MODERN TRENDS IN OPHTHALMOLOGY

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Proceedings of the 18th European Congress of Ophthalmology ECLSO/SOBEVECO, held in Brussels, 16–18 September 1988

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January 15, 1989
Kelman Wisnia, M.D.
General Secretary of the Sobeveco
Editor

EDITORIAL

*KELMAN WISNIA M.D.**

Although ophthalmology is often seen as a fairly simple branch of medicine, especially, although by no means exclusively, by the non-medical public, it is as you know an extremely complex and varied medical specialty in which medicine, surgery and optics combine to tackle the complexities of the eye.

In fact, in scientifically advanced countries, and where economic conditions allow this, the specialty is itself subdivided into a number of highly specific but complementary fields.

The various different fields of modern ophthalmology have, of course, had to develop and advance at different rates. In some areas, such as that of classical bacterial infection, our knowledge is fairly complete, whereas in the area of viral diseases, for instance, discoveries are continuing to be made, often in line with advances in immunology.

Over the past few years, there have been no spectacular changes in the fields of neuro-ophthalmology, strabismus (apart from some changes in surgical technique), classical optics, and degenerative and congenital disease, since our understanding of the genetic factors involved is still incomplete.

Apparently, the greatest advances have been made in those branches of ophthalmology related to diagnostic approaches which make use of complex electronic and optical equipment and in the area of microsurgery using high technology medical products and equipment such as lasers.

It is as if scientists had to wait for the development of high performance equipment before new ideas could emerge and the whole process could snowball into the design of diagnostic and surgical techniques of a sophistication rarely seen before and whose rate of development is ever increasing.

The editing of this book 'Modern Trends of Ophthalmology' has made me aware of the remarkable speed with which ideas have evolved in only a few years. The conferences held over the last few years, the proceedings of which have been edited by Sobeveco, have traced the logical and consistent advances made in the specialty up to the time of this latest conference which can be seen as describing the present state of development.

Clearly, the present volume does not pretend to deal with all current knowledge in ophthalmology but instead attempts to describe our current understanding in a few of these key sectors through the eyes of scientists who have gained specialised knowledge in these fields and whose ideas and techniques have come a long way in recent years.

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It is worth remembering, for example, that the first ophthalmological lasers were developed in Germany by G. Meyer-Schwickerath in the early 70's. Xenon lasers led to argon lasers coupled to the biomicroscope and to the proliferation of a multitude of new surgical applications and a wide variety of optical systems and mirror contact lenses. Then came the YAG laser which was developed out of the work of D. Aron-Rosa, not to mention the Rubis laser, the Krypton laser, and, finally, the Excimer laser, all of which demonstrates the important role of technological development here and shows how surgical techniques in this field are closely dependent on scientific and technical know-how.

Without wishing to review all the chapters concerning these topics here, it is nevertheless worth noting how ocular microsurgery has evolved, especially in those sectors that make use of high power microscopes, instruments so delicate that they stretch the limits of manual dexterity and a whole series of surgical products including sutures that are finer than currently needed and needles specifically designed for a single surgical manoeuvre. The most spectacular advances have probably been made in the field of anterior segment surgery. This, perhaps, is hardly surprising since the anterior segment is the part of the eye that is most accessible both to instruments and to direct visual and microscopic examination. It is also the field of surgery where the effect and the degree of improvement and success are most closely related to the accuracy of the surgical procedures or the skill of the surgeon and his manual and intellectual abilities, backed up by the most up-to-date information and precision equipment.

Cataract microsurgery and the development of intraocular implants is a striking example here.

This has been made possible by advances in many different fields, the sum of which has been more than beneficial to millions of elderly people over the world.

The microsurgical techniques developed to treat glaucoma are another example, and one only needs to see subjects who have been operated on by the old techniques to appreciate the benefits of the new methods which, although still fundamental at creating a fistula for filtration, are virtually nonmutilating.

The favourable statistical success rates now obtained for corneal grafting are due to the high quality of the equipment, the sutures and the techniques used to store the grafts.

Refractive surgery, now in full development, will be inconceivable without the microscope and electronic techniques for measuring the thickness of the cornea.

And no one needs to be reminded of the advances made in contact lenses in terms of both shape and materials, so that these small, technologically advanced optical prostheses can now, in skilled hands, ensure good optical correction of the eye with a very high degree of physiological acceptability.

We hope that this volume, which tries to condense into a few pages the ideas and experience which the speakers have built up over years of work, will contribute to the permanent synthesis and resynthesis of information which is so essential in generating the new ideas and advances upon which modern trends in ophthalmology are based.

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LASERS

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Modern trends in ophthalmology.
K. Wisnia, editor

LASER TRABECULOPLASTY IN CHRONIC OPEN AND NARROW ANGLE GLAUCOMA

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SUMMARY

We performed 150 trabeculoplasties in 94 patients either with the Argon laser or with the cw Nd. YAG laser. Long-term effects on intraocular pressure, outflow capacity and on the evolution of local and general treatment were evaluated.

