies remain unreported. Other previous studies reported the total costs of glaucoma treatments, including incisional surgeries, laser therapies, and medication. However, their data were either limited to specific glaucoma types [7] or too old to reflect recent technological progress in glaucoma procedures [8]. Although several randomized controlled trials calculated the costs of some specific procedures based on claims data [5, 9, 10], they did not cover most of the available procedures.

Claims data are often used for cost analysis [11, 12]. The calculated costs based on claims data are relatively accurate compared with rough estimations based on expected daily practices [13]. However, to date, no studies have attempted to comprehensively compare the costs of incisional glaucoma surgeries and laser therapies based on claims data. This study aimed to calculate the healthcare costs within one year of incisional glaucoma surgery and laser therapy in a real-world setting.

METHODS

DATA SOURCE

We conducted a retrospective cohort study from July 2010 to March 2021 using the Diagnosis Procedure Combination database, which contains administrative claims data from more than 1,200 hospitals in Japan. The database contains information on patients' age, sex, diagnoses, procedure codes, date of operation, and total costs of admission [14]. Pre- and post-admission claims data in outpatient clinics are also available from 22% of the hospitals. A previous study showed the validity of recorded diagnoses and procedures in the database [15]. This study was performed in accordance with the tenets of the Declaration of Helsinki. The Institutional Review Board of the University of Tokyo approved this study, and the requirement for informed consent was waived owing to the anonymous nature of data.

PATIENTS

We included patients hospitalized for incisional glaucoma surgery or laser therapy between July 2010 and March 2021. Incisional glaucoma surgeries comprised trabeculectomy; trabeculotomy; tube shunt surgery; Ex-PRESS® (Alcon Laboratories, Fort Worth, TX, USA) mini-shunt surgery (Ex-PRESS surgery); and iStent® (Glaukos Corporation, Laguna Hills, CA, USA) implantation. The Ahmed® glaucoma valve (New World Medical Inc., Rancho Cucamonga, CA, USA) and Baerveldt® glaucoma implant (Abbott Medical Optics, Abbott Park, IL, USA) are used for tube shunt surgery in Japan. Laser therapies included laser peripheral iridotomy, surgical iridectomy, laser trabeculoplasty, cyclocryotherapy, and cyclophotocoagulation. The reimbursement prices for each procedure are listed in **Supplementary Table 1**. Under the Japanese reimbursement scheme, iStent implantation must be performed in combination with cataract surgery. Therefore, the cost of iStent implantation includes the technical fee for cataract surgery.

We excluded patients who underwent multiple types of glaucoma procedures in a single hospitalization. When multiple admissions were identified during the observation period, we included only the first admission as an eligible admission and regarded the following admissions as re-admissions subsequent to the first eligible one. We excluded patients without any data on postoperative clinic visits because such patients may have been followed up for postoperative care at another clinic, and their cost data were unavailable.

OUTCOMES

The primary outcome was total cost, including costs of hospitalization; re-admissions; antiglaucoma drugs; ophthalmic examinations; and outpatient visits for incisional

glaucoma surgery and laser therapy within one year. The secondary outcomes were itemized costs (breakdown of the total costs), length of hospital stay, re-admission rate, number of outpatient visits, follow-up period, and timing of the last visit within 1 year. We stratified the outcomes by age groups (0–19, 20–39, 40–59, 60–79, and ≥80 years).

STATISTICAL ANALYSIS

We calculated the itemized costs of hospitalizations, re-admissions, antiglaucoma drugs, ophthalmic examinations, and outpatient visits within 1 year of hospitalization and summed them up to obtain the total costs.

Since claims data do not include information about departments, visit fees for ophthalmologists were indistinguishable from those for other physicians, such as internists. When patients visit ophthalmologists, particularly for postoperative glaucoma follow-up, they usually undergo at least one ophthalmic examination or procedure, such as intraocular pressure measurement. To exclude visit fees for other physicians, we included outpatient visit fees only when they were claimed on the same day as any ophthalmic examinations or procedures.

Categorical variables are described as numbers and percentages. Age is described as mean and standard deviation. Since cost data were not normally distributed, they are described as medians and interquartile ranges. All statistical analyses were performed using the statistical programming language R version 4.0.2 (R Core Team, Vienna, Austria).

