Tolerance of laser panretinal photocoagulation treatment under topical anaesthesia using slit lamp delivery vs indirect ophthalmoscope laser panretinal photocoagulation under peribulbar anaesthesia

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Abstract: *Background and Objective*: To compare the pain perceived by patients undergoing argon laser panretinal photocoagulation treatment for proliferative diabetic retinopathy under slit lamp delivery after topical anaesthesia and indirect ophthalmoscope laser delivery after peribulbar anaesthesia.

Study design/ Patient and Methods: Prospective, multicentre non-randomised, study. Forty-six eyes of 46 patients with proliferative diabetic retinopathy were treated either by slit lamp delivery using topical anaesthesia (Group A) or indirect ophthalmoscope laser panretinal photocoagulation after peribulbar anaesthesia (Group B). Patients in both the categories were divided into two subgroups, one receiving pan retinal photocoagulation for the first time (A1 & B1) and the second group receiving laser treatment for the second or subsequent time (A2 & B2).

The primary outcome measure was eye pain perceived during the laser treatment and pain within 48 hours following laser treatment. Patients graded the pain from (0-10) on a visual analogue scale. Secondary outcome measure included the need for oral analgesia within 48 hours following the laser procedure.

Results: Overall panretinal photocoagulation treatment under peribulbar anaesthesia is more comfortable than topical anaesthesia ($p<0.001$), but pain within 48 hours following the laser procedure was similar in the two groups ($p=0.118$).

Panretinal photocoagulation for the first time with peribulbar injection was more comfortable than topical anaesthesia ($p=0.001$), but both the groups perceived similar pain 48 hours following the laser procedure ($p=0.571$).

Subsequent laser treatment is again more comfortable under peribulbar anaesthesia ($p<0.001$) and is also more comfortable than topical anaesthesia causing less pain 48 hours following laser treatment ($p=0.004$).

Conclusion: Peribulbar anaesthesia does not abolish pain completely, but definitely made argon laser panretinal photocoagulation treatment more comfortable for patients. Panretinal photocoagulation under topical anaesthesia is painful and this pain may persist for up to 48 hours. Peribulbar anaesthesia is not entirely effective in controlling pain during the first 48 hours following laser treatment in those patients undergoing laser application for the first time.

Patients need to be counselled regarding pain following panretinal photocoagulation treatment and the need for oral analgesia.

Keywords: Proliferative diabetic retinopathy, Panretinal photocoagulation, Peribulbar anaesthesia, Visual analogue scale.

INTRODUCTION

Laser panretinal photocoagulation remains the primary treatment for high-risk characteristic proliferative diabetic retinopathy. The diabetic retinopathy study (DRS) showed the beneficial effect of argon laser panretinal photocoagulation treatment in reducing the risk of severe visual loss by 50% [1].

There are no established protocols regarding the type of anaesthesia to be used during laser treatment. Laser panretinal photocoagulation (PRP) is performed mostly under topical, occasionally under peribulbar or subtenons anaesthesia and rarely under general anaesthesia. Laser treatment involving the macula is generally well tolerated in comparison to panretinal photocoagulation where pain can be significant.

It is generally accepted, albeit anecdotally, that PRP tends to become painful during subsequent sessions.

To the best of our knowledge there are no reports that compare the comfort of patients treated under topical vs peribulbar anaesthesia during panretinal photocoagulation treatment. We report here the results of a prospective, non-randomised case series that directly compares the pain perceived between topical and peribulbar anaesthesia during panretinal photocoagulation treatment.

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PATIENTS AND METHODS

The study was approved by the ethics committees of the Plymouth Hospital NHS Trust (LREC no: 1818) & the Royal Devon & Exeter Hospital foundation trust. Patients undergoing panretinal photocoagulation for proliferative diabetic retinopathy were included in this study. Patients for this study were recruited from the medical retina out patients clinic. Exclusion criteria for this study included patients with proliferative retinopathy due to other causes like retinal vein occlusion. Patients on chronic pain medication, one-eyed patients, pregnant women, patients with needle phobia, and those unwilling to take part in the study were excluded. Patient who entered the study but could not tolerate a minimum of 800 laser burns exited the study.

Patients enrolled in the study were explained about the visual analogue scale (VAS) and written consent obtained for the study and the laser procedure. The method of anaesthesia (topical or peribulbar) for undergoing panretinal photocoagulation treatment was decided at random in the clinic during consultation with the patient.

Laser Treatment

Direct slit lamp delivery was achieved using a slit lamp mounted argon green laser after instillation of 2 drops of 0.4% benoxinate topical anaesthetic drops five minutes apart, and applying a fundoscopic contact lens. Indirect argon laser was delivered in the operating theatre with the patient in a comfortable reclining position, after administering peribulbar anaesthesia using a mixture of equal volume 2% lidocaine and 0.50% levobupivacaine.

