

RESULTS

Fourty eyes with primary congenital glaucoma were examined and operated on by Goniotomy (18 eyes) or Trabeculotomy (22 eyes) Table 1

Incidence:

Age of onset: table 2-Fig.24

Age of onset	No. of eyes	%
0 - 1 M	14	35%
1 M - 6 M	14	35%
6 M - 12 M	6	15%
1 Y - 3 Y	4	10%
Unknown	2	5%

Table 2. No. of eyes in relation to age of onset.

M = month , Y = year

The age of onset ranges from (0) at birth to twenty four months with average of 5.025 months. The highest incidence of onset was in the age group from birth to one month (35%) and the age group from one month to six months (35%). Where 70% of eyes have their onset from birth to six months of age. Also 85% have their onset before one year of age.

* Relation between age of onset and number of operations needed to control the IOP :

* In our series fourteen eyes (35%) have symptoms that start during the first month. Five eyes controlled by

Table (1): Congenital glaucoma, diagnosis and management.

Eye No.	Patient No.	Sex	Age at Onset	Age at Presentation	Main Symptom							Family History		Visual acuity	Cornea				IOP		Gonio-scopy		Cup/Disc ratio	Pale disc	Operation			Complications																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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M = male, F = Female, FL = Follow light, FO = Follow object, CF = Counting fingers, G = Goniotomy, T = Trabeculotomy, LP = Light perception, MB = Age in months.

(Contd.) The Table:

Table (1): Congenital glaucoma, diagnosis and management.

Eye No.	Patient No.	Sex	Age, at Onset	Age at Presentation	E y e		Main Symptom						Family History		Visual acuity	Cornea				IOP		Gonio-scopy		Cup/Disc ratio	Pale disc	Opera-tion		Complications				
					R	L	Photophobia	Watering	Blepharo-spasm	Large eye	Opaque cornea	Defective vision	Consangu-nity	Other members		Oedema	Haab's striae	Opacities	Diameter	Schiotz	Perkin's	Possible	Impossible			Goniotomy	Trabecu-lotomy	Hyphaema	Iridotomy	Iridodial-ysis	Detachment of	Failure to Cannulate
21	13	M	0	4	+				+			+			FL	+	+	13.5	38	39		+	0.6			T						+
22	13	M	2	4		+					+		+		FL	+	+	14	33	35	+		0.6			G						
23	14	M	0	5	+		+								FL	+	+	13	44	44	+		0.5			G	-					
24	14	M	0	5		+					+				FL	+	+	13	48	49		+	0.5				T					
25	15	F	12	15	+		+		+			+			F0	+	+	14	44	45		+	-				T					
26	15	F	12	15		+	+		+			+			F0	+	+	14	46	48		+	-				T					
27	16	M	6	8		+			+			+			FL	+	+	14.5	47	47		+	-				T					
28	16	M	7	8	+			+				+			FL	+	+	15	49	50		+	-				T					
29	17	M	24	28	+										F0	+	+	14.5	39	39		+	0.7	+			T					
30	18	M	0	4	+		+						+		FL	+		12.5	32	33	+		0.4			G						
31	18	M	0	4		+	+								FL	+	+	13	33	33	+		0.4			G						
32	19	F	5	8	+		+		+			+			F0	+	+	14	40	40		+	0.5				T					
33	19	F	6	8		+						+			F0	+	+	14.5	45	46		+	0.5				T					
34	20	M	24	30		+			+						F0	+	+	15	40	40	+		0.7			G						
35	21	F	5	7	+		+					+			FL	+	+	12.5	35	35	+		0.5			G						
36	22	M	6	9	+		+					+			F0	+	+	13	40	41	+		0.6			G						
37	22	M	6	9		+						+			F0	+	+	13	39	39	+		0.6			G						
38	23	M	0	4	+										FL	+	+	13	50	52		+	-				T					
39	23	M	0	4	+										FL	+	+	13	55	57		+	-				T					
40	24	M	2	6	+			+				+			FL	+	+	13.5	40	40		+	0.5				T					

M = male, F = female, FL = Follow light, F0 = Follow object, CF = Counting fingers, G = Goniotomy, T = Trabeculotomy.
 LP = Light perception, MB: Age in months.

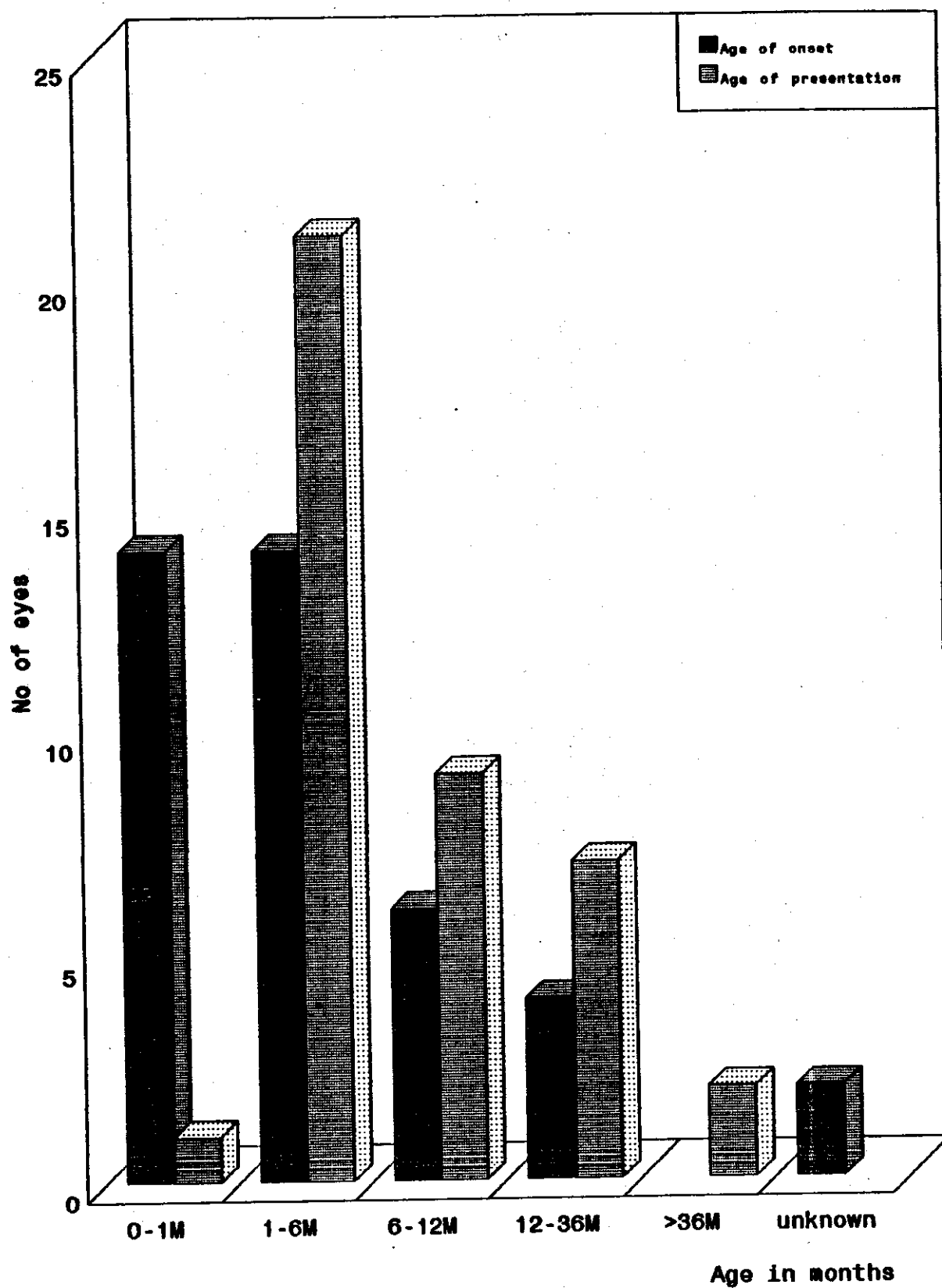


Fig. 24 Number of eyes in relation to age of onset and age of presentation

single operation. While six eyes need two operations to be controlled and the remaining three eyes need three operations to be controlled.