RESULTS

A flowchart of the participant selection process is shown in **Fig. 1**. We identified 49,202 eligible patients who had undergone incisional glaucoma surgery and laser therapy.

The baseline patients' characteristics are presented in **Table 1**. The mean (±standard deviation) age of the patients was 67.3 (±14.6) years. Trabeculectomy was performed in 46.6% of the patients. Surgery was performed on both eyes in 9.7% of the patients. In addition to glaucoma surgery, cataract surgery was performed in 36.5% of the patients.

The results are presented in **Table 2**. The 1-year median total cost was 707,497 yen [interquartile range: 546,887–944,664 yen]. Hospitalization costs accounted for 78% of the total cost. The median total cost was the highest in patients undergoing tube shunt surgery (922,219 yen), followed by Ex-PRESS surgery (811,332 yen), iStent implantation (785,354 yen), and trabeculectomy (697,008 yen) (**Fig. 2**). The total costs of laser therapies were lower than those of incisional glaucoma surgeries and similar between laser therapies. The cost during hospitalization was the highest for tube shunt surgery, followed by Ex-PRESS surgery, trabeculectomy, and trabeculotomy. In laser therapies, the cost during hospitalization was lower, and the cost of antiglaucoma drugs was higher for cyclodestructive procedures (cyclophotocoagulation and cyclocryotherapy). The number of postoperative outpatient visits was 9 [5–13], and it tended to

