

12. American Medical Association. *CPT 2006: Current Procedural Terminology Professional Edition*. Chicago, IL: American Medical Association; 2006.
13. Stein JD, Grossman DS, Mundy KM, Sugar A, Sloan FA. Severe adverse events after cataract surgery among medicare beneficiaries. *Ophthalmology*. 2011;118(9):1716-1723.
14. Stein JD, Ruiz D, Jr., Belsky D, Lee PP, Sloan FA. Longitudinal rates of postoperative adverse outcomes after glaucoma surgery among Medicare beneficiaries 1994 to 2005. *Ophthalmology*. 2008;115(7):1109-1116.e7.
15. Ying Z, Wei L.J. The Kaplan-Meier estimate for dependent failure time observations. *J Multivar Anal*. 1994;50(1):17-29.
16. Glaucoma Laser Trial Research Group. The Glaucoma Laser Trial, I: acute effects of argon laser trabeculoplasty on intraocular pressure. *Arch Ophthalmol*. 1989;107(8):1135-1142.
17. Threlkeld AB, Hertzmark E, Sturm RT, Epstein DL, Allingham RR. Comparative study of the efficacy of argon laser trabeculoplasty for exfoliation and primary open-angle glaucoma. *J Glaucoma*. 1996;5(5):311-316.
18. Ritch R, Liebmann J, Robin A, et al. Argon laser trabeculoplasty in pigmentary glaucoma. *Ophthalmology*. 1993;100(6):909-913.
19. Chen E, Golchin S, Blomdahl S. A comparison between 90 degrees and 180 degrees selective laser trabeculoplasty. *J Glaucoma*. 2004;13(1):62-65.
20. Harasymowycz PJ, Papamatheakis DG, Latina M, De Leon M, Lesk MR, Damji KF. Selective laser trabeculoplasty (SLT) complicated by intraocular pressure elevation in eyes with heavily pigmented trabecular meshworks. *Am J Ophthalmol*. 2005;139(6):1110-1113.
21. Lowry EA, Greninger DA, Porco TC, Naseri A, Stamper RL, Han Y. A comparison of resident-performed argon and selective laser trabeculoplasty in patients with open-angle glaucoma. *J Glaucoma*. 2016;25(3):e157-e161.
22. Weinreb RN, Ruderman J, Juster R, Zweig K. Immediate intraocular pressure response to argon laser trabeculoplasty. *Am J Ophthalmol*. 1983;95(3):279-286.
23. Barkana Y, Belkin M. Selective laser trabeculoplasty. *Surv Ophthalmol*. 2007;52(6):634-654.
24. Stein JD, Challa P. Mechanisms of action and efficacy of argon laser trabeculoplasty and selective laser trabeculoplasty. *Curr Opin Ophthalmol*. 2007;18(2):140-145.
25. Feldman RM, Katz LJ, Spaeth GL, Crapotta JA, Fahmy IA, Ali MA. Long-term efficacy of repeat argon laser trabeculoplasty. *Ophthalmology*. 1991;98(7):1061-1065.
26. Starita RJ, Fellman RL, Spaeth GL, Poryzees E. The effect of repeating full-circumference argon laser trabeculoplasty. *Ophthalmic Surg*. 1984;15(1):41-43.
27. Hong BK, Winer JC, Martone JF, Wand M, Altman B, Shields B. Repeat selective laser trabeculoplasty. *J Glaucoma*. 2009;18(3):180-183.
28. Durr GM, Harasymowycz P. The effect of repeat 360-degree selective laser trabeculoplasty on intraocular pressure control in open-angle glaucoma. *J Fr Ophthalmol*. 2016;39(3):261-264.
29. Birt CM. Selective laser trabeculoplasty retreatment after prior argon laser trabeculoplasty: 1-year results. *Can J Ophthalmol*. 2007;42(5):715-719.
30. Patty L, Wu C, Torres M, Azen S, Varma R; Los Angeles Latino Eye Study Group. Validity of self-reported eye disease and treatment in a population-based study: the Los Angeles Latino Eye Study. *Ophthalmology*. 2012;119(9):1725-1730.

