

Clear corneal Phacoemulsification surgery under topical anesthesia and intracameral Lidocaine at the Royal Medical Services of Jordan

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Abstract

Objectives: to assess the incidence of posterior capsule rupture, the visual outcome, and complications associated with clear corneal phacoemulsification surgery under topical anesthesia and intracameral lidocaine at the Royal Medical Services of Jordan.

Method: This retrospective, non-controlled, observational study was conducted in the Princess Haya Military Hospital, Royal Medical Services of Jordan between August 2018 and April 2019. Files of patients who underwent clear corneal phacoemulsification surgery under topical anesthesia and intracameral lidocaine during the study period, were considered for the research. The inclusion criteria were patients aged above 40 years with visually significant cataract and normal posterior segment examination. The exclusion criteria were patients who had incomplete data, ocular disease apart from cataract, or previous surgery in the operated eye, and combined surgery. The follow-up period was two months.

Results: The files of 400 patients were reviewed, and the complete data of 400 eyes which underwent clear corneal phacoemulsification under topical anesthesia and intracameral lidocaine were enrolled in the study. 216 (54%) patients were males and 184 (46%) patients were females. Three eyes of

three patients (0.75%) developed ruptured posterior capsule. The average unaided and best corrected visual acuity in decimals significantly improved ($p < 0.01$). Only thirty-three (8.25%) patients developed minor complications.

Conclusion: Phacoemulsification surgery under topical anesthesia and intracameral lidocaine is a safe procedure and is not associated with sight-threatening complications; it does not increase the risk of posterior capsule rupture and significantly improves the unaided and best corrected visual acuity.

Key words: Phacoemulsification, Topical anesthesia, Tetracaine, Lidocaine, Posterior capsule.

Introduction

Cataract is the clouding and opacification of the eye lens (1), and it accounts for half of the blindness cases and 33% of visual impairment cases worldwide (2, 3). There are two surgical techniques for cataract removal: intracapsular cataract extraction without intraocular lens implantation and extracapsular cataract extraction with intraocular lens implantation (4)

Phacoemulsification, from Greek "phako" meaning "lens" (5), is a modern type of extracapsular cataract extraction that was invented in 1967 by Dr. Charles Kelman after being inspired by his dentist's ultrasonic probe (6). In phacoemulsification, the internal material of the lens is emulsified, aspirated and foldable intraocular lens is implanted through small corneal incisions.

Phacoemulsification surgery can be accomplished under general anesthesia, regional anesthesia (retrobulbar and peribulbar block), sub-tenon block and topical anesthesia. Under general anesthesia, the patients are subjected to all complications of anesthesia (7). Retrobulbar block was considered the gold standard for years, but it was associated with the risks of scleral perforation, retinal vascular occlusion, optic nerve damage, hematoma, and central nervous system (intrathecal) spread (8). Peribulbar block minimized the incidence of optic nerve damage, hematoma and intrathecal spread, but Peribulbar block and retrobulbar block are blind procedures (9). Despite being a safe procedure, Sub-tenon anesthesia is associated with minor as well as sight-threatening complications such as direct optic nerve damage and globe perforation (10). In contrast, topical anesthesia avoids all the previously mentioned complications (7). The present study was designed to assess the incidence of posterior capsule rupture, the visual outcome, and complications associated with clear corneal phacoemulsification surgery under topical anesthesia and intracameral lidocaine at the Royal Medical Services of Jordan.

Methods

This retrospective, non-controlled, observational study was conducted in the Princess Haya Military Hospital, Royal Medical Services of Jordan between August 2018 and April 2019. Files of patients who underwent clear corneal phacoemulsification surgery under topical anesthesia and intracameral lidocaine during the study period were considered for the research. The inclusion criteria were patients aged above 40 years with visually significant cataract and normal posterior segment examination. The exclusion criteria were patients who had incomplete data, ocular disease apart from cataract or previous surgery in the operated eye, and combined surgery. The IOL Master500 (from Zeiss) was used to calculate the intra ocular lens power. The type of anesthesia was topical tetracaine and intracameral lidocaine without any intravenous sedation. The extracted data included: age, gender, before surgery unaided and best corrected visual acuity, unaided and best corrected visual acuity at one week and one months

after surgery, number of cases which developed ruptured posterior capsule during surgeries, need for conversion to another anesthetic technique, and post-surgery complications. The surgeries were done by two surgeons*, who had good experience in phacoemulsification surgery. The follow-up period was two months. Simple statistical analysis was used for analyzing the data.

