

# A new manner of reporting pressure results after glaucoma surgery

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**Purpose:** To evaluate to what extent contemporary glaucoma abstracts offer complete information and to suggest a new manner of pressure results reporting.

**Materials, methods, and results:** Most of the 36 relevant surgical glaucoma abstracts found in one issue of *International Glaucoma Review* contain insufficient data-supported statements. Such abstracts cannot offer a clear picture of the study essence if economic, linguistic, or political barriers prevent access to the full text. In order to enrich abstract content and to avoid typographic space waste, a formula is suggested to provide, in one single line of symbols and figures, all the necessary data for statistical interpretation at two evolution moments: the first significative control (6 months) and the final one.

**Conclusion:** The current manner of results reporting in surgical glaucoma abstracts is subject to too little standardization, allowing insufficiently data-supported statements. Abstracts, especially those printed in small-circulation language journals, should be conceived and standardized in such a manner that any abstract review reader is capable of grasping the essence of the study at first glance. The suggested manner of reporting results would bring satisfaction to all areas of the process. Publishers would save typographic space, readers would find all the necessary data for statistical analysis and comparison with other studies, and authors would be convinced that the essence of their work would penetrate in spite of any economic, linguistic, or political barriers.

**Keywords:** glaucoma, reporting results, IOP, abstract construction, standardization formula

## Introduction

The most important quality of an abstract is the ability to communicate essential information in a concise form. Because of the extensive use of abstracts for reviewing information, and because of the high degree of information redundancy, this ability has acquired a special significance. In our analysis we examined how completely surgical glaucoma abstracts communicate study results. We did not acquire the full text, as our purpose was to evaluate not the article contents but the success of the abstract at transmitting complete information. We placed ourselves in the position of any reader who is interested in the subject but does not have full access to the article or does not understand the language in which it was printed. Based on the results of our analysis, we suggest a method that could significantly improve the transmission of information.

## Materials and methods

We analyzed the abstracts published in one issue of *International Glaucoma Review*.<sup>1</sup> This issue was picked arbitrarily from a period of time when the review printed

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abstracts, not commentaries on selected articles. The abstracts were evaluated on the basis of whether the information furnished by each surgical glaucoma abstract was complete, so that any reader who is unable to get the full text might run their own statistical interpretation, deduce the information degree of significance, and use the transmitted information accordingly. In addition to noting the type of study (ie, cross-sectional or longitudinal), we looked for data showing (1) the follow-up time, (2) the number of cases that formed the study cohort or that passed the significant controls, (3) the preoperative intraocular pressure (IOP) and the number of medications used, (4) the postoperative IOP and the number of medications used, (5) the criterion of success, (6) the use of generally accepted “complete-qualified” dichotomy, and (7) the presence of tests of statistical significance.

## Results

Each abstract comprised 20–30 lines, with ~78 characters (including spaces) per line. The section summarizing the results usually occupied four to ten lines.

Out of the 65 abstracts on glaucoma surgery, 28 of them were not relevant to our inquiry: six presented animal or laboratory studies,<sup>2–7</sup> four discussed short-term results (ie, hours/days after surgery),<sup>8–11</sup> seven were reviews,<sup>12–18</sup> nine presented case studies,<sup>19–27</sup> and two contained statements insufficiently supported by the furnished data.<sup>28,29</sup>

Out of the 37 relevant abstracts, 14 and 23 abstracts summarized cross-sectional and longitudinal studies, respectively. Most abstracts offered incomplete information, transmitted in an extremely varied way.

Among the 14 abstracts reporting *cross-sectional* studies (Table 1), the information concerning the follow-up time and total number of cases that entered the study was included in every abstract. The number of cases that passed each control was indirectly specified only once.<sup>30</sup> Only three abstracts specified the preoperative IOP,<sup>30–32</sup> and information concerning preoperative treatment intensity was not included. The postoperative IOP was noted in three different ways: as mean (m) ± standard deviation (SD),<sup>30,32,33</sup> as upper limit,<sup>34</sup> as statistical tests proving a “significant IOP reduction”,<sup>35,36</sup> or as qualitative formulations: “a drop in IOP”<sup>31</sup> or “no difference”.<sup>37</sup> Only one abstract quantified a reduction in the number of medications,<sup>30</sup> two abstracts offered statistical tests to prove the reduction,<sup>33,35</sup> and one abstract used the words “no medication”<sup>34</sup> and “no difference”.<sup>37</sup> All 13 abstracts presented good outcomes, but only seven mentioned the success criterion: 20 mmHg,<sup>38</sup> 21 mmHg,<sup>32,39–41</sup> 22 mmHg,<sup>30</sup> or 3 mmHg drop in mean IOP.<sup>42</sup> Four abstracts offered the

