# CONTEMPORARY PRACTICES IN CATARACT SURGERY– SUBJECTIVE PREFERENCES OF CZECH CATARACT SURGEONS

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*The authors declare that the origin and topic of the study are not in conflict of interest and are not supported by any pharmaceutical company; the paper was not assigned to another journal and was not published elsewhere, except for congress abstracts.*

*The results of the study were partially presented at the ČSRKCH and ČOS congresses in Prague.*

Received: 9 November 2021
Accepted: 11 January 2022
Available on-line: 21 March 2022

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## SUMMARY

**Aims:** The aim of the work was to find out the current subjective preferences of Czech cataract surgeons in terms of individual procedures, techniques and materials used during cataract surgery.

**Material and methods:** This study was conducted in the form of a questionnaire (online, a total of 44 questions). The survey respondents were members of the Czech Society of Refractive and Cataract Surgery. Questions 1–10 concerned the characteristics of the respondent (age, number of operations performed, type of workplace, etc.). Questions 11–20 focused on the surgical procedure used by the specific surgeon (anaesthesia, viscomaterial, position of the main incision, use of antibiotics at the end of the operation, etc.). Questions 21–34 concerned the type of intraocular lens used. Lastly, in questions 35–44, respondents were asked about their individual preferences if cataract surgery were to be performed on them.

**Results:** The questionnaire was fully or partially completed by 72 surgeons (26% of the originally approached subjects). Most of the respondents were experienced surgeons, 74.5% of them have been performing surgeries for more than 10 years, out of which 55.5% perform more than 500 operations per year. The average age of the respondents was 50 years. 65.3% of surgeons use hydroxypropylmethylcellulose during surgery, 74% do not use a femtosecond laser for surgery, 50% never perform posterior circular capsulorhexia, and 98% apply antibiotics to the anterior chamber at the end of surgery. Surgeons predominantly use hydrophobic (80.8%), aspherical (72.3%), clear (54.3%), single-focal (97.9%) and non-preloaded (78.3%) lenses. However, if they were not limited or restricted in any way in their choice, they would prefer aspherical lenses (94.6%), multifocal or extended-focus lenses (78%) and preloaded lenses (96.8%).

**Conclusion:** The subjective preferences of Czech cataract surgeons are relatively variable regarding the individual steps. Often the procedures used do not always correspond with the actual preferences of the surgeon. On the contrary, there is almost complete unity in the steps recommended by professional societies (intracameral antibiotics at the end of the operation).

**Key words:** preferences of cataract surgeons, cataract, intraocular lens

*Čes. a slov. Oftal., 78, 2022, No. 2, p. 72–78*

## INTRODUCTION

Modern cataract surgery using the technique of phacoemulsification and implantation of an artificial intraocular lens is one of the most common and most successful operations performed in human medicine [1,2]. In the Czech Republic (as well as in other economically developed countries), this procedure is relatively standardised and is based on the recommendations of professional societies (ESCRS – European Society of Cataract and Refractive Surgeons, ČSRKCH – Czech Society of Cataract and Refractive Surgery) [3-5]. These recommendations are based on several published studies and follow the principles of evidence-based medicine (EBM). Nevertheless, there is a certain

degree of variability in performing the specific steps of the operation and the materials used, both between individual workplaces and specific surgeons. Some of the reasons for this variability include mainly the large amount of data and information available in the literature on this topic, further the rapid development of materials and technologies used during the operation and, to some extent, economic and marketing influences. For example, after entering the keyword "cataract surgery" in the search engine Pubmed (https://pubmed.ncbi.nlm.nih.gov), more than 2 300 scientific papers concerning this topic published in 2020 were found. The procedures officially recommended by professional medical societies define only the basic steps of the operation, while the specific procedures are chosen by the surgeons according to their experience, possibilities, and preferences, as well as according to the patient's needs and wishes. Knowledge of the subjective preferences of cataract surgeons and their comparison with the reality of the procedures can be helpful in forming an opinion of the professional public on specific issues related to cataract surgery.

The purpose of this study was to discover current subjective preferences of Czech cataract surgeons in the case of individual procedures, techniques and materials used during cataract surgery.