* Four eyes have symptoms that start after twenty four months of age. Two of them controlled by one operation, while one eye need two operations and one eye need three operations to be controlled.

* Seventeen eyes manifested between the ages of one month and twelve months. All of them controlled by single operation.

Age of presentation: table 3 - Fig.24

Age of presentation	No. of eyes	%
0 - 1 M	1	2.5%
1 M - 6 M	21	52.5%
6 M - 12 M	9	22.5%
1 Y - 3 Y	7	17.5%
> 3 Y	2	5%

Table 3. No. of eyes in relation to age of presentation
M = month, Y = year.

The age of presentation ranges from three weeks to three and half years with average of 9.525 months. So there is an average delay of 4.5 months between onset and presentation which compromise the prognosis for those cases.

Sex incidence and consanguinity: table 4 - Fig.25

Personal & Family History	No. of eyes	%
Males	17	70.8%
Females	7	27.2%
+ve consanguinity	13	54%
Other members	3	12.55

Table 4. Personal and family history.

There are male preponderance as males represent 70.8% of cases while females represent 29.2%

Consanguinity were present in 54% of cases.

Unilateral or bilateral: table 5.

Side	No. of patients	%
Bilateral	16	66.6%
Unilateral	8	33.3%

Table 5. Bilaterality.

Two thirds of cases are bilateral while one third of patients have unilateral disease.

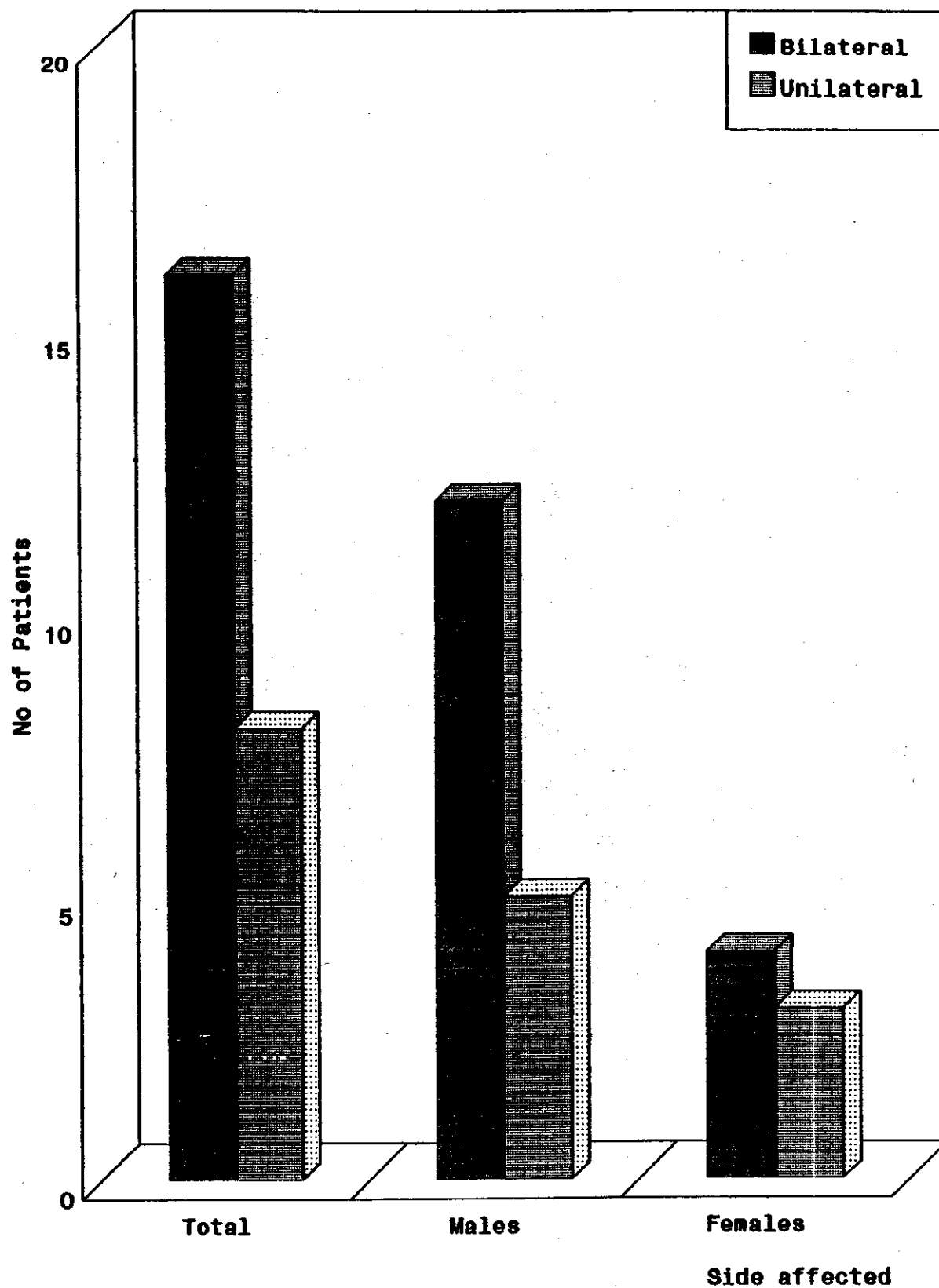


Fig. 25 Sex incidence and bilaterality

The main presenting symptoms: table 6.

Symptom	No. of eyes	%
Photophobia	16	40%
Large eye	14	35%
Cloudy to opaque cornea	5	12.5%
Defective vision	3	7.5%
No Symptoms	2	5%

Table 6. No. of eyes in relation to main symptom.

The main presenting symptoms listed by order of frequency were photophobia in sixteen eyes (40%) that varied from chin depression outdoors to burying the head all the time in the pillow to avoid any light.

The second presenting symptom was large eye which was the presenting symptom in fourteen eyes (35%) of our series. Cloudy to opaque cornea was the third presenting symptom in five eyes (12.5%).

In one girl (eyes No. 15, 16) there was bilateral congenital glaucoma with no symptoms but the child was discovered as she came with her affected brother.

Visual acuity:

Visual acuity testing were inconsistent as most of our patients are young preverbal children who are difficult to cooperate for testing their vision. The visual acuity roughly varied from following light to counting fingers.

Corneal Pathology: table 7.

Corneal pathology	No. of eyes	%
Oedema	35	87.5%
Haab's striae	36	90%
Opacities	25	62.5%

Table 7. Corneal pathology.

On initial examination, corneal oedema was present in thirty five eyes (87.5%) that resolved gradually and completely after control of IOP by surgery. Breaks in Descemet's membrane "Haab's striae" were present in 90% of eyes. They do not disappear after control of IOP, but they regress with time to linear opacities on the back of the cornea which appear as horizontal lines centrally and as curved lines in the periphery of the cornea. Stromal opacities were present in twenty five eyes (62.55) and have variable shapes and locations in corneal stroma.

Corneal diameter: table 8-9. (Fig.26,27)

Initial corneal diameter	No. of eyes	%
12 mm	1	2.5%
12.5 mm	3	7.5%
13 mm	15	37.5%
13.5 mm	3	7.5%
14 mm	10	25%
14.5 mm	6	10%
15 mm	2	5%

Tabel 8.No. of eyes in relation to initial corneal diameter.