success percentage,<sup>32,38,41–43</sup> but only one abstract separately noted the success percentage without and with medication.<sup>38</sup> Ten abstracts added tests of statistical significance.

Among the 24 abstracts reporting *longitudinal* studies (Table 2), only the total number of cases that entered the study was specified in each abstract. Sixteen abstracts specified the follow-up period, either as its limits (1 month to 6 years),<sup>44–47</sup> as mean value,<sup>48–52</sup> as “m (range)”,<sup>53–56</sup> or as  $m \pm SD$ .<sup>57–59</sup> Four abstracts mentioned vague time limits (“at least X months”<sup>60–62</sup> or “up to X months”<sup>63</sup>), whereas two abstracts added even more vague formulations like “at the final follow-up visit”,<sup>52</sup> “at the last visit”,<sup>57</sup> or “long-term results”.<sup>64</sup> Finally, two abstracts did not mention this important parameter at all.<sup>66,67</sup> Less than half of the abstracts mentioned the preoperative and postoperative IOP, using three different means of expression: mean IOP,<sup>48,55,63</sup>  $m \pm SD$ ,<sup>50,54,56,58,59,61</sup> or m (range).<sup>47</sup> Three abstracts noted only the postoperative IOP as mean IOP<sup>53</sup> or as  $m \pm SD$ .<sup>49,57</sup> Two abstracts offered the IOP reduction in mmHg,<sup>48,52</sup> one as  $m \pm SD$ ,<sup>50</sup> one as a percentage,<sup>56</sup> one both in mmHg and as a percentage,<sup>59</sup> and one used a qualitative formulation: “rapid IOP reduction”.<sup>66</sup> The rest of the 18 abstracts did not mention this important parameter. The preoperative number of medications was mentioned in only five abstracts, as “m”<sup>47,63</sup> or as  $m \pm SD$ .<sup>50,56,59</sup> The postoperative number of medications appeared in ten abstracts, but the methods of transmitting this information were extremely varied, such as “m”,<sup>47,49,63</sup> “ $m \pm SD$ ”,<sup>50,59</sup> percentage,<sup>56</sup> or using qualitative terms “no change”,<sup>52,62</sup> or “lower number of medications”.<sup>58</sup> Although all abstracts noted a favorable outcome, only 12 reported it in a quantitative manner, such as the number of patients out of the total,<sup>44,45,49,56</sup> or as a percentage.<sup>51,52,58,60,62</sup> Two abstracts quantified this parameter as both numbers and percentages.<sup>50,55</sup> The success criterion was mentioned in only ten abstracts and expressed in various ways, either in mmHg (4–18,<sup>62</sup> 6–21,<sup>54</sup> 15 and 21,<sup>57</sup> 16,<sup>51,59</sup> 16 and 21,<sup>58</sup> 18 and 21,<sup>50</sup> 20,<sup>60</sup> and 21<sup>44</sup>), or as a percentage of mean IOP reduction (20%,<sup>62</sup> 25%,<sup>63</sup> 30%<sup>59</sup>). Some abstracts expressed the criterion in more than one way.<sup>50,58,59,62</sup> The “complete-qualified” success dichotomy was used in relation to one border IOP by two abstracts.<sup>44,55</sup> Two abstracts offered the dichotomy both for 15 and 21 mmHg<sup>57</sup> and for 16 and 21 mmHg.<sup>58</sup> Three abstracts used different names for this dichotomy (“absolute-relative”,<sup>51</sup> “surgical-qualified”,<sup>54</sup> or “total-qualified”<sup>57</sup>). One abstract<sup>50</sup> used two different border values (ie, 18 mmHg for complete success and 21 mmHg for qualified), without specifying the framing manner when IOP is between these values. One abstract mentioned only success without medication, describing it

