Outcomes of Micropulse Transscleral Diode Laser Cyclophotocoagulation: Short Audit

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Background:

- Glaucoma is a group of progressive optic neuropathy which can lead to retinal ganglion cell death and visual field loss over time. Intraocular pressure is a crucial modifiable indicator. [2]
- Approximately 2-3% of people over 40 years old have developed glaucoma, and this made glaucoma become the second most common causes of avoidable blindness around the world. [1]
- Glaucoma treatment targets lowering intraocular pressure (IOP), slowing the rate of progression throughout patients' lifetime to stabilize vision, lowering the need of polypharmacy and to improve their quality of life. [2]
- Micropulse trans-scleral diode laser cyclophotocoagulation (MP-TSCPC) is a non-invasive cyclodestructive procedure that reduces IOP by breaking down some of the secretory ciliary body epithelium, therefore bringing down aqueous humor production. [3]
- In comparison with conventional continuous-wave diode laser cyclophotocoagulation, micropulse laser treatment generates a set of recurring short pulses of energy 810nm wavelength alternating with rest periods in between pulses. This enables cyclodestruction of the target area whilst potentially minimizing collateral tissue thermal harm with less complications. [4]
- The popularity of micropulse laser treatment is undoubtedly rising as a non-invasive treatment or alternative to other conventional treatments in the management of glaucoma, especially for refractory glaucoma.

Aims:

- To evaluate the clinical outcome of micropulse laser treatment in the management of patients with uncontrolled intraocular pressure, using variable parameters and to compare outcomes with different similar studies.

Methods:

- Retrospective audit analyzing 40 cases with refractory glaucoma treated with micropulse laser undertaken by Mrs. Adesuwa Garrick at Ormskirk District General Hospital, between November 2019 and April 2020.
- A total of 40 patients (42 eyes) underwent the procedure, while 8 of them had a combined cataract phacoemulsification with IOL implant at the same time.
- Pre-op baseline parameters and post-op data on intraocular pressure, visual acuity, number of medications, post-op complications and additional treatments were obtained via Electronic patient record (EPR)
- Visual acuity data was transformed from Snellen form into logMAR scale. [5]
- Under COVID-19 pandemic, follow-up consultations of some patients were cancelled and rebooked due to local travel restrictions.

Results:

- Data was obtained in the first week, between1-6 months and 10-12 months. The mean age of treated patients was 76 years old, in which 22 patients (55%) were female.
- Mean preoperative IOP was 21.8 ±5.6 mm Hg. It was largely lowered to 16.4 ±5.1 mm Hg in the first week, to 16.9 ±5.7 mm Hg between 1-6 months, and 19.1 ±5.7 mm Hg between 10-12 months. The IOP reduced by an average of 24.8% in the first week, 22.5% between 1-6 months and 12.4% between 10-12 months.
- The mean number of anti-glaucoma medications was reduced from 2.9 ±0.9 at baseline to 2.5 ±0.9 at the last consultation. 25% of patients were on a reduced number of IOP lowering medications.
- Median postoperative logMAR visual acuity was stable at 0.2 during the period of data collection
- Only one patient required further incisional surgery for optimal IOP control.
- No severe complications were reported postoperatively, except one patient experienced pain and mechanical restriction on eye elevation.

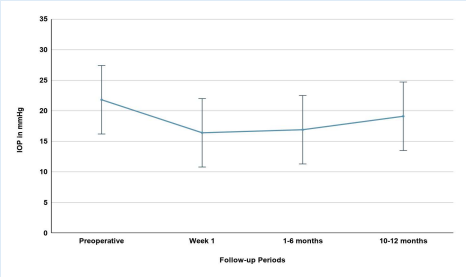


Fig. 1: Mean IOP in mmHg (±2SD) progression curve over the continuous follow-up periods. X axis demonstrates the different follow-up intervals. Y axis shows the mean intraocular pressure in mmHg (±2SD).



Image 1: MicroPulse P3™ Cyclophotocoagulation

Discussion:

- In this retrospective service evaluation on patients with glaucoma, micropulse laser treatment has been demonstrated to be an effective solution to other conventional interventions in the management of glaucoma. IOP has shown a dramatic decline of 24.8%, 22.5%, and 12.4% at 1 week, between 1-6 months, up to 12 months.
- Similar IOP reduction results were observed in other studies.
- Tan et al [3] reported an IOP reduction from preoperative 39.3 ±12.6 to 28 ±12 in the first week, 25.8 ±14.5 at 6 months, 26.6 ±14.7 at 12 months.
- Aleksandr et al [6] reported an IOP reduction from baseline 22 ±9 to 16 ±6 mm Hg at last follow-up.
- Venkata V et al [7] also revealed the effectiveness of micropulse laser in IOP modification, at 1-year, mean IOP was decreased by 40.2% while 85.4% of the patients showed a significant reduction of IOP for more than 20%.
- Over and above that, Matthew E et al [8] showed mean IOP was 27.7 mm Hg preoperatively and mean postoperative IOP reduction by 11.4, 13.1, 14.7- and 16.6-mm Hg at 1, 3, 6, and 12 months, respectively.
- Limitations of this study, however, is its relatively small sample size in comparison to other similar studies and relatively incomplete data at each follow-up interval due to local travel restrictions under COVID-19 pandemic.

Conclusion:

- Micropulse laser has reflected its short-term efficacy in lowering IOP up to 12 months, although the effectiveness reduces gradually in the long term.
- With the absence of severe complications, micropulse laser can be a relatively reliable and effective procedure at decreasing intraocular pressure and minimizing the need for ocular antihypertensive medications.

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Image 1 source: http://david-richardson-md.com/micropulse-p3-laser-cyclophotocoagulation/

Acknowledgements:

- This audit and poster were possible due to the support of my Educational supervisor, Mrs. Adesuwa Garrick.