Corneal diameter 6M. post-operatively	No. of eyes	%
12 mm	3	7.5%
12.5 mm	10	25%
13 mm	18	45%
13.5 mm	7	17.5%
14 mm	2	5%

Table 9.No. eyes in relation to corneal diameter 6 m postoperatively.

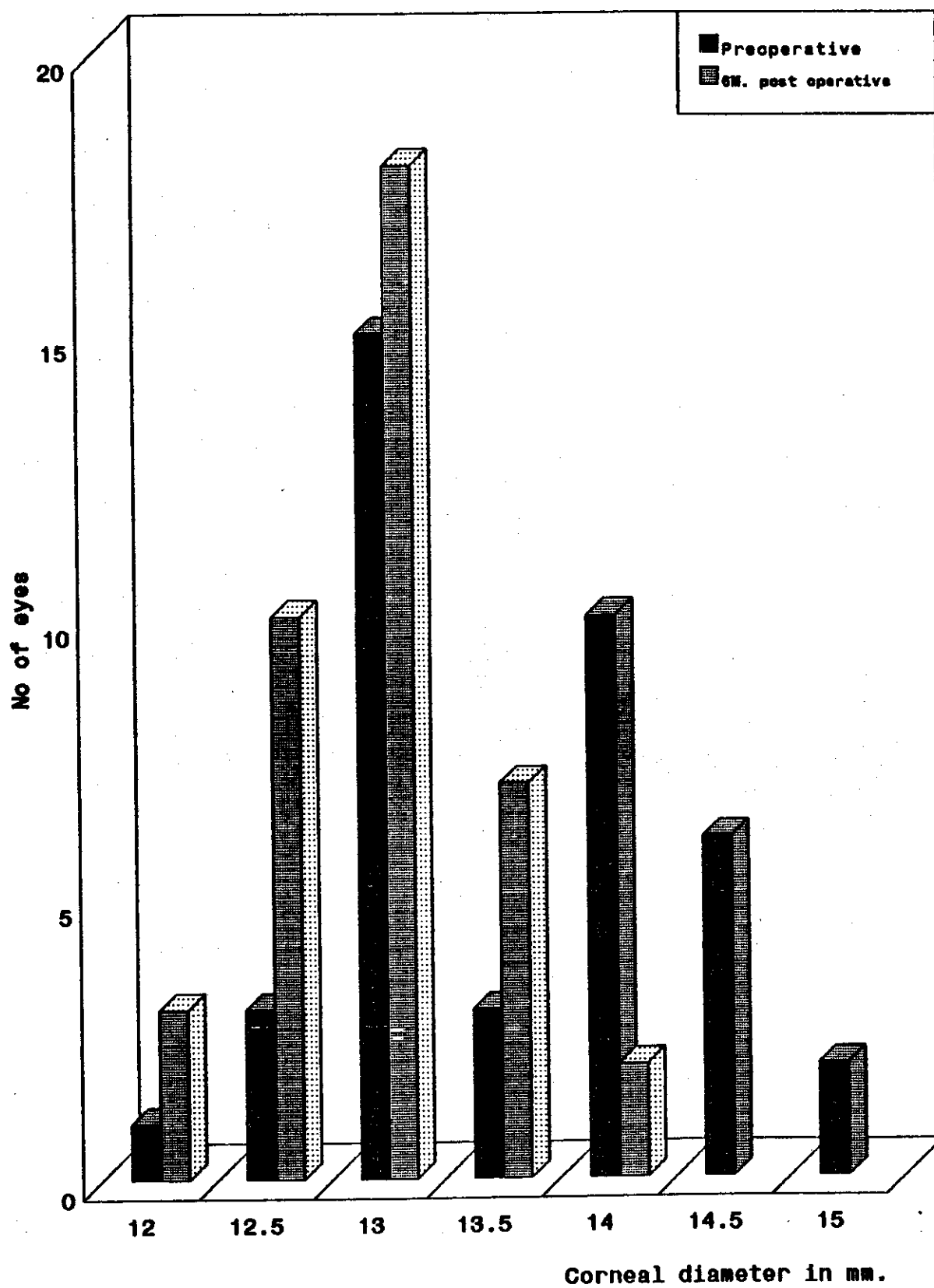


Fig. 26 No of eyes in relation to corneal diameter preoperatively and 6M. postoperatively



Fig. 27 NO of eyes in relation to corneal diameter which undergone goniotomy or trabeculotomy.

The horizontal corneal diameter varied from 12 mm to 15 initially with average of 13.55 mm.

Most cases 90% (thirty six eyes) have corneal diameter of 13 mm or more. Six months postoperatively after control of IOP there were regression in corneal diameter. Where it varied from 12 mm to 14 with average of 12.937 mm. So there was an average decrease in corneal diameter by 0.613 mm/eye after control of IOP.

Fig (27) shows that eyes which operated on by trabeculotomy ab externo have corneal diameter larger than those eyes which operated on by goniotomy.

Gonioscopy:

In all cases where corneal transparency allowed proper gonioscopy : eighteen eyes (45%) pre-operatively, showed gonioscopic picture consistent with primary congenital glaucoma (translucent embryonic tissue in the angle of anterior chamber, anterior iris insertion and narrow to absent angle recess)

Post-operatively there was an open cleft at the site of goniotomy or trabeculotomy which was considered as a sign of success.

Intraocular pressure : table 10, 11, Fig.28,29

Initial IOP (Perkins)	No. of eyes	%
30-35 mmHg	4	10%
35-40 mmHg	11	27.5%
40-45 mmHg	12	30%
45-50 mmHg	9	22.5%
50-55 mmHg	2	9%
55-60 mmHg	2	5%

Table 10. No. of eyes in relation to IOP measured by Perkin's.

Initial IOP (Schiotz)	No. of eyes	%
30-35 mmHg	5	12.5%
35-40 mmHg	10	25%
40-45 mmHg	14	35%
45-50 mmHg	8	20%
50-55 mmHg	1	2.5%
55-60 mmHg	2	5%

Table 11. No. of eyes in relation to IOP measured by Schiotz.

The average pre-operative IOP was 39.975 mmHg. ranging from 30 to 60 mmHg with Perkin's hand held applanation tonometer. An average of 41.3 mmHg with range from 30 to 58 mmHg was recorded with Schiotz tonometer. the highest incidence was in the range of 40-45 mmhg (35%) of cases.

There was no significant difference between Perkins and Schiotz readings

From Fig.29 , we see that patients who underwent trabeculotomy have mean IOP higher than those who underwent goniotomy.

Post-operatively the average IOP was 17 mmHg with perkin's and 16.57 with schiotz with average reduction in IOP by 22.19 mmHg.

