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## ORIGINAL ARTICLE

# Modified technique of autologous transplantation of internal limiting membrane for macular hole<sup>☆</sup>

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### KEYWORDS

Macular hole;  
Autologous  
transplantation;  
Internal limiting  
membrane

### Abstract

**Background:** Autologous internal limiting membrane transplantation has allowed some cases of macular holes refractory to conventional surgery techniques to be treated.

The purpose of this study is to describe the anatomical and functional outcomes of a modification of this technique in a case series of naïve macular hole patients.

**Material and methods:** A consecutive case series study was performed on patients with naïve macular holes with a diameter greater than 600  $\mu\text{m}$ . Best corrected visual acuity, clinical features of the macular area, and optical coherence tomography were recorded before the operation and at the end of follow-up in all patients studied. All patients underwent 23 Ga core vitrectomy, posterior hyaloid separation, and brilliant-blue assisted internal limiting membrane peeling. A small piece of the internal limiting membrane was peeled off to make a free flap, and this was transplanted and placed inside the macular hole under perfluorocarbon liquids. Air–fluid exchange was performed and SF6 gas was injected at a non-expansile concentration. **Results:** The study included 5 eyes of 5 patients who underwent internal limiting membrane autograft. The mean age was 50.6 (SD 12.3) years. Four of the 5 cases had macular hole closure. The case where there was no closure of the macular hole was secondary to trauma. There was an improvement in visual acuity in all patients where the closing of the macular hole was achieved at the end of follow-up.

**Conclusions:** In this cases series of macular hole patients, the autologous internal limiting membrane transplantation was associated with an anatomical closure of the macular hole and functional improvement in most of the patients studied.

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**PALABRAS CLAVE**

Agujero macular;  
Trasplante autólogo;  
Membrana limitante  
interna

**Técnica modificada de trasplante autólogo de membrana limitante interna en agujero macular****Resumen**

*Antecedentes:* El trasplante autólogo de membrana limitante interna ha permitido tratar algunos casos de agujero macular refractarios a las técnicas convencionales de cirugía.

El propósito de este estudio es describir los resultados anatomofuncionales en una serie de casos tratados mediante una variante de esta técnica quirúrgica.

*Material y métodos:* Estudio de serie de casos consecutivos. Se incluyó a pacientes con agujero macular mayor de 600  $\mu$ m de diámetro sin intervención previa. Se realizó toma de capacidad visual, así como fotografías clínicas y tomografía de coherencia óptica preoperatorias y al final del seguimiento, en todos los pacientes estudiados. Previa vitrectomía calibre 23 Ga, con separación de hialoides posterior y limitorrexis empleando azul brillante, se tomó un injerto de membrana de limitante interna y se manipuló desplazándolo bajo líquido perfluorocarbonado, hasta colocarlo dentro del agujero macular para finalmente realizar intercambio líquido-aire y colocación de gas SF<sub>6</sub> a concentración no expansible.

*Resultados:* Se incluyeron 5 ojos de 5 pacientes tratados mediante el autoinjerto de membrana limitante interna. El promedio de edad fue de 50.6 (DE 12.3) años. En 4 de los 5 casos hubo cierre del agujero macular. El caso en donde no hubo cierre fue el secundario a trauma. Hubo mejoría de la capacidad visual en todos los pacientes en quienes se logró el cierre del agujero al final del seguimiento.

*Conclusiones:* En esta serie de casos de agujero macular, el trasplante autólogo de membrana limitante interna se asoció a un cierre anatómico del agujero macular y mejoría funcional en la mayoría de los pacientes incluidos.

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**Background**

Due to its anatomical and functional outcomes, in recent years macular hole surgery has become one of the most frequently performed vitreoretinal procedures. This is largely due to perfections in vitrectomy techniques, and the advent of small-gauge or minimally invasive surgery.<sup>1</sup> Another factor which has had a favourable effect on surgical success is being able to more completely and safely remove the internal limiting membrane around the macular hole due to better visualisation. This is achieved in part with the application of the newly introduced vital stains such as brilliant blue. However, there are still cases that are refractory to conventional surgical techniques and that require alternatives in order to increase the already high rate of macular hole closure.<sup>3-9</sup> One of these techniques is autologous transplantation of the internal limiting membrane as described by Morizane et al.,<sup>10</sup> who show encouraging outcomes in their case series from both an anatomical and functional perspective.

**Objective**

To describe a variant of the vitrectomy technique for autologous transplantation of the internal limiting membrane, for the treatment of macular hole, and the experience gained from a series of consecutive cases.

**Material and methods**

A prospective case series study was undertaken. All the patients were informed of the procedure and their informed consent obtained. The study was approved by the Ethics Committee of the *Clínica David* Ophthalmology Unit and was performed in line with the Helsinki Declaration guidelines.

The inclusion criteria were: patients with unilateral macular hole, with the presence of a macular hole of more than 600  $\mu$ m in diameter, who underwent 23 Ga vitrectomy with autograft of internal limiting membrane and placement of SF<sub>6</sub> at 10% as intraocular tamponade, along with a minimum follow-up period of 3 months post surgery. The elimination criteria were non-completion of follow-up or withdrawing from the study for any other reason.

The patients underwent best corrected visual acuity with Snellen notation, subsequently converted to logMAR notation for statistical analysis. They also underwent a complete ophthalmological examination including clinical photography, and high definition spectral domain optical coherence tomography (Cirrus Carl Zeiss Meditec, Inc., Dublin, California, USA, preoperatively and at the end of follow-up).

With regard to surgical technique, all the patients included in the study underwent minimally-invasive 23 Ga vitrectomy, phacoemulsification and intraocular lens placement with placement of concomitant intraocular lens, after intraocular lens (power) calculation. Triamcinolone was used (ATLC, Laboratorios Grin, Mexico, D.F., Mexico) to impregnate the vitreous and facilitate its visualisation

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