



Follow-up of Visual Field Loss after Electrical Optic Nerve Stimulation in Normal Tension Glaucoma

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INTRODUCTION

Normal tension glaucoma (NTG) is characterized by optic nerve degeneration and loss of retinal ganglion cells causing visual field impairment without elevated intraocular pressure (IOP) (1, 2). The current standard approach in NTG therapy is further reduction of the IOP. Despite effective medications leading to IOP-lowering, glaucoma exacerbation and progressive vision loss among patients is common.

OBJECTIVES

Electrical stimulation of the optic nerve (ONS) facilitates axonal regeneration and survival of retinal ganglion cells (3). The case series provides real-world evidence for clinical efficacy of ONS in NTG.

METHODS

Nine NTG patients, between 46 and 79 years old, with progressive vision loss despite therapeutic IOP reduction underwent electrical ONS. Closed eyes were separately stimulated by bipolar rectangular pulses with intensities up to 1.2 mA sufficient to provoke phosphenes. Ten daily stimulation sessions within two weeks lasted about 80 min each. Right before ONS at baseline (PRE), visual field loss was documented by static threshold perimetry in the central 30° visual field and compared to the same assessment approximately three months (POST3) and twelve months afterwards (POST12). Mean defect (MD) was defined as primary outcome parameter. Only perimetries with a reliability factor (RF) of max. 20% were considered.

CONCLUSIONS

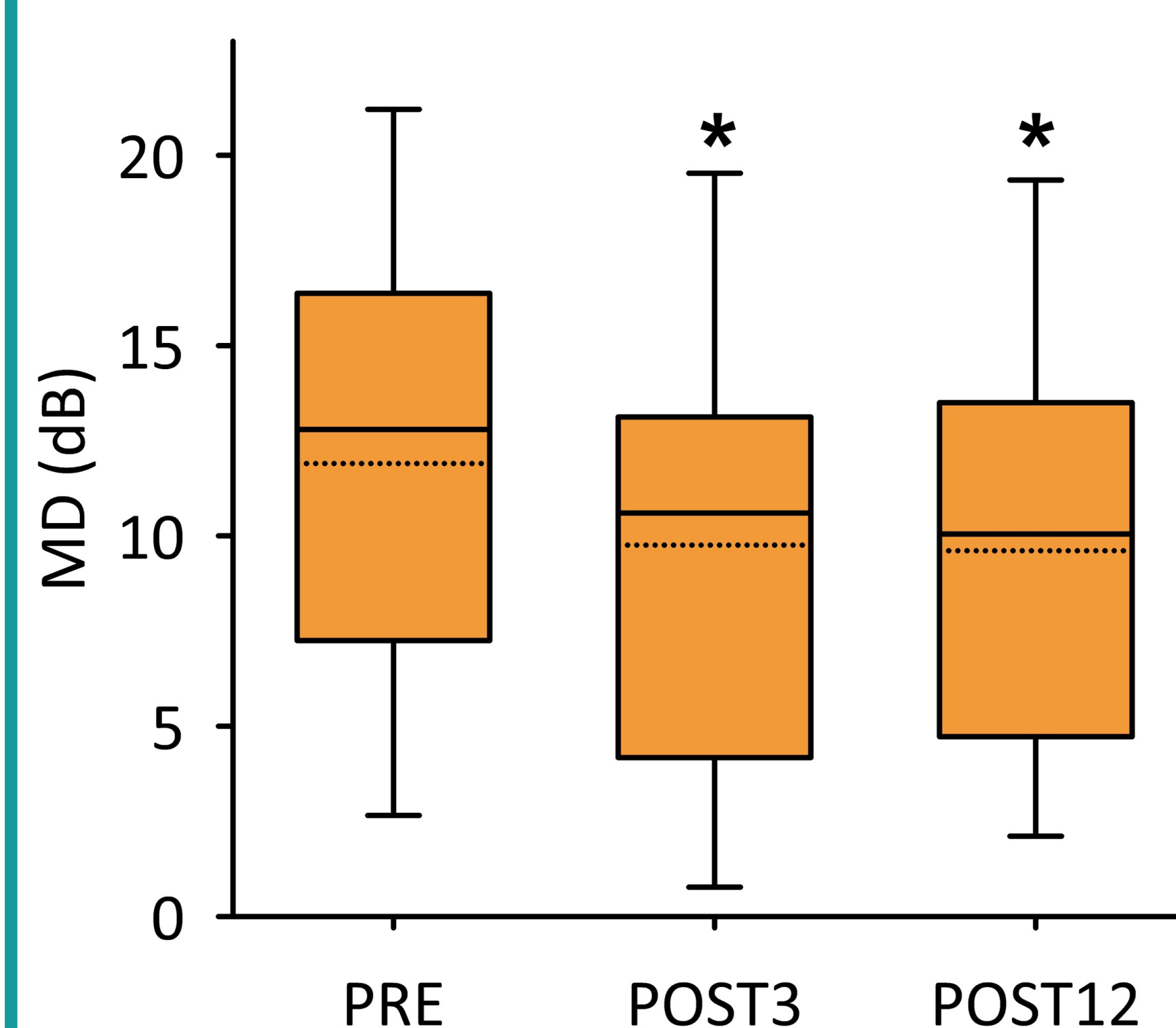
Innovative treatments that preserve visual function through mechanisms other than lowering IOP are required for NTG with progressive vision loss. The present data document progression halt or even improvement of visual fields in the vast majority of affected eyes after ONS and, thus, extend existing evidence from clinical trials.

