



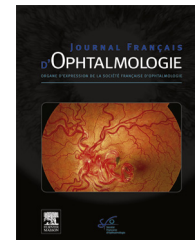
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ORIGINAL ARTICLE

High intensity focused ultrasound as first line treatment in patients with chronic angle closure glaucoma at risk for malignant glaucoma[☆]



Évaluation de l'efficacité des ultrasons focalisés de haute intensité (HIFU) comme traitement de première intention chez les patients atteints de glaucome chronique à angle fermé à risque de glaucome malin

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KEYWORDS

Cyclocoagulation;
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focused ultrasound;
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Chronic angle closure
glaucoma;
Malignant glaucoma;
Intraocular pressure;
Treatment outcomes

Summary

Purpose. – Evaluation of high intensity focused ultrasound (HIFU) transscleral cyclocoagulation as an alternative to trabeculectomy in the treatment of refractory chronic angle closure glaucoma (CACG).

Methods. – This prospective one armed single center pilot study was conducted on patients with medically uncontrolled CACG who underwent high intensity focused ultrasound (HIFU) cyclocoagulation as first line surgical treatment, using the Eye-OP1 HIFU device (Eyetechnicare-Rillieux-la-Pape, France) driven by ultrasound biomicroscopic (UBM) ciliary body localization. All patients had documented progression of their glaucoma despite conventional medical and laser therapy. The primary efficacy outcome was intraocular pressure (IOP) reduction; secondary outcomes included changes in number of glaucoma medications and complications after cyclocoagulation.

[☆] The study was approved by the hospital's institutional board review and was done according to the Declaration of Helsinki, ISO 14155:2011: Clinical Investigations of Medical Devices for Human Subjects – Good Clinical Practices.

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Results. – The study involved 8 eyes of 7 patients between May 2013 and September 2014. The average follow-up was 5.6 ± 2.1 months. The mean IOP was reduced from 18.4 ± 3.5 mmHg preoperatively to 14.8 ± 4.1 mmHg 6 months postoperatively. The average number of glaucoma medications decreased from 3.4 ± 1.1 at baseline to 3.3 ± 0.7 after 6 months. Visual acuity remained stable (median 0.17 log MAR preoperatively and 0.19 log MAR at last follow-up visit). No significant side effect occurred during the 6 months follow-up period.

Conclusions. – HIFU cyclocoagulation appears to be a safe and reliable alternative to filtering surgery in the management of chronic angle closure glaucoma among patients with a high risk of malignant glaucoma.

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MOTS CLÉS

Cyclocoagulation ;
Cyclodestruction ;
Ultrasons focalisés de
haute intensité ;
HIFU ;
Glaucome à angle
fermé chronique ;
Le glaucome malin ;
Pression
intraoculaire ;
Résultats de
traitement

Résumé

Objectif. – Évaluation de la cyclocoagulation transsclérale par ultrasons focalisés de haute intensité (HIFU) comme alternative à la trabéculéctomie dans le traitement du glaucome chronique à angle fermé, en traitement de première intention.

Méthodes. – Cette étude observationnelle prospective et monocentrique, a été menée chez des patients atteints de CACG médicalement non contrôlé ayant bénéficié d'une cyclocoagulation par ultrasons focalisés de haute intensité (HIFU) en première intention en utilisant le dispositif Eye-OP1 HIFU (Eyetechnicare-Rillieux la Pape, France) guidée par échographie en mode UBM afin de centrer le traitement sur les corps ciliaires. Le critère d'évaluation principal était la réduction de la pression intraoculaire (PIO). Les critères d'évaluation secondaires comprenaient la réduction du nombre de traitements antiglaucomeux et les complications après cyclocoagulation.

Résultats. – L'étude a porté sur 8 yeux de 7 patients. Elle a été menée entre mai 2013 et septembre 2014. Le suivi moyen a été de $5,6 \pm 2,1$ mois. La PIO moyenne a été réduite de $18,4 \pm 3,5$ mmHg en préopératoire à $14,8 \pm 4,1$ mmHg à 6 mois. Le nombre moyen de traitements antiglaucomeux a diminué de $3,4 \pm 1,1$ à la valeur de référence à $3,3 \pm 0,7$ après 6 mois de suivi. L'acuité visuelle est restée stable (médiane 0,17 logMAR en préopératoire et 0,19 logMAR à la dernière visite de suivi). Aucun effet secondaire significatif n'est survenu au cours des 6 mois de suivi.

Conclusions. – La cyclocoagulation par HIFU semble constituer, en première intention, une alternative sûre et fiable à la chirurgie filtrante dans la prise en charge du glaucome chronique à angle fermé chez les patients présentant un risque élevé de glaucome malin.

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Introduction

Although chronic angle closure glaucoma (CACG) is the second widespread type of glaucoma worldwide, it is often under-diagnosed in the absence of a thorough gonioscopic study and remains a poor prognosis [1,2]. Trabeculectomy is the gold standard option in the management of CACG that are uncontrolled by maximal medical therapy according to the European Glaucoma Society guidelines [3], but is likely to cause severe complications, such as malignant glaucoma. Malignant glaucoma or aqueous misdirection occurs in up to 6% of the cases after filtering surgery [4]. Modern vitrectomy techniques improved significantly the management and the prognosis of malignant glaucoma but this complication remains challenging and requires heavy medical care [5,6]. It is the first stage of extremely serious complications, such as expulsive hemorrhage, which can result in a functional loss of the eye. Malignant glaucoma preoperative risk

factors are well known [7] and include CACG with pupillary block, or plateau iris configuration [8,9], nanophthalmos and short axial lengths [10,11]. Thick phakic lenses with zonular laxity can predispose to an anterior shift of the lens-iris diaphragm especially if vitreocapsular adhesions are present [12,13]. Given the high risk of malignant glaucoma after filtering surgery in CACG patients, alternative methods are currently tested, such as clear lens phacoemulsification surgery and cyclocoagulation techniques [14,15]. Diode cyclophotocoagulation has been proposed as first line treatment to patients at high risk of malignant glaucoma with severe complication rates (38.5% of significant visual acuity loss for a diode cyclocoagulation as first line treatment in CACG reported by Lai and al. [16]). Previous studies have reported that HIFU reduced significantly intraocular pressure (IOP) with a good safety profile [17], with a better selectivity than cyclodiode laser treatment. A significant IOP reduction (between 26% and 33% IOP reduction after a 12

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