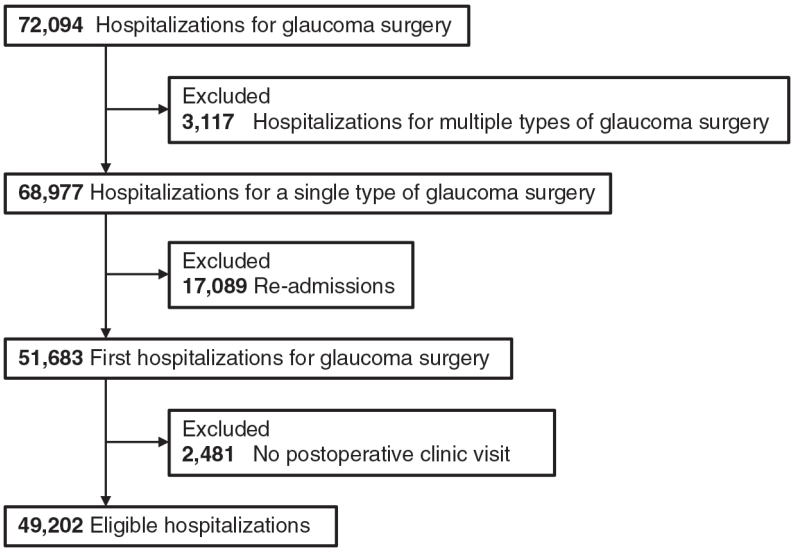

Fig. 1 Patient selection

Table 1 Baseline characteristics

	Trabeculectomy	Trabeculotomy	Ex-PRESS	Tube shunt	iStent	LPI	Iridectomy	LTP	CPC	Cyclocryotherapy	Total
Number of hospitalizations	22,934	16,863	5,403	1,727	466	569	825	24	264	127	49,202
Age, years, mean (SD)	66.9 (13.3)	67.3 (16.5)	69.1 (13.0)	64.3 (15.5)	73.3 (8.8)	71.3 (11.5)	67.1 (15.9)	66.3 (18.7)	62.5 (19.4)	62.2 (18.5)	67.3 (14.6)
Age category, years											
0–19	104 (0.5)	419 (2.5)	20 (0.4)	16 (0.9)	0 (0.0)	0 (0.0)	10 (1.2)	0 (0.0)	11 (4.2)	5 (3.9)	585 (1.2)
20–39	748 (3.3)	786 (4.7)	131 (2.4)	98 (5.7)	0 (0.0)	10 (1.8)	44 (5.3)	2 (8.3)	19 (7.2)	12 (9.4)	1,850 (3.8)
40–59	4,780 (20.8)	2,432 (14.4)	923 (17.1)	473 (27.4)	29 (6.2)	57 (10.0)	136 (16.5)	6 (25.0)	66 (25.0)	29 (22.8)	8,931 (18.2)
60–79	13,718 (59.8)	9,762 (57.9)	3,183 (58.9)	859 (49.7)	322 (69.1)	359 (63.1)	462 (56.0)	9 (37.5)	113 (42.8)	60 (47.2)	28,847 (58.6)
≥80	3,584 (15.6)	3,464 (20.5)	1,146 (21.2)	281 (16.3)	115 (24.7)	143 (25.1)	173 (21.0)	7 (29.2)	55 (20.8)	21 (16.5)	8,989 (18.3)
Male, n (%)	13,317 (58.1)	8,501 (50.4)	3,246 (60.1)	1,136 (65.8)	231 (49.6)	127 (22.3)	272 (33.0)	8 (33.3)	161 (61.0)	83 (65.4)	27,082 (55.0)
Laterality, n (%)											
Left	10,582 (46.1)	7,053 (41.8)	2,506 (46.4)	810 (46.9)	196 (42.1)	219 (38.5)	392 (47.5)	7 (29.2)	137 (51.9)	64 (50.4)	21,966 (44.6)
Right	10,701 (46.7)	7,317 (43.4)	2,546 (47.1)	854 (49.4)	222 (47.6)	246 (43.2)	396 (48.0)	13 (54.2)	121 (45.8)	61 (48.0)	22,477 (45.7)
Both	1,648 (7.2)	2,492 (14.8)	351 (6.5)	63 (3.6)	48 (10.3)	104 (18.3)	37 (4.5)	4 (16.7)	6 (2.3)	2 (1.6)	4,755 (9.7)
Simultaneous cataract surgery, n (%)	5,734 (25.0)	9,990 (59.2)	1,217 (22.5)	201 (11.6)	466 (100)	164 (28.8)	173 (21.0)	4 (16.7)	5 (1.9)	5 (3.9)	17,959 (36.5)

LPI, laser peripheral iridotomy; LTP, laser trabeculoplasty; CPC, cyclophotocoagulation; SD, standard deviation

Table 2 Costs, re-admission rate, and number of outpatient visits

	Trabeculectomy (n = 22934)	Trabeculotomy (n = 16863)	Ex-PRESS (n = 5403)	Tube shunt (n = 1727)	iStent (n = 466)	LPI (n = 569)	Iridectomy (n = 825)	LTP (n = 24)	CPC (n = 264)	Cyclocryotherapy (n = 127)	Average (n = 49202)
Total cost, JPY, median [IQR]	697,008 [561,936–921,988]	664,997 [504,848–928,947]	811,332 [687,878–1,167,084]	922,219 [778,035–1,159,229]	785,354 [481,541–900,774]	355,951 [257,107–573,264]	346,369 [248,940–553,706]	373,560 [281,504–747,905]	322,470 [222,228–608,534]	348,732 [237,116–520,681]	707,497 [546,887–944,664]