Invited Commentary

Laser Trabeculoplasty Use Patterns Among Optometrists and Ophthalmologists in Oklahoma

Murray Fingeret, OD

In the article by Stein et al,¹ the authors' stated objective was "To compare outcomes of LTPs [laser trabeculoplasties] performed by ophthalmologists with those performed by optometrists to determine whether differences exist in the need for additional LTPs." However, the conclusions seem misleading and not supported by their data.

The authors found that "The proportion of eyes undergoing LTP by an optometrist requiring 1 or more subsequent LTP session (35.9%) was more than double the proportion of eyes that received this procedure by an ophthalmologist (15.1%)."



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They conclude that "Health policy makers should be cautious about approving laser privileges for optometrists practicing in other states until the reasons for these differences are better understood." It is unclear how the authors could have made this conclusion. Using Medicare claims data as their only resource, they did not have access to LTP outcomes—the goal of their study—and hence, only reported procedure utilization rates. It is hard to understand the meaning of their conclusions without knowing whether treatments were performed in more than 1 session with 180° treatments or a single session with 360° treatments. Moreover, there was no information about intraocular pressure reduction, associated complications, or any other measure of the safety or efficacy of the laser treatment. Without the aforementioned informa-

tion, the number of LTP sessions cannot be a substitute for the quality of the procedure.

Regarding this lack of information, did the authors consider the American Academy of Ophthalmology Primary Open Angle Glaucoma Preferred Practice Pattern statement that "Treating 180° reduces the incidence and magnitude of postoperative IOP elevation compared with 360° treatment"^{2(p30)} Although they considered the possibility that optometrists "may have been more cautious, scheduling the procedure into 2 or more sessions to try to limit postoperative inflammation or intraocular pressure increases," this was not acknowledged in their conclusions.

All 27 optometrists included in this study were trained and certified to perform LTP at the Northeastern State University Oklahoma College of Optometry. During this study, Northeastern State University Oklahoma College of Optometry's recommendation for initial LTP was to treat half of the angle (180°) and to consider treatment of the other half only if the intraocular pressure was not sufficiently reduced after initial treatment.³ Treatment of one-half of the angle during a first session of LTP has been known for more than 3 decades to reduce the postoperative increase in intraocular pressure.⁴ Moreover, the authors' finding that 36% of patients treated by optometrists received a second treatment is consistent with prevailing guidance and practice during the study period (January 1, 2008, through December 31, 2013).^{5,6} In this context,

treating the other half of the angle was not additional treatment but rather completion of the procedure for the subset of patients requiring treatment of the full 360°.

Finally, this study is an observational one and does not represent level I evidence suitable for informing decisions about health care delivery or policy. The conclusions are inconsis-

tent with the data because the disparity in an additional LTP rate could have been caused by a number of factors not associated with surgical competency, efficacy, or patient safety. Additional studies that address the aforementioned limitations seem warranted to compare LTP outcomes among various groups of health care professionals.

ARTICLE INFORMATION

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Published Online: July 28, 2016.
doi:10.1001/jamaophthalmol.2016.2567.

Conflict of Interest Disclosures: The author has completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr Fingeret is the executive vice president of the Optometric Glaucoma Society.

REFERENCES

- Stein JD, Zhao PY, Andrews C, Skuta GL. Comparison of outcomes of laser trabeculoplasty performed by optometrists vs ophthalmologists in Oklahoma [published online July 28, 2016]. *JAMA Ophthalmol*. doi:10.1001/jamaophthalmol.2016.2495.
- Glaucoma Preferred Practice Pattern Development Process and Participants. *Primary Open Angle Glaucoma*. Amsterdam, the Netherlands: Elsevier; 2016.
- Lighthizer N. *Course manual. Laser certification course. Northeastern State University College of Optometry*. Tahlequah: Oklahoma College of Optometry; 2012.
- Weinreb RN, Ruderman J, Juster R, Wilensky JT. Influence of the number of laser burns administered

on the early results of argon laser trabeculoplasty. *Am J Ophthalmol*. 1983;95(3): 287-292.