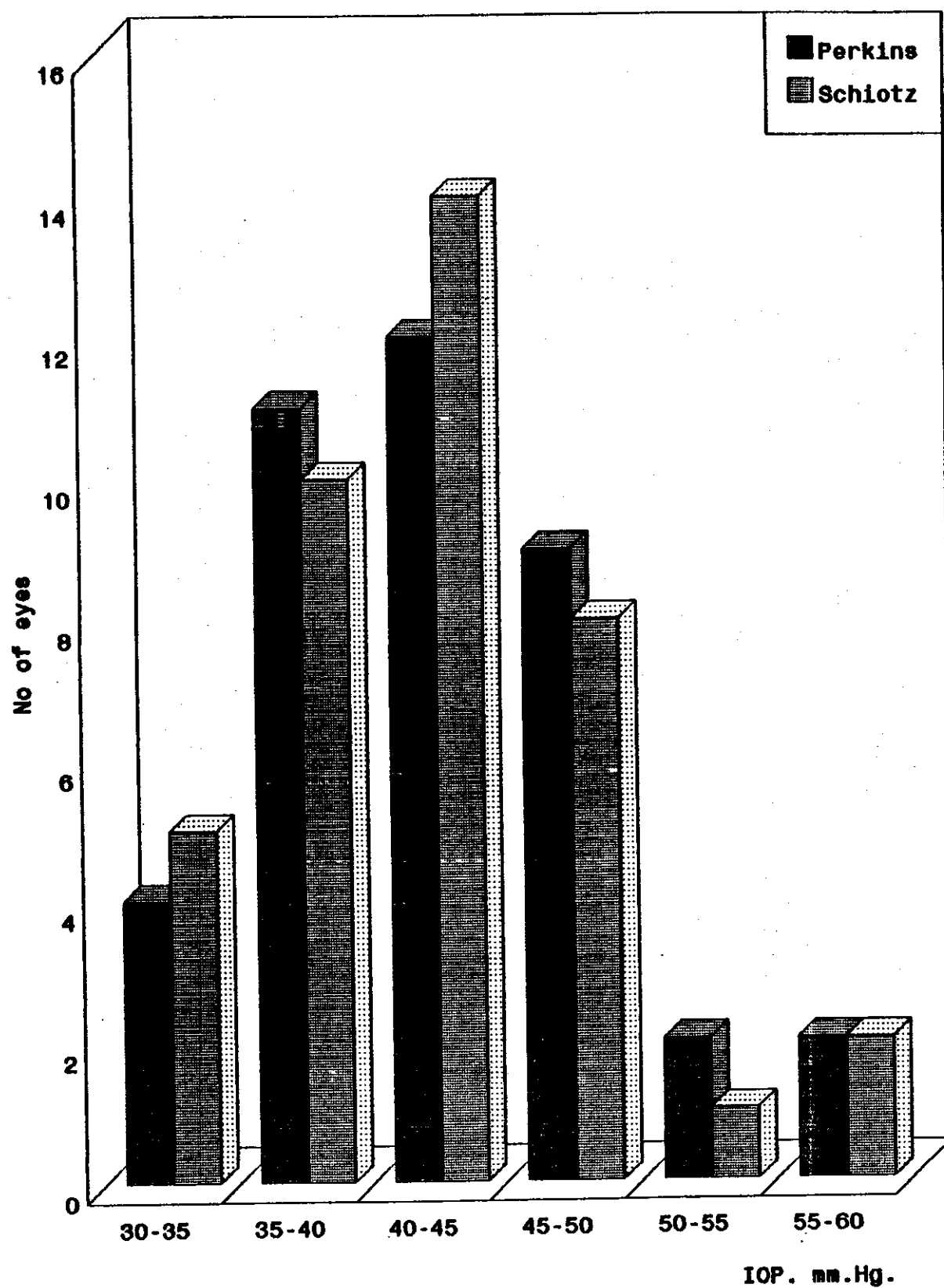


Fig. 28 No of eyes in relation to IOP. with Perkins and Schiotz.

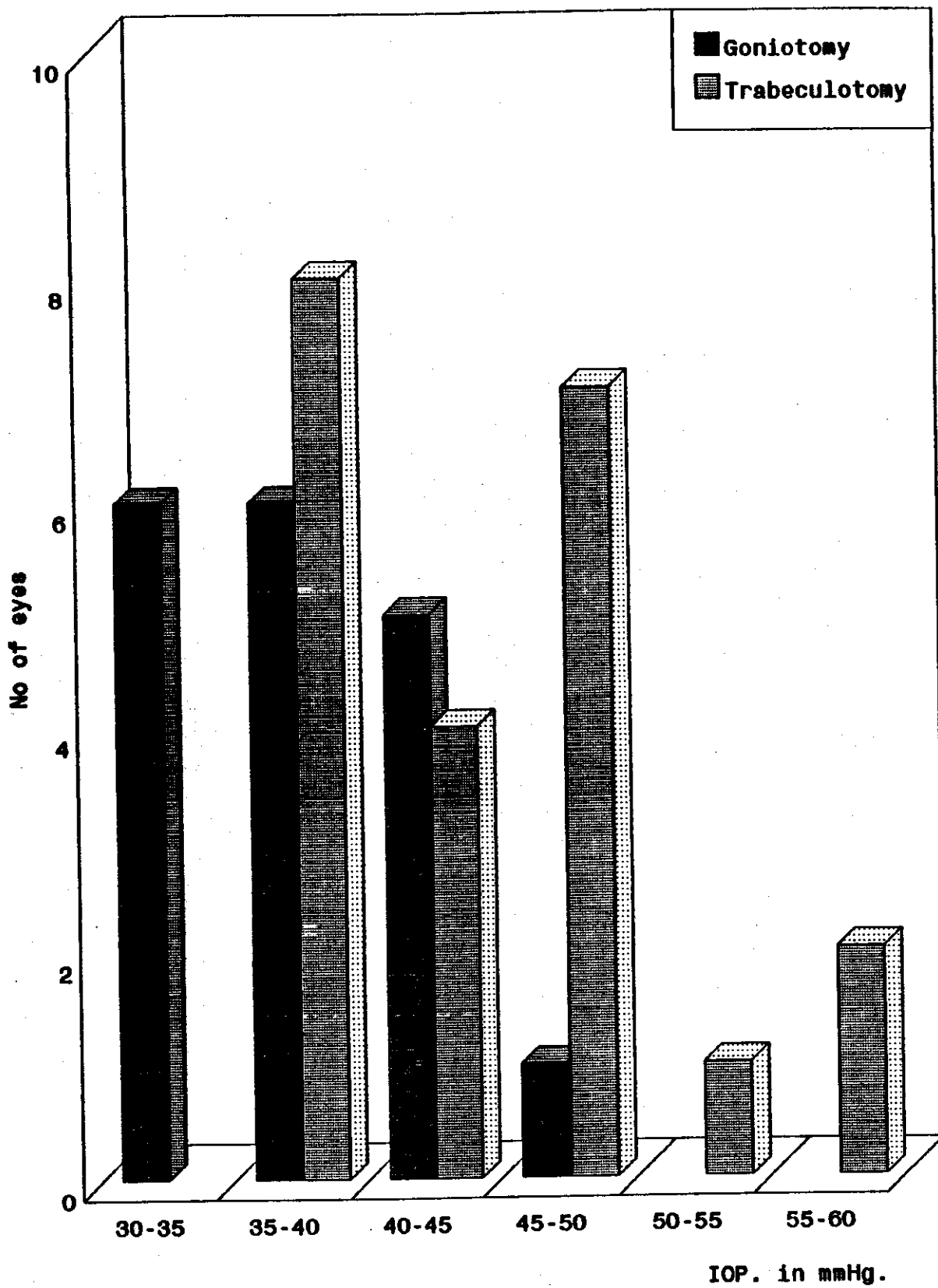


Fig. 29 No of eyes in relation to IOP. which undergo goniotomy or trabeculotomy.

Cup/Disc ratio : table 12,13. Fig.30

C/D ratio pre-operatively	No. of eyes	%
0.4	5	12.5%
0.5	8	20%
0.6	8	20%
0.7	5	12.5%
cannot be seen	14	35%

Table 12. Relative No. of eyes in relation to C/D ratio preoperatively.

C/D ratio 6 M post-operatively	No. of eyes	%
0.3	2	5%
0.4	18	45%
0.5	14	35%
cannot be seen	6	15%

Table 13. Relative No. of eyes in relation to C/D ratio 6 M. postoperatively

The initial cup/disc ratio was found to range from 0.4 to 0.7 with average of 0.55.

The cup/disc ratio six months post-operatively was found to range from 0.3 to 0.5 with average 0.435. With average reduction in cup/disc ratio of 0.115/disc. There was reduction in cup/disc ratio in twenty two eyes of the thirty four whose fundi could be seen six months post-operatively which represented reduction in 64.7% of eyes.

