Analysis of ocular cyclotorsion in lying position after peribulbar block and topical anesthesia

Análise da ciclotorção ocular em posição supina após bloqueio peribulbar e anestesia tópica

Newton Kara-Junior[1]; Paula C. Mourad[1]; Renata L. B. Moraes[2]; Caroline Piva[3]; Marcony Rodrigues Santhiago[1]

ABSTRACT

***Purpose**: Evaluate the magnitude of cyclotorsion during cataract surgery in patients with indication for intraocular toric lenses comparing the results after peribulbar and after topical anesthesia.**Methods**: This prospective study comprised 112 eyes that underwent cataract surgery with implantation of toric intraocular lens by topical anesthesia or peribulbar block**. We estimated how many degrees of cyclotorsion occurred after topical anesthesia and peribulbar block with the patient in supine position. A tag was performed in the position of 180 degrees of the right eye and zero degrees of the left eye, with the patient seated. Afterwards, it was requested a change to the supine position and then a new dial in 180 and zero degrees respectively from right and left eye were made. **Results:** The current study demonstrated that patients submitted to cataract surgery with implantation of toriclens under local anesthesia showed approximately 6.89 degrees of incyclotorsion (82 eyes) and 6.93 degrees of excyclotorsion (38 eyes) and a mean of cyclotorsion of 6.91 degrees. Patients undergoing peribulbar block showed 5.68 degrees of incyclotorsion (73 eyes) and 4.81 degrees of excyclotorsion (47 eyes) and a mean of cyclotorsion of 4.92 degrees. **Conclusion:**Through the study we can see that the movement of incyclotorsion in patients undergoing peribulbar anesthesia was lower when compared to topical anesthesia. This is relevant since the greater the incyclotorsion, the lower the predictability of the surgery and the lower the chance of obtaining excellent results in the final refractometric.*

***Kewords**:Eye movements; Torsion abnormality; Patient positioning;Peribulbar block;Anesthesia, local; Administration, topical*

RESUMO

Objetivo: Avaliar a magnitude da ciclotorção durante a cirurgia de catarata em pacientes com indicação de lentes intraoculares tóricas comparando os resultados após o bloqueio peribulbar e após a anestesia tópica. **Métodos**: Esse estudo prospectivo compreende 112 olhos que foram submetidos à cirurgia de catarata com implante de lente intraocular tórica por meio de anestesia tópica ou bloqueio peribulbar. Foram estimados quantos graus de ciclotorção ocorreu após a anestesia tópica e após o bloqueio peribulbar, com o paciente em posição supina.Foi realizada uma marcação na posição de 180 graus do olho direito e zero grau do olho esquerdo, com o paciente sentado, em seguida,houve uma mudançade posição para decúbito dorsal, sendo realizadas novas marcações em 180 e zero graus dos olhos direito e esquerdo, respectivamente. **Resultados**: O presente estudo demonstrou que pacientes submetidos à facoemulsificação com implante de lente tórica com anestesia tópica apresentaram aproximadamente 6.89 graus de inciclotorção (82 olhos) e 6,93 graus de exciclotorção (38 olhos) com uma média de ciclotorção de 6.91 graus. Já os pacientes submetidos à anestesia peribulbar apresentaram 5.68 graus de inciclotorção(73 olhos) e 4,81 graus de exciclotorção (47 olhos) com uma média de ciclotorção de 4,92. **Conclusão**: Através do estudo podemos observar que o movimento de inciclotorção em pacientes submetidos à anestesia peribulbar foi menor quando comparado ao da anestesia tópica. Isso se torna relevante uma vez que, quanto maior for a inciclotorção, menor a previsibilidade da cirurgia e menor a chance de obtenção de excelência nos resultados refratométricos finais.

Descritores: Movimentos oculares; Anormalidade torsional; Posição do paciente; Anestesia local; Administração tópica

[1] Universidade de São Paulo, São Paulo, (SP), Brazil;
[2] Hospital Naval Marcílio Dias, Rio de Janeiro (RJ), Brazil;
[3] Hospital Federal Bonsucesso, Rio de Janeiro (RJ), Brazil;

Study carried out at Departament of Oftalmology, Universidade de São Paulo, São Paulo (SP), Brazil

There are no conflicts of interest.

Recebido para publicação em 16/03/2014 - Aceito para publicação em 14/04/2014.

Introduction

Cyclotorsions are movements of cyclorotation of the eyes[1]. The cyclotorsion of the human eye occurs with movement of the head and body, changing the original position of the corneal axis. A significant different range of cyclotorsion between a lie and a supine position was previously reported as varying from 2 to 7 degrees[2] .The measurement of the rotation raised concern among refractive and cataract surgeons especially regarding astigmatism correction where a mistake in the position of the axis will lead to a significant impact in patients visual acuity.

Peribulbar block is one of the techniques for anesthesia for cataract surgery and is one of the most popular throughout the world because it is a safe procedure and it's able to warrant a cataract surgery with no pain[3]. The objective is not only the analgesia but also ocular akinesia during the surgical procedure. It is believed that after the peribulbar block, the torsional motion of the eye suffers distortions, which could result in consequences if not evaluated prior to surgery procedure[4,5].

Toric intraocular lenses (IOLs) are spherocylindrical and correct for corneal astigmatism after cataract surgery. The orientation of the toric IOL in the capsular bag is critical because misalignment negates the desired effect of correcting astigmatism. If, for instance, a toric IOL rotates 30 degrees off the prescribed axis of alignment, there is virtually no correction of astigmatism; if it rotates more than 45 degrees from the prescribed axis, the IOL augments the preoperative ocular cylinder[6].