The study and data collection process complied with the tenets of the Declaration of Helsinki, and the ethical committee of the Royal Medical Services approved the study.

Surgical Technique

The standard protocol followed for such cases in the Princess Haya Military Hospital is as follows:

Three drops of topical anesthesia (Tetracaine 1.0%) are applied to the eye five minutes apart preoperatively. The eye is then scrubbed and draped, and the lid speculum is inserted. One drop of tetracaine is applied just before starting the corneal incisions. Two corneal (temporal and nasal) side ports are made by MVR 19G, and then 0.3 ml of preservative free lidocaine 1% is injected intracamerally through one of the side ports, followed by injection of viscoelastic agents (Healon) in the anterior chamber. A 2.8 mm superior corneal incision is made using Keratome. Manual capsulorhexis is achieved by using capsule forceps. Hydrodissection and hydrodelineation are then followed by phacoemulsification steps which are accomplished by Stellaris phaco machine (Stellaris phaco system from Bausch and Lomb is used in Princess Haya Hospital). Balanced Salt Solution (BSS) is used during the whole phacoemulsification surgery. Bimanual irrigation and aspiration of cortex is followed by injection of Healon; after that foldable silicone intra-ocular lens is implanted in the bag, followed by aspiration of Healon and corneal wound hydration. Then 1.0 ml of a mixture of dexamethasone phosphate (4mg/ml) and gentamycin (40mg/ml) is injected subconjunctivally at the end of surgery. The ruptured posterior capsule is managed by automated anterior vitrectomy using Stellaris phaco machine, and three pieces intraocular lens is implanted in the ciliary sulcus when applicable.

Four hours after the surgery, the eye pads of the patients were removed, and they started using topical antibiotic (ofloxacin 0.3% eye drop) and pred forte (prednisolone acetate 1.0% Eye drop) hourly. On the first day after surgery, the patients were assessed in the clinic, and topical eye drops were tapered to 6-8 times a day. After that, the patients were assessed at one week, one month, and two months after surgery. Fundus fluorescein angiography and optical coherence tomography (OCT) were ordered in selected cases. Ofloxacin and pred forte eye drops were slowly tapered and then discontinued six weeks after the surgery.

In addition to the previously mentioned eye drops, patients who had ruptured posterior capsule used Acular (Ketorolac tromethamine 0.5%, a non-steroidal anti-inflammatory drug) eye drop four times a day for one week; the eye drop was tapered slowly and discontinued one month after the

surgery. During first day after surgery visit, Edenorm 5% (hypertonic lubricant ophthalmic solution) was prescribed for patients who developed corneal edema, for four to six times a day for one week.

Results

The files of 400 patients were reviewed, and the complete data of 400 eyes which underwent clear corneal phacoemulsification under topical anesthesia and intracameral lidocaine were enrolled in the study. 216 (54%) patients were males and 184 (46%) patients were females. The average age of males at the time of surgery was 60.59 ± 9.68 years (range from 43 to 78 years), whereas the average age of females at the time of surgery was 65.22 ± 8.44 years (range from 45 to 79 years). The male to female ratio was 1.17: 1 (Table 1). Three eyes of three patients (0.75%) (one female and two males; female's age was 64 years while the two males' age was 62 and 68 years) developed ruptured posterior capsule during the irrigation aspiration step of the surgery, without lens matter drop in any of them. All of the three were managed by automated anterior vitrectomy at the same sitting, and three pieces intra ocular lens was inserted in the ciliary sulcus. None of them required suturing for main wound closure or conversion of anesthesia type.

The average unaided visual acuity and the average best corrected visual acuity in decimals before surgery was 0.17. One week after surgery, the average unaided visual acuity was 0.83, and the best corrected visual acuity was 0.9; both were statistically significant (with P value < 0.01 for both, T-test). One month after surgery, the average unaided visual acuity was 0.9, and best corrected visual acuity was 0.93, and both were statistically significant (P value < 0.01, T- test), as shown in Table 2.