## MATERIAL AND METHODS

The authors of the study created an online questionnaire, which consisted of a total of 44 questions. A link to this questionnaire was distributed by e-mail in April 2021 to all members of the ČSRKCH (a total of 278 people), requesting its anonymous completion. The received answers were then processed and evaluated, using the tools of descriptive statistics – mean, median, standard deviation – in Microsoft Office Excel 2019. Questions 1–10 concerned the characteristics of the respondent. These questions included age, average number of operations performed during an operating day, number of days the surgeon operates in a single week, number of years the surgeon has been actively operating, estimated total number of performed surgeries, number of workplaces the surgeon works at, the type of primary (or if applicable, secondary) workplace, number of operations performed abroad, and lastly, their experience with different types of intraocular surgeries. The following 10 questions (11–20) focused on the surgical procedure used by the specific surgeon. Type of anaesthesia used, type of viscomaterial used (OVD – ophthalmic viscosurgical device), position of the main incision, method of opening the anterior lens capsule, use of femtosecond laser, type of supportive instrument, technique of irrigation-aspiration of lens materials, potential primary opening of the back lens case, method of wound closure, use of antibiotics at the end of the operation. Questions 21–34 (14 in total) concerned the type of intraocular lens (IOL) used. Questions 35–44 (10 in total) evaluated the personal preferences of the given surgeon.

## RESULTS

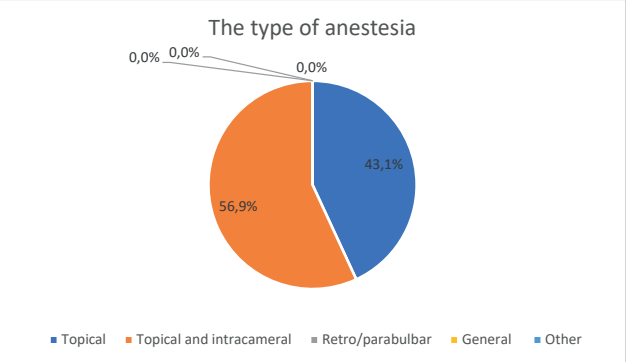
The questionnaire was fully or partially completed by 72 of the approached members of the ČSRKCH (26%). The average age of the respondents was 50, with the oldest aged 70 years, and the youngest 31. In terms of the experience of respondents, they were predominantly very experienced surgeons. 8 respondents stated their estimate of annual cataract surgeries (or clear lens extraction) performed by them as being over 2 000; 3 respondents stated that the number of operations performed by them ranged from 1 501–2 000 per annum; 8 surgeons estimated the number of cataract operations to be between 1 001–1 500 per annum; 11 surgeons 501–1 000; 5 surgeons101-500; 4 surgeons–100; 5 respondents did not perform any operations and 10 respondents chose the option "other". Furthermore, 20 surgeons stated to have been operating for more than 20 years, 12 surgeons 15–20 years, 6 surgeons 10–15 years, 7 surgeons 5–10 years, 4 surgeons 1–4 years and 2 surgeons less than 1 year. Regarding the number of operating days per week, 13 surgeons stated that they operate 4–5 days a week, 23 operate 2–3 days a week, 12 of the questioned surgeons operate at least once a week, and 3 of the respondents do not have a regular schedule for operating days. During a regular operating day, 5 surgeons typically perform more than 20 cataract surgeries, 16 operate between 15–20 cataract surgeries, 17 reported to perform 10–15 cataract surgeries, 8 respondents 5–10, and 5 surgeons operate between 1–5 cataract surgeries. Many of the cataract surgeons also regularly perform other types of eye surgery – antiglaucoma (16 surgeons), vitreoretinal (10), corneal transplantation (11), refractive laser surgery (15), refractive intraocular surgery (23). Only 16 of the questioned surgeons stated that they did not perform any other surgeries besides cataract surgery.

In terms of workplaces of the questioned surgeons, all types of facilities were represented, 33 surgeons listed a private facility as their primary workplace, 8 surgeons stated a teaching university hospital, 4 listed a department of a regional hospital and 4 listed a district-type hospital as their primary workplace. 29 surgeons stated that they operated at a single workplace, while 16 respondents operate at 2 workplaces, 3 at 3 workplaces and 2 stated that they operate at more than 3 workplaces. As their secondary workplace, 16 surgeons mentioned a private facility, 6 a teaching hospital and 1 a regional hospital. Most surgeons solely operate in the Czech Republic (44). 7 of the questioned surgeons operate abroad, while 2 of them do so regularly. In summary, most of the surgeons who participated in the survey have extensive and long-term experience, often at several workplaces.