Cost during hospitalization, JPY, median [IQR]	566,590 [473,585–699,938]	487,192 [398,560–640,320]	673,710 [593,593–789,100]	801,320 [681,590–947,490]	440,660 [415,793–465,033]	270,680 [190,910–465,330]	255,090 [187,160–385,660]	276,685 [201,240–389,316]	173,295 [138,253–284,579]	198,752 [137,353–307,160]	554,199 [442,393–709,157]
Cost of re-admission, JPY, mean (SD)	100,531 (259,969)	132,426 (281,463)	148,835 (333,652)	91,123 (265,050)	191,576 (217,783)	40,769 (175,757)	67,933 (236,082)	64,505 (165,550)	122,807 (298,686)	103,319 (259,211)	116,170 (276,122)
Cost of antiglaucoma drugs, JPY, median [IQR]	17,604 [4,994–42,547]	19,310 [4,610–45,870]	21,531 [5,534–50,128]	21,376 [5,652–49,085]	3,079 [422–15,733]	3,624 [526–11,516]	5,235 [1,219–16,102]	16,625 [5,532–39,272]	28,634 [6,273–56,234]	24,478 [4,529–59,204]	18,016 [4,604–43,958]
Cost of examination, JPY, median [IQR]	29,265 [17,953–44,488]	23,150 [13,430–35,150]	33,160 [21,090–48,765]	29,670 [17,155–46,190]	16,520 [8,932–28,288]	24,870 [11,720–46,860]	25,010 [13,490–43,170]	13,400 [5,200–44,710]	23,690 [13,018–40,358]	29,940 [12,975–48,470]	27,160 [15,980–41,700]
Cost of outpatient visit, JPY, median [IQR]	7,400 [4,440–10,360]	5,180 [2,960–8,140]	7,770 [5,180–11,100]	6,660 [3,700–9,620]	3,700 [2,220–5,180]	4,440 [2,220–7,030]	5,180 [2,960–8,140]	4,070 [2,035–6,845]	7,330 [3,700–11,100]	7,400 [3,675–10,360]	6,660 [3,700–9,620]
Re-admission, n (%)	4,042 (17.6)	4,203 (24.9)	1,175 (21.7)	225 (13.0)	208 (44.6)	49 (8.6)	104 (12.6)	4 (16.7)	72 (27.3)	30 (23.6)	10,112 (0.6)
No. of outpatient visits, median [IQR]	10 [6–4]	7 [4–10]	10 [7–14]	9 [5–12]	5 [3–7]	6 [3–9]	7 [4–11]	6 [3–9]	9 [5–14]	9 [4–14]	9 [5–13]
Follow-up period, days, median [IQR]	337 [193–371]	315 [119–367]	347 [243–376]	315 [152–360]	145 [52–316]	202 [75–330]	268 [89–347]	168 [91–305]	341 [176–370]	330 [164–364]	329 [163–369]
Last visit within 1 year, days, median [IQR]	311 [174–345]	280 [98–338]	318 [199–347]	296 [144–342]	112 [43–276]	158 [58–313]	231 [78–331]	166 [91–270]	308 [145–348]	304 [136–346]	301 [135–343]
Length of hospital stay, days, median [IQR]	10 [6–14]	7 [4–11]	9 [7–13]	8 [6–11]	4 [3–4]	3 [2–6]	4 [3–8]	4 [3–7]	4 [3–7]	5 [3–10]	8 [5–12]

