

Early Glaucoma Surgery in Primary Open Angle Glaucoma

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Abstract: Purpose: to evaluate the efficacy of early primary glaucoma surgery in primary open angle (POAG). **Methods:** This study performed on 50 eyes of 29 patients with POAG in Menoufia University hospital outpatient ophthalmology clinic were divided to group A 25 cases "primary surgery after diagnosis" and group B 25 cases "controlled cases with medical treatment". **Results:** follow up period up in group A, revealed significant reduction in intraocular pressure (IOP) as p -value < 0.001 after 3 months with sustained control over one year with complete success in 68 % of cases while qualified success in 32% of cases, Visual field stability occurred in majority of cases with primary surgical interference. In addition to low intraoperative complication rate including ocular hypotony in 2 cases (8%) and hyphema in 2 cases (8%). **Conclusion:** The results of the study comparing early primary surgery (without waiting results of medications) with conventional treatment for POAG have demonstrated the role of the primary surgery for more safety and visual field preservation due to reaching a target pressure and lessens IOP fluctuations.

[Faried M. Wagdy, Saber H. Elsayed, Hoda M. Elsobky and Doaa F. Eldegwy. **Early Glaucoma Surgery in Primary Open Angle Glaucoma.** *Life Sci J* 2014;11(1):18-26]. (ISSN:1097-8135). <http://www.lifesciencesite.com>.
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Keywords: Early surgery, primary open angle glaucoma, applanation tonometry.

1.Introduction

Primary open-angle glaucoma (POAG) is described distinctly as a multifactorial chronic and progressive optic neuropathy with a characteristic acquired loss of optic nerve fibers. Such loss develops in the presence of open anterior chamber angle, characteristic visual field abnormalities, and elevated IOP that affects haemodynamic circulation of ONH and axoplasmic transport. POAG is a major worldwide health concern, because it has an insidious onset and leads to irreversible blindness¹. In glaucoma there is a relatively slow loss of retinal ganglion-cell axons. Early loss is usually in the mid-peripheral visual field. The disease becomes symptomatic at a relatively late stage when central vision is affected and the visual acuity declines or extensive loss of peripheral vision occur. Blindness due to glaucoma is largely can be minimized by early glaucoma discovery. While the visual damage is irreversible, it can usually be arrested, and to achieve this, early diagnoses have to be attempted². The aim of glaucoma management is to prevent visual loss either by medical or surgical treatment. Medical treatment of open-angle glaucoma can induce undesirable changes within the conjunctiva and Tenon's capsule. In addition to the transient conjunctival changes related to allergy and toxicity that most topically applied eye drops can induce. These clinical observations suggest that a possibility for enhanced postoperative scarring of surgically created filtering blebs might be more likely in patients receiving long-term antiglaucoma medications. Also glaucoma surgery can arrest the progression of the

disease via a reduction in IOP and is successful in maintaining normal IOP. The outcome of surgery is improved if the operation is done early before the increased IOP causes serious damage to the optic nerve fibers. The prognosis is poor if the surgery is performed in the late stages of this disease.³

2. Patients and methods:

This study was performed on 50 eyes of 29 patients attending at Menoufia University hospital outpatient ophthalmology clinic, the study included Patients with primary open angle glaucoma, Age above 40 years and uncontrolled IOP level ≤ 30 mmHg while exclusion criteria: Any other type of glaucoma (closed angle, aphakic, or developmental glaucoma), Previous ocular surgery and any corneal abnormality that could interfere with accurate applanation tonometry.

Ophthalmological examination was done including measurement of visual acuity using landolt's broken rings chart, refraction, anterior segment examination with slit-lamb biomicroscopy to detect any opacity, rubeosis iridis and to assess pupil shape, regularity and reactivity, assessment of IOP using a slit-lamb mounted applanation tonometer, gonioscopy using the Goldmann three mirror lens and fundus and optic nerve head examination using fundus biomicroscopy and the direct ophthalmoscope to detect signs of glaucomatous optic neuropathy and signs of any retinal disease then Perimetry using Octopus 101 perimeter to assess patients visual field.

The selected patients in this study were classified into two groups according to the type of treatment they received for primary open angle glaucoma.

Group A: Included 25 eyes of 13 patients with primary open angle glaucoma; 8 males and 5 females. The patients of this group were subjected to glaucoma surgery.