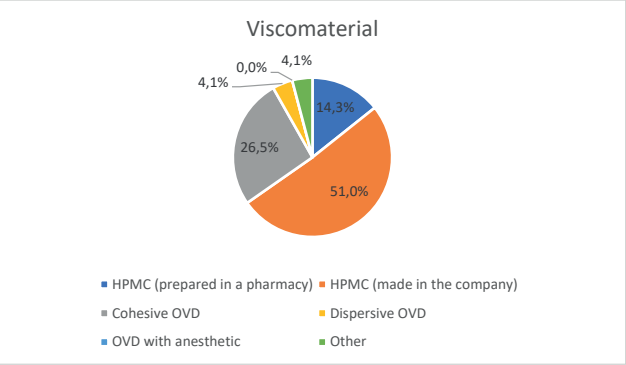
A statistical evaluation of the personal surgical procedure used by a specific surgeon (questions 11–20) is shown in Graphs 1–10. Questions 21–36 concerned the type of IOL and the method of its implantation. In questions 21–25, we asked surgeons which implementation method they performed more often, between two given options in each question. The results are shown in Table 1, middle column.

Questions 26–28 concerned toric IOLs. The majority (71.5 %) of surgeons stated that they use toric lenses in patients with astigmatism, even with less than 2 Dpt, 16.3% of surgeons stated that they use toric lenses exclusively in patients with astigmatism over 2 Dpt, 10.2% do not use toric lenses and 2% checked the "other" option. Overall, surgeons estimate that, out of the total number of implanted IOLs, the toric variants are used in 8.75% cases on average (with the least reported at 0%, and the highest at 30%). To set the axis of the planned position of the toric IOL, 57.8% of surgeons use a navigation system, 11.1% use a marker, 28.9% of surgeons indicate the axis of implantation using a slit lamp, and 2.2% chose the option "other".

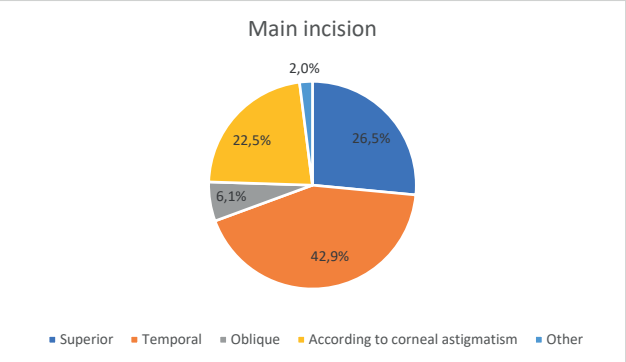
Questions 29–31 observed the use of multifocal IOLs. Most surgeons (79.6%) stated that they use these lenses regularly, 2% use this type of lens exclusively in younger patients, and 18.4% do not implant multifocal IOLs. On average, surgeons estimate that they implant 10.7% of multifocal IOLs (at least 2%, at most 60%), out of which



