Evaluation of visual performance and patient satisfaction with pseudophakic monovision technique

Avaliação do desempenho visual e satisfação do paciente com a técnica de monovisão pseudofácica

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ABSTRACT

Purpose: To evaluate the distance, intermediate and near visual acuity of patients with bilateral cataract operated on both eyes corrected for distance in one eye and for near in the fellow eye, as well as, their stereo acuity and their general satisfaction. **Settings:** Hospital de Olhos de São Paulo and Complexo Hospitalar Padre Bento - Guarulhos - São Paulo - Brazil. **Methods:** This is a prospective study of 76 eyes of 38 patients with bilateral cataract aiming to become spectacle free after surgery. The patients were operated on both eyes; the first eye was corrected for distance and the fellow eye for near vision. The refractive error was programmed between -0.5 D and +0.5 D in the first eye and -2.00 D in the second eye. Patients with preoperative corneal astigmatism equal or higher than 1.0 D were excluded from the study. The uncorrected and best-corrected distant visual acuity (UCDVA, BCDVA) were tested, as well as the uncorrected near visual acuity (UCNVA) and collected at the 3 postoperative months. The Titmus test was performed at the last follow-up. Finally, the modified questionnaire VF-7 was applied and the patient was required to choose, regarding their general satisfaction, between very satisfied, satisfied, or unsatisfied. **Results:** All patients achieved uncorrected distant visual acuity 20/40 or better (mean SE 0.625 D) and uncorrected near visual acuity J3 or better (mean SE -2.0 D), and intermediate visual acuity J3 in 90%. The Titmus test revealed an average of 197" of arc with reduction of stereo acuity in most of patients as expected and 97.3% of patients demonstrated to be satisfied or very satisfied with this technique. **Conclusion:** It consists in a viable technique for correction of near, intermediate and distant vision on cataract surgery as demonstrated by the high rate of satisfaction (97.3%) by the modified VF-7 questionnaire, especially when the patient has no access to a multifocal intraocular lens.

Keywords: Cataract extraction; Refraction, ocular; Lens implantation, intraocular; Phacoemulsification; Visual acuity; Vision tests; Patient satisfaction

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INTRODUCTION

The contemporary cataract surgery using phacoemulsification technique has not only the goal of restoring the transparency of the light path inside the eyeball, but it became also a refractive procedure, trying to minimize the use of eyeglasses in the postoperative period, providing not only a good vision

for distance, but also near vision increasing quality of life, with optical correction independence after cataract surgery[1].

Nowadays, new technologies have emerged in the ophthalmology market in order to provide these goals, such as pseudoaccommadative intraocular lens (multifocal IOL) and accommodative IOLs[2-3]. However, most of these alternatives are not available to all patients, due to their high costs. In cases, where these new IOLs are not an option, the pseudophakic monovision is an alternative technique to reduce the need of optic corrections (contact lenses, eyeglasses) in the postoperative period, consisting of correcting one eye for distance and the fellow eye for near vision with deliberate myopic error[4].

The purpose of this paper is to evaluate the distance, intermediate and near visual acuity of patients with bilateral cataract operated on both eyes corrected for distance vision in one eye and near vision in the fellow eye, as well as their stereo acuity and their general satisfaction.

METHODS

This is a prospective study of 76 eyes of 38 patients with bilateral cataract aiming to become spectacle free after surgery. The patients were operated on both eyes, by the same surgeon (FFM), using the phacoemulsfication technique with IOL implantation of a monofocal IOL (Sensar®- AMO) in the same institution. The first eye was corrected for distance and the fellow eye for near vision. The refractive error of the biometry calculation was programmed for +0.5 D in the first eye and between -2.0 D in the second eye. Prior to surgery, all patients received extensive explanation by the surgeon, about the pseudophakic monovision and an informed consent was obtained. Patients with preoperative corneal astigmatism equal to or higher than 1.0 D, were excluded from the study.

After surgery, the binocular uncorrected and best-corrected distant visual acuity (UCDVA, BCDVA) were tested with the Snellen chart, placed at 6 meters of the patient's eye, as well as the uncorrected near visual acuity (UCNVA) using the Jaegger chart, placed at 0.33 meters of the patient's eye. These results were collected on the first, second and third postoperative months. The uncorrected intermediate visual acuity was tested, using the same chart placed at 0.67 m corresponding to J3. The dominant eye was also verified in the postoperative period and correlated whether it made a difference or not, in order to choose the eye for distance or near correction. Regarding the postoperative stereo acuity, the Titmus test was performed at the last follow-up (third postoperative month period) without correction and corrected using an addition of 3.00 diopters. This test was done in both eyes, at the trial spectacle frame, to evaluate the reduction of stereo acuity when possible, since some patients did not understand the examination.

