OCT STUDY OF FELLOW EYES OF MACULAR HOLES

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SUMMARY

The aim of this study was to examine the vitreomacular interface in symptom-free fellow eyes of macular holes using optical coherence tomography (OCT) to add information to the pathogenesis of macular holes and to refine prognostic factors for bilateral involvement.
Sixty-six patients with a full thickness macular hole in one eye and a symptom-free fellow eye were included in the study between 01/98 - 05/99.
The finding on OCT that a perifoveal vitreous detachment can result in a foveal cyst and subsequently a macular hole confirms the theory of Gass of vitreous traction. Symptom-free fellow eyes with a foveal cyst on OCT represent an elevated risk (55%) for macular hole development. Vitreofoveal separation is probably a good prognostic sign.

RESUME

Observer par tomographie en cohérence optique l'interface vitréomaculaire dans l'oeil adelphe d'un trou maculaire dans le but d'étudier la morphologie et l'évolution des trous maculaires et de déceler des facteurs pronostiques d'une atteinte bilatérale.
Soixante-six patients ayant un trou maculaire dans un oeil et un oeil adelphe sans symptômes ont été inclus dans l'étude entre 01/98-05/99.
Les images en l'OCT démontrent qu'un décollement périfovéolaire de l'hyaloide peut résulter dans la formation d'un kyste maculaire et finalement un trou maculaire, et confirment la théorie de Gass sur l'origine par traction vitréenne. La présence d'un kyste fovéolaire signifie un risque élevé. La séparation vitréofovéolaire est probablement un signe de pronostic favorable.

SAMENVATTING

Het doel van deze OCT studie was het onderzoek van de vitreomaculaire verhoudingen in symptoomvrije contralaterale ogen van maculagaatjes om informatie toe te voegen aan de pathogenese van maculagaatjes en de prognostische factoren voor bilaterale aantasting.
Zesenzestig patienten met een maculagaatje in één oog en een symtoomvrij ander oog werden opgenomen in de studie tussen 01/98 - 05/99.
De bevindingen met OCT dat een perifoveale glasvochtloslating kan resulteren in een foveale kyste en vervolgens een maculagaatje, bevestigen de theorie van Gass van glasvochttractie.
Symptoomvrije ogen met een foveale kyste op OCT hebben een hoger risico (55%) om een maculagaatje te ontwikkelen. Vitreofoveale separatie is waarschijnlijk een gunstig prognostisch teken.

KEYWORDS

Macular hole, vitreomacular traction, OCT.

MOTS CLES

Trou maculaire, traction vitréomaculaire, OCT.

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INTRODUCTION

The first aim of this study was to add information to the pathogenesis and the morphology of macular holes. The introduction of optical coherence tomography (OCT) with its high resolution retinal imaging provides new information on the vitreomacular relationship and foveal changes during the initial stages of macular hole formation.
Secondly, this study was undertaken to refine the prognostic factors for bilateral involvement and to offer to the patient an additional element to the decision for surgery in the first eye.

PATIENTS AND METHODS

Both eyes of ninety-four patients with a full thickness macular hole in at least one eye were examined between 01/98-05/99. All patients underwent a complete ophthalmological examination including biomicroscopic fundoscopy and OCT.
Sixty-six patients with a symptom-free fellow eye, aged between 44 and 82 years (mean age 65,5 years) and of which 71% were female, were included in the study.
Criteria for inclusion of fellow eyes were: a visual acuity between 7/10- 10/10, Snellen 1 and no metamorphopsia on the Amsler chart. Eleven patients with bilateral involvement and seventeen patients with any kind of retinal disease in the fellow eye were excluded.

RESULTS

Three different OCT observations have been made in fellow eyes (fig. 5):
- Group I: normal foveal depression with no visible hyaloid
- Group II: perifoveal detached posterior hyaloid:
  - IIa: with normal foveal depression
  - IIb: with foveal cysts
- Group III: total vitreofoveal separation visible on OCT

1) Group I: Forty-six fellow eyes had a normal foveal depression with no visible hyaloid on OCT scan. In five of these fellow eyes, biomicroscopic fundoscopy showed a posterior vitreous detachment. Twenty-nine patients, of which four of the five patients with a posterior vitreous detachment, remained in group I. There was no follow-up of the seventeen other patients.

2) Group IIa : In five fellow eyes (8%), the posterior hyaloid was detached around the fovea with a persistent adherence at a normal foveal depression. In one of these eyes spontaneous vitreofoveal separation occurred after eight months. Two fellow eyes remained in Group IIa. There was no follow-up of the two other fellow eyes (fig 2).

3) Group IIb: In seven fellow eyes (11%), OCT showed a perifoveal hyaloidal detachment and a foveal cyst. The posterior hyaloid remained attached to the fovea and adhered to the roof of this cyst. In four of these cases (55%), there was a progression to a full thickness macular hole in a period between 1-6 months. In one fellow eye, a spontaneous evolution to vitreofoveal separation occurred after one month, with a restorance of the foveal depression after 6 months.
Two patients remained in group IIb after a follow-up of six months (fig 3).

4) Group III: In seven fellow eyes (11%), OCT showed that the posterior hyaloid was detached over the entire macular region with a normal foveal depression. In none of these cases, a further progression to a macular hole has been observed after a follow-up between 2-14 months (fig 4).

DISCUSSION

The high resolution tomographic images obtained by OCT provide an accurate imaging of the macula and the vitreoretinal interface and can deliver useful information in the pathogenesis of macular holes and the prognostic factors for bilateral involvement.

