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ORIGINAL ARTICLE

Evaluation of a new IOL scleral fixation technique without capsular support

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Évaluation d'un nouvelle technique de fixation sclérale des implants intraoculaires en l'absence de support capsulaire

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But : Le but de cet étude était de comparer une nouvelle technique de fixation sclérale des implants intraoculaires en cas d'absence de support capsulaire (par incision sclérale) avec la technique du volet scléral, en termes d'efficacité, de complications chirurgicales et de coûts chirurgicaux, et d'évaluer les avantages et les inconvénients de ces deux techniques.

Patients et méthode : Cette étude rétrospective a été réalisée chez 30 patients (30 yeux). Dix patients étaient aphakes, 11 présentaient une cataracte traumatique, 7 présentaient une complication après phakoémulsification et 2 avaient une luxation du cristallin. Les patients ont été divisés en deux groupes : le groupe I était opéré selon la technique de l'incision sclérale, et le groupe II selon la technique du volet scléral. Chaque groupe comportait 15 patients, et le suivi s'étendait sur une période de 18 mois. La grande majorité des interventions a été effectuée sous anesthésie générale par le même chirurgien. L'analyse statistique a été réalisée à l'aide du programme SPSS. Les variables numériques ont été comparées en utilisant un test *t*, et les variables catégorielles ont été évaluées à l'aide du test exact de Fisher. Une analyse multifactorielle ainsi qu'une régression logistique ont été réalisées dans le but d'établir un modèle comparatif et prédictif du taux de complications de chaque technique.

Résultats : Le taux de complications était trois fois plus élevé avec la technique du volet scléral par rapport à la technique de l'incision sclérale. Cette différence était particulièrement importante concernant la survenue d'un hyphéma ou le déplacement du volet scléral. Aucune différence statistique n'a été retrouvée entre les deux techniques pour la survenue d'une hémorragie intravitréenne, d'un hématome choroïdien, d'un décollement de rétine, d'une athalamie ou pour la mise en place ou la rupture de la suture. Il existait une association statistiquement significative entre l'existence de complications peropératoire et la technique utilisée (complications plus nombreuses avec la technique du volet scléral) mais aussi avec la présence de pathologies systémiques (plus de complications peropératoires chez les patients hypertendus). Les complications tardives étaient plus fréquentes avec la technique du volet scléral par rapport à la technique de l'incision sclérale ; cependant, le nombre de cas étudiés ne permettait pas d'obtenir un résultat statistiquement significatif.

Conclusion : La durée moyenne de l'intervention était significativement plus courte avec la technique de l'incision sclérale par rapport à la technique du volet scléral. Les complications peropératoires étaient significativement associées à la technique utilisée: elles étaient plus fréquentes avec la technique de volet scléral. Les complications tardives étaient principalement associées aux pathologies oculaires et systémiques préexistantes à la chirurgie.

Mots-clés : Nouvelle technique de fixation sclérale, technique du volet scléral, implants intraoculaires.

Evaluation of a new IOL scleral fixation technique without capsular support

Purpose: The purpose of this study was to compare a new intraocular lens (IOL) scleral fixation technique (scleral incision) with the scleral flap surgical technique as regards to efficacy, surgical complications, advantages, disadvantages, and surgery costs in cases with no capsular support.

INTRODUCTION

Until the 1980s, the intracapsular method was the method of choice, but quickly the extracapsular method became progressively more popular. With the intracapsular method, intraocular lens (IOL) implantation in the sulcus was impossible, which was also true when the extracapsular method had zonular dehiscence complications or large fissures in the posterior capsule. Today there are many fewer cases of traumatized eyes, ectopic lenses, or pediatric lensectomies that present without capsular support. In cases of limited zonular dehiscence, the intraocular lens can be placed in the capsular bag using a capsular tension ring, without compromising stability [1].

There are several causes for zonular and capsular support loss: trauma, complicated surgeries, zonule weakness, and secondary and congenital capsule weakness. The lens can be damaged by a variety of physical, electric, thermal, and chemical factors, but the penetrating and contusing forces are those that truly compromise the zonular and capsular support. Closed trauma has been referred to as the cause of posterior capsule rupture, typically circular or oval and centered. Deforming forces can also stretch the zonule and cause dehiscence. Penetrating lesions cause direct ruptures in the anterior and/or posterior capsule. During extracapsular cataract extraction,