Finally, in order to evaluate patient satisfaction, the modified questionnaire VF-7 was applied emphasizing in each question its function without using glasses. The patient was required to choose, between very satisfied, satisfied, or unsatisfied[1].

RESULTS

The mean age of the 38 patients, was 64.4 years+/- 12.99 SD (range 26 to 86), 36% male and 64% male. At the third postoperative month visit, all 38 patients had UCDVA equal to or better than 20/40, the UCNVA equal to or better than J3 and the intermediate binocular visual acuity was J3 in 90% (36) of the patients, J4 in 5% (2) and J5 in 5% (2) (Figure 1). The eyes corrected for distance vision presented a mean SE of +0.625 D (range -0.75 D to 0.75 D) and the eyes programmed for near vision showed a mean SE of -2.00 D (range -3.12 D to -1.0 D).

Titmus test revealed an average of 197" of arc (range 40 to 3000); in one patient this examination was not possible due to absence of binocular vision as a result of strabismus at his childhood. Regarding the stereo acuity, 7 patients showed no loss of stereopsis when compared with trial spectacle frame; by contrast, 31 patients lost some stereopsis as expected. The dominant eye was corrected for distance in 25 patients (64%) and for near in 14 eyes (36%) with no symptoms or difficulties using this technique.

The modified VF-7 and its answers are attached (see Annex 1) revealing an important acceptance of this technique and the high level of satisfaction. Of 38 patients, 51.4% (20) were very satisfied, 45.9% (17) satisfied and 2.7% (1) was unsatisfied (Figure 2).

In our study, only two patients asked for optical corrections (6%), although one of them asked for occasional correction (scotopic extensive reading) and was satisfied with the technique, the second showed to be unsatisfied, his manifest refraction was OD Plano -0.5 cyl @ 180^0 (dominant eye) with UCVA of 20/20 and OS -1.75 sph -1.5 cyl @ 180^0 with UCNVA of J1 and intermediate UCVA of J3, and Titmus test of 100'arc, he had difficulties in playing soccer and driving at night and was corrected with contact lenses, for distant vision in his left eye and eyeglasses for near vision.

DISCUSSION

The monovision technique was first described by Westsmith in 1958 for presbyopic correction using contact lenses, in phakic patients using the non-dominant eye corrected for near and the dominant eye for distance vision[5]. Recently, this technique was adapted for laser refractive surgery in patients older than 40 years, while correcting the myopic patient or overcorrecting the hyperopic patient, as well as, for patients with bilateral cataract[6-7].

Once the crystalline lens is removed, there is a loss of accommodation creating a population of pseudophakic presbyopes. Nowadays there are some options to compensate the