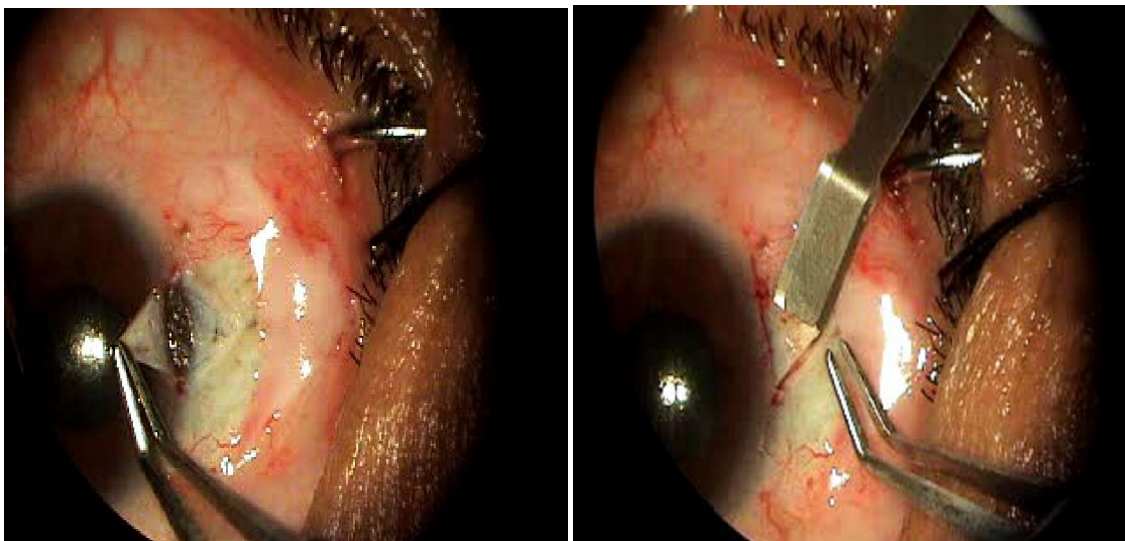
Group B: Included 25 eyes of 16 patients with primary open angle glaucoma; 7 males and 9 females. The patients of this group were subjected to proper medical therapy for glaucoma.

*Glaucoma surgery: all patients were subjected to subconjunctival trabeculectomy in which, a fornix-based flap of conjunctiva and Tenon capsule was fashioned superiorly, Episcleral tissue was cleared. An outline of

the proposed superficial scleral flap was made with wet-field cautery, Incisions were made along the cautery marks through two-thirds of scleral thickness, to create a 'trapdoor' lamellar scleral flap. This flap was either rectangular or triangular, The superficial flap was dissected forwards until clear cornea had been reached, A peripheral iridectomy was performed in order to prevent blockage of the internal opening, The superficial scleral flap was sutured using 10/0 nylon sutures at its posterior corners and Conjunctiva/Tenon capsule flap was sutured using 8/0 silk sutures.

Irrigation through the paracentesis was repeated to produce a bleb, which was then checked for leakage.

A steroid and an antibiotic were injected under the inferior conjunctiva.



(Fig 1): Superficial scleral dissection at 12 o'clock 3x3mm.

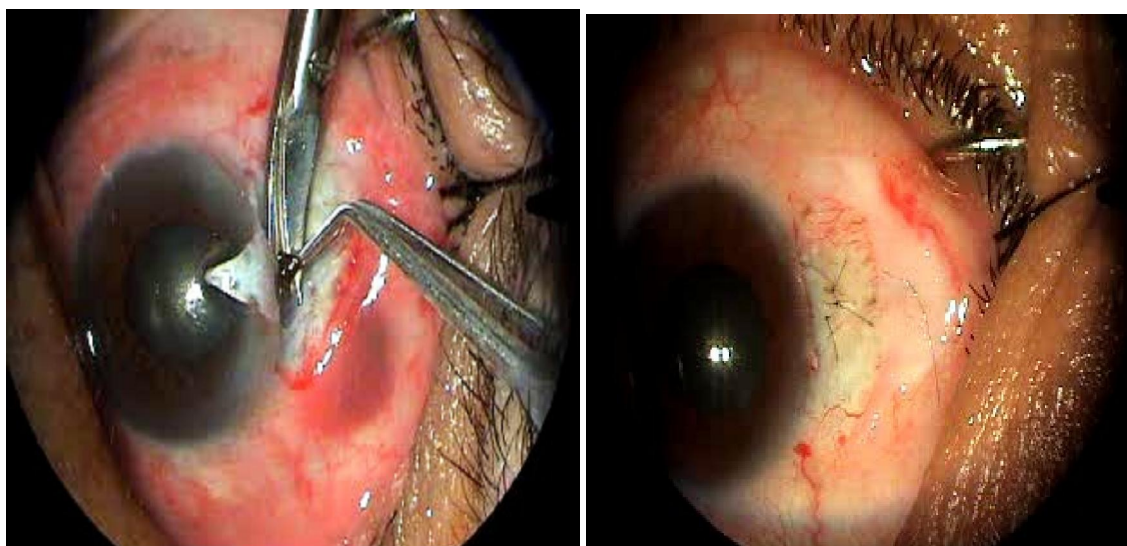


Figure 2: peripheral iridectomy

Figure 3: closure of scleral flap

Postoperative follow up:

Postoperatively all patients received a combination of steroidantibiotic drops and ointment four times daily for one week.

