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ORIGINAL ARTICLE

The effectiveness of continuous intravitreal adrenaline as mydriatic adjuvant on pars plana vitrectomy in diabetic patient, a randomized clinical trial

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KEYWORDS

Diabetic retinopathy;
Pars plana
vitrectomy;
Adrenaline;
Pupil dilatation;
Normalized pupillary
area

Abstract

Introduction: Dilated pupil is an important factor for good visualization during pars plana vitrectomy (PPV) in patients with diabetic retinopathy. Despite its side effects, intravitreal adrenaline has been used to maintain pupil dilation.

Objective: To assess the effect of intravitreal adrenaline infusion on pupil dilation in patients with diabetic retinopathy undergoing PPV.

Methods: This study included 30 eyes of 30 patients with progressive diabetic retinopathy underwent PPV. Pupils of all eyes were dilated by topical application of a combination of 1% tropicamide and 2.5% phenylephrine, and eyes were randomized 1:1 to continuous intravitreal infusion of adrenaline (0.5 mg/500 ml in balanced salt solution) or vehicle control. Surgical procedures were recorded with a high definition video recorder. Normalized pupillary area (NPA) was measured on recorded images before and at the end of surgery.

Results: Post-operative NPA differed significantly between the two groups ($p=0.04$). By contrast, pre-operative NPA ($p=0.81$) and changes in NPA ($p=0.17$) did not.

Conclusion: Intravitreal infusion of adrenaline did not have a significant effect on pupil dilation, compared with non-adrenaline, in patients with diabetic retinopathy undergoing PPV.

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PALABRAS CLAVE

Retinopatía diabética;
Vitreotomía vía pars plana;
Adrenalina;
Dilatación de pupila;
Área pupilar normalizada

La eficacia de la adrenalina intravítrea continua como adyuvante midriático en la vitrectomía pars plana en el paciente diabético, un ensayo clínico aleatorizado

Resumen

Introducción: La dilatación de la pupila es un factor importante para una buena visualización durante la vitrectomía pars plana (VPP) en pacientes con retinopatía diabética. A pesar de sus efectos secundarios, la adrenalina intravítrea se ha utilizado para mantener la dilatación de la pupila.

Objetivo: Evaluar el efecto de la infusión de adrenalina en la dilatación de la pupila intravítrea en pacientes con retinopatía diabética sometidos a VPP.

Métodos: En este estudio se incluyeron 30 ojos de 30 pacientes con retinopatía diabética progresiva que se sometieron a VPP. Las pupilas de todos los ojos estaban dilatadas por aplicación tópica de una combinación del 1% de tropicamida y fenilefrina al 2.5%, y los ojos fueron asignados al azar 1:1 a infusión continua intravítrea de adrenalina (0.5 mg/500 ml en solución salina equilibrada) o a control de vehículo. Los procedimientos quirúrgicos se registraron con un grabador de video de alta definición. El área pupilar normalizada (NPA) se midió en las imágenes grabadas antes y al final de la cirugía.

Resultados: La NPA postoperatoria difería significativamente entre los 2 grupos ($p=0,04$). Por el contrario, en lo referente a la NPA antes de la operación ($p=0,81$) y después de los cambios en la NPA ($p=0,17$) no hubo esas diferencias entre grupos.

Conclusión: La infusión de adrenalina intravítrea no tuvo un efecto significativo sobre la dilatación de la pupila, en comparación con los casos de no infusión de adrenalina, en pacientes con retinopatía diabética sometidos a VPP.

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Introduction

Maintaining a dilated pupil during pars plana vitrectomy (PPV) is an important factor for good visualization during surgery, particularly for patients with diabetic retinopathy. Because diabetic patients show a small resting pupil and weak mydriasis response, eyes of diabetic patients undergoing PPV are frequently treated with continuous intravitreal infusions of adrenaline, diluted in balanced salt solution (BSS), to maintain pupillary dilation.^{1,2} Adrenaline is frequently added to the indwelling posterior segment infusion during vitreoretinal procedures in order to maintain perioperative mydriasis and assist with hemostasis.³ Previous study shows that adrenaline in the intraocular infusion has beneficial effect in maintaining mydriasis in cataract surgery.⁴

Adrenaline, however, was shown to induce the synthesis of endogenous prostaglandins, which can disrupt the blood-retinal barrier and cause cystoid macular edema.^{5,6} Adrenaline has also been found to significantly reduce blood flow to the optic nerve head and have cardiovascular adverse effects.⁷ This study investigated the ability of continuously infused intravitreal adrenaline to maintain pupil dilation during PPV in patients with diabetic retinopathy.

Subjects and methods

This study was a randomized control trial involving 30 eyes of 30 patients with diabetic retinopathy who underwent PPV at Cicendo Eye Hospital. Written informed consent was

obtained from each patient, and the study protocol was approved by the Ethics Committee of the Faculty of Medicine of Padjadjaran University.

Consecutive patients were enrolled and randomized 1:1 using block permutation to the treatment (adrenaline) and control (non-adrenaline) groups, each consisting of 15 patients. Adrenaline solution for intravitreal infusion consisted of 0.5 mg adrenaline dissolved in 500 ml BSS. Each pupil was dilated by topical application of one drop of tropicamide 1% and one drop of phenylephrine 2.5% three times each at 60, 45, and 30 min before surgery.

All surgical procedures were recorded with a high definition video recorder. Eye parameters were measured using by Sketch Up Pro on photos of each recording, which had been edited with Adobe Photoshop. Pupillary dilation was determined by measuring normalized pupillary area (NPA), defined as pupillary horizontal diameter divided by limbal horizontal diameter in millimeters (Fig. 1). NPA was measured twice in each eye, before and after surgery, and the difference was calculated. NPA was measured by individuals blinded to subject allocation. Statistical analyses were performed using SPSS® software.

Results

Of the 30 patients included in this study, 15 were randomized to the adrenaline group and 15 to the control group. Their mean ages were 53.7 years and 53.4 years, respectively, and there were no significant between-group differences in age and gender distribution. The most common diagnosis in the

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