**Table 1** Cross-sectional study abstracts

Abstract no.	Follow-up time	Number of cases		Preoperative		Postoperative reduction			Success		Tests of statistical significance	
		Total	Per control	IOP	Medication	mmHg	IOP	Percents	Number of medications	Criterion		Percents
30	Yes	Y	Y	m ± SD		m ± SD		Y		22 mmHg		Y
31	Y	Y		m ± SD		Drop in IOP						Y
32	Y	Y		m ± SD		m ± SD		Reduction		21 mmHg	Y	Y
33	Y	Y		m ± SD		m ± SD		No medication				Y
34	Y	Y				Less than 1.5 mmHg						
35	Y	Y				Reduction		Reduction				Y
36	Y	Y				Reduction						Y
37	Y	Y				No difference		No difference				
38	Y	Y								20 mmHg	Y	Y, indirectly
39	Y	Y								21 mmHg		Y
40	Y	Y								21 mmHg		Y
41	Y	Y								21 mmHg	Y	Y
42	Y	Y								3 mmHg drop	Y	Y
43	Y	Y									Y	Y

**Abbreviations:** c-q, complete-qualified; IOP, intraocular pressure; m, mean; SD, standard deviation.

**Table 2** Longitudinal study abstracts

Abstract no.	Follow-up time	Number of cases		Preoperative data		Postoperative data		Success Overall	C-q dichotomy	Tests of statistical significance
		Total	Per control	IOP	Number of medications	IOP	Reduction			
44	Limits	Yes						nr.	C-q	
45	Limits	Y						nr.		
46	Limits	Y								
47	Limits	Y		m (range)	m	m (range)	m			
48	m	Y		m		No difference	No difference	nr.		
49	m	Y		m ± SD		m ± SD	m	nr.		
50	m	Y		m ± SD	m ± SD	m ± SD	m ± SD	nr. %	C = 18; q = 21	Y
51	m	Y		m ± SD	m ± SD	m ± SD	m ± SD	%	Absolute-relative	Y
52	m	Y						%		Y
53	m	Y								
54	m (range)	Y		m ± SD	m	m ± SD	No change			Y
55	m (range)	Y		m ± SD	m ± SD	m ± SD		nr. %	Surgical-q	Y
56	m (range)	Y		m				nr.	C-q	
57	m (range)	Y		m ± SD	m ± SD	%	%			
58	m ± SD	Y		m ± SD	m ± SD	m ± SD	Lower number		Total-q for 15 and 21	Y
59	m ± SD	Y		m ± SD	m ± SD	m ± SD	m ± SD	%	C-q for 21 and 16	Y
60	m ± SD	Y		m ± SD	m ± SD	m ± SD	m ± SD	%	C = 30% drop (or 16 mmHg)	Y
61	At least	Y						%	20 mmHg	Y
62	At least	Y		m ± SD				%		Y
63	At least	Y						%	4–18 mmHg (or 20% drop)	Y
64	Up to	Y		m	m		m		25% drop	Y
65	Long term	Y								
66		Y								
67		Y								

**Abbreviations:** c-q, complete-qualified; IOP, intraocular pressure; m, mean; nr., number; SD, standard deviation.

as “complete”,<sup>59</sup> and provided no information about success with medication. In total, only ten abstracts included tests of statistical significance. Four abstracts mentioned only the total number of cases,<sup>65</sup> the number of cases and the follow-up time,<sup>46,64</sup> or the number of cases and a postoperative aspect.<sup>66</sup>

## Discussion

Most of the surgical glaucoma abstracts examined from this single issue summarized *longitudinal studies*, stating the number of cases, the follow-up period, and usually a qualitative appreciation of the results. Half of these abstracts did not contain tests of statistical significance, and the number of patients at significant controls (or at least the final one) was not mentioned. We may only suppose that the whole cohort that entered the study passed every control, although this does not occur on a frequent basis.

In the absence of specific information, a meaningful statistical analysis is not possible because some cases could be complete successes at the first controls but later become qualified successes at the medium term and after variable follow-up, failures at the late controls. When the abstract shows only the preoperative aspect and the final result after variable follow-up, it does not offer any information suggesting possible evolution change, its direction and slope, and the moment from which the change is expected.