Follow up was done at one day, one week, three months, six months and twelve months.

The patients were examined in outpatient clinic for:

Visual acuity: at one day, three months, six months and twelve months.

IOP: using a slit-lamb mounted applanation tonometer at three months, six months and twelve months.

Anterior segment examination: by slit-lamb to assess presence of any shallowing of the anterior chamber, any intraocular inflammation, examination of upper bulbar conjunctiva at the site of surgery and to assess the filtering bleb.

Fundus and optic nerve head examination using fundus biomicroscopy and the indirect ophthalmoscope.

Visual field examination: at three months, six months and twelve months

* Classification Based on MD and CPSD Values by Brusini et al:

Stage 0: both MD and CPSD within normal limits.

Stage 1: MD between -3 and -5 dB and CPSD ≤ 3 dB, OR MD < -3 dB and CPSD between 3 and 5 dB, OR both MD and CPSD between -3 and -5 dB.

Stage 2: MD > -5 and < -8 dB and CPSD < 8 dB, OR MD < -3 dB and CPSD > 5 and < 8 dB.

Stage 3: MD between -8 and -12 dB, OR CPSD ≥ 8 dB.

Stage 4: MD ≥ -12 dB and < -20 dB.

Stage 5: MD ≥ -20 dB 2.

Treatment was considered to be completely successful if IOP was 21mmHg or less without the use of topical antiglaucomatous medications, that occurred in 17 eyes, while qualified success was considered if IOP was 21mmHg or less with the use of a single topical betablocker, that occurred in 8 eyes. Treatment failure was defined as an IOP of more than 21mmHg with or without antiglaucomatous medications.

3.Results:

Table 1 shows that the mean value of IOP was significantly lower among group A than group B after 3 months of surgery (p value < 0.001). In addition 68% of group A patients have complete success (controlled IOP without additional medications) at 12 months after surgery and 32% has controlled IOP with additional drug after surgery with high significant reduction at 3 months follow up while 20% of group B has controlled IOP with 1 drug after 3 months of medical therapy. After 6 months, 52% has controlled IOP by using 2 drugs, while after 12 months, 48% has controlled IOP by using 2 drugs and 24% has controlled IOP by using 3drugs.

As regarding visual field changes table 2 shows that stage 0 and stage 1 visual fields were significantly higher among group A at 12 months of intervention (Figures 4,5,6 and 7).

Table 1: Comparison between group A and group B regarding assessment of IOP within 12 months follow up

IOP	Group A Mean \pm SD	Group B Mean \pm SD	t-test	P value
Preintervention	25 \pm 2.02	25.84 \pm 1.88	0.50	> 0.05
3 months after intervention	14.30 \pm 1.33	17.88 \pm 2.27	6.76	< 0.001
6 months after intervention	14.81 \pm 1.34	15.12 \pm 1.58	0.74	> 0.05
12 months after intervention	15.09 \pm 1.43	15.16 \pm 1.37	0.17	> 0.05

Table 2: Comparison between group A and group B regarding assessment of visual field within 12 months follow up

Visual field after one year	Group A NO	Group A %	Group B No	Group B %	P value
Stage 0	5	20	0	0	< 0.05
Stage 1	10	40	3	12	< 0.05
Stage 2	2	8	6	24	> 0.05
Stage 3	3	12	6	24	> 0.05
Stage 4	2	8	7	28	> 0.05
Stage 5	3	12	3	12	> 0.05