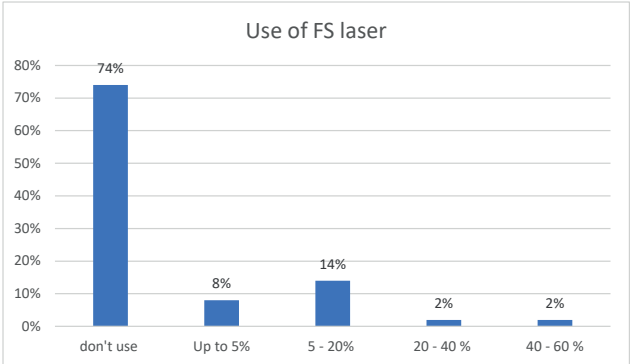

**Graph 1.** Type of standard anaesthesia



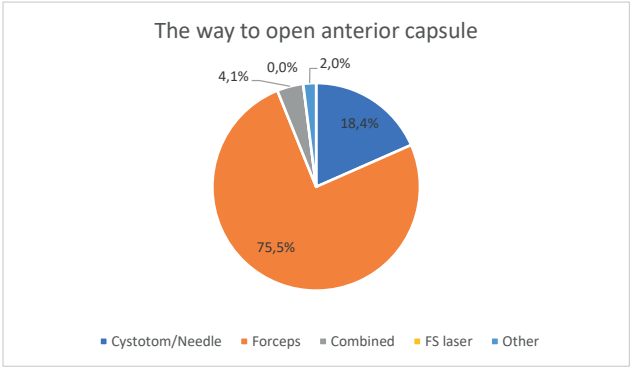

**Graph 2.** Type of dominantly used viscomaterial, HPMC – hydroxypropylmethylcellulose, OVD – Ophthalmic viscosurgical devices



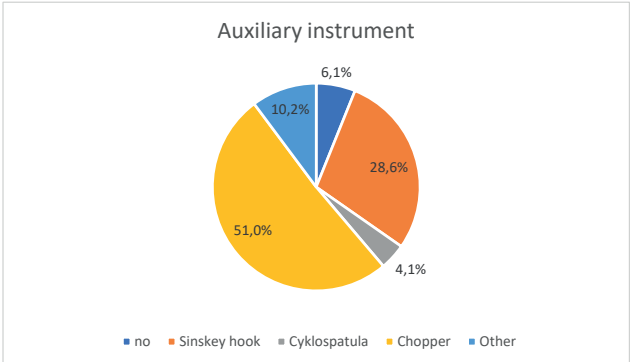

**Graph 3.** Position of the main corneal incisions



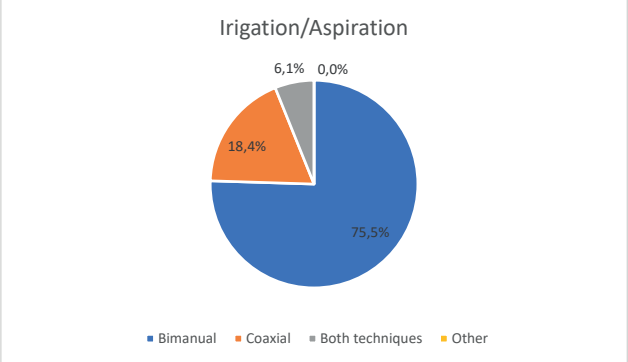

**Graph 4.** Use of Femtosecond (FS) laser during surgery (as a percentage of the total number of cataracts performed by surgeons)