No difference had been noticed between vertical and horizontal cup/disc ratio (cup was rounded).

Disc asymmetry in bilateral cases was noted in two cases out of nine in which the disc could be seen in both eyes this means that 22% asymmetry in bilateral cases.

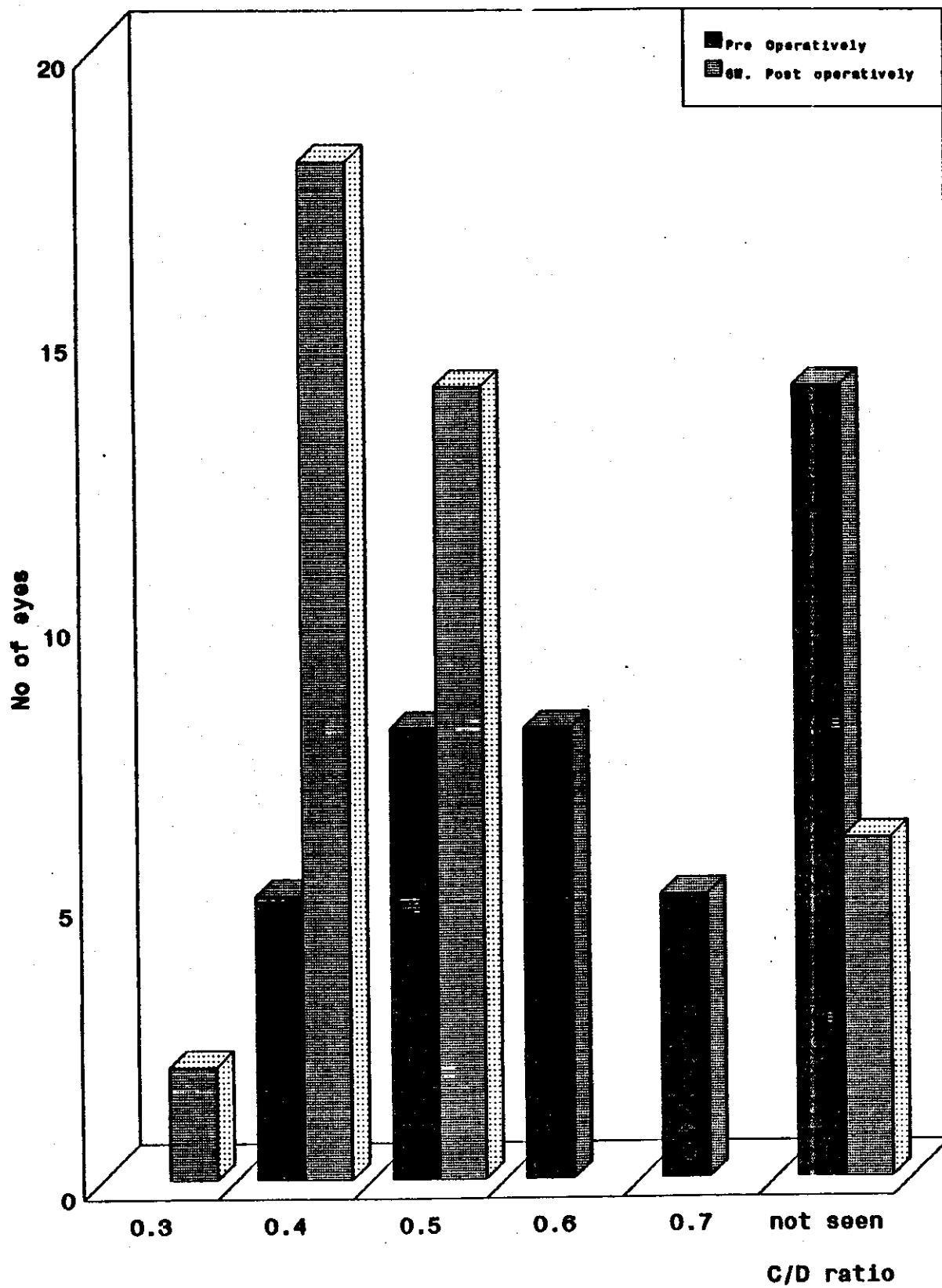


fig. 30 Relative number of eyes in relation to C/D ratio preoperatively and 6M. postoperatively

Pallor of the disc was noted only in two eyes (No. 16, 34) but it was mild pallor.

No nasal shift of vessels was noted in our series.

Follow-Up : tables : 14-22

Follow-up Period	No. of eyes	%
6 weeks	40	100%
3 months	40	100%
6 months	40	100%
9 months	35	87.5%
12 months	31	77.5%
18 months	24	60%
24 months	18	45%
30 months	14	35%

Table 14. No. of eyes in relation to follow-up period.

Patients were followed up post-operatively at intervals of six weeks, then every three months for one year then every six months with a minimum of six months post-operatively.

The criteria for surgical success were disappearance of photophobia, watering, blepharospasm, resolution of corneal oedema, lack of evidence of further corneal enlargement disproportionate to normal growth, or even regression of enlarged corneal diameter. An IOP of 20 mmHg or less under general anaesthesia without any antiglaucoma medications, stable or improved cup/disc ratio and visible evidence on gonioscopy of technically adequate operation (open cleft) for a minimum of 6 months post-operatively.

Table (15): Follow-up 6 weeks post-operatively

Eye No.	Patient No.	Eye		Symptoms						Cornea				Visual acuity	I O P		Gonio-scopy		cup/disc ratio	Reoperation
		M	L	Photophobia	Waterying	Blepharospasm	Large Eye	Opaque cornea	Defective vision	Diameter	Edema	Hab's striae	Opacities		Schiotz	Perkins	Open cleft	Closed cleft		
1	1		+							12.5		+		FO	15	15	+		0.4	
2	1	+					+			13.5		+	+	FO	17	17	+		0.4	
3	2	+		+	+	+				12	+			FL	30	32		+	0.5	G
4	2		+					+		12.5		+	+	FL	18	19		+		
5	3	+					+			13		+		FL	17	17	+		0.4	
6	4	+								12.5		+		FL	16	16	+		0.4	
7	4		+							12.5		+	+	FL	17	17	+		0.4	
8	5	+								13		+	+	FO	16	16		+	0.5	
9	5		+					+		14		+	+	FO	18	19		+		
10	6		+						+	14		+	+	FO	18	18		+		
11	7	+								13.5		+		FO	18	18	+		0.5	
12	7		+							13.5		+		FO	19	19	+		0.5	
13	8	+					+			13.5		+	+	FO	16	16	+		0.6	
14	8		+				+			14		+	+	FO	18	19	+		0.6	
15	9	+								12.5				CF/2M	16	17	+		0.5	
16	9		+	+	+	+				13	+	+		CF/2M	34	35		+	0.7	G
17	10	+						+		13		+	+	FL	18	19		+		
18	10		+					+		12.5		+	+	FL	17	17		+		
19	11	+					+	+	+	14		+	+	fo	16	16		+		
20	12	+					+		+	14		+	+	FO	15	15	+		0.5	
21	13	+								13		+	+	FO	18	19	+		0.5	
22	13		+							13.5		+	+	FO	17	17	+		0.5	
23	14	+								13		+		FO	19	19	+		0.4	
24	14		+							13		+	+	FO	19	19	+		0.4	
25	15	+							+	13.5		+	+	fo	18	18	+		0.5	
26	15		+						+	13.5		+	+	fo	18	19	+		0.5	
27	16		+				+			14		+	+	FO	18	18		+	0.6	
28	16	+					+			14.5		+	+	FO	18	18		+	0.6	
29	17	+					+			14.5		+	+	FO	19	19	+		0.6	
30	18	+								12.5				FL	16	16	+		0.4	
31	18		+	+	+					13	+	+		FO	33	34		+	0.4	G
32	19	+								13.5		+	+	FO	17	17		+	0.4	
33	19		+				+			14		+	+	FO	18	19		+	0.4	
34	20		+				+		+	14.5		+		CF/2M	18	18	+		0.6	
35	21	+								12.5		+		FO	16	17	+		0.4	
36	22	+								13		+		FO	17	17	+		0.5	
37	22		+							13		+		FO	17	18	+		0.5	
38	23	+					+	+		13			+	FL	19	19		+		
39	23		+	+	+	+	+	+		13	+	+	+	FL	45	46		+		T
40	24	+					+			13.5		+	+	FO	16	16	+		0.4	

FL = follow light, FO = Follow object, CF = counting fingers, G = goniotomy, T = Trabeculotomy.