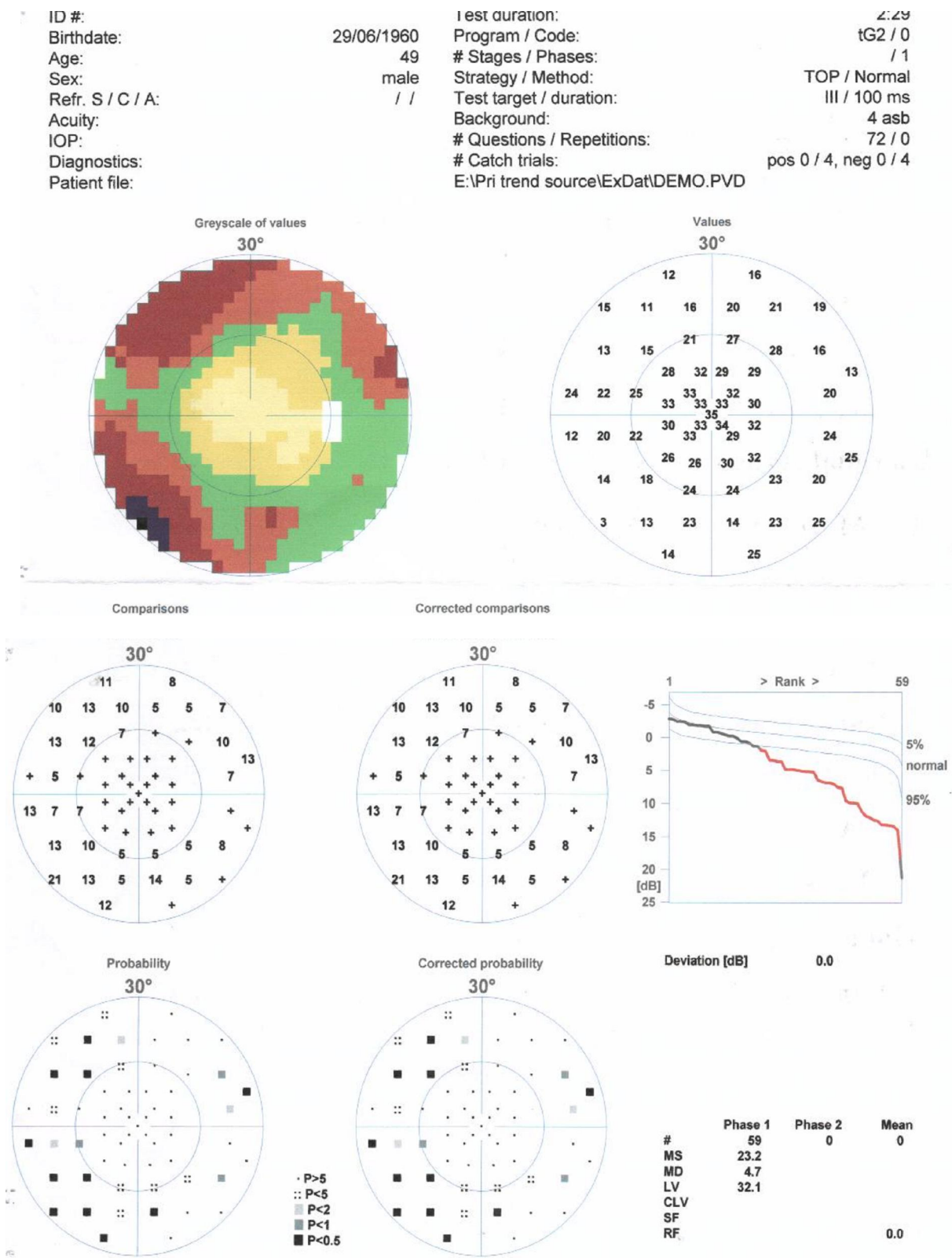


Figure (4): Perimetry before surgery

ID #:		Test duration:	
Birthdate:	29/06/1960	Program / Code:	tG2 / 0
Age:	49	# Stages / Phases:	/ 1
Sex:	male	Strategy / Method:	TOP / Normal
Refr. S / C / A:	/ /	Test target / duration:	III / 100 ms
Acuity:		Background:	4 asb
IOP:		# Questions / Repetitions:	72 / 0
Diagnostics:		# Catch trials:	pos 0 / 4, neg 0 / 4
Patient file:		E:\Pri trend source\ExDat\DEMO.PVD	