OCT can detect the initial stages of vitreous separation and foveal alteration in fellow eyes. This study demonstrates that perifoveal vitreous detachment can initiate the formation of an intraretinal foveal cyst and subsequently a ma-

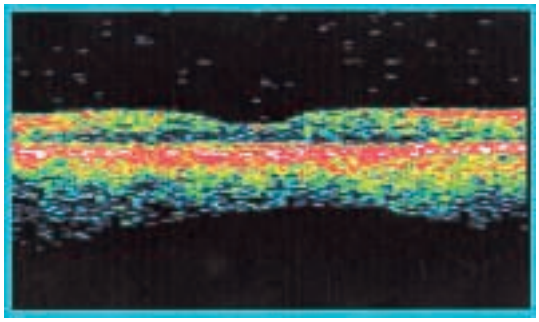

Fig. 1

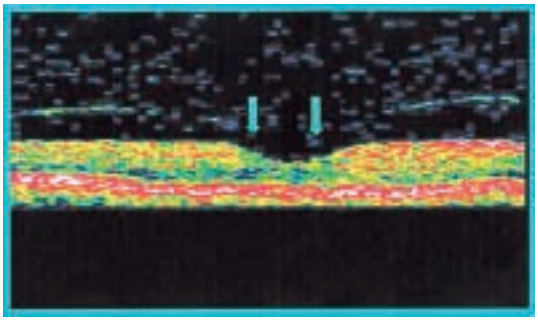

Fig. 2

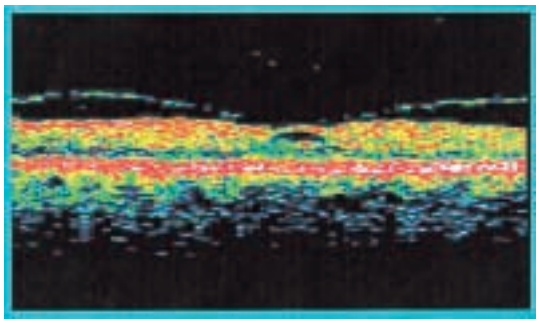

Fig. 3

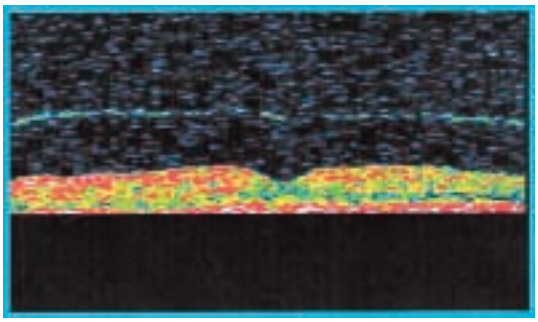

Fig. 4

cular hole, supporting the theory of Gass [6] of vitreous traction.

It has been proposed by many authors that a foveal cyst, caused by vitreous traction, is the initial feature of macular hole development. Kishi et al [9] used a scanning laser ophthalmoscope (SLO) to show tractional elevation of Henle's fiber layer with foveal cyst formation in the early stages of macular holes. Folk et al [4] and Asrani et al [2] demonstrated foveal cysts with a retinal thickness analyser. Finally, observations with OCT by Hee et al [7] and Gaudric et al [5] supported the same hypothesis.
Although many reports have studied the role of vitreous traction in the pathogenesis of macular holes, the nature of the traction remains controversial. Gass [6] proposed the theory of tangential vitreous traction whereas other studies [5,8] suggested a role of anteroposterior traction.

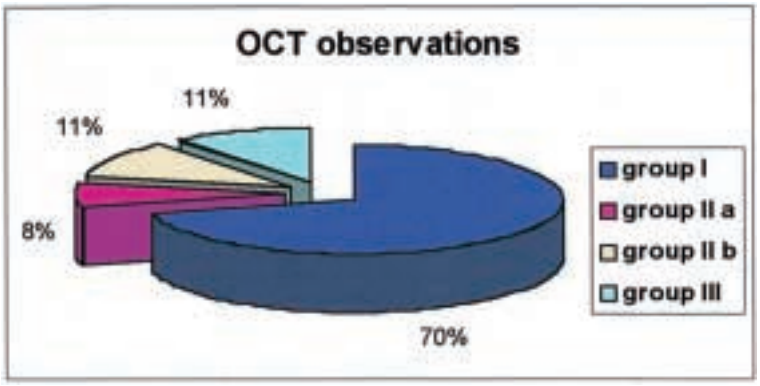

Fig. 5

OCT is very useful in evaluating the risk of macular hole formation in fellow eyes of patients with an unilateral full thickness macular hole. In general, the risk of fellow eye involvement is 10-15%[1,3]. However, patients with a vitreofoveal separation in the fellow eye, assessed by

biomicroscopy or using OCT, can probably be reassured that there is a minimal risk for bilateral involvement: no patient in this study had a further evolution to a macular hole. On the other hand, fellow eyes - although symptom-free - with perifoveal vitreous detachment and foveal cyst formation are prone to a much higher risk: fifty-five per cent of these eyes developed a full thickness macular hole.

CONCLUSION

This study demonstrates that OCT is a very accurate imaging method to evaluate the vitreomacular interface and foveal changes in fellow eyes. The finding on OCT that a perifoveal vitreous detachment can result in a foveal cyst and subsequently a macular hole, confirms the theory of Gass of vitreous traction.

Symptom-free fellow eyes with foveal cysts represent an elevated risk for macular hole development. Vitreofoveal separation is probably a good prognostic sign.

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