We obtained a decrease in intraocular pressure of 28.5% after 60 months and an amelioration of 42% in outflow capacity after 36 months. General medication was stopped for all patients, and for almost half of them local drops were lowered. Complications were transient and mild.

INTRODUCTION

Few studies [1, 2, 3, 4] have shown the benefits of laser trabeculoplasty on intraocular pressure, outflow capacity and visual field in open and narrow angle glaucoma.

In order to review our results, we performed a retrospective study of all our patients, treated since 1982 by laser trabeculoplasty.

MATERIAL AND METHODS

Laser trabeculoplasty was performed in:

- eyes with insufficient intraocular pressure decrease after maximal tolerated local and general medical treatment.
- eyes with further deterioration of the visual field defects and optic nerve damage under maximal treatment.
- patients with a bad compliance for their medication.

We used either the Argon (129 eyes) or the cw Nd. YAG laser (21 eyes). For application of the Argon laser, we used a spotsize of 50μ, an exposure time of 0.1 sec and a power varying from 600 to 1200 mWatt, adjusted to obtain a small air bubble or a blanch at the impact site. The cw Nd. YAG laser was set in the free running mode with an energy from 50 to 1400 mJoules, a spotsize of 70 and an exposure time of 20 msec.

After installation of a local anaesthetic (Novosine^{R} 0,4%), about 50 laser points were directed to the inferior 180° of the anterior non-pigmented trabecular meshwork through the Goldmann three mirror lens or the March trabeculoplasty lens. After an interval of two weeks, the second superior 180° of the iridocorneal angle was treated. Three or four months later, the whole treatment was repeated when the intraocular pressure decrease was insufficient.

After laser therapy, all patients received anti-inflammatory drops (Medrivas^{R}) and one tablet of Acetazolamide (Diamox^{R}, 250 mg) in addition to their usual anti-glaucomatous drugs.

Intraocular pressure was measured after one day, one week, one month and then subsequently at regular intervals of three months by means of a tonometer, applied on an Haag-Streit slit lamp.

Visual fields were examined by means of the dynamic Goldmann perimeter or the static Hymphrey peritest at regular intervals of six months. In this way, we treated 150 eyes of 94 patients; 50 females and 44 males. The mean age was 69.7 (35-89) years and they were followed up for a mean period of 21.5 (1-60) months. Both phakic (62.9%) and aphakic (7.7%) eyes with primary open angle glaucoma were included. In order to widen the iridocorneal angle and to prevent goniosynechiae, we submitted patients with narrow angles (19.3%) either to a previous Argon gonioplasty (7.3%) or an iridotomy (12%) by means of an association of Argon and Nd. YAG Q-switched laser [7]. Eyes with chronic open angle glaucoma secondary to trauma (1.4%), to myopia (1.4%), to pigment dispersion (1.4%), to thrombosis of the central retinal vein (0.7%), to retinal detachment surgery (0.7%) and two cases of congenital glaucoma were also treated.

RESULTS

We considered an eye with a decrease of intraocular pressure below 20 mmHg, in addition to no further visual field deterioration and/or cupping of the optic disc, a success.

The mean intraocular pressure before laser trabeculoplasty amounted to 24.2 mmHg; after one day it dropped to 15.8 mmHg; after one week to 18.3 mmHg; after one month to 17.3 mmHg and it remained at this level over a period of 60 months. These results were obtained in association with a progressive reduction of the local and general treatment.

In 86.5% the intraocular pressure decreased below 20 mmHg with one or two treatments over 180°. The remaining 13.5% needed a third or sometimes a fourth session to obtain a stabilization of the visual field and of the cup to disc ratio. The mean number of sessions was 1.74 over 180° per patient.

Before laser treatment, we found a mean outflow capacity of 0.12 l/min/mmHg; which increased to 0.17 µl/min/mmHg after one month and to 0.19 l/min/mmHg (42%) after 36 months.

To evaluate the evolution of general and local treatment, we accorded to each drop or drug a certain unit, which we multiplied by the number of intakes and then divided by the total number of patients. After 60 months, we were able to stop the systemic treatment in all our patients. The drops were lowered from 4.79 applications to 3.46 after 60 months. Local treatment was lowered or stopped in 44% of our patients, remained unchanged in 55%, and in only 1% did we need to add some local treatment after stopping the systemic one.

The complications were mild and transient. After one day, hyperemia and some inflammatory reaction in the anterior chamber were seen in almost all cases. A mild corneal oedema was observed in 2%. Keratitis, probably due to the pressure on the contact lens, occurred in 3.4%.

