

# Laser photocoagulation for peripheral rhegmatogenous retinal detachment

## *Fotocoagulação a laser em pacientes portadores de descolamento de retina regmatogênico periférico*

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### ABSTRACT

**Objective:** To report a series of macular sparing rhegmatogenous retinal detachment (MSRRD) in patients treated with demarcation laser photocoagulation. **Methods:** Retrospective, interventional, and noncomparative case series of 14 eyes in 12 patients with primary MSRRD. Eyes with previous surgical intervention were excluded from this study. All eyes received three or more rows of confluent demarcation laser photocoagulation at the margin of retinal detachment. Best corrected preoperative and postoperative visual acuity and progression of retinal detachment during the follow-up were recorded. **Results:** Thirteen eyes needed only one session of laser to wall off the retinal detachment. Only one eye required one additional procedure because of progressive retinal detachment. Myopia was noted in 7 eyes. All patients maintained best corrected visual acuity equal or better than 20/30. **Conclusion:** In selected cases, demarcation laser photocoagulation would be considered to treat macular sparing rhegmatogenous retinal detachment.

**Keywords:** Retinal detachment/therapy; Photocoagulation; Laser therapy

### RESUMO

**Objetivo:** Relatar uma série de casos de descolamento de retina sem envolvimento macular tratados com fotocoagulação a laser. **Métodos:** Estudo tipo série de casos envolvendo 14 olhos de 12 pacientes com descolamento de retina regmatogênico sem envolvimento macular, retrospectivo, de intervenção. Olhos com procedimentos cirúrgicos prévios foram excluídos. A fotocoagulação a laser foi aplicada com três fileiras confluentes de spot de 300µm, posterior ao descolamento de retina, se estendendo até a ora serrata. A melhor acuidade visual corrigida pré e pós-operatória e a progressão do descolamento de retina foram registrados durante o estudo. **Resultados:** Treze olhos necessitaram de apenas uma sessão de laser para conter o descolamento de retina. Apenas um olho necessitou de intervenção adicional por causa da evolução do descolamento de retina. Miopia foi encontrada em 7 olhos. Todos os pacientes mantiveram acuidade visual corrigida igual ou melhor que 20/30. **Conclusão:** Em casos bem selecionados, a fotocoagulação a laser pode ser considerada para o tratamento de descolamento de retina regmatogênico.

**Descritores:** Descolamento de retina/terapia; Fotocoagulação; Terapia a laser

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## INTRODUCTION

**R**hegmatogenous retinal detachment (RRD) is a solution of continuity in the neurosensory retina allowing the passage of intra-vitreous fluid into the subretinal space, leading to its separation from the pigment epithelium<sup>(1)</sup>. Its estimated prevalence in the general population is 0.3%, reaching 5.0% in patients with high myopia and 10% in patients who underwent cataract surgery with vitreous loss<sup>(2,3)</sup>.

The treatment of rhegmatogenous retinal detachment is based on Gonin's principles for the location of the solution of continuity and the presence of chorioretinal scarring, and is aimed at closing the lesion<sup>(1)</sup>. Current techniques can cure up to 90% of non-complicated detachments (i.e., without vitreoretinal proliferation)<sup>(4)</sup>.

Pneumatic retinopexy, scleral buckle, and posterior vitrectomy can be used to treat retinal detachment. All these procedures can cause serious complications, including the risk of irreversible visual loss<sup>(5)</sup>.

Selected cases, such as asymptomatic RRD, RRD in phakic eyes, RRD associated with atrophic retinal hole, and inferior RRD, can be managed with observation and informing the patient about symptoms<sup>(6)</sup>.

As an alternative to observation and surgical management, a case series has described the use of laser photocoagulation in patients whose detachment is flat, does not affect the macular region, and is not associated with vitreoretinal proliferation (VRP)<sup>(7)</sup>.

The aim of this study was to report a case series of patients with primary RRD without macular involvement treated with laser photocoagulation.

## METHODS

Retrospective study of 17 patients with RRD treated with laser photocoagulation at the Altino Ventura Foundation from 1998 to 2009. Five patients underwent laser photocoagulation after surgical correction of retinal detachment and were therefore excluded. Fourteen eyes of 12 patients were included.

