



## Original article

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## FIRST EXPERIENCES IN ULTRASOUND CATARACT OPERATION-PHACOEMUL- SIFICATION

## SUMMARY

In the course of the first six months of 2004, 852 patients have undergone operations in Ophthalmology Clinic Ni{ for various forms of cataract. Out of the total number of patients operated for cataract, in 164 (19.2%) cases we performed an ultrasound cataract operation - phacoemulsification. During the operation, all patients received implantation of PMA lenses. The method of phacoemulsification has been performed on Millennium apparatus, manufactured by Baush&Lomb company, while method of extracapsular extraction has been performed after classical limbal incision with opening of 10-12mm.

During our work, we analyzed the number of postoperative and operative complications in 164 patients operated by ultrasound method and compared it with the same findings for 165 patients operated by manual extracapsular method with implantation of hard intraocular lenses.

We also analyzed the length of hospital stay and postoperative visual acuity for both groups of patients.

The results reveal that the number of operative and postoperative complications caused by application of phacoemulsification method has been significantly lower compared to the technique of manual extracapsular extraction.

Postoperative recovery is much quicker in patients operated by ultrasound method; local status during the first postoperative day shows a smaller number of pronounced signs of postoperative reactions (redness of the eye, corneal edema, exudation signs). The average length of recovery for patients operated by extracapsular method was 3.5 days, while for patients operated by phacoemulsification it was only one day.

*Key words:* ultrasound cataract operation, phacoemulsification

## INTRODUCTION

In the last ten years since in 1970 the first successful ultrasound cataract operation was performed, this method has become through advancement of new technologies, equipment, intraocular

lenses and operation techniques, the leading method for treatment of millions of people suffering from cataract (1-3).

Ultrasound cataract operation is the most advanced technique that enables the performance of postoperative procedure after minimal transcorneal

incision of 3mm, with minimal trauma for the eye, by way of introduction of ultrasound probe by means of which phacoemulsification of lenses nucleus is performed. The operation is performed in local anesthesia, after application of peribulbar or subtenon anesthesia. The average operation time is 15–20 minutes, mostly performed as one-day surgery (4).

The application of ultrasound method also enables us to operate cataract patients in the early stages of the disease, when the lenses still are not completely opaque, but when there are still significant visual function disturbances. Since the postoperative recovery is short, the patients can quickly return to their duties and normal life. Classical manual extracapsular cataract operation still has its place in everyday clinical practice, but more and more it is being replaced by ultrasound cataract extraction (5,6).

After the acquisition of the most contemporary apparatus for ultrasound operations and performance of the first operation on October 28, 2003, in Ophthalmology Clinic, Ni{, we have been using this method as a routine operation (7). In this paper, we present the experiences acquired during the six months of intense performance of this operation.

### MATERIAL AND METHODS

Intraoperative and postoperative complications, postoperative visual acuity and postoperative findings after cataract operation in 164 patients operated by ultrasound method, phacoemulsification, have been compared with those of 165 patients operated by manual extracapsular method with implantation of intraocular lenses.

Ultrasound operations were performed by means of Millennium apparatus, manufactured by Baush&Lomb, and by means of implantation of silicon lenses, manufactured by the same company. Operation technique includes the application of transcorneal incision of 3mm, continued capsulorhexis, hydrodissection of lenses nucleus and the removal of nucleus and perinucleus by means of ultrasound probe introduced in the front chamber.

Manual extracapsular method (ECCE) was performed by means of limbal incision of 10–12mm, by manual extraction of nucleus and aspiration of lenses mass, along with implantation of hard acrylate lenses, and making of 5-6 corneal single sutures.

All operations have been performed with use of local peribulbar and subtenon anesthesia. Statistical analyses have been performed by use of <sup>2</sup>-test.

### RESULTS

Out of the total number of 852 patients operated for cataract in the first six months of 2004, in 164 (19.2%) we performed ultrasound operation, phacoemulsification. In this period we also performed 668 (80.8%) manual extracapsular cataract operations, out of which we analyzed 165 randomly chosen cases. Structure according to sex is shown in table 1.

