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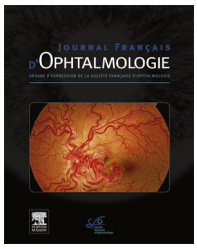

Formation médicale continue

GENERAL REVIEW

Role of laser peripheral iridotomy in pigmentary glaucoma and pigment dispersion syndrome: A review of the literature

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Summary
Purpose. — Pigment dispersion syndrome (PDS) is characterized by a structural abnormality of the posterior surface of the iris causing contact with the zonular fibers. It can lead to an open-angle glaucoma secondary to pigment dispersion into the trabecular meshwork. Laser peripheral iridotomy (PI) has been proposed as a treatment for pigmentary glaucoma (PG) and pigment dispersion syndrome (PDS) by reducing the dispersion of pigment. The goal of this review was to assess the effects of PI for PDS and PG.
Methods. — We included six randomized controlled trials and two cohort studies (286 eyes of 218 participants). Four trials included participants with PG, and 4 trials enrolled participants with PDS with or without elevated intraocular pressure (IOP).
Results. — Among patients with PG, at an average of 9 months of follow-up, the mean difference in IOP between groups was 2.69 mm Hg less in the PI group (95% CI: −6.05 to 0.67; 14 eyes). In patients with PDS, the average IOP was statistically lower after PI as compared to baseline (Student test $t = 11.49$, $P < 0.01$, 38 eyes). With regard to visual field progression in participants with PG, after an average follow-up of 28 months, the risk of progression was not influenced by PI (RR 1.00 95% CI: 0.16 to 6.25; 32 eyes). No trials that enrolled patients with PDS showed a diminution of the risk of glaucoma conversion at mid- and long-terms.

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Conclusion. — PI decreases the biomechanical factor causing contact between the iris and zonular fibers and may lower IOP over the long-term. Nevertheless, the effects of PI on visual field changes or progression have not been established in PG and PDS. There is no scientific evidence as of yet to advocate PI as a treatment for PDS or PG.

Introduction

Pigment dispersion syndrome (PDS) is a clinical-anatomic entity characterized by the following triad:

- radial transillumination of the mid-peripheral iris (Fig. 1a);
- pigment deposits in the eye, notably on the zonular fibers, the anterior and posterior surfaces of the lens, the posterior surface of the cornea (Krukenberg spindle, Fig. 1b), and the iridocorneal angle, in particular within the trabecular meshwork (Fig. 1c);
- a posterior insertion of the iris, associated with a concave configuration of the iris periphery (Fig. 2).

The pathophysiologic mechanism is felt to consist of mechanical contact between the zonular fibers and the posterior part of the iris, resulting in a release of iris pigment within the eye [1].

The prevalence of PDS is 2.45% in Caucasian subjects [2], with a higher prevalence among myopic men between 20 and 50 years of age. The incidence is thought to decrease with age. One study has thus reported that after 10 years of progression, the amount of pigment on the posterior surface of the cornea decreased, and in certain patients who had been treated for pigmentary glaucoma, the disease remained stable after discontinuation of treatment [3]. The increased volume of the lens and the loss of accommodative power would seem to decrease the contact between the posterior iris and the zonular fibers [4]. In patients presenting with PDS, the progressive obstruction of the trabecular meshwork by iris pigment may lead to trabecular dysfunction and elevation of intraocular pressure (IOP). Thus, between 25 and 50% of patients with PDS are at risk of developing ocular hypertension (OHT) [5].

Pigmentary glaucoma (PG) is defined as the association of PDS and glaucomatous optic neuropathy [6]. The conversion of PDS to PG has been studied in various retrospective studies. One of these has found conversion to PG in 10% of cases after 5 years of follow-up, and in 15% of cases after 15 years of follow-up [7]. Another study found PG in 35% of patients with PDS after a mean follow-up of 17 years [8]. PG is a secondary open-angle glaucoma, and it represents 1 to 1.5% of the causes of glaucoma [9]. The average age at diagnosis of PG is between 30 and 50 years.

Peripheral iridotomy [PI] was proposed as a treatment for pigmentary glaucoma for the first time by Karickhoff et al. in 1992 [10]. In PDS, the iris acts as a valve, allowing the aqueous humor to pass only from the posterior chamber to the anterior chamber. This is known as reverse pupillary block. This is felt to be the cause of the peripheral iris concavity. The principle behind PI would thus be to equalize the pressure between the anterior and posterior chambers of the eye, so as to reduce the posterior concavity of the iris. Thus would allow for reduced friction between the iris and zonular fibers, thus reducing or eliminating pigment dispersion [11]. Thus, the obstacle to aqueous humor excretion related to the pigment deposits in the trabecular meshwork would be reduced or even eliminated [12]. The goal of this literature review was to evaluate the effect of PI in PDS and PG.

Patients and methods

In December 2016, we performed a search on PUBMED using the terms ''pigmentary glaucoma'' OR ''pigment dispersion syndrome'' AND ''peripheral iridotomy'' (Fig. 3). The references in the articles revealed by this search were also studied. We thus included in this literature review all prospective studies, which compared laser, PI to medical management, trabeculectomy or simple monitoring in patients with PDS or PG. There were no exclusion criteria regarding age, gender, ethnicity, comorbidities or use of adjuvant treatments. The primary outcome measures used were visual field progression with at least 6 months of follow-up and IOP reduction. The secondary outcome measures were visual acuity, necessity of additional pressure-lowering treatment, and anatomic changes in the anterior chamber [anterior chamber depth, iridocorneal angle measurement, iris flattening] measured by high frequency ultrasound biomicroscopy [UBM] or by OCT.

Results

Among the 48 articles found on PubMed, we eliminated 35, either because they dealt with other types of glaucoma: primary open angle ($n = 9$), angle closure ($n = 5$) or unspecified ($n = 3$), or because they did not study PI, but studied other treatments instead (phacoemulsification, Selecta laser trabeculoplasty, medical management) ($n = 6$); 7 articles were diagnostic rather than therapeutic studies, and finally, 5 articles did not deal specifically with PDS or PG. Thirteen articles were eliminated at the stage of reading the complete text: 1 was in German, 2 were case reports, and