5. Prasad N, Murthy S, Dagianis JJ, Latina MA. A comparison of the intervisit intraocular pressure fluctuation after 180 and 360 degrees of selective laser trabeculoplasty (SLT) as a primary therapy in primary open angle glaucoma and ocular hypertension. *J Glaucoma*. 2009;18(2): 157-160.

6. Nagar M, Ogunyomade A, O'Brart DP, Howes F, Marshall J. A randomised, prospective study comparing selective laser trabeculoplasty with latanoprost for the control of intraocular pressure in ocular hypertension and open angle glaucoma. *Br J Ophthalmol*. 2005;89(11):1413-1417.

Public Health Policy Lessons From Oklahoma

Alan L. Robin, MD

Laser trabeculoplasty (LTP) was popularized in 1979¹ in eyes receiving maximal medical therapy. Various prospective clinical trials sponsored by the National Institutes of Health have since better defined its usefulness in early and advanced glaucoma. Today, the American Academy of Ophthalmology Primary Open Angle Glaucoma Preferred Practice Pattern finds that argon LTP and selective LTP have comparable intraocular pressure (IOP) lowering efficacy and safety profiles, but additional LTP (regardless of the laser type) has a decreased rate of success and an increased complication profile, including permanent IOP increase.²

Stein et al³ find a clinically significant difference in the frequency of additional LTPs between optometrists and ophthalmologists in Oklahoma. The study's data analysis is valid.⁴ Despite acknowledged limitations, the use of claims allows us to observe the habits of many different health care professionals rather than a select few practices or academic centers. These data do not rely on patients' self-report but rather coding as performed by health care professionals. Finally, the number of patients and treatments is an order of magnitude larger than existing data sources.

Historically, claims data have helped us better understand how LTP is used. We have successfully used insurance claims data when assessing LTP's frequency and geographic patterns of use.^{5,6} Claims data have also allowed us to better understand associated costs when compared with medical therapy with a prostaglandin analogue.⁷

Three events occurred between 2001 and 2002, which dramatically changed the number of LTPs performed. First, in 2001, the Q-switched Nd:YAG LTP entered widespread use, with no thermal damage and possible repeatability. Second, the global period for payment of LTP decreased from 90 to 10 days. Third, the Centers for Medicare & Medicaid Services reimbursement for LTP began to decrease (−14% between 2001 and 2002). From 76 000 procedures in 2001, the number of procedures quickly increased to 157 000 by 2004.

We initially treated a full 360° of the trabecular meshwork in 1 session. In 1983, a single small prospective study found a marked increase in the incidence and magnitude of the immediate IOP increase in eyes undergoing 360° vs 180° of LTP. This increase worried many surgeons, causing them to change their treatment patterns to two 180° sessions per eye. However, additional LTPs can be harmful.⁸ In addition, in the National Eye Institute-sponsored Glaucoma Laser Trial, an eye that developed an IOP increase after the first treatment session was at significantly higher risk of developing an increase during the second session. Moreover, studies in humans found that performing an LTP more than once, after 360° treatment, could permanently increase the IOP.²

The US Food and Drug Administration approved apraclonidine, 1%, in December 1987. The concept of two 180° treatments ended for most because 2 pivotal trials using 360° argon LTP found the rate of large IOP increases more than 10 mm Hg over baseline diminished from 17% to 0% and from 19% to 5%.⁹ Most ophthalmologists quickly implemented prophylactic topical alpha agonist therapy, and 360° LTP was again performed in a single session.⁷ It is a



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