Laser photocoagulation was indicated to patients without macular involvement, symptoms of visual field loss, or vitreoretinal proliferation.

We collected data regarding age, sex, refraction (spherical equivalent), Snellen visual acuity before and after laser coagulation, number of tears, type of tear (atrophic hole, dialysis, horseshoe), lens status, location and extent of the detachment, symptoms (floaters and/or photopsia), previous vitreoretinal surgery, progression of the detachment, state of the contralateral eye, presence of a demarcation line, appearance of the detachment (flat or bullous), and the presence of posterior vitreous detachment.

Patients were informed about the safety and efficacy of the treatment and provided their free and informed consent after discussing the risks and benefits of surgical treatment (pneumatic retinopexy, scleral buckle, and posterior vitrectomy).

Laser photocoagulation was applied with three confluent rows of 300  $\mu$ m spots, posterior to the retinal detachment and extending to the ora serrata.

## RESULTS

Of the 12 patients included in the study, seven were male (58%) and five were female (42%). Two patients had bilateral RRD treated with laser. Corrected visual acuity ranged from 20/20 to 20/40 before the procedure and 20/20 to 20/30 after the

**Table 1**  
Clinical data of study subjects.

Nº.	Age	Genre	Eye	Refraction (SE)	Initial VA	Final VA	Number of tears	Type of tear	Location of RD	Extension of RD (hours)	Follow-up time (months)	Symptoms
1	63	M	RE	-0.75	20/20	20/20	1	HST	SN	1	35	FL
	63	M	LE	-0.5	20/20	20/20	1	HST	SN	1	3	FL
2	30	M	LE	-0.25	20/20	20/20	2	AH	IT	1	3	AS
3	59	M	RE PP (Myopia)		20/20	20/20	1	HST	S	2	5	PH
4	29	F	RE	-4	20/20	20/20	1	AH	IT	2	42	AS
	29	F	LE	-4	20/20	20/20	1	AH	IT	2	25	AS
5	39	M	LE	0.5	20/20	20/20	2	AH	T	3	22	AS
6	51	M	RE	-1	20/30	20/30	0	N/A	NH	6	137	AS
7	41	M	RE PP (ND)		20/25	20/25	0	N/A	IT	2	141	AS
8	44	F	LE	1.5	20/20	20/20	D	D	IT	2	48	AS
9	36	F	LE	-8	20/40	20/25	2	AH	IT	2	131	AS
10	31	F	LE	-8.75	20/20	20/20	1	AH	T	3	45	AS
11	39	M	LE	-7	20/40	20/30	2	AH	IT	2	71	AS
12	76	F	LE	PP (0,25)	20/20	20/25	1	D	ST	1	36	AS

SE, spherical equivalent; VA, visual acuity; RD, retinal detachment; AH, atrophic hole; HST, horseshoe tear; D, dialysis; SN, superior nasal; IN, inferior nasal; IT, inferior temporal; S, superior; T, temporal; NH, nasal hemiretina; ST, superior temporal; PH, photopsia; FL, floaters; AS, asymptomatic; ND, not determined by the patient; N/A, not applicable; PP, pseudophakic.

procedure. Five patients had RRD in the contralateral eye; of these, three were treated with posterior vitrectomy, one with scleral buckle, and one patient had no surgical indication, as the diagnosis had been made more than six months earlier and there were signs of bulbar atrophy.

Seven patients (58%) had myopia, of which four were greater than 4 dioptres. Three patients were pseudophakic, of which two did not know whether they had a refraction error before undergoing cataract surgery.

The type of tear found was atrophic hole in seven eyes, horseshoe tear in three eyes, dialysis in two eyes, retinoschisis associated with retinal tear in one eye, and no tear in two eyes. The location of RRD was inferior-temporal in seven eyes, superior-nasal in two eyes, temporal in two eyes, superior-temporal in one eye, superior in one eye, and one eye had a lesion affecting the entire nasal hemiretina. The extension of RRD in terms of angle varied from one to six hours.

Most patients were asymptomatic (nine patients) and their RRD was diagnosed through routine examination. Two patients experienced symptoms: one had floaters and the other had photopsia. Only these two patients also had posterior vitreous detachment. No patient had symptoms of visual field loss. Ten patients had flat RRD, without folds or ridges; in one patient the RRD had a bullous appearance in the periphery of a retinoschisis. This patient was offered the option to undergo laser treatment due to the presence of RRD in the contralateral eye extending to the inferior temporal arcade and threatening the macular region, with surgical indication, which was the reason for the consultation. After a thorough discussion of the risks and benefits of treatment, the patient opted for laser therapy.