Furthermore, surgeons typically introduce new techniques with only a few cases and progressively increase the number with experience, so that the number of cases reaching the midterm or the late phase of follow-up remains relatively small. In an abstract showing the whole cohort preoperative aspect and the final result, the better results from recent cases can mask the reality of late controls, resulting in the final data becoming statistically less significant and the comparison between studies less relevant than expected.

This possible skewing in the reporting of outcomes is an important consideration when deciding whether to start practising a new procedure. Encouraged by the information that a new technique produced “complete success in 90% of cases after 6–36 months” but finding poorer results at 6 months, one can feel confused, being torn between three possible explanations: (1) errors in surgical performance, (2) embellishment of the real results by the authors of an initial study, and (3) mix-up between recent cases and fewer earlier ones. Unfortunately, the actual form of the results’ presentation within abstracts often fails to resolve the confusion.

Fewer abstracts summarize *cross-sectional* studies. This is true not only for the analyzed issue but for the whole

literature, because it is difficult for ophthalmic surgeons to gather enough cases for each horizontal slice. Of the few printed in this issue, only one horizontal study abstract<sup>30</sup> mentioned the number of patients who passed each control. This parameter is an important one because it is difficult to accept that in large cohorts of 50–450 patients,<sup>31,33,36–38,40,43</sup> none was lost at some control point or even at the final control. Hence, for such cohorts, the abstracts should mention tests of statistical significance or, better, the number of patients who passed the significant controls. In this manner, the reader may perform their own calculations, find the degree of significance, and even use the statistical data in further personal studies. This ability is especially relevant for those who cannot acquire the full text because of economic, linguistic, or political barriers.

From these considerations, it is evident that *both types of study need more detailed abstracts* in order to transmit more information. Nevertheless, each journal has its own structure and word limits, constraining the amount of information an abstract can transmit.

On the other hand, it is true that the strength and relevance of a study are related more to its methodology, structure, and interpretation of data than to how complete the information within the abstract is. Nevertheless, in order to push the reader to look for the full text, the abstract must prove that the study authors are serious researchers and that the effort will be worth it. And how could an abstract perform this role if it does not offer any data about the preoperative and postoperative IOP and number of medications, if it talks about success without defining the criterion and without quantifying the reduction in treatment intensity, if it does not use the generally accepted “complete-qualified” dichotomy, and if it does not include tests of statistical significance? Facing the amount of missing abstract information revealed in this paper, one must remember that the abstracts printed in *International Glaucoma Review*, 2007, Vol. 8, No. 4, were selected in a review process. This prompts one to wonder about the other abstracts that not did stir the reviewers’ interest. Did these abstracts really deserve to be neglected? Is it not possible that this neglect be connected, at least in part, to the lack of transmitted information?

In addition, one may wonder what future one’s effort will have if the full text is written in a language few understand, or is printed in largely inaccessible journals because of economic or political barriers. The linguistic barrier has already forced too many contributors to print in small-circulation language journals. Because the reviewers were not able to read the full text due to the language barrier and because

the English abstracts did not give enough information, *International Glaucoma Review* contained mainly abstracts from articles printed in English. As a result, possibly valuable contributions from other linguistic regions were lost because their authors did not master English perfectly and because the generally accepted manner of abstract construction did not compel the authors to offer enough data.

*Small, supplementary changes could help correct this situation.* The first step has already been taken by the World Glaucoma Association's guidelines on design and reporting of glaucoma surgical trials,<sup>67</sup> which have established a set of rules to be followed in a surgical glaucoma study. We attempt to go further by addressing the issue of how abstracts can better communicate results. In our opinion, in order to transmit information more completely, the abstract should combine the long sight of longitudinal studies with the analytic scrutiny of cross-sectional ones. For any type of study, even when the number of cases with a long follow-up remains small, every case has passed at least the first significant control, and many have passed the intermediate ones. If the abstracts present more than the results of the last control, such as providing the results of at least one additional intermediate control situated at an important evolutive juncture, the reader should readily understand the nature of the evolution, its slope, and the moment at which the evolutive change might be expected. As the first significant control is situated postoperatively at 6 months, we suggest that the results at 6 months appear in every abstract on glaucoma surgery. When starting to practise a new procedure, one will not have to wait for the long-term results in order to understand whether something is wrong with the execution; one will get the first hint by comparing the 6-month results.