RESULTS

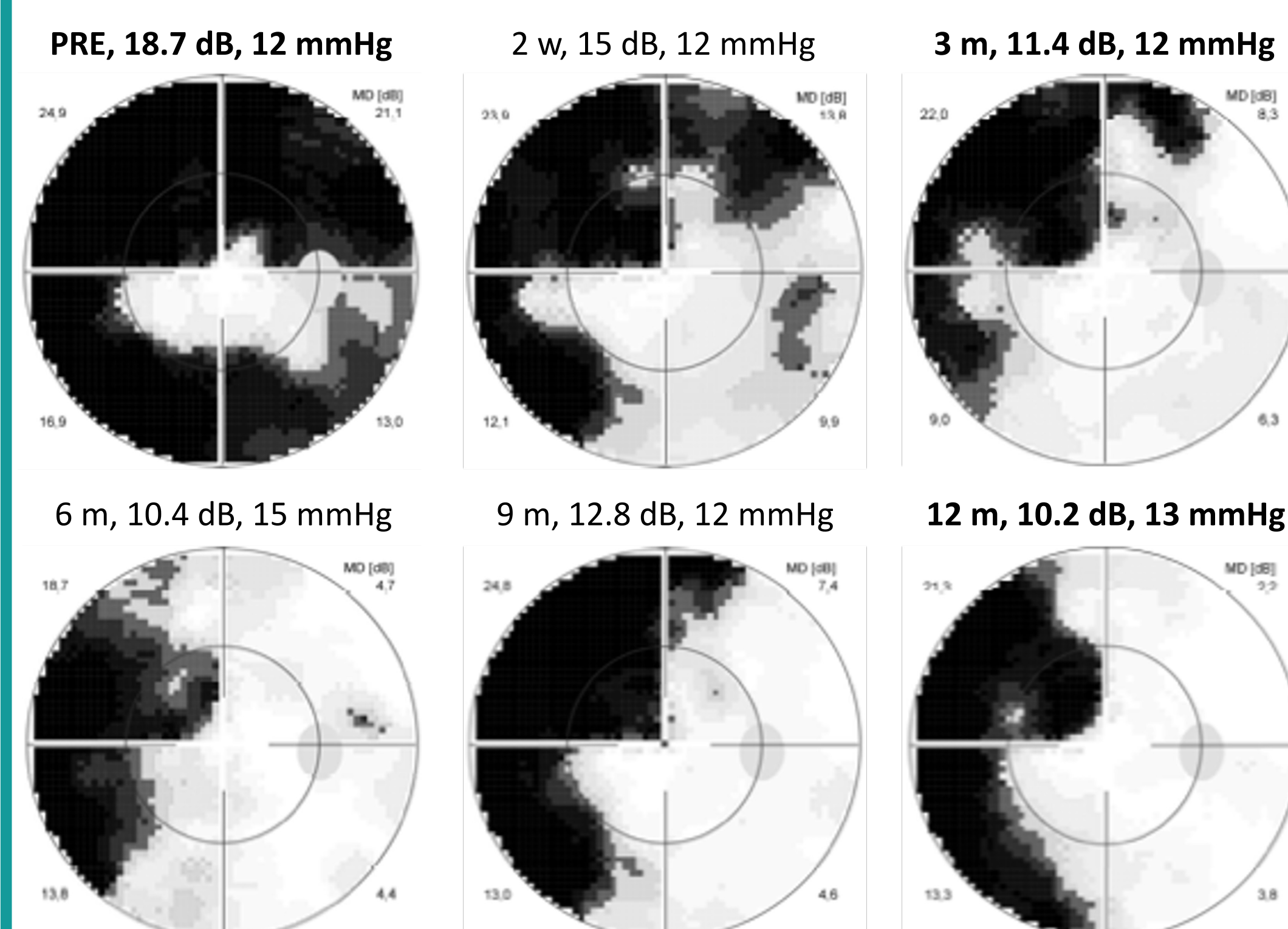
Clinical data from 18 eyes in 9 patients (6 female, 3 male) fulfilled the inclusion criteria. Patients were 63.1±13.1 years old (Mean±SD) ranging from 46 to 79 years. IOP was 13.3±1.2 mmHg ranging from 12 to 15 mmHg.