Follow-up ranged from 3 to 141 months. The progression of RRD after laser therapy was observed in only one patient (#10) who initially had lattice degeneration with atrophic hole between 3 and 4 o'clock. After one year of monitoring, this patient developed an atrophic hole on the inferior retina, between 6 and 7 o'clock, with the presence of fluid near the inferior temporal arcade. The patient was then indicated retinopexy with scleral buckle and cryopexy, with a good outcome. This patient was phakic. Fluid progression was not observed in the other patients. No patient had vitreoretinal proliferation before or after laser photocoagulation.

## DISCUSSION

In 1958, Schepens used the term "subclinical retinal detachment" (SRD) for cases where the detachment was so peripheral and flat that it did not affect the visual field or visual acuity<sup>(8)</sup>. In 1973, Davis suggested that the term SRD should only be used in cases where the fluid was limited to 1 disc diameter (DD) beyond the tear but less than 2 DD posterior to the equator<sup>(9)</sup>. The term "limited retinal detachment" is used for cases without significant symptoms, which are only diagnosed during fundus examination<sup>(10)</sup>. In general, flat, peripheral, asymptomatic retinal detachments have a lower chance of progression, which may influence the choice of treatment<sup>(6,11)</sup>. Therefore, factors related to the anatomy and symptoms guide the decision to adopt expectant management, laser photocoagulation, or an invasive surgical procedure.

Based on studies showing the slow progression of asymptomatic retinal detachment, many surgeons simply adopt expectant management and do not indicate invasive surgical procedures, due to their inherent risks<sup>(12)</sup>. However, expectant management also has its disadvantages. Among them is the limitation of daily activities at work or in sports; progression

may occur between routine examinations and there is risk of detachment in the macular region, with a higher chance of central vision impairment. Also, the photoreceptors in the †detached, untreated retina may degenerate over time, with limited recovery of the visual field after a future surgical procedure<sup>(12)</sup>.

When indicating an invasive surgical procedure, its risks and complications should be considered. These can range from mild complications that do impair visual acuity, such as a refraction change that could be corrected, to serious complications that could even lead to atrophy of the eyeball or irreversible blindness, such as intractable glaucoma<sup>(13)</sup>.

Treatment with laser photocoagulation is an intermediate procedure between expectant management with periodic observation and an invasive surgical procedure. There are no well-defined criteria indicating which cases would benefit from laser therapy; thus, the management of retinal detachment also depends on the surgeon's preferences and experience. Laser photocoagulation is known to increase the retinal pigment epithelium's adhesion to the neurosensory retina within the first 24 hours<sup>(14)</sup>. However, maximum adhesion occurs between 3 and 14 days<sup>(15)</sup>. The nerve fibre layer in the treated area could also lose its function, with consequent visual field impairment even in patients who subsequently undergo surgical correction<sup>(15)</sup>.

The presence of a demarcation line in the detachment does not guarantee that the lesion is safe and will not progress. It only suggests that the detachment is possibly chronic and has been progressing for more than three months. Some reports have shown fluid progression even in patients who already had a demarcation line<sup>(16)</sup>.

There are reports of fluid reabsorption after laser photocoagulation in patients submitted to scleral buckle<sup>(17,18)</sup>. Lee et al.<sup>(17)</sup> described four patients who suffered a redetachment after undergoing scleral buckle. Since all redetachments were peripheral, the authors opted for laser photocoagulation only. The patients progressed with complete reabsorption of the fluid 4-14 days after the procedure.

This study's limitations were its small sample, and its retrospective, case series design.

Demarcation of RRD with laser photocoagulation seems to be an effective therapeutic alternative for selected cases, when the detachment has not yet reached the macular region and there is no vitreoretinal proliferation. Still, regular follow-up and patient advice on the emergence of new symptoms is critical to determine whether there is progression of RRD after the laser procedure. A prospective, randomised controlled trial is needed to assess the safety and effectiveness of laser photocoagulation in the treatment of selected cases of RRD.

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