Table 1. Structure according to sex of cataract operated patients

Operation type	Male		Female	
	N	%	N	%
Phacoemulsification	74	25.2	90	54.8
ECCE	72	43.6	93	54.4
Total	146	44.8	183	55.2

In the previous table we may notice a greater number of patients operated for cataract, 183 (55.6%). In the next table you can see age structure of cataract operated patients, with regard to use of two different operative techniques.

Table 2. Age structure of cataract operated patients

Operation type	Male (years)	Female (years)	Mean
Phacoemulsification	63.7	66.7	65.2
Manual ECE	71.9	73.1	72.5
Total	67.8	69.9	68.8

It is evident that the average age of patients operated by phacoemulsification method was lower, 65.2 years, compared to the group operated by manual extracapsular lens extraction, where it was 72.5 years. The youngest patient from the first group was 23 years old while the oldest was 82. In the second group, the youngest patient was 57, while the oldest was 93.

Table 3. Preoperative visual acuity in cataract operated patients

Visual acuity	Phacoemul-sification	ECCE	P
Light detection and normal projection	4	46	p<0.01
Finger count in front of the eye	5	63	p<0.01
< 0.10	87	34	p<0.05
> 0.10	68	22	p<0.01
Total	164	165	

It is evident that preoperative visual acuity in the group of patients operated by manual extracapsular method was much lower, where we also had the greatest number of eyes with light detection and finger count. In the group operated by phacoemulsification there was a much greater number of those with visual acuity higher than 0.10 (table 3). In the table 4, you can see postoperative visual acuity, the day after the operation, for cataract-operated patients.

Table 4. Postoperative visual acuity in cataract operated patients

Visual acuity	Phacoemul-sification	ECCE	P
< 0.1	24	37	p>0.05
0.1- 0.3	47	56	p>0.05
0.4- 0.6	35	39	p>0.05
0.7- 1.0	56	33	p<0.01

Postoperative visual acuity, the day after the operation was significantly better in the group operated by ultrasound method; there was especially a great number of eyes with visual acuity 0.7–1.0, 56 patients (p<0.01). In table 5, you can see the most common intraoperative complications in the group of operated patients.

Table 5. Intraoperative complications

Complications	Phacoemul-sification	ECCE	P
Operative wound bleeding	–	25	p<0.01
Iris bleeding	5	5	p>0.05
Vitreous body prolapse	4	12	p<0.05
Lenses luxation in CV	2	2	p>0.05
Implant dislocation	3	3	p>0.05

Apart from more frequent capillary bleeding from operative wound in extracapsular operation and a greater number of vitreous body prolapses in this group, there were not significant differences in the frequency of other complications. In the table 6, you can see postoperative complications in the same group of patients.

Table 6. Postoperative complications

Complications	Phacoemul-sification	ECCE	P
Suture dehiscence	–	10	p<0.05
Corneal epithelia edema:			
- mild	25	30	p>0.05
- moderate	12	24	p<0.05
- severe	6	12	p>0.05
Wrinkled m.Descemeti			
- mild	17	34	p<0.05
- moderate	11	27	p<0.01
- severe	6	11	p>0.05
Shallow anterior eye chamber	–	10	p<0.05
Exudation in CA	16	36	p<0.05
Anterior chamber coagulum	2	7	p>0.05
Irregular pupile	4	18	p<0.05
Lens mass remains	5	24	p<0.01
Anterior lens capsule remains	–	16	p<0.01
Bad lens centering	7	9	p>0.05
Lens dislocation	3	3	p>0.05
Endophthalmitis	–	–	p>0,05

The most significant difference in the frequency of postoperative complications was in the occurrence of lens mass remains and anterior lens capsula in manual extracapsular extraction, which is directly related to the characteristics of the operation technique itself, while in this method due to manual flushing and removal of lens masses there is a higher risk of a fragment remaining in the anterior eye chamber. There was not a single case of endophthalmitis in both groups of operated patients.