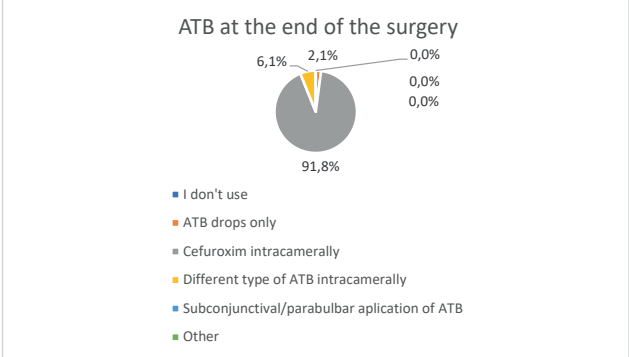

**Graph 5.** How to open the anterior capsule



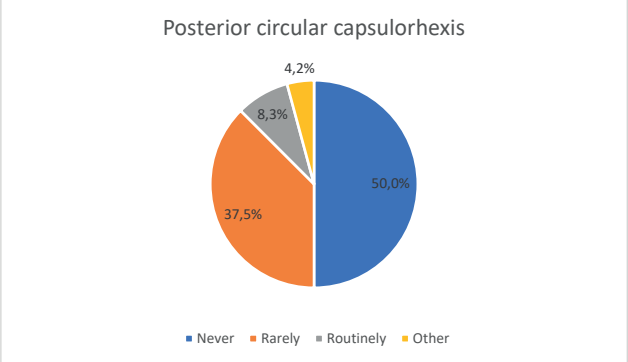

**Graph 6.** Type of second instrument used during phacoemulsification



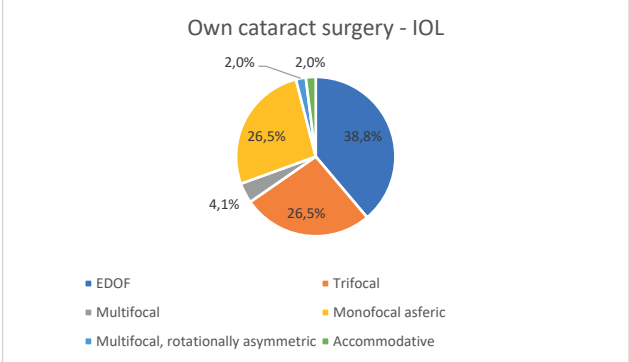

**Graph 7.** Technique of irrigation/aspiration



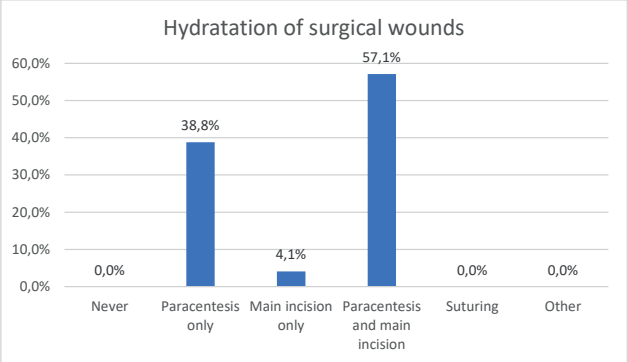

**Graph 10.** Use of antibiotics (ATB) at the end of the surgery



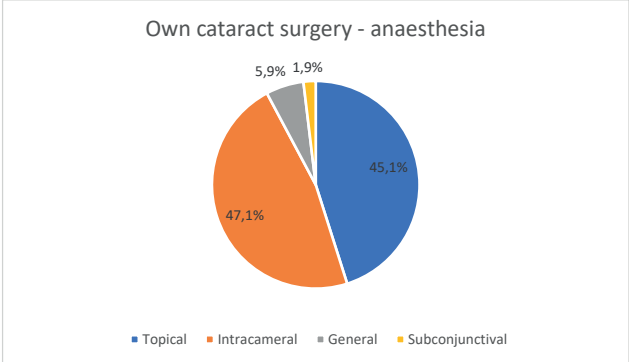

**Graph 8.** Creation of primary posterior circular capsulorhexis




**Graph 11.** Type of preferred intraocular lens (IOL) in the case of own eye surgery




**Graph 9.** Hydration of surgical wounds

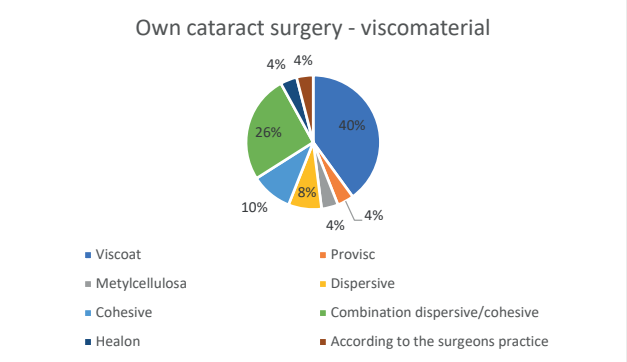



**Graph 12.** Type of preferred anaesthesia in the case of own eye surgery

number (again by estimate) trifocal IOLs make up an average of 81.4%, lenses with elongated depth of focus (EDOF) 12.8%, bifocal IOL 3.5%, and "other" 2.3%.

Questions 32–34 concerned the method of implantation. In most cases (64.6%), a nurse assists during the operation and prepares the lens, 27.1 % of surgeons fold the lens themselves, under the operating microscope, 4.1% of surgeons prepare the lens outside the operating microscope, 2.1% use only preloaded IOL and 2.1% mentioned the "other" option. Roughly one-quarter of the surgeons (25.5%) use cohesive OVD for IOL implantation, 21.3% use hydroxypropyl methylcellulose (HPMC) and most surgeons (53.2%) do not use OVD for implantation (hydro implantation technique). For implantation, 75% of surgeons use piston injectors, 16.6% disposable injectors, 6.3% screw injectors, and 2.1% stated another option.