The aim of the treatment in both modes of laser application was to create a gentle whitening of the retina. Care was taken to avoid the long ciliary nerves in the horizontal meridian during laser delivery. Three senior ophthalmologists performed the laser procedure (two at the REI and one at RD&E).

Evaluation of Pain

Fifteen minutes following the laser treatment, patients were asked to score the pain experienced during the laser procedure on the VAS chart. The severity of pain in Visual analogue scale (VAS) is graded from 0 (no pain) to 10 (the worst possible pain) [2].

Before discharge, patients were given a self-addressed envelope containing a VAS chart, to score the pain perceived during the 48 hours period following the laser treatment and a printed sheet to record the need for oral analgesia.

The patients did not receive a prescription for oral analgesia following the laser treatment but were advised to take acetaminophen or any non-prescription, analgesic if they felt the need.

Statistical Analysis

Pain scores were assessed for each of the four groups during the laser treatment and within 48 hours following the treatment. Comparisons between groups were made using the Mann Whitney U test.

Analgesia use was compared between groups using Fischer's exact test.

RESULTS

49 patients were recruited in the study. Two patients exited the study as they were unable to withstand the treatment of atleast 800 laser burns, and one patient did not return the self addressed envelope. 46 patients completed the study and were included in the final analyses. 21 in the topical anaesthesia group (A1 & A2) and 25 in the peribulbar anaesthesia group (B1 & B2). There were no complications associated with the use of peribulbar anaesthesia or the laser treatment.

The mean (SD) age in the peribulbar, and topical anaesthesia group was 53.6(13.7) and 56.3(16.9) years respectively (p=0.55). In the peribulbar group there were 20 males and 5 female, and in the topical group there were 12 males & 9 female (p=0.12)

Overall the median (range) pain score during PRP treatment in the topical anaesthesia group (A1+ A2) was 5 (1-9) and 1(0-7) in the peribulbar anaesthesia group (B1+B2) (p<0.001) Table **1**.

There was no significant difference between the groups with regard to pain during the 48 hours period following laser treatment (p=0.118).

Sub group analyses of pain on patients with no previous laser A2 (topical) and B2 (peribulbar) showed a significant benefit with peribulbar anaesthesia during the procedure (p=0.001) whereas the pain following laser treatment was not significant (p=0.571).

Patients having subsequent laser sessions A2 (topical) and B2 (peribulbar) felt more comfortable with

Table 1: Pain perceived during laser treatment

	Median (Range)	P Value
Topical anaesthesia group (A1 + A2)	5 (1-9)	<0.001
Peribulbar anaesthesia (B1+B2)	1(0-7)	

Table 2: Need for oral analgesia

Laser treatment	Treatment		P value
	Injection	Topical	
Group B1 & A1	5/8 (62.5%)	4/12 (33.3%)	0.362
Group B2 & A2	5/17(29.4%)	5/9(55.6%)	0.234

peribulbar anaesthesia during (p<0.001) as well as after (p=0.004) the laser treatment.

The need for oral analgesia (Table **2**) following laser treatment was not statistically significant in either of the groups.

DISCUSSIONS

Studies evaluating pain during [3-5] and after retinal laser procedures are limited. Our study was designed to evaluate the pain perceived by patients undergoing laser by the two common anaesthetic techniques used in the centre where the study was undertaken i.e., topical and peribulbar. This study was conceived after some patients complained of severe pain lasting for two or more days following the laser treatment.

Although peribulbar anaesthesia is widely believed to be comfortable to the patient during panretinal photocoagulation, it is probably not popular among ophthalmologists due to the injection related side effects like globe perforation, artery occlusion and ocular motility disorders [6-8] along with the additional resources (anaesthetist & theatre monitoring facilities) needed to perform the procedure.

The study reveals some interesting and important aspects of PRP treatment. It reinforces the painful nature of the laser panretinal photocoagulation treatment under topical anaesthesia and the significant patient comfort achieved with peribulbar anaesthesia. Post laser treatment pain does not find mention in the medical literature but is a clinically significant issue for patients and may last upto 48 hours. Peribulbar anaesthesia though effective may not completely abolish this pain (Table **2**).

Description of pain among patients in our study was varied; they usually localised the pain to the globe or along the distribution of the ophthalmic division of the trigeminal nerve. Some felt the laser light beam to be very strong and painful. Our study has limitations; it is not randomised, and the numbers are very small. Nevertheless the patients in our study were drawn from a routine practice hence may be clinically relevant.

We feel patients undergoing panretinal photocoagulation treatment should be offered the option of peribulbar anaesthesia. In addition use of indirect mode of laser delivery, offers physical comfort as the patient is in a reclining position, and it also facilitates the surgeon with good accesses and an adequate peripheral laser treatment of the retina. The need for possible oral analgesia following laser treatment should be explained to the patient, irrespective of the nature of the anaesthetic technique used.

This study was conducted at the Royal Eye Infirmary Plymouth UK and the Royal Devon &Exeter Hospital NHS foundation Trust, Exeter UK.

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