Material and Methods: This was a retrospective study conducted on thirty patients (30 eyes), ten of whom were aphakic, eleven had traumatic cataract, seven had post-phacoemulsification complications, and two had lens luxation. The patients were divided into two groups (I – scleral incision technique and II – scleral flap technique) of fifteen patients each, during a study period lasting eighteen months. The great majority of the procedures were performed under general anesthesia and by the same surgeon. Statistical analysis was done using SPSS. The numerical variables were compared using the *t* test and the categorical ones using the Fisher exact test. We performed multifactorial analysis to build a model that could predict and compare the complications associated with each technique. An explicative model was built using logistic regression.
Results: We observed a threefold higher rate of complications associated with the scleral flap technique when compared to the scleral incision technique. This difference was particularly relevant as regards the occurrence of free scleral flap and hyphema. No statistically significant differences were observed regarding vitreous hemorrhage, choroidal hemorrhage, retinal detachment, difficulty in the external pulling of the Prolene suture, breaking of the Prolene suture, and anterior chamber collapse. We found a significant association between intraoperative complications and the technique used (higher number of complications with the scleral flap) and also with some systemic diseases (patients with hypertension had more intraoperative complications). The number of late complications resulting from the scleral flap technique was much higher than those observed with the scleral incision technique; however, the number of the cases we studied is insufficient to reach statistical significance.
Conclusion: The duration of the procedure using the IOL scleral incision technique is significantly lower than using the scleral flap technique. Intraoperative complications were significantly associated with the technique used: more frequent with scleral flap. Late complications were mainly associated with systemic and previous ocular diseases.

Key-words: New IOL scleral incision fixation technique, scleral flap technique.

the support can also be compromised, directly by surgical trauma or by pre-existent anomalies such as posterior polar cataract. Ruptures in the posterior capsule may also occur at any time during phacoemulsification. The most common causes of congenital zonular/capsular ruptures are Marfan's syndrome, Weill-Marchesani syndrome, and idiopathic or familial lens atrophy, both of which lead to ectopia lentis. Among the most frequent late causes of zonule weakness is the pseudoexfoliation syndrome. Zonule weakness predisposes to phacodonesis and consequent spontaneous lens subluxation. Other late causes of zonule weakness are chronic uveitis, mature cataract, childhood glaucoma with buphthalmos, high myopia and the presence of silicone oil in the eyeball for a long period of time.

If the capsular support is not safe, the lens can be placed in the sclerally fixated posterior chamber [1-6], as first reported by Malbran *et al*. [7], in a procedure referred to the intraocular lenses scleral fixation. Many methods and technique variations have been described for the IOL scleral fixation through the ciliary sulcus [8-11]. These techniques are not free of complications [12-17] such as hemorrhages, haptic ectopies, lens decentration, luxation, and tilt. To decrease such complications, we have developed and studied a new technique and compared it to the two point fixation and scleral flap technique. With this multifactorial study, it is our intention to compare both scleral lens fixation surgical techniques by studying efficacy, surgical complications, advantages, disadvantages, procedure time, and surgery costs in each procedure.

MATERIAL AND METHODS

We studied and operated thirty patients (30 eyes) that had no capsular support, ten of which were aphakic, eleven had traumatic cataract, seven had postphacoemulsification complications, and two had lens luxation *(fig. 1)*. These patients were divided randomly into two groups: group I (scleral incision technique) and group II (scleral flap technique). Each group included fifteen patients, with twelve males and three females in group I and nine males and six females in group II. No restrictions concerning age or sex were made. The study was conducted over eighteen months.

The preoperative pharmacologic preparation used in all patients was cyclopentolate 1%, phenylephrine 10%, and flurbiprofen administered three times with 10-min breaks and suspended for 45 min before the procedure.

The great majority of the procedures were performed under general anesthesia and by the same surgeon. After lens extraction using several techniques and anterior vitrectomy, the scleral intraocular lens fixation was performed using two different methods. We used the Alcon CZ 70 BD scleral fixated rigid intraocular lens comprising three parts: the optic disc 6 mm in diameter and two PMMA haptics (total diameter, 13.5mm).

The scleral incision technique (group I) consisted of a tight limbus conjunctival flap at 5 and 11 o'clock. A radial scleral incision was made 3 mm perpendicular to the limbus and as deeply as possible at 5 and 11 o'clock *(fig. 2)* followed by scleral layer cauterization. A scleral layer pathway was made 1.5 mm behind the posterior surgical limbus with a 30-G needle. The 10-0 Prolene needle extremity was passed opposite the pointed one through this scleral pathway until it was seen in the pupillary area *(fig. 3)*. We then pulled the Prolene thread externally through the 7-mm-long corneal incision and extracted the Prolene needle by reversing it through the incision. The extremity of the folded thread was brought through the haptical hole, so that the lens haptical extremity could then pass through the interior of the folded thread (sailor's stitch) *(fig. 4)*. The IOL was inserted into the posterior chamber and the haptic was placed in the ciliary sulcus, with IOL scleral fixation through