The aim of this prospective study is to determine the amount of ocular cyclotorsion in lie positions after topical anethesia and peribulbar block.

Methods

This prospective series of cases included 112 eyes of 112 patients. The study was approved by the ethical committee of University of São Paulo. Exclusion criteria were patients who showed any alteration in ocular extrinsic motility and patients with very shallow or deep orbit, abnormalities of their visual system and their stereopsis less than 40 seconds of arc. Strabismus (especially dissociated vertical divergence, DVD) and any organic eye disease were excluded by thorough ophthalmological examination including biomicroscopy, indirect ophthalmoscopy, refractometry or retinoscopy in cycloplegia, cover test, assessment of ocular motility, prism and cover test, verification of stable, central fixation by using the so called "Haidinger Büschel" and after image, determination of stereopsis by the Lang stereotest and the Titmus test. The nature of the study had been clearly explained and informed consent was obtained from all subjects before testing. The study follows the tenets of declaration of Helsinki.

Perilimbar mark was performed in the position of 180 degrees in right eye and zero degrees of left eye, with the patient seat down, in the immediately sequence requested that the patient lie down, and then a new dial in 180 and zero degrees respectively from right and left eye were made. The angle of rotation of the original mark was recorded after topical anesthesia.

After that, the block was performed with peribulbar infiltration of 5mL of anesthetics in access inferotemporal. New measures were taken in lying down position, always with reference to the initial marking in the supine position.

Statistical analysis was performed using SPSS for Windows (version 115, SPSS, Inc.). For statistical analysis of visual acuity, LogMAR values were used. Normality was checked using the Kolmogorov-Smirnov test. When parametric analysis was not possible the non-parametric Mann–Whitney *U* test was used to compare data between the two IOL groups. The analysis of primary outcome measures was based on a non-normal distribution of the data. When parametric analysis was possible, the Student's *t*-test was used to compare the outcomes. All the statistical tests have been conducted at an alpha level of 0.05.

Results

This study evaluated 112 eyes of 112 patients and the measured cyclotorsional deviation in supine position, in patients with topical anesthesia was located around 6.89 degrees (82 eyes) of incyclotorsion and 6.93 (38 eyes) degrees of excyclotorsion, with a mean of cyclotorsion located around 6.91 degrees.

In patients with peribulbar block, the deviation were located around 5.68 degrees (73 eyes) of incyclotorsion and 4.81 degrees (47 eyes) of excyclotorsion and a mean of cyclotorsion of 4.92 degrees. (p=0.002).

Statistical analysis of the different test positions and anesthesia showed less positionaly induced incyclotorsion on patients with peribulbar block.

There were also no statistically significant difference between the topical anesthesia and peribulbar block on excyclotorsion (p=0.120).

Discussion

In this prospective series of 112 consecutive cases we observed that the range of cyclotorsion (incyclotorsion) previously the block, in lie positions was 6.91±2.36 degrees. After the peribulbar block there was a decrease in the cyclotorsion, for 4.92±2.91degrees (p=0.002).

These results lead us to suggest that, despite the apparent akinesia achieved with the peribulbar block, the cyclotorsion persists and presents significant different values when compared to topical anesthesia. It is known that a rotation of 6 degrees can reduce the effect of an astigmatic correction by approximately 20%[2,5].

Positional induced inexcyclotorsion could be an important factor concerning of astigmatism in refractive surgery. Before performing refractive and cataract surgery correcting astigmatism, the axis of astigmatism is usually measured in seated position, while the procedure of correction itself takes place in a supine position.

Positional induced inexcyclotorsion could be an important factor in the outcome of cataract and refractive surgery. Two possible mistakes with clinical significance may occur. Firstly, a simple difference of the axis of astigmatism between the sitting and supine position will lead not only to an erroneous correction of the astigmatism itself, but the whole spherocylindrical correction could be false[7].

The refractive outcome of the cylinder correction depends on the accuracy of the axis treatment. For example, a 10-degree

axis shift decreases the efficiency of the desired cylinder correction by more than 30%. Even minimal meridional errors can have significant negative refractive consequences, particularly in cases of moderate to high astigmatism[8].

Febbraro et al. also evaluated cyclorotationand found that the mean static of cyclotorsionin their study was 3.08 +/ - 2.68 degrees, which was statistically significant greater than 0 degrees.The cyclotorsion was less than 5 degrees in 53 eyes (71%), 5 to 9 degrees in 19 eyes (26%) and 10 degrees or more in 2 eyes (3%).Incyclotorsion appeared in 22 eyes (31%) and the mean of rotation was 2.9 degrees. Excyclotorsion ocurred in 42 eyes (60%) and the mean was 3.6 degrees. There were no cyclotorsion in 6 eyes[9].

Postural changes, such as moving from an upright to a supine position, can induce a mean ocular cyclotorsional effect of 0.4 to 4.2 degrees (range 0 to 16 de- grees)[10,11],and this effect can be incyclotorsional or excylcotorsional[10]. However, keratometry is typically recorded with the patient upright, whereas ocular surgery is performed with the patient supine. As a consequence, it has been recommended that preoperative corneal markings of the 0- to 180-degree meridian using specifically designed instruments should be made with the patient upright and that the markings should then be aligned with the 0- to 180-degree meridian of a fixation ring with the patient supine, from which the meridian of the toric IOL to be implanted is marked with a meridian marker.

In conclusion, cyclotorsion represents another potential source of residual refractive errors that subsequently will lead to a reduced visual quality postoperatively. Therefore should be carefully taken into account in the preoperative analyses.

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