Six weeks post-operatively the IOP rise again in eyes No. 3,16,31 and 39. Second goniotomy was done to eyes No. 3,16, 31 and second trabeculotomy was done to eye No. 39.

Table (16): Follow-up 3 months post-operatively

Eye No.	Patient No.	Eye		Symptoms					Cornea				Visual acuity	IOP		Gonio-scopy		cup/disc ratio	Reoperation	
		+	-	Photophobia	Watring	Blephoro-spa-sm	Large Eye	Opaque Cornea	Defective vision	Diameter	Oedema	Haab's striae		Opacities	Schlotz	Perkins	Open cleft			Closed cleft
1	1		+							12		+		FO	15	15	+		0.3	
2	1	+					+			13		+	+	FO	16	16	+		0.4	
3	2	+								12				FL	18	19	+		0.5	
4	2		+					+		12.5		+	+	FL	18	19				
5	3	+					+			13		+	+	FL	17	17			0.4	
6	4	+								12		+		FO	15	15	+		0.3	
7	4		+							12.5		+	+	FO	16	16	+		0.4	
8	5	+								13		+	+	FO	16	16			0.5	
9	5		+	+	+			+		13.5	+	+	+	FO	34	35		+	-	T
10	6		+						+	13.5		+	+	FO	17	17			0.5	
11	7	+								13		+		FO	16	16	+		0.4	
12	7		+							13		+		FO	17	17	+		0.5	
13	8	+								13		+	+	fO	15	15	+		0.5	
14	8	+					+			13.5		+	+	fO	17	17	+		0.5	
15	9	+								12.5				CF/BM	16	17	+		0.5	
16	9		+							12.5		+		CF/BM	17	17	+		0.6	
17	10	+						+		12.5		+	+	FO	18	18				
18	10		+					+		12.5		+	+	FO	17	17				
19	11	+								13		+	+	FO	16	16	+		0.4	
20	12	+					+		+	13.5		+	+	CF/BM	15	15	+		0.5	
21	13	+		+	+	+				13	+	+	+	FL	36	37		+	0.5	T
22	13		+							13.5		+	+	FO	16	16	+		0.5	
23	14	+		+	+	+				13	+			FO	36	37		+	0.4	G
24	14		+							13				FO	18	18	+		0.4	
25	15	+					+		+	13.5		+	+	fO	16	17	+		0.5	
26	15		+				+		+	13.5		+	+	fO	17	17	+		0.5	
27	16		+							13.5		+	+	FO	17	17	+		0.5	
28	16	+					+			14		+	+	FO	18	18	+		0.6	
29	17	+					+		+	14		+	+	CF/2M	18	18	+		0.5	
30	18	+		+	+	+				12.5	+			FL	38	39		+	0.4	G
31	18		+							12.5		+		FL	18	18	+		0.4	
32	19	+								13		+	+	FO	16	16			0.4	
33	19		+				+			13.5		+	+	FO	17	17			0.4	
34	20		+						+	14		+		CF/BM	17	17	+		0.5	
35	21	+								12.5		+		FO	16	16	+		0.4	
36	22	+								13		+		FO	16	16	+		0.5	
37	22		+							12.5		+		FO	16	16	+		0.5	
38	23	+		+	+	+				13	+	+	+	FO	47	48		+		T
39	23		+				+			13		+	+	FO	18	19	+			
40	24	+					+			13		+	+	FO	16	16	+		0.4	

FL = follow light, FO = Follow object, CF = counting fingers, G = goniotomy, T = Trabeculotomy.

Three months post-operatively the IOP rise again in eyes No. 9,21,23,30,38. Second goniotomy was done to eyes No. 23,30 and second trabeculotomy was done to eyes NO. 9,21,38.

Table (17): Follow-up 6 months post-operatively

Eye No.	Patient No.	Eye		Symptoms						Cornea				Visual acuity	IOP		Gonio-scopy		cup/disc ratio	Bioprecipitation
		R	L	Photophobia	Waterying	Blepharospasm	Large Eye	Opaque cornea	Defective vision	Diameter	Oedema	Haab's striae	Opacities		Schiotz	Perkins	Open cleft	Closed cleft		
1	1		+							12		+		FO	15	15	+		0.3	
2	1	+								13		+	+	FO	16	16	+		0.4	
3	2	+								12				FO	17	18	+		0.5	
4	2		+					+		12.5		+	+	FO	17	17				
5	3	+					+			13		+	+	FO	17	17	+		0.4	
6	4	+								12		+		FO	15	15	+		0.3	
7	4		+							12.5		+	+	fo	16	16	+		0.4	
8	5	+								13		+	+	FO	16	16	+		0.5	
9	5		+					+		13		+	+	FO	18	19				
10	6		+	+	+	+			+	13.5	+	+	+	FO	40	41		+	0.5	T
11	7	+								13		+		fo	16	16	+		0.4	
12	7		+							13		+		fo	16	17	+		0.4	
13	8	+								13		+		fo	15	15	+		0.5	
14	8		+							13.5		+	+	fo	16	16	+		0.5	
15	9	+								12.5				a/oo	16	16	+		0.5	
16	9		+							12.5		+		a/oo	16	16	+		0.5	
17	10	+						+		12.5		+	+	FO	17	17				
18	10		+					+		12.5		+	+	FO	17	17				
19	11	+								13		+	+	fo	16	16	+		0.4	
20	12	+					+			13.5		+	+	a/oo	15	15	+		0.5	
21	13	+								13		+	+	FO	16	16	+		0.5	
22	13		+							13		+	+	FO	18	18	+		0.4	
23	14	+								13				FO	17	17	+		0.4	
24	14		+	+	+	+				13	+	+	+	FO	36	37	+		0.4	T
25	15	+								13		+	+	fo	17	17	+		0.4	
26	15		+				+			13.5		+	+	fo	17	17	+		0.4	
27	16		+							13.5		+	+	fo	16	16	+		0.5	
28	16	+					+			14		+	+	fo	17	17	+		0.5	
29	17	+					+		+	13.5		+		a/oo	16	16	+		0.5	
30	18	+								12.5				FO	19	19	+		0.4	
31	18		+							12.5		+		FO	17	17	+		0.4	
32	19	+								13		+	+	fo	16	16	+		0.4	
33	19		+				+			13.5		+	+	fo	16	16	+		0.4	
34	20		+	+	+		+		+	14	+			CF/4M	36	36		+	0.5	G
35	21	+								12.5		+		FO	16	16	+		0.4	
36	22	+								13		+		fo	15	15	+		0.5	
37	22		+							12.5		+		fo	16	16	+		0.5	
38	23	+					+	+		13		+	+	FO	18	19				
39	23		+				+	+		13		+	+	FO	17	17				
40	24	+					+			13		+	+	fo	16	16	+		0.4	

FL = follow light, FO = Follow object, CF = counting fingers, G = goniotomy, T = Trabeculotomy.