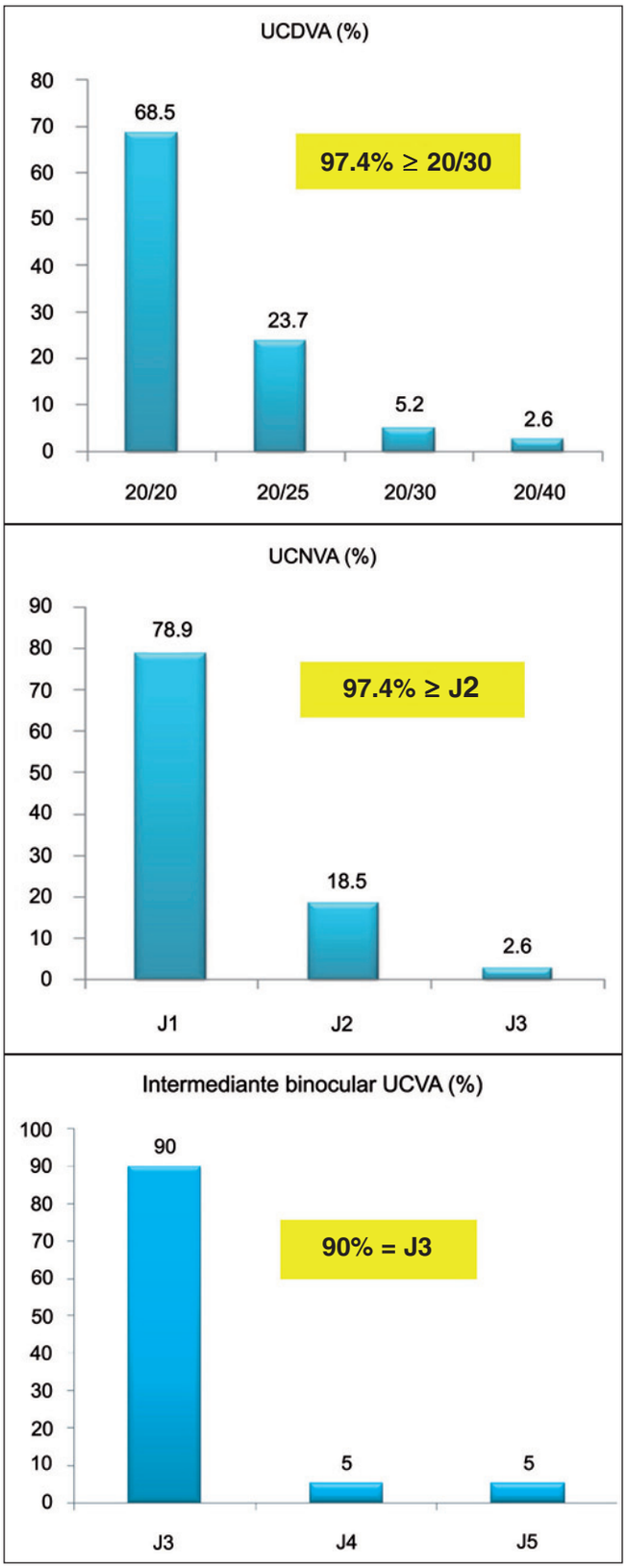

Figure 1 - Postoperative uncorrected visual acuity (distance, intermediate, near)

absence of near vision, such as pseudo accommodative and accommodative IOL providing both distance and near correction; however, these technologies are not always available for all patients, due their high costs[2-3].

One of the concerns of this technique, is the consequence of losing binocularity with aniseikonia, asthenopia and loss of intermediate vision. Although, this loss has been confirmed by the stereo Titmus test, which revealed a reduction of the stereo acuity in 31 patients (81.6%). This result is a consequence of the mean SE difference, created between eyes of 1.84 D, only one patient (2.7%) reported discomfort requiring optical correction, against 97.3% satisfied or very satisfied patients shown by the modified VF-7.

This study has some shortcomings, including a relatively short follow-up (3 months), a large range of age (24 to 86 years) and the fact that the apparent accommodation present in the patients with monofocal IOL, already demonstrated by some authors[8-9], was not measured. It is associated with pupil size[9], myopic astigmatism[10], longitudinal movement of the IOL[11], and corneal multifocality[12].

Nevertheless, this technique revealed a marked acceptance in our studied group with higher rate of satisfaction and its result is consistent with other studies, including the same mean SE reported by some authors[13] who also demonstrated that the SE of -2.0 D provided intermediate and near vision in most cases. Although, there was an expected reduction in stereo acutiy in most of cases, it did not have any influence on the results, as well as, on the importance of the dominant eye being corrected for distant vision. When measuring binocular visual acuity using the Snellen and Jaegger charts, the results are comparable to the studies involving bilateral multifocal intraocular lens or even better, becoming a viable option for the patients that cannot afford to obtain a multifocal implant[2].

In order to provide a good result and achieve the patient's expectative; the indication of this technique must be done