In order to more completely transmit information, a generally accepted formula should exist, so that the information can be conveyed without wasting typographic space. The elaboration of such a formula was a constant preoccupation for one of the authors, and the first variant was presented at the Congress of the European Society of Ophthalmology in Budapest, Hungary, in 1997:<sup>68</sup>

6 m; 58 [15.3 ± 1.3] C 84.5; R 6.9(1), 8.6(3)  
/21–23 m; 12 [16.7 ± 2.1] C 83.3; R 8.3(2).

The formula shows two sets of data separated by a slash, summarizing the aspect at the first significant control (usually at 6 months) and at the final one: the lapse of time, the number of cases, the mean IOP ± SD, the success without medication rate (C, complete success), the success with medication rate (R, relative success), and the number of medications.

Since 1999, the notion of qualified success has been accepted, and various success criteria are now in use: from the classic value of less than 21 mmHg, from the newer borderlines of 17 mmHg and 15 mmHg or even lower IOP, from IOP reduction expressed in mmHg or in percents, to the “target pressure”. In the future, we expect the use of “normative pressure” (ie, when a calculation formula for this parameter will appear). In order to incorporate all these present and future variants, we suggest the following updated formula:

6 m; 58 [15.3 ± 1.3] (sc) C 84.5; q 6.9(1), 8.6(2)  
/21–23 m; 12 [16.7 ± 2.1] C 83.3; q 8.3(3),

where 6 m = laps of time, in months or years; 58 = number of cases controlled at this postoperative interval; [15.3 ± 1.3] = mean IOP ± SD, in mmHg; (sc) = success criterion {(sc 21) = IOP upper limit, in mmHg; (sc Δ3 or sc Δ20%) = IOP reduction, in mmHg or as a percentage; (sc TP) = target pressure; or (sc NP) = normative pressure}; C = complete success rate: the percentage of cases that fulfilled the success criterion without medication; q = qualified success rate {the percentage of cases that fulfilled the same success criterion with medication; when the qualified success criterion was different, it will be specified as (qsc) placed before “q”; the figures between the parentheses represent the number of medications}.

*The suggested manner* of reporting pressure results offers several advantages. First, it can be used to summarize the preoperative aspect, too: 58 [35.4 ± 3.5] (0; 5; 70; 25), where the figures between parentheses represent the percentage of cases that did not respond to one, two, three, or four medications.

Second, it provides all the necessary data for statistical analysis: time interval, number of cases, mean IOP, and SD at significant controls, success criterion, success rate without and with medication, and treatment intensity. The reader can perform their own statistical analysis even working on English abstracts printed in small-circulation language journals. The reader may even use this information in further studies.

Third, it specifies the success criterion, which is important to state, because there are currently a number of means for defining success.

Fourth, it offers more than the complete-qualified success dichotomy by showing the number of medications that lead to the qualified success.

Fifth, it saves even pieces of information with little importance at the time of the report but possibly with significative implications in a longer follow-up. The figures between square brackets in the suggested formula show that although the complete success rate remains almost the same, the IOP increase may sketch the further evolution trend.

Sixth, it reduces typographic space, which is particularly important in abstracts. It would take ten lines of ~78 characters per line to write in words the information synthesized in this formula. The suggested formula states that out of the 58 cases that entered the study, all passed the 6-month control. The mean IOP was  $15.3 \pm 1.3$  mmHg, with no failure. Complete success (compared with a given value) was noted as 84.5%, whereas the qualified one was 15.5% (6.9% with one medication and 8.6% with two medications). Twelve patients passed the 21- to 23-month control. The mean IOP was  $16.7 \pm 2.1$  mmHg. Compared with the same criterion, the success was complete in 83.3% and qualified, with three medications in 8.3%. One case (8.3%) was a failure, but the mean IOP  $\pm$  SD of this control cohort shows that the degree of decompensation was slight. Indeed, in this case, the IOP at the last control was 23 mmHg with three medications.

Seventh, it makes comparing experiences, studies, and data easier. One could assess the evolution at first glance from reading the abstract. When the postoperative evolution or the response in time to medication is important, the author might offer further sets of data.