Six months post-operatively the IOP rise again in eyes No 10,24,34. Second goniotomy was done to eye No. 34 and second trabeculotomy was done to eyes No. 10,24.

Table (18): Follow-up 9 months post-operatively

Eye No.	Patient No.	Eye		Symptoms					Cornea				Visual acuity	IOP		Gonio-scopy		cup/disc ratio	Reoperation	
		R	L	Photophobia	Watery	Blepharo-spasm	Large Eye	Opaque cornea	Defective vision	Diameter	Edema	Haid's striae		Opacities	Schiotz	Perkins	Open cleft			Closed cleft
1	1		+							12		+		fo	15	15	+		0.3	
2	1	+								13		+	+	fo	16	16	+		0.4	
3	2	+								12				FO	17	17	+		0.5	
4	2		+					+		12.5		+	+	FO	17	18				
5	3	+								13		+	+	FO	17	17	+		0.4	
6	4	+								12		+		fo	15	15	+		0.3	
7	4		+							12.5		+	+	fo	16	16	+		0.4	
8	5	+								13		+	+	FO	16	16	+		0.5	
9	5		+	+	+	+		+		13	+	+	+	FO	37	38				T'
10	6		+					+		13		+	+	CF/3M	19	19	+		0.4	
11	7	+								13		+		fo	16	16	+		0.4	
12	7		+							13		+		fo	16	16	+		0.4	
13	8	+								13		+	+	fo	15	15	+		0.5	
14	8		+							13		+	+	fo	16	16	+		0.5	
15	9	+								12				6/60	16	16	+		0.5	
16	9		+	+	+	+		+		12				6/60	38	39		+	0.5	T'
17	10	+						+		12.5		+	+	FO	16	16				
18	10		+					+		12.5		+	+	FO	17	17				
19	11	+								13		+	+	fo	16	16	+		0.4	
20	12	+								13		+	+	6/36	15	15	+		0.5	
21	13	+					+			13.5		+	+	FO	16	16	+		0.5	
22	13		+							13		+	+	FO	17	17	+		0.4	
23	14	+								13				FO	16	16	+		0.4	
24	14	+								13		+	+	FO	18	18	+		0.4	
25	15	+								13		+	+	CF/3M	17	17	+		0.4	
26	15		+							13		+	+	CF/3M	17	17	+		0.4	
27	16		+				+	+		13.5		+	+	fo	16	16	+		0.5	
28	16	+					+	+		13.5		+	+	fo	17	17	+		0.5	
29	17	+								13		+		6/36	16	16	+		0.5	
30	18	+		+	+	+				12.5	+			FO	42	43		+	0.4	T'
31	18		+	+	+	+				12.5	+	+		FO	38	40		+	0.4	T+T'
32	19	+								13		+	+	fo	16	16	+		0.4	
33	19	+								13		+	+	fo	16	16	+		0.4	
34	20		+							13				6/60	17	18	+		0.5	
35	21	+								12		+		fo	15	15	+		0.4	

FL = Follow light, FO = Follow objects, CF = Counting fingers, T' = Trabeculectomy, T = Trabeculotomy.

Nine months post-operatively there was re rise of IOP after second goniotomy in eyes No. 16,30,31 and a third operation was needed. It was trabeculectomy in eyes No. 16,30 and combined trabeculotomy and trabeculectomy in eye No. 31. In eye No. 9 the IOP rise again after second trabeculotomy and a third operation (trabeculectomy) was done.

Table (19): Follow-up 12 months post-operatively

Eye No.	Patient No.	Eye		Symptoms					Cornea				Visual acuity	IOP		Gonio- scopy		cup/disc ratio	Reoperation	
		R	L	Photophobia	Waterying	Blepharo- spasm	Large Eye	Opaque cornea	Defective vision	Diameter	Edema	Haab's striae		Opacities	Schiotz	Perkins	Open cleft			Closed cleft
1	1		+							12		+		f0	15	15	+		0.3	
2	1	+								13		+	+	f0	16	16	+		0.4	
3	2	+								12				F0	17	17	+		0.5	
4	2		+					+		12.5		+	+	F0	17	17				
5	3	+								13		+	+	f0	16	16	+		0.4	
6	4	+								12				f0	15	15	+		0.3	
7	4		+							12.5				f0	16	16	+		0.4	
8	5	+								13		+	+	F0	15	16	+		0.5	
9	5		+					+		13		+	+	F0	19	19				
10	6		+	+	+	+				13	+	+	+	CF/4M	39	40		+	0.4	T+T'
11	7	+								13				f0	16	16	+		0.4	
12	7		+							13				f0	16	16	+		0.4	
13	8	+								13		+	+	f0	15	15	+		0.5	
14	8		+							13		+	+	f0	16	16	+		0.5	
15	9	+								13				6/36	16	16	+		0.5	
16	9		+							12		+		6/36	19	19	+		0.5	
17	10	+						+		12.5		+	+	F0	16	16				
18	10		+					+		12.5		+	+	F0	17	17				
19	11	+								13		+	+	CF/2M	16	16	+		0.4	
20	12	+								13		+	+	3/36	15	15	+		0.5	
21	13	+					+			13.6		+	+	F0	16	16	+		0.5	
22	13		+							13				f0	17	17	+		0.4	
23	14	+								13		+	+	f0	16	17	+		0.4	
24	14		+							13		+	+	f0	17	17	+		0.4	
25	15	+								13		+	+	CF/5M	17	17	+		0.4	
26	15		+							13		+	+	CF/5M	16	16	+		0.4	
27	16		+				+			13.5		+	+	f0	16	16	+		0.5	
28	16	+					+			13.5		+	+	f0	17	17	+		0.5	
29	17	+					+			13				6/36	16	16	+		0.5	
30	18	+							+	12.5				F0	18	18	+		0.4	
31	18		+						+	12.5		+		F0	19	19	+		0.4	

FL = Follow light, FO = Follow object, CF = Counting fingers, T = Trabeculotomy, T' = Trabeculectomy.

Twelve months post-operatively the IOP rise again in eye No. 10 after second goniotomy and a third operation was done (combined trabeculotomy and trabeculectomy).

Table (20): Follow-up 18 months post-operatively

Eye No.	Patient No.	Eye		Symptoms						Cornea				Visual acuity	IOP		Coni- scopy		cup/disc ratio	Reoperation
		R	L	Photophobia	Watering	Blepharo- spasm	Large Eye	Opaque cornea	Defective vision	Diameter	Oedema	Hab's striae	Opacities		Schiotz	Perkins	Open cleft	Closed cleft		
1	1		+							12		+		CF/BM	15	15	+		0.3	
2	1	+								13		+	+	CF/BM	16	16	+		0.4	
3	2	+								12				FO	17	17	+		0.5	
4	2		+					+		12.5		+	+	FO	17	17				
5	3	+								13		+	+	fo	16	16	+		0.4	
6	4	+								12				fo	15	15	+		0.3	
7	4		+							12.5				fo	16	16	+		0.4	
8	5	+								13		+	+	FO	15	16	+		0.5	
9	5		+					+		13		+	+	FO	17	17				
10	6		+							13		+	+	CF/4M	19	19	+		0.4	
11	7	+								13				fo	16	16	+		0.4	
12	7		+							13				fo	16	16	+		0.4	
13	8	+								13		+	+	CF/BM	15	15	+		0.5	
14	8		+							13		+	+	CF/BM	16	16	+		0.5	
15	9	+								13				6/24	16	16	+		0.5	
16	9		+							12				6/24	18	18	+		0.5	
17	10	+						+		12.5			+	FO	16	16				
18	10		+					+		12.5			+	FO	17	17				
19	11	+								13		+	+	6/60	16	16	+		0.4	
20	12	+								13		+	+	6/36	15	15	+		0.5	
21	13	+					+			13.5				FO	16	16	+		0.5	
22	13		+							13		+	+	CF/BM	17	17	+		0.4	
23	14	+								13		+	+	CF/BM	17	17	+		0.4	
24	14		+							13		+	+	CF/BM	16	16	+		0.4	

FL = Follow light, FO = Follow objects, CF = Counting fingers.