LPI, laser peripheral iridotomy; LTP, laser trabeculoplasty; CPC, cyclophotocoagulation; JPY, Japanese yen; IQR, interquartile range; SD, standard deviation

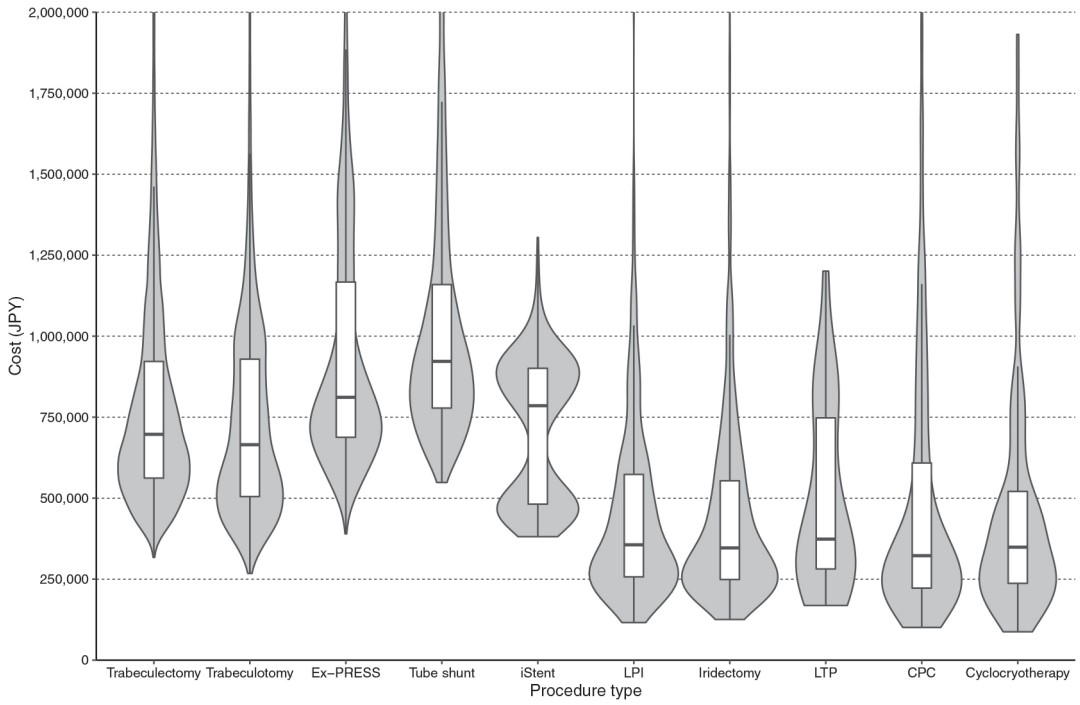

Fig. 2 **One-year total cost**

The horizontal lines indicate the median, the bottom and top of the box indicate the first and third quartiles (Q_1 and Q_3), and the bottom and top of the whisker indicate the minimum and maximum, respectively, without outliers. Outliers are defined as being less than Q_1 − 1.5*IQR or greater than Q_3 + 1.5*IQR. The width of the gray area indicates the frequency.
LPI, laser peripheral iridotomy; LTP, laser trabeculoplasty; CPC, cyclophotocoagulation; JPY, Japanese yen; IQR, interquartile range

be higher in filtering surgeries (trabeculectomy, Ex-PRESS surgery, and tube shunt surgery) and cyclodestructive procedures. The patients who underwent iStent implantation had the lowest number of visits (five visits). The frequency and cost of re-admissions were the highest for iStent implantation.

Table 3 shows the outcomes stratified by age group. The total cost was the highest in the 0–19 age group (856,398 [649,419–1,258,844] yen) (**Fig. 3**). Although hospitalization costs and re-admission were the highest for the 0–19 age group, the costs of antiglaucoma drugs and examinations were the lowest. The 40–59 age group had the highest cost of antiglaucoma drugs and examinations.

DISCUSSION

The current study evaluated one-year total costs of incisional glaucoma surgery and laser therapy. We found that tube shunt surgery was the costliest incisional glaucoma surgery in terms of one-year total costs. The reason for the high costs of tube shunt surgery during hospitalization was its high reimbursement price. This high cost of tube shunt surgery was consistent with a previous cost analysis, which reported costs of $7,872 for trabeculectomy and $10,075 for tube shunt surgery [5].

Ex-PRESS surgery was the second most expensive surgery. A randomized controlled trial comparing between surgical costs and one-year postoperative costs of Ex-PRESS surgery and those of trabeculectomy reported that postoperative costs did not significantly differ between the two surgeries [10]. In contrast to this previous study, the current study showed that the postoperative costs of Ex-PRESS surgery were higher than those of trabeculectomy. We suggest that this discrepancy might have been caused by schedules for postoperative outpatient visits. Due to the nature of randomized controlled trials, postoperative outpatient visits and examinations in the previous study were mainly scheduled based on trial protocols. In contrast, the postoperative schedules in the current study were devised based on clinical conditions. Although several studies suggested that the efficacy and safety were similar in terms of one-year outcomes [16, 17], statistically higher intraocular pressure was observed

Table 3 Costs, re-admission rate, and number of outpatient visits stratified by age group

	0–19 years (n = 585)	20–39 years (n = 1,850)	40–59 years (n = 8,931)	60–79 years (n = 28,847)	≥80 years (n = 8,989)	Average (n = 49,202)
Total cost, JPY, median [IQR]	856,398 [649,419–1,258,844]	680,374 [507,040–954,849]	706,374 [543,619–977,549]	711,477 [552,948–942,989]	693,930 [533,106–907,229]	707,497 [546,887–944,664]
Cost during hospitalization, JPY, median [IQR]	669,610 [498,440–891,400]	526,930 [410,455–688,079]	547,460 [431,025–697,941]	557,660 [448,525–710,050]	548,924 [436,540–709,530]	554,199 [442,393–709,157]
Cost of re-admission, JPY, mean (SD)	278,722 (605,321)	150,285 (365,246)	137,517 (316,840)	111,385 (257,038)	92,719 (226,485)	116,170 (276,122)
Cost of antiglaucoma drugs, JPY, median [IQR]	11,933 [2,479–36,496]	18,167 [4,470–42,790]	19,914 [5,323–44,514]	18,332 [4,748–44,121]	15,421 [3,874–43,193]	18,016 [4,604–43,958]
Cost of examination, JPY, median [IQR]	18,500 [10,520–31,660]	28,235 [16,735–45,003]	30,520 [19,225–46,815]	27,570 [16,590–41,750]	22,700 [12,520–36,180]	27,160 [15,980–41,700]
Cost of outpatient visit, JPY, median [IQR]	6,720 [4,440–10,390]	7,400 [4,440–10,730]	7,400 [4,440–10,360]	6,660 [3,700–9,620]	5,180 [2,960–8,140]	6,660 [3,700–9,620]
Re-admission, n (%)	186 (31.8)	412 (22.3)	2,025 (22.7)	5,878 (20.4)	1,611 (17.9)	10,112 (0.6)
Number of outpatient visits, median [IQR]	8 [5–12]	9 [6–14]	10 [6–14]	9 [5–13]	7 [4–11]	9 [5–13]
Follow-up period, days, median [IQR]	352 [272–468]	345 [220–380]	343 [216–378]	331 [170–370]	284 [99–357]	329 [163–369]
Last visit within 1 year, days, median [IQR]	318 [213–348]	315 [187–349]	317 [191–347]	303 [140–343]	247 [87–332]	301 [135–343]
Length of hospital stay, days, median [IQR]	8 [5–11]	9 [6–13]	9 [6–13]	9 [5–12]	8 [5–12]	8 [5–12]