MD significantly decreased from PRE 11.9±6.4 dB to 9.8±6.2 dB at 3 months (POST3) and 9.6±5.8 dB at 12 months (POST12) after ONS (one-way repeated-measures (RM) ANOVA $p<0.001$) corresponding to an average improvement of visual fields. 16 eyes in 9 patients showed a reduction of MD by 2.5±2.1 dB (range 0.1 to 7.3 dB) at POST3. Thus, 88.9% of eyes in the present case series were responders 3 months after ONS.

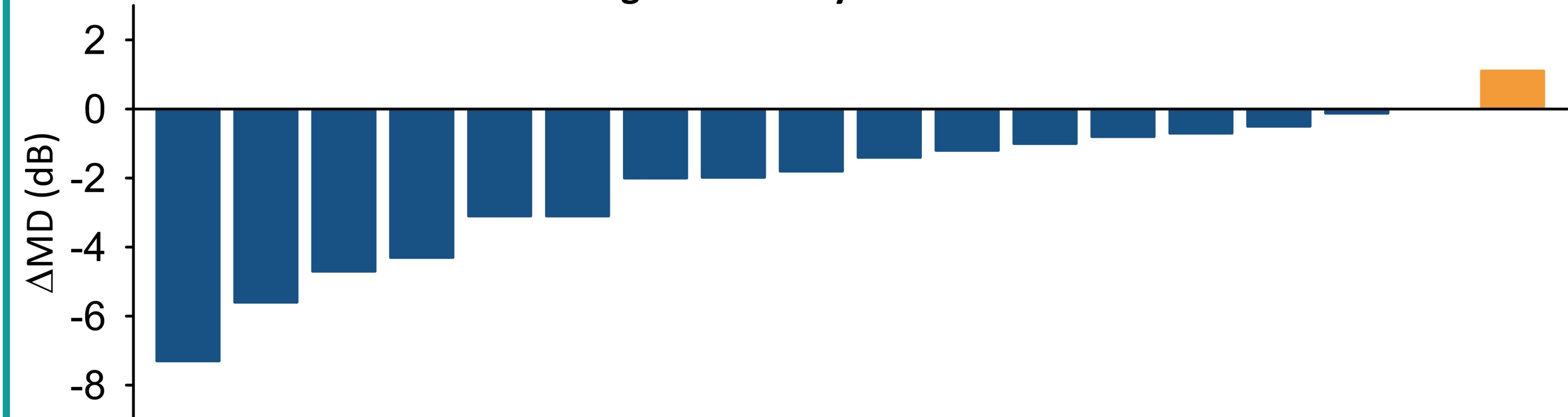
MD reduction in 18 eyes of 9 patients
one-way RM-ANOVA: $F=13.6$, $p<0.001$



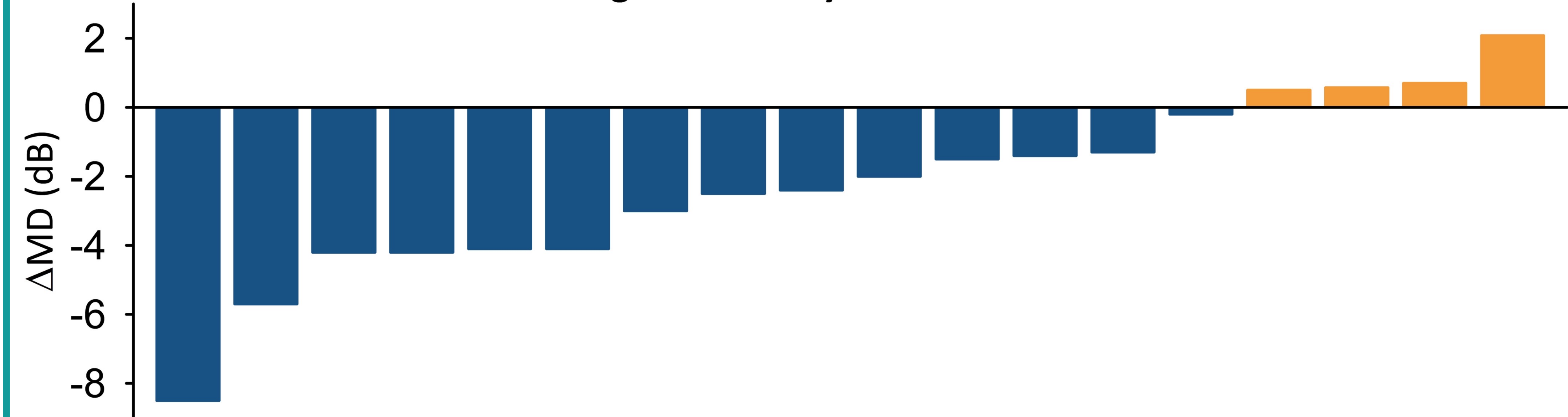
Visual field progress of the right eye in one NTG patient over 12 months after ONS



MD change in all 18 eyes 3 months after ONS



MD change in all 18 eyes 12 months after ONS



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