Eighth, furthermore, the full text itself would become more comprehensive if horizontal slices reflecting the most important events in the evolution were added.

Ninth, for authors forced to print in small-circulation language journals, this formula significantly improves the possibility that their contribution will count in the process of understanding glaucoma, in the effort of creating from local facets the global image of a sickness that represents one of the main causes of blindness all over the world. In any language in which the abstract be printed, its message (transmitted by generally accepted symbols) would reach its intended audience.

Tenth, this approach may prove its value not only in glaucoma literature but in any clinical work when the main parameter shows variation in rapport with time and the author wishes to stress this variation.

*As with any novelty*, the suggested manner of pressure results reporting will certainly stir opposition at the beginning. Some possible reproaches are as follows.

1. "It is not necessary to set up a standard formula for all surgical glaucoma abstracts." We remind potential opponents that when terms like "complete" and "qualified" were suggested to describe the success, most authors opposed them with almost the same argumentation. As a consequence, these terms were rarely used. Now, 10 years later, more than 50% of the printed papers on glaucoma surgery offer this utile information, and the trend is rising.

The explanation is the fact that these terms were necessary, being the first attempt to bring scientific rigor at a time when most of the surgical glaucoma abstracts used confusing formulations like "in a study on X cases followed for Y years, we obtained compensation in Z% of cases". Our formula brings even more scientific rigor, offering complete information in a reduced typographic space. In addition, we think that our formula fulfils a need felt by the glaucoma specialists audience, although still not strongly expressed. It is this need that made the World Glaucoma Association issue its guidelines on design and reporting of glaucoma surgical trials, precisely in order to compensate the too wide variety of ways in which trials were conducted, a variety that could create confusion and mislead the readers. If we agree with these guidelines, why would we not accept that discipline is necessary in abstracts too? Is it wrong to transmit more information in less typographic space than the space occupied nowadays by usual formulations (eg, in a study on X cases, Y years after surgery we found complete success in Z% of cases and qualified success in W% of cases)? What could be wrong in combining concision with completion?

2. "Abstracts with word limitations are not really a reliable source of information." In fact, abstracts completed with our formula will become a really reliable source of information and, what is important, without outpacing the word limitation imposed by each journal.
3. "There is no need to impose a formula, because, for a serious reader, the method of a study may be more important than the results. Therefore, the full text is more important than the abstract." We completely agree, but when a paper is published, the reader is certain that the study has passed through the attentive scrutiny of two or three experienced reviewers who have confirmed that it was properly conducted, according to all accepted rules. Therefore, the reader is justified in taking the abstract into consideration. Nevertheless, in order to look for the full text, the reader must be attracted by something within the abstract. The abstract plays the role of the commercial advertisement in the nonmedical world. If the abstract intrigues the readers enough, they will search for the full text. Otherwise, in a period when time is extremely precious and readers are bombarded with so much information, they could overlook a full text preceded by an abstract that does not stir their interest.
4. Some authors could argue that they do not want to emphasize their results in a statistical way. We would ask these potential opponents whether there is a better way to reflect reality than statistically, if statistics was properly used.

This is exactly one of the roles of the full text – to prove that the study was properly conducted.

- Finally, other authors could say that no one is allowed to impose on them to renounce what they want to emphasize. It was not our intention to impose on anyone to renounce what they want to emphasize. The authors may fully express their ideas, but only after inserting complete information in one single line. This complete information would not harm the emphasized ideas; on the contrary, complete information would offer substantial support.

## Conclusion

The current manner of reporting results in surgical glaucoma abstracts is subject to little standardization, such that too many variants fill the typographic space with statements insufficiently supported by the provided data. Abstracts, especially those printed in small-circulation language journals, should be conceived and standardized so that any reader should be able to grasp the essence of the study at first glance. The ideal abstract should contain all the data necessary for statistical interpretation. An efficient means of accomplishing this goal is to gather the data in a formula that is accessible in any language. The suggested manner of reporting results would bring satisfaction to all areas of the process. Publishers would be spared the typographic space, readers would find all the necessary data for statistical analysis and comparison with other studies, and authors would be convinced that the essence of their work will penetrate in spite of any economic, linguistic, or political barriers.

## Disclosure

The authors report no conflicts of interest in this work.

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