JPY, Japanese yen; IQR, interquartile range; SD, standard deviation

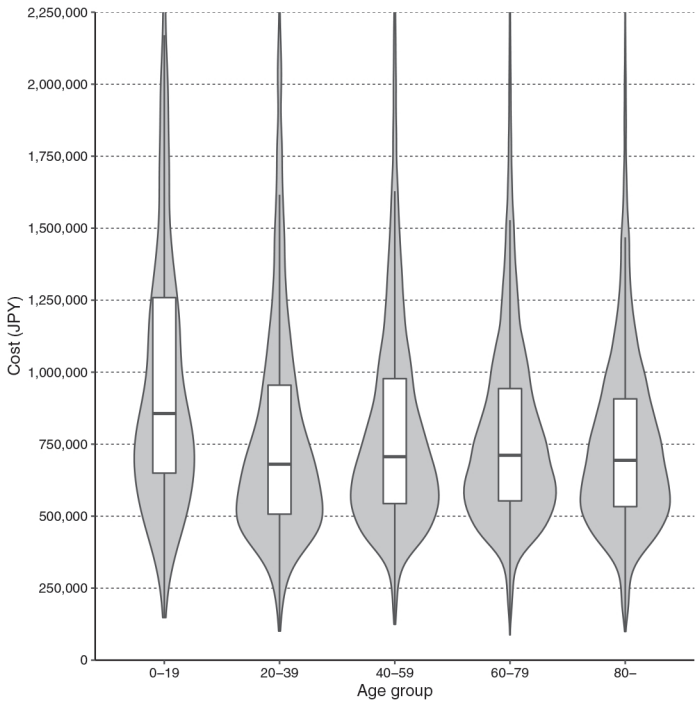

Fig. 3 **One-year total cost stratified by age group**

The horizontal lines indicate the median, the bottom and top of the box indicate the first and third quartiles (Q_1 and Q_3), and the bottom and top of the whisker indicate the minimum and maximum, respectively, without outliers. Outliers are defined as being less than Q_1 − 1.5*IQR or greater than Q_3 + 1.5*IQR. The width of the gray area indicates the frequency.
JPY, Japanese yen; IQR, interquartile range

in the Ex-PRESS group at earlier timings, such as 1 week, 2 weeks, 1 month, and 3 months [18, 19]. Higher intraocular pressure at these earlier timings might have required closer observation. In addition, more frequent failure and reoperation after Ex-PRESS surgery than after trabeculectomy have been reported [20, 21]. We suggest that our results reflected the clinical reality that Ex-PRESS surgery required more effort for postoperative management than trabeculectomy within one postoperative year.

iStent implantation had the third highest total cost. Although its reimbursement price was also the third highest, the cost during hospitalization was the lowest among incisional surgeries. This discrepancy was caused by the shorter length of hospital stay. The frequency and cost of re-admission were highest for iStent implantation. We suggest that this was because iStent implantation is often performed in both eyes on subsequent days [22].

