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Authors
Mansouri, K
Medeiros, FA
Weinreb, RN

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Twenty-four-hour intraocular pressure patterns in a symptomatic patient after ab interno trabeculotomy surgery

Kaweh Mansouri1
Felipe A Medeiros2
Robert N Weinreb2

1Glaucoma Sector, Department of Ophthalmology, Geneva University Hospitals, Geneva, Switzerland;
2Hamilton Glaucoma Center and Department of Ophthalmology, University of California, San Diego, La Jolla, CA, USA

Abstract: We report the results of repeated ambulatory continuous 24-hour intraocular pressure (IOP) monitoring with a contact lens sensor (CLS) in a glaucoma patient with ocular pain after ab interno trabeculotomy (Trabectome™) surgery. Our findings show that a combined prostaglandin–pilocarpine treatment reduced nighttime IOP peaks and relieved the patient’s symptoms.

Keywords: 24-hour, Trabectome contact lens sensor, prostaglandin–pilocarpine treatment

Introduction
Ab interno trabeculotomy with Trabectome™ is a generally safe surgical technique for glaucoma, in which the conventional outflow facility is increased through trabecular meshwork ablation. Recently, Ahuja et al1 reported a 4.6% prevalence of spontaneous delayed-onset hyphema after this procedure. They postulated “rapid ocular decompression after ocular compression during sleep” as a causative mechanism. The development of a contact lens sensor (CLS) enables monitoring of intraocular pressure (IOP) patterns for 24 hours, including during sleep.2,3 For the first time, continuous 24-hour IOP patterns after incisional glaucoma surgery are described.

Case report
A 59-year-old healthy female patient with advanced primary open-angle glaucoma underwent repeated 24-hour IOP monitoring with the CLS in the left eye (OS) (Figure 1). Goldmann applanation tonometry (GAT) was performed before placement and after removal of CLS. The patient had undergone selective laser trabeculoplasty (SLT) 14 months earlier, followed by Trabectome surgery in OS after three months. Despite postoperative IOPs in the low teens under a topical regimen with bimatoprost 0.01%, her glaucoma was progressing. The patient complained of recurrent pain in OS occurring towards the end of the sleep period.

After a 1-month washout period, start and end GAT values were 13 mmHg and 12 mmHg, respectively. The patient’s diary showed that she went to bed at 23:20, woke up around 03:30 due to pain in OS, and remained awake mostly in the recumbent position for the rest of the night. She returned to the clinic and underwent a water drinking test (WDT): 1 L of water in 5 minutes at 08:30, after which the signal remained largely unchanged. The patient was re-started on bimatoprost 0.01%.

A month later, the patient returned for a second monitoring session when start and end GAT values were 11 mmHg and 12 mmHg, respectively. The patient instilled
one drop of bimatoprost 0.01% at 21:45, after which a rapid
signal drop was observed. She went to bed/sleep from 22:00
to 07:00. The next day, she reported persistence of symptoms
in OS, corresponding with a peak signal around 05:00. WDT
was performed at 10:10. The patient was started on once-daily
pilocarpine 2% and maintained on bimatoprost.

The patient returned one month later and reported signifi-
cant relief of pain in OS since the previous visit. Due to patient
unavailability, IOP monitoring started at 17:30. Start and end
GAT values were 12 mmHg and 12 mmHg, respectively.
At 22:15, the patient instilled bimatoprost drops, followed
by pilocarpine at 22:45 and went to bed/sleep from 23:00 to
05:45. Following drug instillation, the signal dropped and
remained below daytime values for the entire sleep period.

Twenty-four-hour IOP monitoring confirmed the presence
of post-Trabectome IOP spikes associated with symptomatology
of recurrent nighttime pain. The basis for the increased noctur-
nal IOP is unknown. One cannot preclude the possibility of a
recurring nocturnal hyphema caused by reversal of the pressure
gradient between IOP and episcleral venous pressure.1,4 Parekh
et al5 observed intra-operative blood reflux during cataract
extraction two years after Trabectome surgery, and hypothesized
bleeding through focal neovascularization, similar to that found
with Swan syndrome. Gonioscopy was performed after visits
2 and 3; small amounts of red blood cells could be seen only
after visit 2. It is possible that a nocturnal microhyphema may
have resolved by the time of presentation. It is, however, also
possible that the observed IOP spike would represent a delayed
post-SLT rather than a post-Trabectome IOP spike.

Conclusion
We found that while instillation of bimatoprost had limited
effect, the combination with pilocarpine seemed to blunt the
nighttime IOP peaks. It is possible that the ciliary muscle-
contracting effect of cholinergic agents and the increased
outflow facility might be the underlying mechanism for
the observed IOP-lowering.6 Pilocarpine may further coun-
teract hyphema-induced increased outflow resistance. To
our knowledge, twenty-four-hour IOP-lowering effects of
pilocarpine and its degree of additivity to prostaglandin
analogs have not been previously reported, and merit fur-
ther research.

Disclosure
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