The length of postoperative hospital stay for the patients operated for cataract is not shown in a table but our results show that most of the patients operated by phacoemulsification method spent less than one day in hospital while the average hospital stay for patients operated by means of manual extracapsular extraction was 3.5 days.

## DISCUSSION

Cataract operation is the most frequent elective operation performed on a human being. Because of a great number of patients suffering from cataract all around the world, there is a need for constant increase of the number of operations. While in undeveloped countries cataract still represents the most common cause of blindness, the developed countries strive to increase the number of operations through introduction of new operative techniques and reduce the length of treatment and thereby enable faster physical and social recovery of the patient (4,8,9).

The analysis of our first results after working with the new operative technique-phacoemulsification for six months reveal many advantages of this operation compared to manual extracapsular lens extraction.

The latest opinions concerning the indications for cataract operation reveal that the patients can be operated in the early phase of the disease, when there is not a drastic decline in visual acuity, but its reduction prevents the patient in performance of everyday activities. There is not a clear line for deciding the appropriate time for this operation, but this time is getting shorter and shorter (2,8).

Our results show that the average age of patients who are operated by means of ultrasound method is significantly lower when compared to that for manual extracapsular extraction. Younger patients, especially those who are professionally active, are motivated to be operated by phacoemulsification method, and this technique is more suitable for the type of cataract they usually have.

Some operative and postoperative complications, due to the specificities of ultrasound operation, practically never occur. Dehiscence of corneal suture can occur after manual extracapsular extraction, because corneal incision is so small after ultrasound operation that it is not stitched. Operative wound bleeding in limbal incision is not considered a serious complication because it is a capillary bleeding, so greater incidence of this complication in manual extracapsular operation is not considered important although there is a statistical significance.

In the group with manual ECCE extraction there is also a greater number of prolapses of vitreous body which also represents a complication typical for this operative technique and it is more frequently seen in mature and hyper mature cataracts which are more frequent in this group of operated patients.

On the other hand, ultrasound cataract operation, especially in the phase of introduction of this method, can produce more frequent corneal complications, in the form of epithelial edema and potential keratopathies, as well as ruptures of posterior capsula and dislocation of implanted lenses (10,11).

Our first experiences are very favorable, because the complications occurred rarely, below the average percentage. This can be explained by adequate and timely education of our personnel involved in the operation (surgeon, anesthesiologist, assistant) and the choice of teacher with great previous experience in these operations.

We should also take into account that some of the complications that occurred in phacoemulsification are the consequence of the phases of education of some surgeons performing this technique. At the same time, manual extracapsular cataract extraction is performed by a greater number of surgeons, also having different level of experience, so statistical analysis must be accepted with some reserve because this retrograde analysis excludes randomization of the studied groups.

We can unambiguously conclude that the recovery after ultrasound operation is much faster because of lesser trauma it produces. This is also confirmed by a smaller number of postoperative complications as well as by greater degree of postoperative visual acuity. The patients operated by phacoemulsification method can leave the hospital after several hours, which is a great advantage and convenience for the patient (12).

At the end we can conclude that our first experiences unequivocally confirm that phacoemulsification is a method of choice and the future in cataract surgery. This method requires very precise execution of surgery and leads to much shorter hospital stay and faster recovery of the operated eye. The number of successfully completed ultrasound

cataract operations at the Ophthalmology Clinic in Nis is significant and has an increasing tendency, so we can realistically expect that it will double in the next period, and that further personnel education

will cause it to exceed the number of manual extracapsular extractions.