The last 10 questions investigate the subjective preferences of cataract surgeons. The answers to the question: "Which IOL




**Graph 13.** Type of preferred viscomaterial in the case of own eye surgery

would I implant the most if I did not have to take into account workplace practices or the patient's financial capabilities?" are presented in the third column of Table 1. Regarding the division of lenses by focus, 22% of surgeons would prefer a monofocal lens, 28% trifocal lens and 50% EDOF lens. No surgeon chose the bifocal lens as an option. When asked about using the femtosecond (FS) laser, 46.8% of surgeons stated that they do not use FS laser and do not consider it beneficial, 27.7% do not have FS laser available, but would like to use it during surgery, 8.5% pf surgeons use FS laser, despite not considering it beneficial and 17% use FS laser and consider it to be a beneficial method. When asked about bilateral cataract surgery performed in a single day (immediately sequential bilateral cataract surgery-ISBCS), 22.9% of surgeons answered that they perform this technique by default. Another 12.5% of surgeons will perform it at a patient's request and 52.1% will perform the operation in indicated cases. 12.5% of surgeons never perform this type of operation.

The question: "What do you consider to be the greatest progress in cataract surgery in recent years?" was open-ended, the respondent could give any as well as multiple answers. The most frequent among the answers included: trifocal or multifocal IOL (13x), toric IOL (7x), EDOF lenses (7x), active fluidics (and/or adjusting pressure in the eye) (6x), FS laser (5x), navigation systems (4x) and operating microscopes (4x). Other listed answers included: microincision, biometrics, OVD, intracameral antibiotics and Malyugin Ring.

In the final 6 questions, we asked respondents which method of surgery they would prefer if they themselves had to undergo cataract surgery. The type of IOL preferred is shown in Graph 11. Some respondents named a type of lens from a specific manufacturer, these answers were generalised to the given type of IOL. Two respondents stated a toric variant of the given IOL.

The type of preferred anaesthesia is shown in Graph 12. Out of this number, 2 surgeons would support the anaesthesia of their eye with analgosedation.

The percentage of types of OVD that surgeons would prefer in their own eye surgery is shown in Chart 13. This question was open-ended, meaning the respondents could not choose from proposed options. For this reason, some respondents mentioned the general type of OVD (cohesive, dispersive), whereas others the name of a specific product.

When asked if they would like a surgeon to use an FS laser during their cataract surgery, 11.8% of surgeons answered "yes", 86.3% answered "no". One of the surgeons mentioned that he would like to undergo the cataract surgery with the use of FS laser on one eye and without it on the second eye for personal interest and comparison. 15.7% of surgeons would prefer bilateral surgery (ISBCS), and 84.3% would not. When asked which colleague they would ask to perform their operation, the respondents appointed a total of 17 surgeons – colleagues (listed in alphabetical order): Baráková D., Cendelín J., Fučík M., Hlinomazová Z., Hložánek M., Honner D., Cholevík D. , Kacerovský M., Kuchynka P., Ma-

**Table 1.** Dominantly implanted/preferred kind of intraocular lens

| Type of intraocular lens | Number of surgeons who use this variant more (in %) | Number of surgeons who would theoretically prefer this option (in %) |
|---|---|---|
| Hydrophobic | 80,8 % | - |
| Hydrophilic | 19,2 % | - |
| | | |
| Spherical | 27,7 % | 5,4 % |
| Aspherical | 72,3 % | 94,6 % |
| | | |
| Clear | 54,3 % | 35,5 % |
| With yellow filter | 45,7 % | 64,5 % |
| | | |
| Monofocal | 97,9 % | 22,0 % |
| Multifocal and EDOF | 2,1% | 78,0 % |
| | | |
| Preloaded | 21,7 % | 96,8 % |
| Non-preloaded | 78,3 % | 33,2 % |

rešová K., Němec P., Novák P., Stodůlka P., Studený P., Tihelková E., Továrek L. Váša M. (each surgeon was at most mentioned 5 times, and at least once).

## DISCUSSION

In the literature, comparatively few papers are devoted to the subjective preferences of physicians or cataract surgeons. Although, in the evidence pyramid (which ranks types of studies according to their importance in developing EBM procedures), publications describing expert opinions rank at the bottom [6], the authors of this study believe that knowledge of the subjective preferences of cataract surgeons (as well as a comparison of these preferences with actual and specific practices at different workplaces) can be helpful in forming the opinions of ophthalmologists on certain controversies related to cataract surgery. For example, the comparison is very interesting of the actual procedure and the procedure that the surgeon would have chosen, if not being bound by the financial possibilities and habits of the workplace, or the procedure that the surgeon would have preferred in the operation of their own eye.