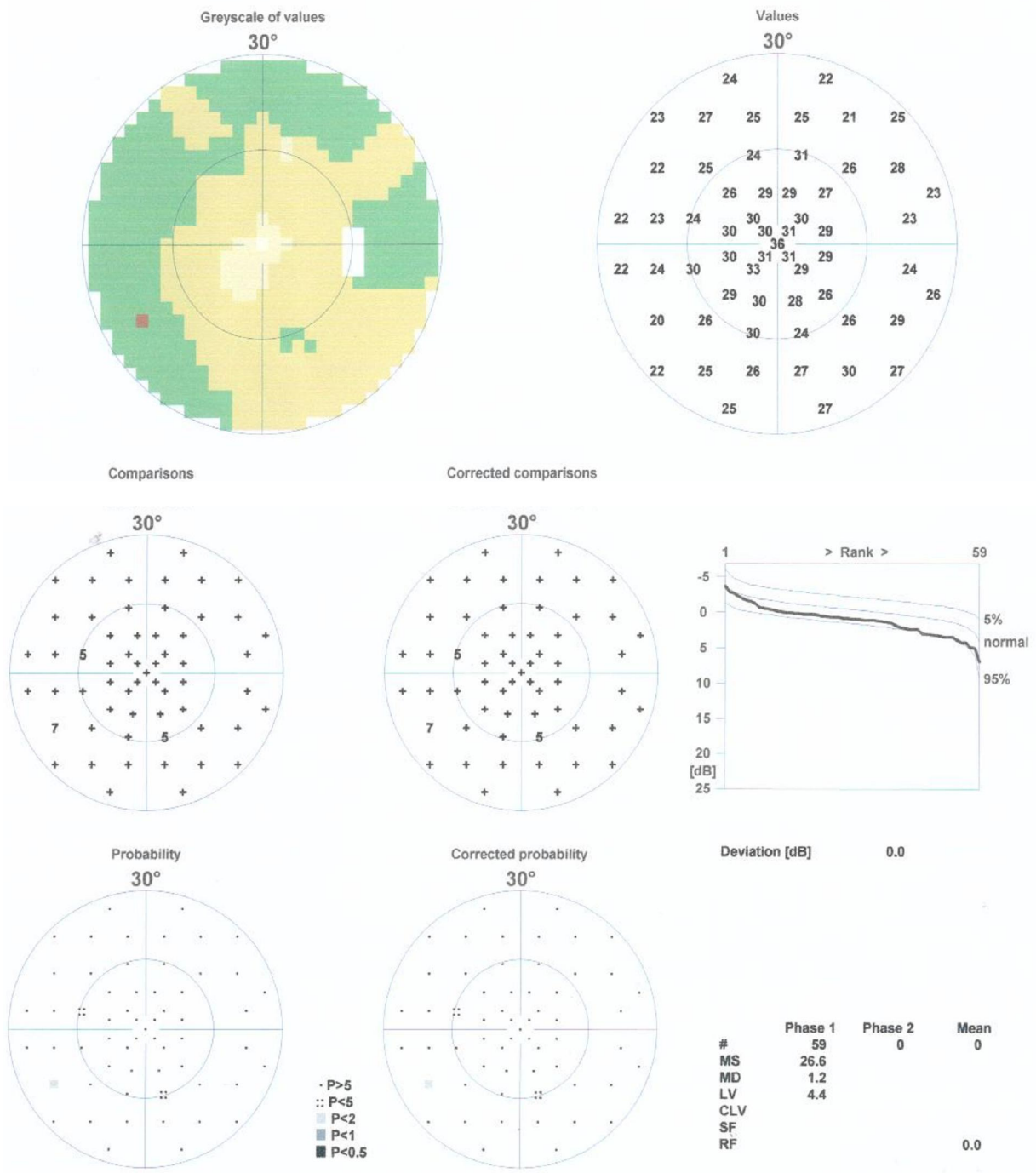


Figure (5): Perimetry one year after surgery

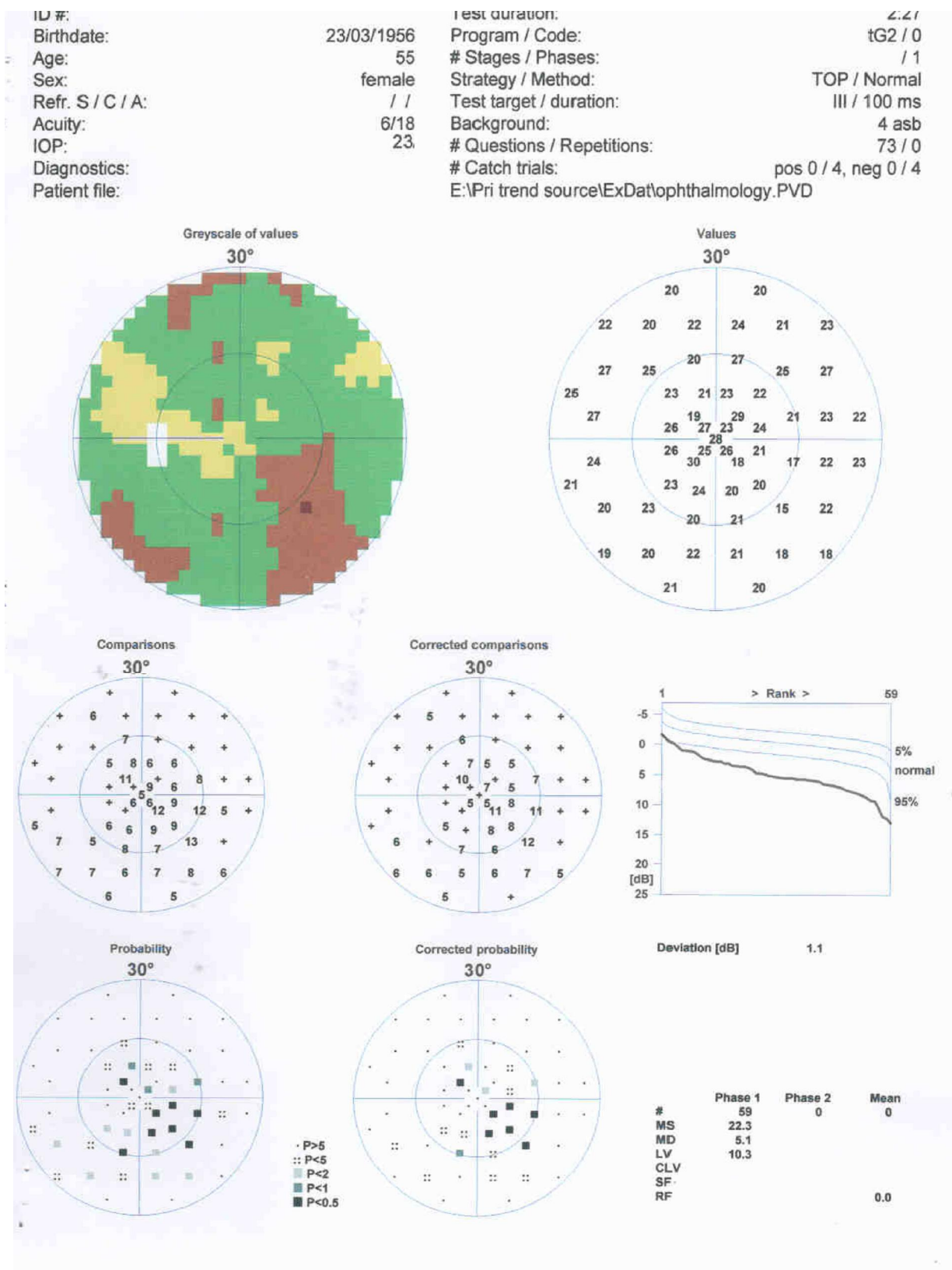


Figure (6): Perimetry before medical therapy

Birthdate: 23/02/1956 Program / Code: tG2 / 0
 Age: 55 # Stages / Phases: / 1
 Sex: female Strategy / Method: TOP / Normal
 Refr. S / C / A: / / Test target / duration: III / 100 ms
 Acuity: 6/18 Background: 4 asb
 IOP: 17 # Questions / Repetitions: 69 / 0
 Diagnostics: # Catch trials: pos 0 / 3, neg 0 / 4
 Patient file: E:\Pri trend source\ExDat\ophthalmology.PVD