In 4.7% small hemorrhages developed at the impact site in the iridocorneal angle; they stopped spontaneously with gentle pressure on the contact glass. They never caused an hyphema. A rising of the intraocular pressure was observed the morning after laser treatment in only 4% of our series.

After one week, all these inconveniences had disappeared. However, we observed the formation of permanent goniosynechiae in 4% of the cases. A persistent elevation of the intraocular pressure was measured in 6.7% of our patients. They had either filtering surgery (5.3%) or cryocoagulation of the ciliary body (1.4%).

DISCUSSION

In our patients, generally under maximal medical treatment, laser trabeculoplasty was able to produce a clinical useful reduction of the intraocular pressure of 6.9 mmHg (28.5%) after a mean follow-up period of 21.5 months. Few patients with a follow-up of 60 months still favour the benefits of this intraocular pressure reduction. This decrease can be compared with results of other authors: Sherwood [2] found a 30% decrease after 2.5 years follow-up; Traverso [5] 21.6%, and Singleton [6] 41% after 60 months.

35.8% patients needed only one session over 180° to obtain a good intraocular pressure control. The majority (50.7%) had their visual field and cup to disc ratio stabilised after two sessions. This corresponds with the findings of Wise [3], that a full treatment over 360° is necessary for most patients to obtain satisfactory results. In our series, only 20 eyes (13.5%) needed retreatment; 15 of these (75%) responded well, the other 5 eyes had filtering surgery. Brown [12] found in 38% only a good response in cases of retreatment and warned against high intraocular pressure rises after laser as a major complication, necessitating urgent filtering surgery. This finding could be explained by the studies of Gaasterland [14] and Quigley [15] who demonstrated on monkeys that intense laser application on the trabecular meshwork causes its destruction, with permanent intraocular pressure rise. Other authors [13] discussed the beneficial effects of repeated laser trabeculoplasty and thought it an alternative to surgery.

The beneficial effect of laser trabeculoplasty on outflow capacity is shown by the amelioration of outflow measurements by standard tonography. The outflow improved in 42% in our series after a follow-up of three years. However, an even better amelioration was found by other authors. Wilensky [8] had an improvement of 50% and Schwartz [9] of 87.5%, although their follow-up period was much shorter. Merte [10] found the increase to be immediate and lasting: he measured 66% improvement after one day, 74% after six weeks and 71% after one year. On the other hand, Raitta [16] measured no significant changes compared with pre-operative values after a mean follow-up period of three years and three months, and pointed to a short-term effect of laser trabeculoplasty on outflow values.

Our complications, the day after, were mild and transient. Following Watson [17] and Wilensky [18], the corneal complications were generally due to a direct laser burn or to the pressure on the three mirror contact lens.

Anterior uveitis occurred in almost all of our patients and is probably caused by a breakdown of the blood - aqueous barrier according to Watson [17]. A rapid resolution was observed after topical administration of corticoids.

Acute intraocular pressure rise occurred only in 4%. However, our results are influenced by the additional medical treatment immediately after each laser session and by the delayed intraocular pressure measurement. Other authors reported I.O.P. rises in 32% of their patients, independently of the total amount of energy, the localisation of the burns, the occurrence of hemorrhages or the degree of inflammation. Watson [17] showed that minimal treatment over 180° lessens the incidence and severity of this intraocular pressure rise.

The delayed formation of peripheral anterior synechiae was noted one week to several months after laser treatment. Traverso [18] correlated this complication especially with more posteriorly positioned burns and Thomas [19] with higher laser energies.

Sherwood [2] could stop medical treatment in 13% after one year and could lower it in 46%. General treatment could be stopped in 64% by Pollack [11]. We could stop or lower local treatment in 44% and no systemic treatment was required after 60 months. In our series, 1% even needed additional treatment after laser trabeculoplasty.

Filtering surgery could be avoided in 93.3% of our patients. If we consider all retreatments as a failure, our ultimate success rate amounts to 83.4% after a mean follow-up of 21.5 months. Multiple factors influence the success rate, for instance: age (better results were obtained in the elder [9]), pigmentation of the trabecular meshwork (more success in heavily pigmented meshwork [21]), type of glaucoma (better response in glaucoma capsulare and pigmentary glaucoma [9]), initial intraocular pressure (the higher the initial intraocular pressure, the better the response [9]), iris color (blue irises do better than brown ones [1]), experience of the performer [20].

CONCLUSION

Laser trabeculoplasty is effective in lowering intraocular pressure and increasing outflow capacity in primary and secondary open angle glaucoma. In cases of narrow angle glaucoma, it should be preceded by a gonioplasty or an iridotomy in order to widen the iridocorneal angle to prevent goniosynechiae.

When no sufficient decrease in intraocular pressure or no stabilization of the visual field is obtained after two treatments over 360°, surgical intervention can still be carried out, without any higher risk.

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