For example, for their own surgery, more than 1/3 of surgeons (38.8%) would choose an EDOF lens, another group – also more than one-third (34.6%) – a multifocal lens (trifocal, multifocal, rotationally asymmetric or accommodating) and only less than one-third (26.5%) would choose a monofocal lens. This essentially corresponds with the type of lens surgeons would use in their patients if they had no limitations – 22% monofocal IOL, 78% multifocal and EDOF IOL. However, realistically surgeons use these lenses in an estimated 10.7% of patients, and only 2.1% of surgeons use this type of lens predominantly in their patients. In the same way, differing results can be seen in the use of viscomaterial. In a theoretical scenario of operation on themselves, surgeons would choose methylcellulose in only 4% of cases, but in reality, methylcellulose (company produced or manufactured in a pharmacy) is used by 65.3% of surgeons.

On the contrary, the results when comparing the anaesthesia actually used during real surgeries and that preferred by surgeons were almost identical, if it were to be used on themselves if undergoing a cataract surgery: topical - 43.1 or 45.1% and intracameral – 56.9 or 45.1%. Out of the questioned group, 3 colleagues would also prefer general anaesthesia, or would support the anaesthesia with analgosedation (2 colleagues).

It is possible to find an extensive number of studies and publications in the professional literature devoted to the comparison of different types of anaesthesia, both from the perspective of the patient and the surgeon. Especially in older publications regarding this topic, more invasive methods of anaesthesia (general, subconjunctival) were rated slightly better, as they are perceived as a more comfortable option [7,8]. In general, less invasive methods of anaesthesia (topical, intracameral) predominated in cataract surgery. The most likely reason for this finding is the considerable simplicity of these procedures and the low risk of complications. Papers which compare the effectiveness of topical and intracameral anaesthesia find only minor differences between the two, and slight benefits of intracameral (or combined) anaesthesia [9,10].

Other interesting insights were discovered while evaluating questions about the use of FS laser. Nearly 3/4 of surgeons (74%) stated that they do not use FS laser for cataract surgery. Although, out of this number, about 1/3 of surgeons (37.4%) would like to use this technology, others do not consider it beneficial. On the contrary, out of the surgeons who have FS laser available during surgeries (26%), 2/3 consider this technology to be a beneficial addition (65.4%), and 1/3 (34.6%) do not see any benefit. Only 11.8% of cataract surgeons would like an FS laser to be used during their own cataract surgery. On the other hand, 5 surgeons consider FS laser to be the greatest advancement in cataract surgery in recent years. The ambiguity of the data in the professional literature also corresponds with the diverse opinions on this technology. Moreover, it possible to find studies in which surgeons evaluate FS laser as beneficial [11,12] and vice versa [13,14].

Furthermore, the bilateral cataract surgery performed in one day remains quite a controversial question. Roughly 1/5 (22.9%) of the surgeons standardly perform this method, another 64.6% of respondents opt for this method at the request of the patient or in indicated cases. Only 12.5% never perform this method. Conversely, if the surgeons were to undergo the cataract surgery themselves, only 15.7% of surgeons would choose the option of surgery on both eyes in a single day.

From the above discussed and compared results of the actually used and preferred practices, it can be assumed that economic influences (e.g. prices of single-focal and multifocal IOLs, preloaded and non-preloaded IOL variants, OVD type) to some extent affect the choice of a particular method used, as well as cause differences between a real procedure and a procedure which would be preferred by the surgeon. This is despite the fact that financially more demanding variants are more advantageous according to the personal experience of surgeons and according to the literature [15,16]. On the contrary, when the potential economic difference in variants is insignificant (anaesthesia, hydrophobic versus hydrophilic IOL), the differences are not major or are even non-existent.

## CONCLUSION

The subjective preferences of Czech cataract surgeons are fairly variable regarding the individual steps. The procedures actually used do not always correspond to the surgeon's real preferences. Most variable opinions are visible in the areas of some newer procedures, such as the use of FS laser or the ISBCS operation. On the contrary, there is almost complete unity in the steps recommended by professional companies (intracameral ATB at the end of the operation).

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