Eighteen months post-operatively ; all the eyes that are followed up are controlled.

Table (21): Follow-up 24 months post-operatively

Eye No.	Patient No.	Eye		Symptoms						Cornea				Visual acuity	IOP		Gonio-scopy		cup/disc ratio	Reoperation
		M	L	Photophobia	Itching	Blepharospasm	Large Eye	Opaque cornea	Defective vision	Diameter	Edema	Haab's striae	Opacities		Schiotz	Perkins	Open cleft	Closed cleft		
1	1		+							12		+		6/60	15	15	+		0.3	
2	1	+								13		+	+	6/60	16	16	+		0.4	
3	2	+								12		+		F0	17	17	+		0.5	
4	2		+					+		12.5		+	+	F0	17	17				
5	3	+								13		+	+	CF/8M	16	16	+		0.4	
6	4	+								12				CF/4M	15	15	+		0.3	
7	4		+							12.5		+		CF/4M	16	16	+		0.4	
8	5		+							13		+	+	CF/4M	15	15	+		0.5	
9	5		+					+		13		+	+	F0	17	17				
10	6		+							13		+	+	CF/5M	17	17	+		0.4	
11	7	+								13				CF/5M	16	16	+		0.4	
12	7		+							13				CF/5M	16	16	+		0.4	
13	8	+								13		+	+	6/60	15	15	+		0.5	
14	8		+							13		+	+	6/60	16	16	+		0.5	
15	9	+								13				6/24	16	16	+		0.5	
16	9		+							12				6/24	17	17	+		0.5	
17	10	+						+		12.5		+	+	F0	16	16				
18	10		+					+		12.5		+	+	F0	17	17				

FL = Follow light, F0 = Follow objects, CF = Counting finers.

Twenty four months post-operatively ; all the eyes that are followed up are controlled.

Table (22): Follow-up 30 months post-operatively

Eye No.	Patient No.	Eye		Symptoms					Cornea				Visual acuity	IOP		Conio- scopy		cup/disc ratio	Reoperation	
		R	L	Photophobia	Itching	Dipthero- spasm	Large Eye	Opaque cornea	Defective vision	Diameter	Oedema	Haab's striae		Opacities	Schiotz	Perkins	Open cleft			Closed cleft
1	1		+							12		+		6/60	15	15	+		0.3	
2	1	+								13		+	+	6/60	16	16	+		0.4	
3	2	+								12		+		CF/3M	17	17	+		0.5	
4	2		+					+		12.5		+	+	F0	16	17				
5	3	+								13		+	+	CF/4M	16	16	+		0.4	
6	4	+								12				6/60	15	15	+		0.3	
7	4		+							12.5		+		6/60	16	16	+		0.4	
8	5	+								13		+	+	CF/4M	15	15	+		0.5	
9	5		+					+		13		+	+	F0	17	17				
10	6		+							13		+	+	CF/5M	17	17	+		0.4	
11	7	+								13				6/36	16	16	+		0.4	
12	7		+							13				6/60	16	16	+		0.5	
13	8	+								13		+	+	6/36	15	15	+		0.5	
14	8		+							13		+	+	6/36	16	16	+		0.4	

FL = Follow light, F0 = Follow object, CF = Counting fingers.

Thirty months post-operatively ; all the eyes that are followed up are controlled.

Goniotomy table 23.

Goniotomy was done as an initial procedure in eighteen eyes (45%), where it control the IOP throughout the study in twelve eyes (66.6%). In the remaining six eyes (33.3%) the IOP rise again after initial control. This recurrence occurred in three eyes after six weeks, in two eyes after three months and in one eye recurrence occur at six months post-operatively. No recurrence occurred after the six months.

Those six eyes which escape control after one goniotomy. Their age of onset was at birth in four eyes, at twenty four months of age in one eye, and in one eye congenital glaucoma was discovered at the age of 3.5 years. Second goniotomy was done to the six eyes that escape control. This second goniotomy succeeded in controlling the IOP in three eyes but failed to control the IOP in the other three eyes, where a third operation has to be done. It was trabeculectomy in two eyes and combined trabeculotomy and trabeculectomy in one eye.

So goniotomy eventually control the IOP in fifteen eyes (83.3%) out of the eighteen eyes with a single goniotomy in twelve eyes (66.6%) and by two goniotomies in 3 eyes (16.7%).

	Group I	Group II
Cornea	Clear	hazy to opaque
No. of eyes	18	22
Percentage of total	45%	55%
First operation	Goniotomy	Trabeculotomy
No. of eyes	12	16
Success		
Percentage	66.6%	72.6%
No of eyes	6	6
recurrence		
Percentage	33.4%	27.4%
Second operation		
Goniotomy		
No of eyes	3	
Success		
Percentage	16.7%	
No of eyes	3	
recurrence		
Percentage	16.7%	
Trabeculotomy		
No of eyes		4
Success		
Percentage		18.2%
No of eyes		2
recurrence		
Percentage		9.1%
Third operation		
Trabeculectomy		
No of eyes	2	2
Percentage	11.2%	9.1%
Trabeculectomy +		
Trabeculotomy		
No of eyes	1	-
Percentage	5.5%	
Total No. of eyes		
controlled	15	
by goniotomy		
Percentage	83.3%	
Total No. of eyes		
controlled		20
by trabeculotomy		90.8%
Percentage		

Table 23 results of goniotomy and trabeculotomy

Trabeculotomy ab externo : table 23.

It was done as an initial operation in twenty two eyes (55%). It controlled the IOP throughout the study in sixteen eyes (72.7%). In six eyes (27.3%) the IOP rise again after initial control. The recurrence occurred after six weeks in one eye and after three months in three eyes and in two eyes it recurred at six months post-operatively.

The age of onset for those six eyes which escape control was at birth in five eyes and in one eye the age of onset was fourteen months, and the patient present to the clinic at age of twenty months.

Second trabeculotomy was done in the six recurrent eyes, where it controlled the IOP in four eyes (18.2%). The remaining two eyes needed third operation. It was trabeculectomy, so the final outcome of trabeculotomy ab externo was control of IOP in twenty eyes (90.9%) out of twenty two eyes with single trabeculotomy in sixteen eyes (72.7%) and by two trabeculotomies in four eyes (18.2%)

Complications of surgery table 24

Complications	Goniotomy	Trabeculotomy	Total
Hyphaema mild	10	8	18
Hyphaema moderate	3	2	5
Hyphaema severe		1	1
Iridotomy	1	2	3
Iridodialysis	1	1	2
Failure to find canal		1	1
Detachment of Descemet's		2	2
Filtering bleb		2	2

Table 24. Complications of goniotomy and trabeculotomy.

The most common complication was hyphaema, where it occurred in twenty four eyes out of forty eyes (60%).

It was mild (less than 1/3 of A.C.) in eighteen eyes (75%) where it needed one or two days to be absorbed.

It was moderate (between 1/3 to 1/2 of A.C.) in five eyes (20.8%) where it needed five days to be absorbed.

In one eye it form total hyphaema and needed surgical evacuation.

Other complications were iridotomy in three eyes and iridodialysis in two eyes, failure to find Schlemm's canal in one eye where the operation was converted to trabeculectomy in the same sitting, detachment of peripheral part of Descemet's membrane occurred in two eyes and filtering bleb in two eyes due to loose scleral sutures.