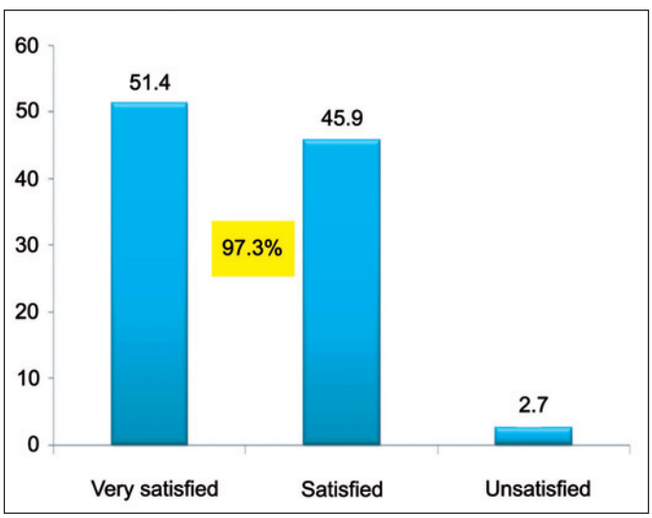

Figure 2 - Level of patient satisfaction

Annex 1 - Modified VF-7 questionnaire

Annex 1 - Modified VF-7 questionnaire

1. How much difficulty do you have driving at night because of your vision? Do you have:
   - a) No difficulty (24.3%)
   - b) A little difficulty (10.5%)
   - c) A moderate amount of difficulty (2.6%)
   - d) A great deal of difficulty (2.6%)
   - e) Not applicable (58%)
2. Do you have any difficulty, *without glasses*, reading small print, such as labels on medicine bottles, a telephone book, or food label?
   - a) A little (60.5%)
   - b) A moderate amount (18.4%)
   - c) A great deal (7.9%)
   - d) Are you unable to perform the activity? (7.9%)
   - e) Not applicable (5.3%)
3. Do you have any difficulty, *without glasses*, watching television?
   - a) A little (89.5%)
   - b) A moderate amount (7.9%)
   - c) A great deal (2.6%)
   - d) Are you unable to perform the activity? (0)
   - e) Not applicable (0)
4. Do you have any difficulty, *without glasses*, seeing steps, stairs, or curbs?
   - a) A little (97.4%)
   - b) A moderate amount (2.6%)
   - c) A great deal (0)
   - d) Are you unable to perform the activity? (0)
   - e) Not applicable (0)
5. Do you have any difficulty, *without glasses*, reading traffic signs, street signs, or store signs?
   - a) A little (92.1%)
   - b) A moderate amount (5.3%)
   - c) A great deal (2.6%)
   - d) Are you unable to perform the activity? (0)
   - e) Not applicable (0)
6. Do you have any difficulty, *without glasses*, cooking?
   - a) A little (86.9%)
   - b) A moderate amount (0)
   - c) A great deal (0)
   - d) Are you unable to perform the activity? (2.6%)
   - e) Not applicable (10.5%)
7. Do you have any difficulty, *without glasses*, doing fine handwork such as sewing, knitting or carpentry?
   - a) A little (81.6%)
   - b) A moderate amount (13.2%)
   - c) A great deal (2.6%)
   - d) Are you unable to perform the activity? (2.6%)
   - e) Not applicable (0)

carefully, explaining the advantages and drawbacks of the visual performance, such as, neuroadaptation and the expected loss of stereo acuity which may play an important role depending on the patient's occupation.

CONCLUSION

It consists of a viable and alternative technique, for correction of near, intermediate and distance vision, in the cataract surgery. Although there was an expected reduction of stereo acuity in most of cases, we observed a high rate of spectacle independence, as demonstrated by the high rate of patient satisfaction (97.3%).

RESUMO

Objetivo: Avaliar a acuidade visual para longe, perto e intermediária dos pacientes operados de catarata bilateral em ambos os olhos corrigidos para longe em um olho e para perto no olho contralateral, bem como sua acuidade estereoscópica e sua satisfação geral. **Local:** Hospital de Olhos de São Paulo e Complexo Hospitalar Padre Bento - Guarulhos - São Paulo - Brasil. **Métodos:** Este é um estudo prospectivo com 76 olhos de 38 pacientes com catarata bilateral e desejo de ficar independente de óculos após a cirurgia. Os pacientes foram operados em ambos os olhos; o primeiro olho foi corrigido para longe e o contralateral para perto. O erro refrativo programado foi entre -0,5 D e +0,5 D para o primeiro olho e -2,0 D no segundo. Pacientes com astigmatismo corneao pré-operatório igual ou maior que 1,0 D foram excluídos do estudo. A acuidade visual sem correção e melhor acuidade visual para longe foram testadas, bem como, a acuidade visual sem correção para perto, e coletadas no terceiro mês pós-operatório. O teste de Titmus foi realizado na última visita. Finalmente, o questionário modificado VF-7 foi aplicado e ao paciente foi solicitado escolher, em relação à satisfação geral entre satisfeito, muito satisfeito ou insatisfeito. **Resultados:** Todos

pacientes atingiram acuidade visual sem correção para longe de 20/40 ou melhor (EE médio de 0,625 D) e acuidade visual para perto sem correção de J3 ou melhor (EE médio de -2,0 D), e acuidade visual intermediária de J3 em 90%. O teste de Titmus revelou uma redução média de 197" de arco na maioria dos pacientes como esperado e 97,3% dos pacientes demonstraram estar satisfeitos ou muito satisfeitos com esta técnica. **Conclusão:** Esta técnica consiste em uma opção viável para correção da acuidade visual de perto, longe e intermediária na cirurgia de catarata como demonstrado pela alta taxa de satisfação (97,3%) através do questionário VF-7, especialmente quando o paciente não tem acesso a uma lente intraocular multifocal.

Descritores: Extração de catarata; Refração ocular; Implante de lente intraocular; Facoemulsificação; Acuidade visual; Testes visuais; Satisfação do paciente

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