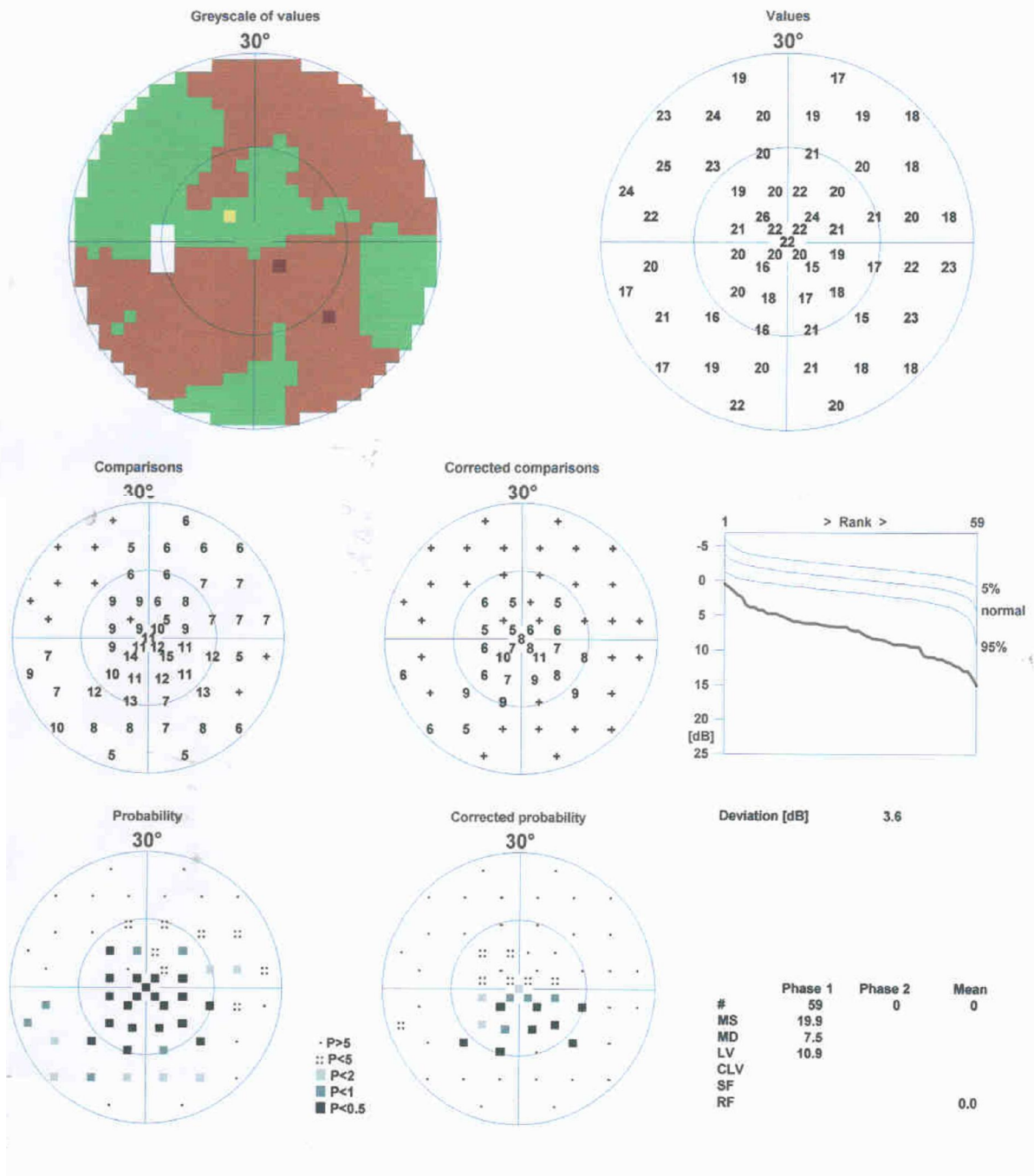


Figure (7): Perimetry one year after medication despite controlled IOP

4. Discussion

In this study the mean intra ocular pressure at diagnosis was 25 ± 2.02 mmHg for group A and 25.84 ± 1.88 mmHg for group B. These results were similar to that achieved by Badeeb et al.,(2010) who reported that the mean intra ocular pressure at diagnosis was 25.1 ± 5.6 mmHg, noting that the number of patients in his study were 59 patient⁴.

In contrast Jay et al., (1988) obtained that the mean intra ocular pressure at diagnosis was 36.1 mmHg for group A and 35.9 mmHg for group B, noting that the number of patients in his study for group A were 53 patient and for group B were 46 patient⁵.

In this study the mean intra ocular pressure 3 months after surgery was 14.30 ± 1.33 mmHg for group A. This result was similar to that obtained by Redmond JH., (Moorfields study) (1986) that obtained that the mean intra ocular pressure 3 months after surgery was 15 mmHg, noting that this study randomly assigned patients to primary treatment with medicine, laser, or surgery. However, the criterion for failure was rigidly defined as repeated IOPs exceeding 21 mmHg⁶.

Also this result was similar to that obtained by Migdal C et al., (Glasgow study) (1987), which compared primary surgery with the conventional treatment given in west Scotland at the time.⁷

In this study the mean intra ocular pressure 1 year after surgery was 15.09 ± 1.43 mmHg for group A. This result was similar to that obtained by Jay et al., (1988) who obtained that the mean intra ocular pressure 1 year after surgery was 15.0 mmHg for group A⁵.

As regarding the final follow up of IOP, Moorfields study (1986) showed maintenance of intra ocular pressure for the end of follow up period and also the annual daytime diurnal curves for this group confirmed the maintenance of success.⁶

In contrast Badeeb et al.,(2010) obtained that the mean intra ocular pressure was 16.3 ± 6.0 on final follow up that was about 2 years after surgery.⁴

In group B (medical therapy) the mean intra ocular pressure 1 year after medical therapy was 15.16 ± 1.37 mmHg for group B.