## REFERENCES

1. Brian G, Beaumont J, Hollows F, Holt P. Intraocular lens implantation; a model for the Third World. *Aust NZJ of Ophthalmol* 1988;16:321-324.
2. Stark WJ, Sommer A, Smith RE. Changing trends in intraocular lens implantation. *Arch of Ophthalmol* 1989;107:1441-1444
3. Olson R.J, M Mamlis N, Werner L, David JA. Cataract treatment in the beginning of the 21<sup>st</sup> century. *Am J Ophthalmol* 2003;136:10-17
4. Brian G, Taylor H. Cataract blindness-challenges for the 21<sup>st</sup> century. *Bull World Health Org* 2002;79:249-256.
5. Schein OD, Steinberg EP, Cassard SD, Tielsch JM, Javitt Jc, Sommer A Predictors of outcome in patients who underwent cataract surgery. *Ophthalmology* 1995; 102: 817-823.
6. McCarty CA, Keeffe JE, Taylor HR. The need for cataract surgery: projections based on lens opacity, visual acuity, and personal concern. *Br J Ophthalmol* 1999;83:62-65.
7. Veselinović D. Operacija katarakte u Klinici za očne bolesti Ni: Pogled u prošlost i budućnost. *Glasnik* 2003;1:25-27
8. Gillies M, Brian G, La Nauze J, Le Mesuzier R, Moran D, Gaylar H, Rut S. *Arch O.* 1988, 116:90-92.
9. McCarty CA, Mukesh BN, Dimitrov PN, Taylor HR. Incidence and progression of cataract in the Melbourne visual impairment project. *Am J Ophthalmology* 2003;136:10-17.
10. McCarty CA, Mukesh BN, Dimitrov PN, Taylor HR, Dowler JG, Hykin PG, Hamilton AM. Phacoemulsification versus extracapsular cataract extraction in patients with diabetes. *Ophthalmology* 2000;107:457-462.
11. Cunliffe IA, Flangan DW, George ND, Aggarwal RJ, Moor AT. Extracapsular cataract surgery with lens implantation in diabetics with and without retinopathy. *Br J Ophthalmol* 1991;75:9-12.
12. Antcliff RJ, Poulson A, Flangan DW. Phacoemulsification in diabetics. *Eye* 1996;10:737-741

## PRVA ISKUSTVA U ULTRAZVU^NOJ OPERACIJI KATARAKTE I FAKOEMULZIFIKACIJI

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U toku prvih šest meseci 2004. godine u Klinici za očne bolesti Ni, operisano je 852 pacijenta zbog različitih formi katarakti. Od ukupnog broja pacijenata operisanih zbog katarakte u 164 (19.2%) slučajeva izvršena je ultrazvučna operacija katarakte i fakoemulzifikacija. Kod svih pacijenata je u toku operacije izvršena implantacija PMA sočiva. Metoda fakoemulzifikacije rađena je na aparatu Millenijum, firme Baush&Lomb, dok je metoda ekstrakapsularne ekstrakcije vršena nakon klasičnog limbalnog reza pri otvoru od 10-12mm.

U radu se analizira broj operativnih i postoperativnih komplikacija kod 164 pacijenta operisanih ultrazvučnom metodom i poredi se sa istim nalazima 165 pacijenata operisanih manuelnom ekstrakapsularnom metodom uz implantaciju tvrdih intraokularnih sočiva.

Takođe se analizira dužina bolničkog lečenja i postoperativna smrtnost obe grupe pacijenata.

Rezultati pokazuju da je broj operativnih i postoperativnih komplikacija primenom metode fakoemulzifikacije znatno manji u poređenju sa tehnikom manuelne ekstrakapsularne ekstrakcije.

Postoperativni oporavak je znatno brži kod pacijenata operisanih ultrazvučnom metodom, lokalni status prvog postoperativnog dana sa mnogo manje izraženih znakova postoperativnih reakcija (crvenilo oka, edem rožnjače, znaci eksudacije). Prosečna dužina lečenja pacijenata operisanih ekstrakapsularnom metodom je 3,5 dana, dok je kod pacijenata operisanih metodom fakoemulzifikacije jedan dan.

ključne reči: ultrazvučna operacija katarakte, fakoemulzifikacija.