The total cost was similar between the laser therapies. The cost of postoperative antiglaucoma drugs and the number and cost of postoperative outpatient visits for cyclodestructive procedures were higher than those for other laser therapies. Cyclodestructive procedures are often indicated for refractory eyes with uncontrolled preoperative intraocular pressures [23]. Refractory eyes often have uncontrolled intraocular pressures even after the procedures and require multiple postoperative antiglaucoma drugs [24].

The total cost of laser therapies is relatively lower than that of incisional surgeries. This difference was mainly due to the difference in hospitalization costs. The lower costs of laser therapies during hospitalization resulted from their lower reimbursement prices and shorter hospital stays. Although the total costs of laser therapies were lower than those of incisional surgeries, the intraocular pressure reduction in laser therapies could be usually smaller than that in incisional surgeries [25]. To account for this, cost-effectiveness analyses of incisional surgeries and laser therapies are needed in future studies.

When stratified by age group, the total cost was the highest in the 0–19 age group, which was mainly due to the high costs during hospitalization. Pediatric surgeries are usually performed under general anesthesia instead of local anesthesia, and additional reimbursement is available for pediatric outpatient visits and hospitalizations.

The frequency and cost of re-admission were also high in the 0–19 age group. Childhood glaucoma is usually treated bilaterally [26] and often requires incisional surgery, because the safety of medication in children is not well established. The costs of postoperative outpatient treatment were low in the 0–19 age group. This can be explained by the result that the percentage of bleb-related surgeries that incur high postoperative costs was lower in the 0–19 age group than those in the other age groups (21.2% vs 58.0%, respectively, $p < 0.001$, chi-square test). In addition, ophthalmic examinations, such as visual field tests and postoperative outpatient procedures under local anesthesia, are difficult to perform in children. The 40–59 age group had the highest cost of outpatient clinic visits, antiglaucoma drugs, and examinations. This was probably because most cases requiring surgery at this age are severe and require strict intraocular pressure management to maintain visual function for the rest of life [27].

A previous study on the cost of incisional glaucoma surgery roughly simulated surgery-related costs based on US Medicare-allowable fees and expected clinical practice [6]. However, the estimation was not accurate because the costs of outpatient clinic visits and ophthalmic examinations such as visual field tests were omitted for simplicity. To overcome this limitation, we included all possible direct cost drivers in the calculation. The results of this study can be used for future cost-effectiveness analyses.

This study has several limitations. First, we counted outpatient visits and re-admissions only at hospitals where the initial surgeries were performed. Thus, we might have underestimated the postoperative costs. Second, the costs were calculated per patient rather than per eye because it was impossible to separate the outpatient costs for each eye. Third, we included only hospitals that provide data on outpatient clinics. Therefore, the proportion of large-scale hospitals and academic hospitals was higher than that in Japan. This may have resulted in an increased proportion of severe cases and shorter follow-up periods. Fourth, in cases where patients visited other physicians and ophthalmologists on the same day, the office visit cost for the other department was included in this study. Fifth, only inpatient surgeries were included. According to the National Database of Health Insurance Claims and Specific Health Checkups of Japan Open Data, the percentage of inpatient procedures was 70.5% in patients undergoing incisional glaucoma surgeries and 3.6% in those receiving laser therapies in 2019 [28]. Therefore, the results of incisional surgeries would have reflected the nationwide reality, whereas those of laser therapies might have been biased to some extent. Finally, some misclassifications and miscoding may be present in the administrative database.

CONCLUSIONS

The one-year total costs of incisional glaucoma surgeries and laser therapies in a real-world setting were assessed in this study. Our results revealed that tube shunt surgery was the most expensive procedure. Filtering surgeries in which conjunctival blebs are constructed required long hospital stays and incurred high postoperative costs. Although the costs of laser therapies were relatively low, their cost-effectiveness compared with incisional surgeries needs further analysis. Our results would be valuable information to assist in conducting future cost-effectiveness analyses.

CONFLICTS OF INTEREST STATEMENT

The authors declare no conflicts of interest in relation to the work presented in the manuscript.

ACKNOWLEDGMENTS

This work was supported by grants from the Ministry of Health, Labour and Welfare, Japan (21AA2007 and 22AA2003), and the Ministry of Education, Culture, Sports, Science and Technology, Japan (20H03907).

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