Thirty-three (8.25%) patients developed complications after phacoemulsification surgery, including 15 (3.75%) males and 18 (4.5%) females. A total of 28 patients (7%; 12 males and 16 females) had corneal edema. The corneal edema was transient, lasting around one week after surgery without serious sequelae (no single case of bullous keratopathy had been reported during the given follow-up period). Three (0.75%) patients (2 males and 1 female), had posterior capsule opacification. Two patients (0.5%; 1 male and 1 female) had inflammatory membrane, which was treated medically by increasing the frequency of prednisolone acetate (1.0%) eye drop to hourly dosage, adding cyclopentolate hydrochloride (1%) eye drop three times a day, and subconjunctival injection of 1.0 ml of (dexamethasone phosphate 4 mg/ml and gentamycin 40 mg/ml) once a day for three days; the condition of both patients improved within one week, and the eye drops were tapered slowly. No patients had dislocated intra-ocular lens, rise of intraocular pressure, retinal detachment, or endophthalmitis. Fundus fluorescein angiography and macular OCT were requested for patients who had ruptured posterior capsule or abnormal macular reflex, and none of them showed clinically significant cystoid macular edema (Table 3).

Discussion

Topical anesthesia is increasingly used in phacoemulsification surgery; however, there are a limited number of comparative studies (11). In 1996, Fichman evaluated pain and discomfort experienced by patients who underwent cataract extraction and found no change in the vital signs during surgery when using topical anesthesia without intravenous sedation (12).

According to the literature, the overall incidence of posterior capsule rupture ranges from 0.45% to 5.2% (13). Surgeon's experience and the presence or absence of risk factors (glaucoma, pseudoexfoliation, etc.) (14) can affect the incidence of posterior capsule rupture. In 2014, a study conducted at a Hawaiian cataract surgical center (15), found that the incidence rate of posterior capsule rupture during phacoemulsification surgery under topical anesthesia was 0.68%. Similarly, a Canadian study found the incidence rate to be 0.5% (16).

Tavares et al. conducted a study in Brazil (11) and reported statistically significant improvement in average visual acuity after phacoemulsification surgery under topical anesthesia. In a study published in the United Kingdom (17), the overall incidence of complications after phacoemulsification surgery was 8.7%, and only 2.4% were major complications. On the contrary, an Indian study reported only minor complications post phacoemulsification surgery under topical anesthesia which did not affect the visual outcome and were not related to anesthetic technique (18). Carino reported that both topical tetracaine and intracameral lidocaine were safe and effective in patients having phacoemulsification surgery (19).

In our study, the incidence of posterior capsule rupture was 0.75%, which is consistent with that reported in the literature. The average unaided and best corrected visual acuity improved significantly (p value < 0.01) after surgery. Only 8.25% developed minor complications which were either transient or treatable, and there were no sight-threatening complications such as endophthalmitis or retinal detachment.

Topical anesthesia and intracameral lidocaine can safely replace other ocular anesthetic techniques in phacoemulsification surgery without increasing the rate of rupture posterior capsule or inducing sight-threatening complications.

Conclusion

Phacoemulsification surgery under topical anesthesia and intracameral lidocaine is a safe procedure and is not associated with sight-threatening complications; it does not increase the risk of posterior capsule rupture and significantly improves the unaided and best corrected visual acuity

Table 1: The demographic characteristics of the studied population

	Males	Females
Number of patients	216 (54%)	184 (46%)
Average age at time of surgery	60.59 ±9.68 years	65.22±8.44 years
Range of age	43 - 78 years	45 – 79 years

Table 2: The average unaided and best-corrected visual acuity (in Decimal) before surgery, one week, and one-month after surgery

	Average unaided visual acuity	Average best corrected visual acuity
Before surgery	0.17	0.17
One week after surgery	0.83 (P value<0.01)	0.9 (P value<0.01)
One month after surgery	0.9 (P value<0.01)	0.93 (P value<0.01)

Table 3: Complications after phacoemulsification surgery under topical anesthesia and intracameral lidocaine

Complications	Number of male patients	Number of female patients	Total number of patients
Corneal edema	12	16	28 (7%)
Dislocated intra ocular lens	0	0	0 (0%)
Rise of intra ocular pressure	0	0	0 (0%)
Inflammatory membrane	1	1	2 (0.5%)
Posterior capsule opacification	2	1	3 (0.75%)
Retinal detachment	0	0	0 (0%)
Endophthalmitis	0	0	0 (0%)
Bullous keratopathy	0	0	0 (0%)
Cystoid macular edema	0	0	0 (0%)
Total	15 (3.75%)	18 (4.5%)	33 (8.25%)

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