In contrast Jay et al., (1988) obtained that the mean intra ocular pressure 1 year after medical therapy was 19.5 mmHg.⁵

In this study a comparison of the mean intra ocular pressure for all the patients in group A with all the patients in group B showed a difference of about 4-5 mmHg after 3 months of intervention, decreasing to about 0-1 mmHg towards the end of the study. This was different from Moorfields study (1986) a comparison of the mean intra ocular pressure for all the patients in group A with all the patients in group B (including those who failed and were rerandomised to

additional treatment) showed a difference of about 5-6 mmHg throughout the duration of the trial.⁶

In this study as for the effect of surgery on the final visual outcome of patients, there was a significant stability in the visual acuity 96% during the follow up period after 12 months of surgery. While only 4% of cases showed deterioration in visual acuity that occurred in one case due to cataract progression after surgery.

In contrast Lawan.,(2007) obtained that 80% of cases presented with stability of visual acuity after surgery. Lawan study was done on 71 eyes Of 63 patients. At presentation 19% of patient had WHO vision category 0, 41% were category 1, 19% were category 2, and 21% were category.⁸

Also Jay et al in 1988 obtained that there was no significant difference in the final visual acuity before and after surgery, and cataract occurred in approximately 10% of cases after surgery.⁵

Also Badeeb et al.,(2010) obtained that 84.7% of cases presented with stability of visual acuity after surgery. While only 15.3% of cases showed deterioration in visual acuity that occurred in 5 cases (8.5%) due to cataract progression after surgery, 3 cases (5.1%) due to age related macular degeneration and one case (1.7%) due to progression of glaucoma.⁴

In this study as for the effect of medical therapy on the final visual outcome of patients, there was stability in the visual acuity 84% during the follow up period after 12 months of medical therapy. While only 12% of cases showed deterioration in visual acuity that occurred in 3 cases even with treatment with two topical drugs in 2 cases(8%) and with three topical drugs in 1 case (4%) in order to reduce IOP all over the follow up period of 12 months.

This result was similar to that obtained by Jay et al in 1988 that shown only 6 cases (11%) lost central fixation because of progressive loss of visual field.⁵

In this study as for the effect of surgery on the final visual field of patients, there was a significant improvement in the visual field 76% during the follow up period after 3 months of surgery as the retinal sensitivity was improved in 19 cases.

There was a significant stability in the visual field 96% during the follow up period after 12 months of surgery. While only 4% of cases showed deterioration in the retinal sensitivity that occurred in only 1 case even with treatment in the form of a betablocker eye drops in order to reduce IOP all over the follow up period of 12 months.

In contrast to that obtained by Jay et al in 1988 that shown only 9% of cases presented with deterioration of visual field.⁵

In this study as for the effect of medical therapy on the final visual field of patients, there was stability

in the visual field (80%) during the follow up period after 12 months of medical therapy.

While only (16%) of cases showed deterioration in the retinal sensitivity that occurred in only 4 cases, even with treatment with two topical drugs in 3 cases (12%) and with three topical drugs in 1 case (4%) in order to reduce IOP all over the follow up period of 12 months.

In contrast to Jay et al in 1988 study, who obtained that 26% of cases presented with deterioration of visual field after 12 months of medical therapy.⁵

In this study the complete success of surgery occurred in 17 cases (68%), as no further need for any antiglaucomatous treatment in the follow up period, while only 8 cases (32%) showed qualified success under the effect of a single betablocker eye drops.

These results were comparable to those achieved by Badeeb et al., (2010) who reported that complete success occurred in his study that was performed in a large number of eyes (59 eyes) in 52.6% of the cases and 32.2% of the cases showed qualified success.⁴

Also these results were comparable to those achieved by Ehrnrooth et al., (2002) who reported that complete success occurred in 50.9% of the cases and qualified success occurred in 16.3%.⁹ Watson et al., (1981) reported complete success in 86% and qualified success in 12%.¹⁰ Also Vesti (1993) reported complete success in 74%.¹¹

In contrast Jay et al., (1988) reported that none of the surgical group were having supplementary medical treatment for 1 year of follow up.⁵

Therefore, a significant stability in both visual acuity and visual field after surgery, in addition to the significant reduction of intra ocular pressure thereafter that makes the surgery better than medical therapy.

Conclusion:

The results of the study comparing early surgery with conventional treatment for POAG have demonstrated the role of the primary surgery for visual

field preservation due to reaching a target pressure and lessens IOP fluctuations.

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